ESTMJS

Recommendations on Condylar Dislocation

- **Preliminary version** (subject to language editing) **-**

ESTMJS – The European Society of Temporomandibular Joint Surgeons

Part I: Preamble

Disclaimer:

The evidence and consensus based "ESTMJS Recommendations on Condylar Dislocation" are based on a systematic literature research and were passed after a formalised voting and consensus meeting on the occasion of the ESTMJS 2019 general assembly, May10th-11th, held at Marburg, Germany, and released after a final systematic literature update 2/2021 on. The present recommendations are expected to be valid for 5 years and will expire as a latest in 11/2026.

The methodological procedure of this recommendation is based on the rules and standards of the AWMF[1] (German Study Group of Scientific Medical Societies, Muche-Borowski et al., 2013) and is described in detail in the concomitant report (cf. report condylar dislocation: http://www.estmjs.org).

The AWMF methodology for medical guidelines has been systematically developed to assist physicians in their decision-making process in specific situations. They base on the current scientific knowledge and field-tested proven methods and ensure added safety in medicine, but also consider aspects of cost efficiency. These "Guidelines viz. Recommendations" are not legally binding for practitioners and therefore can neither constitute grounds for liability nor grounds for any exemption from liability.

ESTMJS as a non-profit professional society takes the utmost care when compiling and publishing recommendations nevertheless ESTMJS is unable to guarantee accuracy of the information contained therein.

[1] (Arbeitsgemeinschaft der Wissenschaftlichen Gesellschaften, i.e. Study Group of the German Scientific Medical Societies, Muche-Borowski et al., 2013)

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Instructions on terminology and syntax of the recommendation

The following tables 1-5 give an overview of the graduation systems used for the recommendations according to the rules and standards of the AWMF. For more detailed information on methodology including quality assessment of the studies according to the SIGN criteria cf. document "report on condylar dislocation", http://www.estmjs.org

Level of evidence

Graduation of levels of evidence (LoE) of the included studies was performed according to the study types following the Oxford-criteria 2009:

Table 1: Graduation of levels of evidence according to the Oxford criteria 2009, (https://www.cbem.net/2009/06/oxford-centre-evidence-based-medicine-levels-evidence-march-2009/, last download 10.08.2018)

LOE		Study type
I	a	metaanalysis / systematic review of studies level of evidence Ib
	b	randomized controlled clinical trial (RCT)
II	a	metaanalysis / systematic review of studies level of evidence IIb
	b	controlled clinical trial (CCT) / controlled prospective cohort study(with control group)
III	a	metaanalysis / systematic review of studies level of evidence IIIb
	b	retrospective cohort study / case-control-study
IV		non-controlled observational study > 1 patient (e.g. case series), in vitro or cadaveric studies, consensus paper
V		case report, non-systematic literature search, secondary literature, expert opinion

Methodical quality of the included studies was evaluated according to SIGN-Criteria (cf. Table 2). However, due to limited numbers of high quality evidence (i.e., few systematic publications LoE Ia, IIa, IIIa, only), besindes case-control-studies (LoE IIIb), also publications with lower LoE, such as case series and reports (LoE IV and V), were included.

Table 2: SIGN Criteria (http://www.sign.ac.uk/checklists-and-notes.html, last download 17.02.2019)

++	high-quality, majority of criteria fulfilled, no/ low risk of bias
+	acceptable quality, majority of criteria fullfilled, medium risk of bias
-	low-quality, majority of criteria not fulfilled, relevant risk of bias
0	study discarded due to relevant lack of quality

SIGN-Criteria to evaluate methodical quality are available for studies LoE Ia – IIIb, only. As the included studies with lower evidence (LoE IV and V) showed considerable heterogeneity of quality, an additional system to judge methodical quality was applied. Dependent on topic and methods, the following criteria were considered (Table 3):

- number of patients included
- relevance of topic (clinical aspects) and goal of investigation
- disclosure of the recruitment process and patients' characteristics
- period of follow-up
- percentage of "lost-to-follow-up"
- suitability of control group and intervention

Table 3: Evaluation of methodical quality

k++	high-quality, majority of criteria fulfilled
k+	acceptable quality, majority of criteria fulfilled
k-	low-quality, majority of criteria not fulfilled
k0	study discarded due to lack of relevance

Graduation of Recommendations

Over and above level of evidence, the grades and respective strength of recommendations (GoR) are not only based on literature research, but also consider aspects such as clinical experience, clinical feasibility, benefit-to-risk ratio, as well as preference of patients and ethical, legal and economic considerations, as basis for a consensus of the voting group. Graduation of recommendations was implemented according to the rules and standards of the AWMF as follows (cf.Table 4 and Figure 1):

Table 4: Classification of grades of recommendations (GoR) according to the AWMF rules and standards (https://www.awmf.org/leitlinien/awmf-regelwerk/II-entwicklung/awmf-regelwerk-03-leitlinienentwicklung.html, last download 22.11.2019)

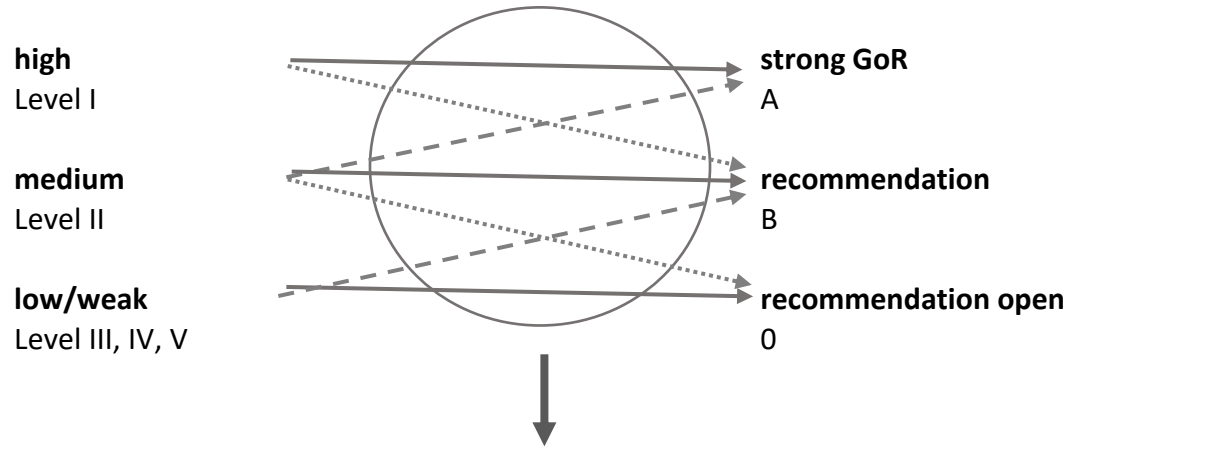
Grade of recommendation	characterization	syntax
A	strong recommendation	shall/shall not
B	recommendation	should/should not
0	recommendation open	may/may not be considered

Figure 1: Development of GoR based on best available evidence (https://www.awmf.org/leitlinien/awmf-regelwerk/II-entwicklung/awmf-regelwerk-03-leitlinienentwicklung/II-entwicklung-graduierung-der-empfehlungen.html, last download 17.07.2020)

Grades of recommendation depending on best available evidence

GoR	Description	Syntax
A	Strong recommendation	shall
B	Recommendation	should
0	Recommendation open	may

Development of GoR based on best available evidence



Aspects of consensus:

- consistency of study results
- clinical relevance of end points
- benefit-risk-ratio
- ethical, legal, economical consider-ations
- preference of patients

Strength of Consensus

Classification of strength of consensus (SoC) for any recommendation or statement was assessed and classified according to the rules and standards of the AWMF as follows:

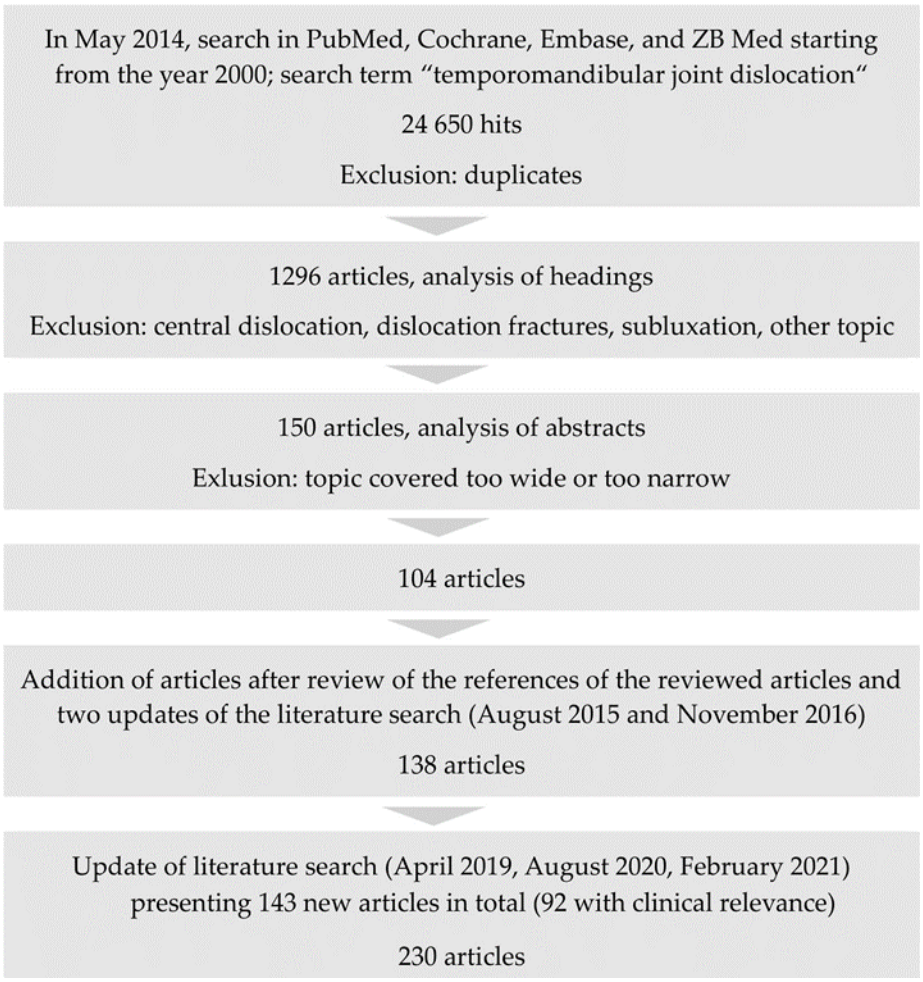
Table 5: Classification of strentgh of consensus (SOC) according to the AWMF rules and standards (https://www.awmf.org/leitlinien/awmf-regelwerk/awmf-regelwerk-03-leitlinienentwicklung/II-entwicklung-strukturierte-konsensfindung.html, last download 22.11.2019)

Consensus	Strength of Consensus (AWMF-definition)
> 95%	strong consensus
95 – 76%	consensus
75 – 50%	approval by majority
< 50%	no consensus

Literature search and search update (2019-2021)

The initial literature search identified 104 relevant articles (Figure 2). Updated searches which fed into the evidence presented in the German Guidelines, identified a further 34 articles. Following the new search in 2020 and February 2021, 92 newly published papers were integrated in the guideline, resulting in 230 papers which were summarized and considered in forming the present recommendation (Figure 2).

Figure 2: Literature research



Establishment of the ESTMJS Guidelines (2019-2021) - Summary

An initial set of draft guidelines were formulated, from the German S3 interdisciplinary guidelines on Condylar Dislocation (AWMF registry 007-063, June 2016 [https://www.awmf.org/leitlinien/detail/ll/007-063.html], translated into English. This German S3 (i.e., evidence and consensus-based) guideline (first author and guideline coordinator A.N.) is based on a systematic literature search, us-

ing the term “temporomandibular joint dislocation” in PubMed, Cochrane, Embase, and ZB MED databases, which was originally conducted in 2014, 2015 and 2016 (cf. above). The literature research methodology according to the AWMF rules for S3 guidelines [German Study Group of Scientific Medical Societies, Muche-Borowski et al., 2013] is basically congruent to the PRISMA checklists and the guidelines are structured using PICOTS charts (for further details cf: long version and guideline report of the German guideline on Condylar dislocation, AWMF registry 007-063 under https://www.awmf.org/leitlinien/detail/ll/007-063.html). Two independent authors (U.V. and L.S.) screened all papers. A third author (A.N.) was consulted in cases of disagreement between these two independent screening results. Papers identified were graded by their level of evidence based on the criteria of the Oxford Centre for Evidence-based Medicine (cf. Table 1) and according to the rules of the AWMF. The literature search was repeated in 2019 (M.R., L.S. and A.N.), to assess any new publications that might affect the recommendations, and again in 2020 (M.R., L.S. and A.N.) and 2021 (M.R. and A.N.) in preparation of issuing the present guideline.

The initial set of draft guidelines consisted of 30 individual recommendations relating to the assessment and treatment of TMJ dislocation (cf. https://www.awmf.org/leitlinien/detail/ll/007-063.html). The expert group, consisting of members of the ESTMJS (cf. list of authors), were sent this initial draft 6 weeks prior to the general assembly (GA) held in Marburg, Germany, in May 2019. They were invited to grade these and make suggestions) for alterations and modifications (i.e., blinded to the other participants), which were processed by an independent monitor (L.S.).

The results of the preliminary grading were tabulated, and an updated draft presented at the GA. Attending members and associate members of the ESTMJS discussed and voted on this with an independent monitor (L.S.) moderating and documenting the discussion and recording results of the voting, following the rules of the structured consensus procedure of the AWMF [German Study Group of Scientific Medical Societies, Muche-Borowski et al., 2013].
At the same session, the ESTMJS members also discussed and voted on definitions to be used for TMJ dislocation, aiming at establishing a uniform nomenclature of terminology.

Declaration of Potential Conflicts of Interest:

The ESTMJS members involved in establishing this ESTMJS guideline have no conflicts of interest

Part II

1. Introduction

1.1 Rationales for Prioritization

- Condylar dislocations account for around 3% of all documented dislocations (Shorey et al., 2000: V/k++), the prevalence in Europe is estimated to be around 2.5 to up to 25 per 100.000 persons/per year with a high rate of unreported cases (Prechel et al., 2018: V/k++). According to the literature condylar dislocation of the temporomandibular joint affects mainly patients between 20 to 40 years of age and all genders (Sang et al., 2010: IIIb-), due to the fact that not only neurological (Daelen et al., 1998: IV/k+; Ugboko et al., 2005: IV/k++)[2] and neuromuscular (Daelen et al., 1998: IV/k+; Agbara et al., 2014: IV/k++) diseases but also advanced tooth loss and the resulting lack of posterior support zones are regarded as a predisposition for condylar dislocation (Matsushita et al., 2006: V/k+; Sang et al., 2010: IIIb-; Forshaw, 2015: V/k-; Momani et al., 2015: V/k+). However, in an aging population increased incidence is to be expected in the future (Sato et al., 2003: IIb+). Especially diagnosing and managing the condition in older patients, where multimorbidity is increasingly common, will constitute an additional challenge (Kurita et al., 1996: V/k+; Lee et al.; 2006: V/k+; Momani et al., 2015: V/k+).

- Due to the relatively low number of cases, many physicians/oral surgeons and other therapists not specialized in treating condylar dislocations may lack routine in diagnosis and therapy of the condition. However, the earliest possible reduction is crucial since the longer the delay the more difficult a successful reduction will become (Caminiti et al., 1998: IV/k+; McGoldrick & Stassen et al., 2010: V/k+; Sang et al., 2010: IIIb-; Lorenzo et al., 2014: V/k-).

- Recurrent dislocations are associated with a significant negative effect on the quality of life for the affected patient (Torres et al., 2012: IV/k+) and will lead to subsequent damage to the temporomandibular joint in the long term (Triantafillidou et al., 2012: Ib+). Moreover, a structured approach will ensure a cost-efficient use of resources.

- In most European countries, fundamental therapy methods for dislocation of the condyle have not been receiving much attention from the scientific community for some time. Management is typically based on traditional surgical experiences which have been published on the level of established, but not evidence-based textbooks. More recent publications on the management of condylar dislocations primarily originate from non-European/Anglo-American countries and their evidence-level is often low or moderate.

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[2] References have been sorted chronologically to facilitate findability. Within the same year, they have been sorted alphabetically, by author, if applicable.

- Treatment approaches and techniques for repositioning differ greatly between schools and also different countries. Due to the lack of reliable epidemiological data on the various treatment approaches resulting from the small sample size, higher-grade evidence-based recommendations can only be issued conditionally (Shorey et al., 2000: V/k++; Sato et al., 2003: IIb+; Ziegler et al., 2003: IV/k+; Ardehali et al., 2009: Ib+; Sang et al., 2010: IIIb-; Candirli et al., 2012: IV/k++; Torres et al., 2012: IV/k+; Ybema et al., 2012: IV/k++; Ying et al, 2013: IV/k++), as e.g. only two randomized controlled studies evaluated different approaches of manual reduction (Ardehali et al., 2016: Ib++, Xu et al., 2016: Ib+). Nevertheless, in recent years some interventions with good success rates have been established as generally accepted standards on an international level.

- In the field of non-surgical treatments, new approaches have been introduced in recent years. E.g. the efficacy of autologous blood injections (Aamir et al. 2020, Ib-; Abrahamsson et al. 2019, Ia+; Bayoumi et al. 2014, IV/k++; Bukhari und Rahim 2020, IIb+; Candirli et al. 2012, IV/k++; Coser et al. 2015, IV/k+; Daif 2010, Ib+; Gagnani et al. 2020, IV/k+; Hegab 2013, Ib+; Kato et al. 2007, V/k+; Machon et al. 2009, IV/k++; Machon et al. 2018, Ib++; Oshiro et al. 2014, IIb+; Patel et al. 2017, IV/k+; Pinto et al. 2009, V/k+; Varedi und Bohluli 2015, V/k++; Yoshida et al. 2018a, IV/k+), prolotherapy (Matsushita et al. 2007, V/k+; Tocaciu et al. 2019, V/k++; Ungor et al. 2013, IV/k++; Zhou et al. 2014, IV/k++) and of botulinum toxin as a non-surgical, minimally-invasive treatment for recurrent and persistent condylar dislocations has been convincingly clinically demonstrated in several cases (Bouso et al. 2010, IV/k+; Daelen et al. 1998, IV/k+; Fu et al. 2010, IV/k+; Martínez-Pérez und García Ruiz-Espiga 2004, IV/k-; Oztel et al. 2017, V/k+; Stark et al. 2015, V/k+; Tocaciu et al. 2019, V/k++; Yoshida 2018b, IIb+; Ziegler et al. 2003, IV/k+). As, e.g. prophylactic treatment with botulinum toxin in the context of recurrent condylar dislocations so far remains an off-label use of the drug, the relevant warnings by the manufacturers regarding the use of and indications for botulinum toxin need to be observed[3] and this efficient treatment may not be refunded by e.g. public health insurances in some European countries.

- For the above reasons, this recommendation aims to provide a standardized and proven consensus- and literature-based approach for the treatment of condylar dislocations by European TMJ-surgeons and those involved in the treatment of TMJ disorders.

[3] In Germany this minimally-invasive alternative to surgical methods for the treatment of temporomandibular joint dislocation has so far not been added to the catalogue of standard therapy methods covered by statutory public health insurance and therefore requires individual application and approval in every individual case.

1.2 For whom this recommendation is intended

This recommendation is intended primarily for physicians and surgeons in particular those surgeons specialized in oral and maxillofacial surgery, oral surgery and for dentists (especially in the fields of functional diagnostics and therapy, orthodontics and prosthodontics) and physiotherapists.

1.3 Exemptions from the recommendation

This recommendation does not cover central dislocations of the temporomandibular joint condyle (most commonly traumatic intracranial dislocation of the condylar head of the temporomandibular joint, or of the head of a prosthetic temporomandibular joint, with perforation of the glenoid fossa or the cranial base) and dislocation fractures of the temporomandibular joint condyle (ICD 10, S02.63).

Further exempt from this recommendation are non-fixed dislocations (see 2. Definitions below).

2. Definitions[4]

The international terminology is highly heterogeneous (Akinbami 2011: IV/k++; Sang et al. 2010: IIIb-; Papoutsis et al., 2018: IV/k-; Güven et al., 2019: IV/k-; Tocaciu et al., 2019: V/k++; Das et al., 2020: V/k+; Hillam et al., 2020: V/k+). In order to promote a European consensus based terminology, the following definitions were profoundly discussed and unanimously adopted by the ESTMJS members present at the annual meeting.

Dislocations of the condyle of a non-fractured mandible are most commonly muscular or neuromuscular dislocations of the condyle anterior and superior to the articular tubercle. In **dislocations** (German: ***Luxation***) the repositioning of the condyle is usually prevented by muscle tension leading to the mandible being stuck in an open mouth position, i.e. inability to close the jaws, necessitating medical attention. In contrast, in **subluxations** (i.e. ***non-fixed dislocations***), occurring in the context of condylar hypermobility, the condyle is easily spontaneously self-reducible.

A **recurrent** condylar dislocation may develop after a previous **single episode** (i.e., ***one-time***) condylar dislocation, and is defined as involving recurrent dislocations over time. Once this mechanism has been facilitated, it can lead to **habitual** condylar dislocations of the affected temporomandibular joint, and dislocations may occur during physiological movements.

An **acute** dislocation is a dislocation which has just occurred recently. This society would consider that it should be called a **chronic** (***persistent***) dislocation, when it has occurred beyond more than four weeks. **Long-standing** dislocation is a chronic dislocation with adaptive and/or degenerative changes in and around the joint. Manual reduction may no longer be effective and surgery may be required (Akinbami 2011, V/k++; Balaji und Balaji 2018, IV/k+; Gholami et al. 2018, IV/k+; Huang et al. 2011, IV/k+; Ihab et al. 2020b, IV/k+; Isler et al. 2018, V/k-; Jeyaraj und Chakranarayan 2016, V/k+; Sarlabous und Psutka 2020, IV/k+; Segami et al. 2018, IV/k+; Segami et al. 2019, IV/k++; Ugboko et al. 2005, IV/k++).

[4] Proposed ESTMJS terminology in bold letters including synonyma

The below ICD 10 diagnoses provide an overview of related disorders:

ESTMJS Recommendation	ICD* 10 code
Condylar dislocation	S03.0 Dislocation of jaw S03.4 Sprain and strain of jaw K07.6 Temporomandibular joint disorders

*International Classification of Diseases, for the purposes of documentation and quality management in medicine. (ICD-10-GM: Version 2014)

3. Therapy aims

- Central aims of primary treatment, apart from correcting the dislocation itself, are to restore the joint to a pain-free, physiological functional state.

- Long-term aim of secondary treatment is the prevention both of future dislocations and of subsequent damage and complications.

4. Symptoms and treatment indications

(For clinical symptoms see e.g. Shorey et al., 2000: V/k++; Chan et al., 2008: V/k-; McGoldrick & Stassen et al., 2010: V/k+; Shakya et al., 2010: V/k+; Zhou et al., 2013: IV/k++; Cohen et al., 2014: V/k-; Hebard, 2015: V/k+; Momani et al., 2015: V/k+; Sriganesh et al., 2015: V/k-; Yesiloglu et al., 2015: IV/k+).

- Empty temporomandibular joint fossa

- Impaired occlusion or inability to close jaws

- Pain

- Muscular dysfunction

- Malnutrition

NB: In patients with dementia, patients after trauma, patients under sedation and in patients with persistent dislocation, symptoms may be less marked or noticeable and may therefore be missed as such (Aquilina et al. 2004, V/k+; Güven 2019, IV/k-; Lee et al. 2006, V/k+; Okamoto et al. 2020, IV/k-; Pillai und Konia 2013, V/k-; Toufeeq et al. 2019, V/k+; Wijmenga et al. 1986, IV/k+).

5. Examinations

5.1 Required examinations (see Table 6, text supplement)

- Inspection
- Palpation
- X-ray (optional)

Recommendation		
Patients without acute facial trauma who for the first time experience a condylar dislocation **may** be diagnosed based on medical history and physical examination (inspection, palpation), if the symptoms are sufficiently indicative of a condylar dislocation (Aktas et al., 2016: V/k-; Chan et al., 2008: V/k-; Dellon et al., 2016: V/k-; Hillam et al., 2020: V/k+; Maqsood et al., 2018: V/k-; McGoldrick & Stassen et al., 2010: V/k+; Papoutsis e al., 2018: IV/k-; Turgut et al., 2020: V/k+; Zhou et al., 2013; IV/k++).	**Strong consensus**	**0**
Level of evidence: IV		

Recommendation		
X-rays are not mandatory in standard cases, but imaging examinations **should** be performed in patients with symptoms allowing for other differential diagnoses, to rule out facial fractures and to provide information for further treatment planning (Aktas et al., 2016: V/k-; Ardehali et al., 2009: Ib+; Dellon et al., 2016: V/k-; Hillam et al., 2020: V/k+; Pillai et al., 2013: V/k-; Sicard et al., 2018: IV/k+; Turgut et al., 2020: V/k+).	**Strong consensus**	**B**
Level of evidence: Ib		

5.2 Additional examinations (optional)

- MRI
  (Nitzan, 2002: IV/k-; Sato et al., 2003: IIb+; Akinbami, 2011: V/k++; Agbara et al., 2014: IV/k++; Oshiro et al., 2014: IIb+; Aktas et al., 2016: V/k-; Hillam et al., 2020: V/k+)

- Three-dimensional imaging (CT/DVT)
  (Nitzan, 2002: IV/k-; Sang et al., 2010: IIIb-; Akinbami, 2011:V/k++; Agbara et al., 2014: IV/k++; Cohen et al., 2014: V/k-; Lorenzo et al., 2014: V/k-; Oshiro et al., 2014: IIb+; Aktas et al., 2016: V/k-; Momani et al., 2016: V/k+; Sicard et al., 2018: IV/k+; Hillam et al., 2020: V/k+)

- Ultrasound
  (Akinbami, 2011: V/k++)

- Clinical functional analysis
  (Gsellmann, 2001: V/k-)

- Arthroscopic examination
  (Akinbami, 2011: V/k++; Agbara et al., 2014: IV/k++; Das et al., 2020: V/k+)

Recommendation		
These optional additional alternative examination methods **may** be indicated in the postacute phase for the purposes of revealing pathogenesis and for appraisal of the further therapeutic approach (Akinbami, 2011: V/k++; Hillam et al., 2020: V/k+; White et al., 2016: V/k-).	**strong consensus**	**0**
Level of evidence: V		

6. Treatment

6.1 Conservative Treatment (see Table 7, text supplement)

- Manual reduction of mandible
- Appropriate management of pain during reduction maneuvre (see Table 8)

The most commonly used technique is the Hippocratic method of reduction (Akinbami, 2011: V/k++; Forshaw, 2015: V/k-; Okoje et al. 2017, IV/k+). According to more recent studies, the wrist pivot method represents an alternative manual technique for temporomandibular joint reduction which is at least equal to the Hippocratic method of reduction with regard to success rate, reduction-related pain and reduction time (Ardehali et al., 2009 Ib+; McGoldrick & Stassen & Stassen, 2010, V/k+, Akinbami et al.; 2011 V/k++, Ardehali et al., 2016 Ib++; Ardehali et al. 2016, Ib+; Lum et al., 2017: V/k-).

Taking into account the risk of injury to the medical therapist associated with this intraoral reduction technique, reduction may also be performed via the extraoral route in patients with unilateral dislocation (Ardehali et al., 2009 Ib+; Ardehali et al., 2016: Ib+). However, this technique is somewhat more painful and time-consuming compared to the described intraoral maneuvers (Ardehali et al., 2009 Ib+). In patients with bilateral dislocation, the extraoral method has a low success rate (54.5% in patients with bilateral dislocation versus 96.7% in patients with unilateral dislocation) and its use is therefore only recommended in case of increased bite or infection risks (for example, in patients with dementia, hepatitis C patients) (Ardehali et al., 2009 Ib+).

Recommendation		
An attempt at a manual reduction **should** initially be made in all cases of non-traumatic condylar dislocation (Ugboko et al., 2005: IV/k++; Papoutsis et al. 2018, IV/k-; Srinath et al. 2017, V/k+; White et al. 2016, V/k+). The earlier the reduction is performed, the greater the chances for a successful reduction (Caminiti et al, 1998: IV/k+; McGoldrick & Stassen et al, 2010: V/k+; Sang et al., 200: IIIb-; Aktas et al. 2016, V/k-; Chin et al. 2018, V/k+; Kaushal et al. 2018, V/k-; Marqués-Mateo et al. 2016, IV/k+; Maqsood et al. 2018, V/k-; Sarlabous und Psutka 2020, IV/k+).	**Strong consensus**	**B**
Level of evidence: IIIb		

Recommendation		
The ESTMJS members have no experiences with alternative repositioning procedures described in literature, such as the wrist pivot method. The ESTMJS members therefore recommend that any attempt at a manual reduction **should** initially be made according to the Hippocratic method of reduction, as it has demonstrated a high rate of success according to literature (Akinbami, 2011: V/k++; Forshaw, 2015: V/k-).	**Strong consensus**	**B**
Level of evidence: V		

Recommendation		
In patients with potential infectious diseases, dementia etc., unilateral dislocation reduction **may** also be performed via the extraoral route (Ardehali et al., 2009 Ib+, Ardehali et al., 2016 Ib++).	**Strong consensus**	**0**
Level of evidence: Ib		

Recommendation		
Reduction **may** be performed separately one side at a time (Kummoona, 2001: IV/k+; Chen et al., 2007: IV/k+; Chan et al., 2008: V/k-; Cheng, 2010: IV/k-; Terai et al., 2014: IV/k-; Yabe et al., 2014: IV/k-).	**Strong consensus**	**0**
Level of evidence: IV		

Recommendation		
In literature, there is a recommendation to use of bite blocks and double gloves to help to prevent bite injuries and associated infections (Lowery et al., 2004: V/k-; Chan et al., 2008: V/k-; Cohen et al., 2014: V/k-). ESTMJS Members recommend the thumbs **should** be put on the oblique line instead.	**Strong consensus**	**B**
Level of evidence: V		

Recommendation		
If a reduction is to be performed with the patient in a sitting position, patient's head **should** be stabilized (Chen et al., 2007: IV/k+; Chan et al, 2008: V/k-).	**Strong consensus**	**B**
Level of evidence: IV		

NB: Recently, Xu et al. published an RCT (40 patients, non-traumatic condylar dislocation) comparing the supine position technique method with the conventional method for manual reduction and reported a better ability to monitor the dynamic occlusion during jaw manipulation possible only in the supine position method group. (Xu et al. 2016, Ib+). Xu et al also reported a reduced operation time and reduced pain perception for the supine position technique method. The ESTMJS group discussed the influence of different positions (supine vs. sitting position) but did not consider this as a major decisive factor for successful repositioning (no recommendation was given concerning this matter).

Recommendation		
The attempt at a manual reduction of an acute dislocation **may** initially be made without administration of any medications (Ugboko et al., 2005: IV/k++; Chan et al, 2008: V/k-; McGoldrick & Stassen et al., 2010: V/k+; Akinbami, 2011: V/k++; Huang et al., 2011: IV/k+).	**Strong consensus**	**0**
Level of evidence: IV		

Recommendation		
If such attempts are unsuccessful, further attempts **should** be made under medication (muscle relaxants and/or analgesics) and, if required, under analogsedation or under general anaesthesia (Kummoona, 2001: IV/k+; Avidan, 2002: V/k-; Ugboko et al., 2005: IV/k++; Chan et al, 2008: V/k-; Anantharam et al., 2010: V/k-; McGoldrick & Stassen et al., 2010: V/k+; Akinbami, 2011: V/k++; Huang, 2011: IV/k+; Hebard, 2015: V/k+; Yesiloglu et al., 2015: IV/k+; Liu et al. 2019, Ib+; Woodall et al. 2019, V/k-).	**Strong consensus**	**B**
Level of evidence: Ib		

Recommendation		
Non-surgical methods **should** have failed before any minimally invasive or open-surgical intervention (Blank et al., 1982: V/k+; Sang et al., 2010: IIIb-; Shakya et al., 2010: V/k+; Akinbami, 2011: V/k++; Brożyna et al. 2018, V/k-; Machon et al. 2018, Ib++; Marqués-Mateo et al. 2016, IV/k+; Sharma et al. 2017, V/k+; Segami et al. 2018, IV/k+).	**Strong consensus**	**B**
Level of evidence: IIIb		

NB: Should manual reduction be unsuccessful, and a more invasive method of reduction not possible due to existing morbidities, or not wanted, palliative care is required with the aim to insure adequate nutrition and pain relief, e.g. by use of prosthodontic measures (Momani et al., 2015: V/k+).

6.2 Adjuvant measures of conservative therapy

6.2.1 Adjuvant measures of conservative therapy in acute dislocations

- Intermaxillary immobilization, duration of immobilization depends on the duration of dislocation and concomitant fractures
  (Srinath et al. 2017, V/k+)

- Monitoring of regular medication with extrapyramidal symptoms
  (Solomon et al., 2010: V/k-; Zakariaei et al., 2012: V/k-; Karthik et al., 2014: V/k-)

- Physiotherapy/ manual therapy for relaxation of masticatory muscles (see 6.4 Supplementary measures)
  (Srinath et al. 2017, V/k+)

NB: If necessary, mobilization of contralateral side, motion and stabilization exercises (Freesmeyer, 2001: V+), neuromuscular re-education exercises (dynamic coordination exercises and static stabilization exercises in case of submaximal mouth opening)

Recommendation		
In acute dislocations, bandages **may** be used after reduction to help maintain stabilization (Agbara et al., 2014: IV/k++; Yesiloglu et al., 2015: IV/k+).	**Strong consensus**	**0**
Level of evidence: IV		

6.2.2 Adjuvant measures of conservative therapy in recurrent and/or habitual dislocations

- Pharmaceutical treatment with medications such as NSAIDs and/or muscle relaxants
  (Ziegler et al., 2003: IV/k+)

- Intermaxillary immobilization
  (Ugboko et al., 2005: IV/k++; Hegab, 2013: Ib+; Agbara et al., 2014: IV/k++)

  NB: The present studies Ugboko et al., Hegab et al. and Agbara et al. address the issue of intermaxillary fixation with regard to recurrent and chronic TMJ dislocations. Regarding the duration of intermaxillary immobilization, Agbara et al. and Ugboko et al. do not give any data. Hegab et al. recommend intermaxillary fixation for 4 weeks and its continuation for another 2 weeks in case of recurrent dislocation.

- Monitoring of regular medication with extrapyramidal symptoms
  (Le Goff et al. 2016, V/k+)

- Physiotherapy/ manual therapy for relaxation of masticatory muscles (see 6.4 Supplementary measures)
  (Undt et al., 1996a: V/k-; Shorey et al., 2000: V/k++; Ziegler et al., 2003: IV/k+)

  NB: If necessary, mobilization of contralateral side, motion and stabilization exercises (Freesmeyer, 2001: V+), neuromuscular re-education exercises (dynamic coordination exercises and static stabilization exercises in case of submaximal mouth opening)

- Relaxation techniques
  (Lima et al., 2010: V/k+)

- Functional treatment with bite splints, orthodontic functional appliances and prosthodontic measures
  (Kai et al., 1992: IV/k-; Ziegler et al., 2003: IV/k+; Agbara et al., 2014: IV/k++; Momani et al., 2015: V/k+)

Conservative treatment methods for the management of recurrent dislocations require a high level of compliance (Ziegler et al., 2010: IV/k+; Hegab et al., 2013: Ib+). Long-term results are often less than satisfactory requiring more invasive procedures later (Shorey et al., 2000: V/k++; Sang et al., 2010: IIIb-; Shakya et al., 2010: V/k+) (see 6.2 Minimally Invasive Methods and 6.3 Surgical Treatment).

6.2.3 Adjuvant measures of conservative therapy in chronic and/or longstanding dislocations

- Intermaxillary immobilization
  (Ugboko et al., 2005: IV/k++; Agbara et al., 2014: IV/k++)

  NB: The present studies Ugboko et al., Hegab et al. and Agbara et al. address the issue of intermaxillary fixation with regard to recurrent and chronic TMJ dislocations. Regarding the duration of intermaxillary immobilization, Agbara et al. and Ugboko et al. do not give any data.

- Relaxation techniques
  (Caminiti et al., 1998: IV/k+; Lima et al., 2010: V/k+)

- Functional treatment with bite splints, orthodontic functional appliances and prosthodontic measures
  (Agbara et al., 2014: IV/k++)

Recommendation		
In cases of recurrent, long-standing and/or habitual dislocations, securing methods **should** be considered (Huang, 2011 IV/k+, Blank et al. 1982 V/k+, Wijmenga et al. 1986 IV/k+, Caminiti et al., 1998 IV/k+, Aquilina et al., 2004 V/k+, Lee et al., 2006 V/k+, Deng et al., 2007 V/k+, Nwashindi et al. 2013 V/k+; Albilia et al. 2018, V/k+; Srinath et al. 2017, V/k+; White et al. 2016, V/k+).	**Strong consensus**	**B**
Level of evidence: IV		

6.3 Minimally invasive therapy (see Table 9, text supplement)

- Local anaesthesia (for pain management and as direct and indirect muscle relaxant)
  (Sang et al., 2010: IIIb-)

- Botulinum toxin injection
  (Daelen et al., 1998: IV/k+, Ziegler et al., 2003: IV/k+, Martinez-Perez et al., 2004: IV/k-, Fu et al.: IV/k+, 2009: IV, Bouso et al., 2010: IV/k+; Stark et al., 2015: V/k+; Oztel et al. 2017, V/k+; Renapurkar und Laskin 2018, IV/k+; Yoshida 2018b, IIb+; Tocaciu et al. 2019, V/k++)
- Sclerotherapy
  (Matsushita, 2006: V/k+; Ungor et al., 2013: IV/k++; Zhou et al., 2013: IV/k++; Renapurkar und Laskin 2018, IV/k+; Tocaciu et al. 2019, V/k++; Abrahamsson et al. 2019, Ia+)

- Autologous blood therapy
  (Kato et al., 2007: V/k+; Machon et al., 2009: IV/k++; Daif et al., 2010: Ib+; Pinto et al., 2010: V/k+; Candirli et al., 2012: IV/k++; Hegab et al., 2013: Ib+; Bayoumi et al., 2014: IV/k++; Oshiro et al., 2014: IIb+; Coser et al., 2015: IV/k+; Varedi et al., 2015: V/k++, Bukhari et al., 2020: IIb+, Gagnani et al., 2020: IV/k+, Abrahamsson et al., 2019: Ia+; Renapurkar und Laskin 2018, IV/k+; Tocaciu et al. 2019, V/k++; Yoshioka et al. 2016, IV/k-; Machon et al. 2018, Ib++; Patel et al. 2017, IV/k+; Yoshida et al. 2018a, IV/k+; Aamir et al. 2020, Ib-)

Minimally invasive methods for the treatment of recurrent temporomandibular joint dislocations are especially suited for patients with reduced compliance or increased surgical risk (Matsushita et al., 2006: V/k+; Ziegler et al., 2013: IV/k+; Oshiro et al., 2014: IIb+; Oztel et al. 2017, V/k+; Yoshida et al. 2018a, IV/k+). However, long-term results are often less than satisfactory, necessitating surgery later (Shorey et al., 2000: V/k++; Sang et al., 2010: IIIb-; Shakya et al., 2010: V/k+).

Studies with high level of evidence (i.e. level of evidence II or above) are currently available mostly for treatment with autologous blood injection (Daif et al., 2010: Ib+; Hegab, 2013: Ib+, Bukhari et al., 2020 IIb+, Gagnani et al., 2020 IV/k+, Abrahamsson et al., 2019 Ia+; Oshiro et al., 2014: IIb+; Aamir et al., 2020: Ib-; Machon et al. 2018, Ib++).
These recommend the autologous blood to always be injected into the upper articular space and pericapsular tissue (Daif et al., 2010: Ib+; Oshiro et al., 2014: IIb+, Bukhari et al., 2020 IIb+, Gagnani et al., 2020 IV/k+, Abrahamsson et al., 2019 Ia+). According to some reports, an additional immobilization of the joint will further enhance the success of the treatment (Hegab, 2013: Ib+).
According to available evidence autologous blood injection in the superior joint space and pericapsular tissues in combination with IMF at present is the treatment with best scientific support for the treatment of recurrent TMJ dislocation.

There are also positive first results regarding the treatment of recurrent and habitual condylar dislocations with botulinum toxin (i.e. for prevention of recurrence) (Daelen et al., 1998: IV/k+; Ziegler et al. 2003: IV/k+; Fu et al., 2009: IV/k+; Bouso et al., 2010: IV/k+; Oztel et al. 2017, V/k+; Yoshida 2018b,

IIb+). According to Yoshida et al. as the only study with a high level of evidence regarding the therapy with botulinum toxin, intramuscular injection with botulinum toxin into the lateral pterygoid muscle is an efficient and secure method to treat habitual condylar dislocation.

Recommendation		
Treatment of recurrent/ persistent temporomandibular joint dislocation with botulinum toxin so far remains an off-label use of the drug. Warnings of the manufacturers regarding the use of and indications for botulinum toxin **shall** be observed	**Strong consensus**	**A**
Level of evidence: IV		

Recommendation		
The authors of this Recommendation however, are of the opinion that the use of botulinum toxin for treatment of recurrent dislocations **should** be included as a potential indication[5].	**Strong consensus**	**B**
Level of evidence: IV (expert consensus)		

[5] This minimally-invasive pharmaceutical alternative to surgical methods for the treatment of temporomandibular joint dislocation has so far not been added to the catalogue of standard therapy methods covered by statutory health insurance in Germany and therefore requires individual application and approval of assumption of costs in every individual case.

6.4 Surgical treatment (arthroscopic and open methods)

6.4.2 Surgical methods for treatment of recurrent and/or habitual dislocation

- Eminectomy to facilitate spontaneous reduction (see Table 11)
  (Oatis et al., 1984: IV/k++; Undt et al., 1997b: IV/k+; Shorey et al., 2000: V/k++; Sato et al., 2003: IIb+; Cardoso et al., 2005: IIIb+; Vasconcelos et al., 2009b: IV/k++; Sang et al., 2010: IIIb-; Martins et al., 2014: IV/k++; Coser et al., 2015: IV/k+, Almeida et al. 2016: V/k++; Almeida et al. 2016, V/k++; Cremer et al. 2016, IV/k+; Iwanaga et al. 2016, IV/k+; Jeyaraj 2018, Ib+; Vyloppilli et al. 2018, IV/k+; Segami 2018, IV/k++; Tocaciu et al. 2018, IV/k+; Okamoto et al. 2020, IV/k-)

- Restrictive techniques for prevention of recurrence of dislocation (blocking or redressment procedures) (see Table 12)
  (Iizuka et al., 1988: IV/k+; Undt et al., 1997a: IV/k+; Kobayashi et al., 2000: IV/k+; Shibata et al., 2002: IV/k+; Kuttenberger et al., 2003: IV/k+; Cardoso et al., 2005: IIIb+; Medra et al., 2007:IV/k++; Vasconcelos et al., 2009a: IV/k++; Güven, 2009: IIIb+; Ying et al., 2013: IV/k++; Baptist et al., 2017, IV/k+; Jeyaraj 2018, Ib+; Ihab et al. 2020b, IV/k+; Ihab et al. 2020a, Ib+)

- Surgical correction of capsular ligament complex (see Table 13)
  (Georgiade, 1965: IV/k-; McFarlane, 1977: IV/k+; Tones et al., 2012: IV+; Ybema et al., 2012: IV/k++; Vyloppilli et al. 2018, IV/k+; Renapurkar und Laskin 2018, IV/k+; Okamoto et al. 2020, IV/k-)

6.4.1 Surgical methods to facilitate reduction in cases of chronic/persistent and/or longstanding dislocation (open reduction) (see Table 10)

- Redressive methods (on open joint)
  (Caminiti et al., 1998; IV/k+; Akinbami, 2011: V/k++; Huang, 2011: IV/k+; Nwashindi et al., 2013: V/k+; Jeyaraj et al., 2016, V/k+; Marqués-Mateo et al. 2016, IV/k+; Chin et al. 2018, V/k+)

- Eminectomy
  (Blank et al., 1982: V/k+; Tipps et al., 1982: V/k+; Caminiti et al., 1998: IV/k+; Kummoona, 2001: IV/k+; Marqués-Mateo et al. 2016, IV/k+; Chin et al. 2018, V/k+; Isler et al. 2018, V/k-; Segami 2018, IV/k++; Güven 2019, IV/k-; Okamoto et al. 2020, IV/k-; Segami et al. 2019, IV/k++)

- Condylectomy (in individual cases only)
  (Blank et al., 1982: V/k+; Tipps et al., 1982: V/k+; Wijmenga et al., 1986: IV/k+; Ugboko et al., 2005: IV/k++; Akinbami, 2011: V/k++, Marqués-Mateo et al. 2016, IV/k+; Brożyna et al. 2018, V/k-; Segami 2018, IV/k++; Segami et al. 2019, IV/k++; Toufeeq et al. 2019, V/k+; Karakida et al. 2020, V/k+)

- Osteotomy methods (e.g. in individual cases median mandibular splitting, sagittal or vertical osteotomy of the ramus etc., see Table 10)
  (Smith et al., 1994: V/k+; Debnath et al., 2006: V/k+; Ugboko et al., 2005: IV/k++; Lee et al., 2006: V/k+; Akinbami, 2011: V/k++)

- Lateral pterygoid myotomy (anterior release)
  (Tipps et al., 1982: V/k+; Gholami et al., 2018: IV/k+; Segami et al., 2019: IV/k++; Das et al., 2020: V/k+)

Recommendation		
If reduction by non-surgical methods remains unsuccessful, e.g. in cases of long-standing dislocations, surgical methods **should** be considered.	**Strong consensus**	**B**
Level of evidence: IV (expert consensus)		

For this purpose, redressive methods and, if necessary, more invasive methods, such as eminectomy, and in individual cases also condylectomy and specific osteotomy methods are available (see Table 10) (Blank et al., 1982: V/k+; Tipps et al., 1982: V/k+; Wijmenga et al., 1986: IV/k+; Smith et al., 1994: V/k+; Caminiti et al., 1998: IV/k+; Kummoona, 2001: IV/k+; Ugboko et al., 2005: IV/k++; Debnath et al., 2006: V/k+; Lee et al., 2006: V/k+; Deng et al., 2007: V/k+; McGoldrick & Stassen et al., 2010: V/k+; Shakya et al., 2010: V/k+; Akinbami, 2011: V/k++, Huang, 2011: IV/k+; Nwashindi et al., 2013: V/k+).

Recommendation		
Also, in patients with *recurrent* dislocations, an indication for open surgical treatment **should** be established after failure of non-surgical treatments and/or minimally invasive therapy.	**Strong consensus**	**B**
Level of evidence: IV (expert consensus)		

The most commonly used surgical techniques include eminectomy, blocking procedures or redressment procedures and surgery on the capsular ligament complex (see Tables 11,12 and 13).

NB: Recently Jeyaraj et al. and Ihab et al. each published an RCT regarding surgical procedures for recurrent TMJ dislocations (Jeyaraj et al., 2018: Ib+; Ihab et al., 2020a: Ib+).

Jeyaraj et al. published an RCT (75 patients, recurrent dislocations, 25 patients per group) comparing the Dautrey's procedure with eminectomy with and without disc plication as a surgical method for recurrent TMJ dislocation and concluded that Dautrey's procedure yielded more gratifying and stable results, as compared to eminectomy carried out either alone or in combination with disc plication and tethering. The group of patients treated with the Dautrey's procedure had a far less incidence of recurrence of dislocation (4%), TMJ clicking (4%), TMJ pain (8%) and referred pain (4%) as compared to the two other groups. (Jeyaraj et al., 2018: Ib+).

Nevertheless, Jeyaraj et al. concluded that eminectomy is a safe therapy as complications are also very rare (Follow-up 8-36 months) and is less time consuming, less invasive, respects the integrity of the joint space and does not require osteotomy. However, it was found to encroach on the physiologic pattern of condylar movement, allowing it to hypertranslate, thus inviting injuries of the disc and residual pain in many of the patients. In this study better results were achieved when eminectomy was combined with disc plication.

Ihab et al. published an RCT with a small sample size (10 patients, bilateral recurrent dislocations) comparing different materials for augmentation in eminoplasty: an individual titanium implant vs. an autogenous bone graft harvested from the chin. They reported stable results regarding condylar movements with no recurrence and no condylar changes (Follow-up 12 months) suggesting that this technique could be a good alternative for treatment of recurrent TMJ dislocation. Still, difference in maximum interincisal opening was not statistically significant when compared with those of the inlay autogenous bone grafting technique (Ihab et al., 2020a: Ib+).

Due to the relatively small sample size, there is still a shortage of higher level of evidence studies regarding the various, to some extent competitive surgical methods (Jeyaraj et al., 2018: Ib+; Ihab et al., 2020a: Ib+). Currently, although Dautrey's procedure shows some advantages according to an RCT by Jeyaraj et al. (Jeyaraj et al., 2018: Ib+) eminectomy (especially when combined with disc plication) is considered to be a safe therapy option with a good outcome for the treatment of recurrent TMJ dislocations (Jeyaraj et al., 2018: Ib+). Eminectomy methods (see Tab. 6) are widely documented (though on lower level of evidence) as promising techniques (Undt et al., 1996b: IV/k+; Undt et al., 1997b: IV/k+; Caminiti et al., 1998: IV/k+; Shorey et al., 2000: V/k++; Sang et al., 2010: IIIb-, Almeida et al., 2016: V/k++; Cremer et al., 2016: IV/k+).

To date, the overall small sample size including RCTs (Jeyaraj et al., 2018: Ib+; Ihab et al., 2020a: Ib+), varying follow-up periods, inhomogeneous target parameters and different surgical techniques including endoscopic approaches render comparison and evaluation of long-term effects still difficult

(damage, recurrence of dislocation) (Undt et al., 1996b: IV/k+; Undt et al., 1997b: IV/k+). More RCTS and systematic reviews, would be desirable for better evaluation of various surgical procedures regarding recurrent TMJ dislocations (Tocaciu et al., 2019: V/k++; Abrahamsson et al., 2019: Ia+).

At present, the ESTMJS members, therefore, did not establish a recommendation towards a defined surgical procedure. Instead, an individualized surgical approach is recommended.

Recommendation		
Especially in cases of persisting dislocations an individualized approach based on the entire range of available surgical methods and procedures **should** be considered (Nwashindi et al., 2013: V/k+).	**Strong consensus**	**B**
Level of evidence: IV (expert consensus)		

6.5 Supplementary measures

- Non-surgical therapy measures

    - Soft foods only
      (Sato et al., 2003: IIb+; Chan et al., 2008: V/k-; Ardehali et al., 2009: Ib+; Güven, 2009: IIIb+; Daif et al., 2010: Ib+; Torres et al., 2012: IV/k+; Hegab, 2013: Ib+; Ying et al., 2013: IV/k++; Zhou et al., 2013: IV/k++; Bayoumi et al., 2014: IV/k++; Oshiro et al., 2014: IIb+; Coser et al., 2015: IV/k+; Yesiloglu et al., 2015: IV/k+; Aktas et al., 2016: V/k-; Dellon et al., 2016: V/k-; Yoshioka et al., 2016: IV/k-; Baptist et al., 2017: IV/k+; Gadre et al., 2017: IV/k-; Patel et al., 2017: IV/k+; Machon et al., 2018: Ib++; Vyloppilli et al., 2018: IV/k+; Aamir et al., 2020: Ib-; Ihab et al., 2020a: Ib+; Ihab et al., 2020b: IV/k+; Li et al., 2021: V/k-)

    - Avoid opening mouth widely
      (Hasson et al., 2001: IV/k+; Güven et al., 2009: IIIb+; Daif et al., 2010: Ib+; Shakya et al., 2010: V/k+; Oshiro et al., 2014: IIb+; Patel et al., 2017: IV/k+; Isler et al., 2018: V/k-; Machon et al., 2018: Ib++; Aamir et al., 2020: Ib-; Ihab et al., 2020a: Ib+)

    - Immobilization by bandage, head-chin cap, cervical collar (e.g. stiff neck) or MMF (see Table 14)

    - Functional treatment with bite splints, orthodontic functional appliances and prosthodontic measures
      (Matsushita et al., 2006: V/k+; Sang et al., 2010: IIIb-)

    - Physiotherapy
      (Hasson et al., 2001: IV/k+; Chan et al., 2008: V/k-, Güven, 2009: IIIb+; Bayoumi et al. 2014: IV/k++; Coser et al., 2015: IV/k+; Varedi et al., 2015: V/k++; Ogawa et al., 2015: V/k+; Patel et al., 2017: IV/k+; Srinath et al., 2017: V/k+; Balaji et al., 2018: IV/k+; Brożyna et al., 2018: V/k-; Toufeeq et al., 2019: V/k+)

- Medication

    - Appropriate pain management
      (Oatis, 1984: IV/k++; Hasson et al., 2001: IV/k+; Matsushita, 2006: V/k+; Chen et al., 2007: IV/k+; Ardehali et al, 2009: Ib+; Güven, 2009: IIIb+; Pillai et al., 2013: V/k-; Bayoumi et al., 2014: IV/k++; da Costa Ribeiro et al., 2014: IV/k+; Gorchynski et al., 2014: IV/k+; Oshiro et al., 2014: IIb+; Coser et al., 2015: IV/k+; Patel et al., 2017: IV/k+; Ihab et al. 2020b: IV/k+)
    - Antibiotic therapy
      (Oatis et al., 1984: IV/k++; Hasson et al, 2001: IV/k+; Daif et al., 2010: Ib+; Bayoumi et al., 2014: IV/k++; da Costa Ribeiro et al., 2014: IV/k+; Oshiro et al., 2014: IIb+; Patel et al.,

2017: IV/k+; Vyloppilli et al., 2018: IV/k+; Jeyaraj et al., 2018: Ib+ ; Ihab et al., 2020b: IV/k+; Aamir et al., 2020: Ib-)

NB: If pneumatisation of the articular eminence is ascertained during eminectomy surgery, prophylactic postoperative antibiotic treatment is recommended (Shorey et al., 2000: V/k++).

- Orthodontic and oral and craniomaxillofacial orthognathic surgery

    - Orthognathic surgery
      (Ugboko et al., 2005: IV/k++)

    - Functional and reconstructive surgery of the joints
      (Tasanen et al., 1978: IV/k+; Caminiti et al., 1998: IV/k+; Tones et al., 2012: IV+; Sarlabous et al., 2020: IV/k+)

Recommendation		
After any surgical treatment patient **should** for a few days only eat soft foods only and refrain from opening mouth widely (Sato et al., 2003: IIb+; Güven, 2009: IIIb+; McGoldrick & Stassen et al., 2010: V/k+; Tones et al., 2012: IV+; Hegab et al., 2013: Ib+; Ying et al., 2013: IV/k++; Zhou et al., 2013: IV/k++; Patel et al. 2017, IV/k+; Machon et al. 2018, Ib++; Aamir et al. 2020, Ib-; Ihab et al. 2020a, Ib+).	**Strong consensus**	**B**
Level of evidence: Ib		

Recommendations regarding duration of immobilisation vary widely in the literature (see Table 14).

Recommendation		
Moreover, especially after autologous blood injection therapy (Shorey et al., 2000: V/k++; Hasson et al., 2001: IV/k+; Daif et al., 2010: Ib+; Candirli et al., 2012: IV/k++; Hegab, 2013; Ib+; Bayoumi et al., 2014: IV/k++; Coser et al., 2015: IV/k+, Bukhari et al., 2020: IIb+, Gagnani et al., 2020: IV/k+, Abrahamsson et al., 2019: Ia+; Yoshioka et al. 2016, IV/k-; Patel et al. 2017, IV/k+; Machon et al. 2018, Ib++; Aamir et al. 2020, Ib-) and after surgery on the capsular ligament complex (McFarlane, 1977: IV/k+; Shorey et al., 2000: V/k++; Torres et al., 2012: IV/k+) immobilization **may** be indicated. The goal is here to limit maximum opening of the jaws; rigid fixation is not recommended.	**Strong consensus**	**0**
Level of evidence: Ib		

Recommendation		
In case of secondary damage such as malocclusion (e.g. anterior open bite due to persisting dislocations refractory to treatment), an individualized approach based on the range of functional surgical procedures for temporomandibular joints as well as reconstructive and orthognathic surgery **may** be required	**Strong consensus**	**0**
Level of evidence: IV (expert consensus)		

7. Predisposing Factors[6]

- Congenital or acquired neurological (Daelen et al., 1998: IV/k+; Ugboko et al., 2005: IV/k++; Sang et al., 2010: IIIb-; Agbara et al., 2014: IV/k++; Yoshida et al.; 2018: IIb+) and neuromuscular (Daelen et al., 1998: IV/k+; Agbara et al., 2014: IV/k++; Moreno-Hay et al., 2019: IV/k+) and rheumatic autoimmune diseases (Sriganesh et al., 2015: V/k-)

- Parafunctions, hyperactivity of lateral pterygoid and suprahyoid muscles
  (Stark et al., 2015: V/k+; Varedi et al., 2015: V/k++)

- Malocclusion
  (Cascone et al., 2008: V/k+)

- Advanced tooth loss (and resulting lack of posterior support zones
  (Matsushita et al., 2006: V/k+; Sang et al., 2010: IIIb-; Forshaw, 2015: V/k-; Momani et al., 2015: V/k+)

- Anatomical features of articular eminence or fossa
  (Varedi et al., 2015: V/k++)

- Congenital or acquired skeletal or soft and connective tissue changes/diseases, congenital joint hyperlaxity (e.g. Ehlers-Danlos syndrome, Marfan syndrome, Down syndrome etc.) (Myrhaug, 1951: IV/k+; Buckingham et al., 1991: IV/k+; Ugboko et al., 2005: IV/k++; Sang et al., 2010: IIIb-; Shakya et al., 2010: V/k+; Akinbami, 2011: V/k++; Coser et al., 2015: IV/k+; Varedi et al., 2015: V/k++; Campbell et al., 2019: V/k+)

In the context of a predisposition, certain factors will trigger a dislocation. Opening the mouth widely, as it occurs during yawning or laughing or taking a large bite, may constitute such a trigger factor e.g. in a patient with recurrent dislocation (Ugboko et al., 2005: IV/k++; Sang et al., 2010: IIIb-; Agbara et al., 2014: IV/k++; Gorchynski et al., 2014: IV/k+; Coser et al., 2015: IV/k+; Varedi et al., 2015: V/k++; Yesiloglu et al., 2015: IV/k+; Lum et al., 2017: V/k-).

Iatrogenic triggers for dislocation, too, have been established, such as anti-dopaminergic medication (Willemsen, 2008: V; Solomon et al., 2010: V/k-; Zakariaei et al., 2012: V/k-; Karthik et al., 2014: V/k-; Davies et al., 2018: V/k+), prolonged dental treatments (e.g. tooth extractions) (Wijmenga et al. 1986, IV/k+; Gorchynski et al. 2014, IV/k+; Martins et al., 2014: IV/k++; Yeşiloğlu et al. 2015, IV/k+; Anjari et al. 2018, V/k-; Moreno-Hay und Okeson 2019, IV/k+), intubations or endoscopic examinations (Agbara et al., 2014: IV/k++; Bayoumi et al., 2014: IV/k++; Cohen et al., 2014: V/k-; Han

[6] The recommendations of the German S3 guideline concerning condylar dislocation an anaesthesiological procedures were not supported for inclusion into the ESTMJS recommendations

et al., 2014: V/k-; Lorenzo et al., 2014: V/k-; Coser et al., 2015: IV/k+; Horta et al., 2015: V; Sriganesh et al., 2015: V/k-; Varedi et al., 2015: V/k++; Yesiloglu et al., 2015: IV/k+; Dellon et al., 2016: V/k-; Kaushal et al., 2018: V/k-; Toufeeq et al., 2019: V/k+; Caballero-Mateos et al., 2020: V/k-) sometimes also occasioning the otherwise rare *unilateral* dislocations (Cohen et al., 2014. V/k-; Dellon et al., 2016: V/k-).

Dislocation is caused by prolonged and forced jaw opening in a patient with decreased muscle tone under medication, and there is a risk that such a dislocation will initially go unnoticed in a patient under sedation (Savas, 2004: V/k-; Anantharam et al., 2010: V/k-; Pillai et al., 2013: V/k-; Han et al., 2014: V/k-; Lorenzo et al., 2014: V/k-; Kaushal et al., 2018: V/k-; Toufeeq et al., 2019: V/k+).

NB: Practical experiences give empirical evidence that patients with e.g. unilateral disc dislocation without repositioning (ADDwoR) or after condylar trauma will often exhibit hypermobility of the contralateral side or have exhibited said hypermobility in the past. The dislocated side will exhibit greater joint play in articular motion in comparison between the sides (condylar hypermobility). Also on the dislocated side, increased changes in muscular consistency of the adductors can be observed already previous to, and not only after a dislocation (Rudolf et al., 2000: V).

8. Complications (see Table 15)

- Recurrence of dislocation
- Permanence and deterioration of complaints (pain, clicking, crepitus)
- Fractures (bony e.g. in athropic jaws)
- Bone resorption
- Dysphagia
- Nerve lesions
- Significant reduction of maximum mouth opening (MMO)

8.1 Rarer complications

- Fracture/ loosening of osteosynthesis/augmentation materials
  (Shorey et al., 2000: V/k++; Akinbami et al., 2011: V/k++)
- Antibody formation, dysarthria (Botulinum toxin)
  (Daelen et al., 1998: IV/k+; Fu et al., 2009: IV/k+)
- Dural tear, arachnoid bleeding, haematoma and infections (during explanation from calvarial bone, eminectomy in case of a pneumatized eminence)
  (Shorey et al., 2000: V/k++; Shakya et al., 2010: V/k+; da Costa Ribeiro et al., 2014: IV/k+; Segami et al., 2018a: IV/k++)
- Impaired occlusion and imperfect articulation
  (Shorey et al., 2000: V/k++)
- Progressive changes to the disco-condylar complex
  (Patel et al., 2017: IV/k+)
- Condylar fracture (extraoral manual reduction or “unified hands”-method)
  (Ardehali et al., 2009: Ib+; Cheng et al., 2010: IV/k-)
- Weight loss (MMF)
  (Smith et al., 1994: V/k+; Hegab et al., 2013: Ib-)
- Gingivitis (MMF with wire eyelet)
  (Hegab et al., 2013: Ib+)

- Fibrosis, cartilage damage (sclerotherapy, therapy with autologous blood)
  (Shakya et al., 2010: V/k+; Candirli et al., 2012: IV/k++)

- Damage to teeth or prosthodontics, such as fractures or loosening of teeth or prosthodontic restaurants etc. (therapy using bite blocks, orthodontic appliances with lever effect) (Agbara et al., 2014: IV/k++; Ogawa et al., 2015: V/k+)

9. General Recommendations

Recommendation		
The treatment of condylar dislocation **should** be initiated as early as possible to limit degenerative changes or their progression, resulting from recurrent dislocation or increasing dislocation rate, and so to enhance the chances of success of conservative/ minimally invasive treatment methods (Caminiti et al., 1998: IV/k+; McGoldrick & Stassen et al., 2010: V/k+; Sang et al., 2010: IIIb-; Thangarajah et al., 2010: V/k+; Huang, 2011: IV/k+; Aktas et al. 2016, V/k-; Marqués-Mateo et al. 2016, IV/k+; Kaushal et al. 2018, V/k-).	**Strong consensus**	**B**
Level of evidence: IIIb		

Recommendation		
Which treatment has the best chance of success will be dependent on numerous factors (pathogenesis, age of patient, secondary diagnoses, compliance, treatment goals, care structures, among others). Thus, the best treatment for each individual patient **should** be determined based on a thorough medical history and physical examination (Güven, 2009: IIIb+; Akinbami, 2011: V/k++).	**Strong consensus**	**B**
Level of evidence: IIIb		

10. Annex

Table 6: Studies with an explicit message regarding diagnostic procedures and larger studies with description of diagnostic methods

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
Nitzan, 2002	Temporomandibular joint "open lock" versus condylar dislocation: Signs and Symptoms, Imaging, Treatment, and Pathogenesis	Case series	n=5 with "open lock" and unsuccessful attempt at conservative treatment	Arthrocentesis NSAID, soft foods only, physiotherapy, occlusal splint	Follow-up period 6 months	Clinical and radiological criteria for differentiation between "open lock" and dislocation: dislocation in maximum mouth opening, self-/ spontaneous reduction impossible, CT/MRT shows condyle anterior to eminence	IV/k-
Shibata, 2002	Treatment of habitual temporomandibular joint dislocation with miniplate eminoplasty: a report of nine cases	Case series	n=9, ages 46-87 all with existing comorbidities (cerebral infarction, dementia, total paralysis, mental retardation)	Blocking procedure with T-shaped titanium miniplate	Follow-up period 9- 54 months, no recurrence of dislocation, 1 plate breakage	OPG + CT for assessment of condition and preoperative diagnosis of temporomandibular joint (in addition to clinical examination)	IV/k+
Lowery et al., 2004	The wrist pivot technique, a novel technique for temporomandibular joint reduction	Case report	n=1, age 53 Hippocratic technique of reduction under sedation + analgesia unsuccessful	Wrist pivot technique	Reduction	Clinical diagnosis sufficient if symptoms (see 4.) present, in case of trauma: X-ray to assess possible fractures	V/k-
Ugboko et al., 2005	A survey of temporomandibular joint dislocation: aetiology, demographics, risk factors and management in 96 Nigerian cases	Retrospective analysis of patient files	Data from 1993-2002, n=96, of which 93 accidental anterior dislocation 46 (1 declines treatment), persistent 29 (5 decline treatment), recurrent 21 (1 declines treatment),	All initially attempt at manual Hippocratic method of reduction	Success rate: accidental: in 38/45 (16 without, 2 local anaesthesia, 15 under sedation, 5 general anaesthesia) persistent: 5/24 (1 local anaesthesia, 1 under sedation, 1 general anaesthesia),	Diagnosis based on medical history, clinical findings and X-ray	IV/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
			ages 9-85 (-35.5)		recurrent 14/21 (9 without, 5 under sedation)		
Debnath et al., 2006	Bilateral vertical-oblique osteotomy of ramus (external approach) for treatment of a long-standing dislocation of the temporomandibular joint: A case report	Case report	n=1, age 36, persistent (3 months)	Manual Hippocratic method of reduction unsuccessful, wire on mandibular angle unsuccessful, lever on mandibular symphysis unsuccessful Bilateral vertical-oblique osteotomy of ramus, temporal muscle detached, no IMF, after 1 month: mouth opening exercises	Follow-up period 18 months, orthopantomogram - changes to condyle, minimal changes to length of coronoid process	Complete clinical examination required ("completed") including radiological findings for diagnostic and treatment purposes	V/k+
Medra, 2007	Glenotemporal osteotomy and bone grafting in the management of chronic recurrent dislocation and hypermobility of the temporomandibular joint	Interventional study/ case study	N=40 (+20 with hypermobility), ages 18- 36	Osteotomy, without capsulotomy, periosteum of inner surface of the eminence to be kept intact to prevent resorption, inlay technique with sufficient space to condyle to avoid impingement, fixation with wire (10 patients), titanium miniplates (40), microplates (10) calvarial bone graft preferable to transplant from iliac crest, as can be harvested by mere extension of incision, and is	Follow-up period 1-8 years, no resorption, 1 recurrence of dislocation caused by accident 5 patients for up to 3 months: paralysis of anterior ramus of facial nerve, pain and clicking disappeared and improved mobility, 3 patients impingement by wires> removed (were to be removed in any case)	X-ray confirms diagnosis (and shows position of condyle)	IV/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
				less frequently resorbed			
Chan et al., 2008	Mandibular reduction	Review Article	n=0			Diagnostic imaging often not required if clinical symptoms are indicative of dislocation and if no acute trauma in medical history	V/k-
Ardehali et al., 2009	Temporomandibular Joint Dislocation Reduction Technique A New External Method vs. the Traditional	Randomized controlled trial (block randomization), double-blind	n= 58 group 1: n=29, ages 17-75 (-26), duration of dislocation 2 hrs , in 4 patients recurrent dislocation group 2: n=29, ages 17-80 (-32), duration of dislocation - 3 hrs , in 8 patients chronic dislocation patients with Parkinson's disease and schizophrenia not eligible	Group 1: manual Hippocratic method of reduction group 2: according to Chen '07 extraoral avoid opening mouth widely, soft foods only, analgesia if required.	Group 1: success rate 86.2%, of remaining 4 patients in 1 extraoral reduction successful, others under muscle relaxant with Hippocratic method of reduction group 2: success rate 55.2%, in 10 of remaining patients Hippocratic method of reduction successful, in 3 extraoral reduction with muscle relaxant follow-up period 1 month	Mandibular fracture were ruled out by physical examination and X-ray when necessary	Ib+
Daif et al., 2010	Autologous blood injection as a new treatment modality for chronic recurrent temporomandibular joint dislocation	Randomized controlled trial	n=45, ages 20-56 15 patients per group	Group A: 2 mL blood into upper intra-articular space, group B: 2 mL into upper intra-articular space + 1 mL pericapsularly; (group C: pericapsularly only> all recurrent) all elastic bandage for 24 hrs ,	Follow-up period 1 year, pain for a few days after treatment, group B: 80% no recurrence of dislocation group A: 60% no recurrence of dislocation.	Diagnosis based on clinical and radiographic criteria as established by Nitzan, 2002	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
				avoid opening mouth widely + soft foods only for 1 week, antibiotics + NSAID for 1 week	MMO significanly reduced in both groups		
McGoldrick & Stassen et al., 2010	Management of acute dislocation of the temporomandibular joint in dental practice	Review article	n=0			An X-ray examination (e.g. OPG) would confirm anterior position of condyle, should however not be required to establish diagnosis	V/k+
Sang et al., 2010	Temporomandibular joint dislocation in Nairobi	Retrospective analysis of patient files	Data from 1995-2005, n=29, of which 25 anterior dislocation, especially recurrent dislocation, cause: trauma in 5 patients ages 10-95 (-42)	In 15 patients manual reduction attempted under general anaesthesia	In 8 patients successful	Diagnosis in 58.6% by OPG + CT, in 27.6% OPG only, in 13.8% CT only	IIIb-
Thangarajah et al., 2010	Bilateral temporomandibular joint dislocation in a 29-year-old man: a case report	Case report	n=1, age 29	Manual Hippocratic method of reduction under sedation unsuccessful pain continues > patient refuses local anaesthesia and receives general anaesthesia + muscle relaxant, then manual Hippocratic method of reduction 24 hrs Philadelphia collar, no excessive movements of jaw	Reduction	Diagnosis confirmed by X-ray diagnostics	V/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
Candirli et al., 2011	Histopathologic evaluation of autologous blood injection to the temporomandibular joint	Animal experiment	8 rabbits, 7 autologous blood bilateral 1 control	1 mL into upper intra-articular space, 0.5 mL pericapsularly, IMF 24 hrs , soft foods only, after 1 month histopathologic evaluation	1 week difficulties chewing or reduced mobility, histopathologic evaluation > no chondromalazia, but also no formation of connective tissue some fibrin formation only (inflammation)	Diagnosis based on clinical and radiographical criteria	IV/k+
Torres et al., 2012	Arthroscopic electrothermal capsulorrhaphy for the treatment of recurrent temporomandibular joint dislocation	Retrospective case study	n=11, ages 17-97 (-45) patients with temporomandibular joint disorders, such as disk displacement or earlier surgery on temporomandibular joint not eligible	Arthroscopic electrothermal capsulorrhaphy, shrinkage of synovia limited to 15% > problem: no objective end point of evaluation, elastic fixation on brackets for 3 weeks + 3 weeks nights only, 3 days liquid foods only, soft foods only for 6 weeks	Follow-up period 6 months to 6 years, 2 recurrences of dislocation (in 1 patient capsulorrhaphy repeated + autologous blood injection, nevertheless dislocations continue)	Traditional X-ray diagnostics sufficient to establish a diagnosis	IV/k+
Hegab et al., 2013	Treatment of chronic recurrent dislocation of the temporomandibular joint with injection of autologous blood alone, intermaxillary fixation alone, or both together: a prospective, randomised, controlled clinical trial	Randomized controlled trial (block randomization)	n=48, ages 23-53 16 patients per group including subluxations!	other groups? group 2: IMF for 4 weeks with wire on arch bars or on brackets	12 months follow-up, significant reduction of MMO, 3 dislocations> 2 weeks IMF IMF with wire an eyelet> gingivitis	Radiological findings (condyle anterior to articular eminence) confirmed diagnosis	Ib+
Pillai et al., 2013	Unrecognized bilateral temporomandibular joint dislocation after general anaesthesia with a delay in diagnosis and	Case report, review	n=1, age 66, laparotomy for pelvic tumour under general anaesthesia, before surgery normal mouth opening and	Surgery 11 hrs , general anaesthesia uneventful, pain at night and open lock> muscular spasm suspected, after X-	Reduction under diazepam sedation	If symptoms are indicative of dislocation and there is no facial trauma, reduction may be performed	V/k-

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
	management: a case report		Mallampati Score, lower jaw somewhat hypoplastic	ray dislocation diagnosed		without diagnostic imaging	
Zhou et al., 2013	Modified dextrose prolotherapy for recurrent temporomandibular joint dislocation	Prospective case study	n=45, ages 17-59 (-34) young adult patient without preexisting illnesses	Modified sclerotherapy: auriculo-temporal nerve block +50% dextrose 2 mL into posterior band soft foods only, avoid opening mouth widely for 2 weeks 26 patients one injection, 11 two injections, 4 three injections	Follow-up period 6 months, 21 patients pain after injection, MMO for 1 week somewhat reduced, 1 patient facial nerve paralysis for 2 hrs , 41 patients no recurrence of dislocation (success rate 91%)	Diagnosis based on clinical examination and medical history	IV/k++
Agbara et al., 2014	Temporomandibular joint dislocation: experiences from Zaria, Nigeria	Retrospective analysis of patient files	n=26, 16 m, ages 17-90 (-39.8), 96% bilateral, 46.2% acute, 42.3% chronic causes: 50% yawning, 20% trauma, 12% antipsychotics	22 patients treated: of which 50% manual treatment, 9% manual treatment + IMF, 10% vertical sub-sigmoid osteotomy, 5% L-shaped osteotomy, 27% bite block (in chronic cases)+ IMF 9% local anaesthesia, 9% local anaesthesia +intravenous, 18% general anaesthesia	Manual treatment: 59% success rate, bite block: 67% success rate, surgery: 67% complications (open bite) bite block: time-consuming, may be painful, may mobilise teeth, risk of injury by wire	In developing country diagnosis mainly clinical, diagnostic imaging may be used for assessment, therapy planning and monitoring	IV/k++
Bayoumi et al., 2014	Arthrocentesis followed by intra-articular autologous blood injection for the treatment of recurrent tem-	Case series	n=15, 12 f., ages 21-36 (-28), bilateral recurrent dislocation, diagnosis according to clinical and ra-	Arthrocentesis under sedation or general anaesthesia with 250 mL NaCl, then injection of 2 mL autologous blood into	Pain in the first two days regular follow-ups until 1 year after therapy: significant reduction of	Diagnosis according to clinical and radiographic criteria as established by Nitzan	IV/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
	poromandibular joint dislocation		diographic criteria as established by Nitzan (OPG)	upper intra-articular space, 1ml into outer surface of joint capsule elastic bandage for 24 hrs restrict movement for 2 weeks, restrictive head bandage and soft foods only, antibiotics (cephalosporins) and NSAID (ibuprofen) for 1 week afterwards physiotherapy, head bandage at night only	MMO (-6.73mm), 80% no recurrence of dislocation, 20% renewed dislocation after 2 weeks after 1 year in addition to clinical assessment also CBCT>no osseous changes		
Oshiro et al., 2014	Analysis of MRI findings in minimum invasive treatment for habitual TM joint dislocation by autologous blood injection around the TM joint capsule	Case-control study of the patho-physiology of autologous blood injection	n= 14, (10 f), ages 17-82 (-57), all habitual unilateral dislocation (diagnosis according to criteria established by Nitzan, 2002>clinical, CT, MRT), 8 patients with systemic disorders controls (n=14): CMD	Autologous blood therapy: 3 mL 1% Lidocaine, 3 mL autologous blood injection into upper articular space, 2 mL into pericapsular tissue antibiotics from 3 days prior to surgery until surgery, NSAID after surgery limited mouth opening and soft foods only after surgery controls: arthrocentesis (pump) therapy on affected side	Follow-up period 1 year: no recurrence of dislocation MRI-analysis of patients with autologous blood therapy: -1 h after injection (n=14): type 1: (=haematoma/ effusion): 57% grade 1, 14% grade 2, 29% grade 3 type 2: (sporadic and diffuse T2-weighting): 64% positive type 3: (=reduced condylar mobility): 57% positive -4 weeks after injection (n=9):	Diagnosis according to clinical and radiographic criteria as established by Nitzan, 2002	IIb+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
					type 1: 100% grade 0 type 2: 0% positive type 3: 89% positive -12 weeks after injection (n=14): type 1: 100% grade 0 type 2: 0% positive type 3: 79% positive MRI of controls on untreated side: before therapy: type 1: 71% grade 0 29% grade 1 type 2: 0% positive type 3: 0% positive -4 weeks after therapy: type 1: 79% grade 0 21% grade 1 type 2: 0% positive type 3: 0% positive		
Yesiloglu et al., 2015	The lever technique for the extemal reduction of temporomandibular joint dislocation	Case series	n=29, ages 24-44 (-23.6), 20 f., 21 unilateral causes: yawning during sleep in 14 patients, taking a large bite in 6 patients, dental surgery on third molar in 5 cases, laughing in 3 cases X-ray for confirmation of diag-	Muscle relaxant, gauze pad on third molar of affected side, physician lifts chin upwards elastic bandage and cold pad recommended, soft foods only for 3 weeks	Reduction, in 3 patients recurrent dislocation > renewed reduction successful with same technique	X-ray for confirmation of diagnosis and asessment of pericondylar bone apposition	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
			nosis and asessment of pericondylar bone apposition (HO)				
Aktas et al., 2016	Bilateral Temporomandibular Joint Dislocation Secondary to Epileptic Seizure	Case report	N=1 27 years (m), bilateral anterior dislocation after epileptic seizure	Closed reduction in local anaesthesia+ sedation, afterwards soft diet	Not specified	Radiological examination (X-ray/ CT/ MRI) to exclude a fracture	V/k-
Dellon et al., 2016	Jaw Dislo-cation as an Unusual Complicati-on of Upper Endoscopy	Case report	N=1 48 years (w), unilateral anterior dislocation after endoscopy	Manual reduction in general anaethsia, jaw strap and soft diet for 7 days	Not specified	A radiological examination should be done in every jaw dislocation, to exclude any kind of mandibular fracture	V/k-
White et al., 2016	Dislocation of the Temporomandibular Joint and Relocation Procedures	Survey article	not applicable	not applicable	not applicable	X-ray and CT localize the examination findings and validate the examination results	V/k+
Sicard et al., 2018	Bilateral dislocation of the Tem-poro-mandibular Joint in children	Case series	N=2 Pat.1: 26 months (m), recurrent bilateral dislocation during meals Pat.2: 19 months (f), anamnestic myoclonus, bilateral dislocations	Pat.1: manual reduction under N2O/Propofol/ Diazepam> afterwards headbandage > reluxations during meals> Psychotherapy, as the child thus wanted to escape a quarrelsome situation at mealtimes Pat.2: manual reduction under N2O/general anaesthesia, Prescription of anticholinergics> no further reluxations.	Pat.1: Follow-up 6 months: two self-limited reluxations Pat.2: Follow-up 3 months: no further reluxations after anticholinergic therapy	Imaging to rule out condyle fractures, especially in facial trauma CT for detailed anatomical imaging	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re: **X-ray diagnostic procedures**	LoE
Hillam et al., 2020	Mandible dislocation	Survey article	not applicable	not applicable	not applicable	CT in case of trauma, uncertain diagnosis or suspected fracture MRI for evaluation of the joint capsule and ligaments MRI for the diagnosis of chronic recurrent dislocations or in case of complications	V/k+

Table 7: Conservative treatment methods (for studies with sample size n<6 see Annex German S3 guideline)

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
Ugboko et al., 2005	A survey of temporomandibular joint dislocation: aetiology, demographics, risk factors and management in 96 Nigerian cases	Retrospective analysis of patient files	Data from 1993-2002, n=96, of which 93 anterior dislocation accidental 46 (1 declines treatment), persistent 29 (5 decline treatment), recurrent 21 (1 declines treatment), ages 9-85 (-35.5)	All initially attempt at manual Hippocratic method of reduction	Success rate: accidental dislocations: 38/45 (16 without, 2 local anaesthesia, 15 under sedation, 5 general anaesthesia) persistent dislocations: 5/24 (1 local anaesthesia, 1 under sedation, 1 general anaesthesia) recurrent dislocations: 14/21 (9 without, 5 under sedation)	Always attempt manual reduction first	IV/k++
Chen et al., 2007	A Safe and Effective Way for Reduction of Temporomandibular Joint Dislocation	Case series	n=7 1 patient persisting, in all Hippocratic method of reduction unsuccessful	Extraoral reduction 3 weeks: avoid opening mouth widely, soft foods only for a few day days: analgesia if required.	Reduction	New technique for manual reduction: extraoral, one side at a time, technique also suitable for self-reduction by patient or e.g. relative	IV/k+
Chan et al., 2008	Mandibular reduction	Review article	n=0			Various manual reduction techniques: 1) patient in sitting position, head stabilized on head rest, patient's lower jaw below physician's elbow, bite block + fingers splint on thumb, fingers wrapped around and pressing under	V/k-

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
						chin and exert upward pressure, to achieve lever action on and rotation of condyle 2) patient recumbent 3) from behind 4) ipsilaterally: first extraorally, then intraorally then in combination 5) wrist pivot technique: parallely on both sides 6) by inducing gag reflex	
Ardehali et al., 2009	Temporomandibular Joint Dislocation Reduction Technique A New External Method vs. the Traditional	Randomized controlled trial (block randomization), double-blind	n= 58 group 1: n=29, ages 17-75 (-26), duration of dislocation -2 hrs , 4 patients with recurrent dislocation group 2: n=29, ages 17-80 (-32), duration of dislocation -3 hrs , 8 patients with chronic dislocation patients with Parkinson's disease or schizophrenia not eligible	Group 1: manual Hippocratic method of reduction group 2: according to Chen '07, extraoral Avoid opening mouth widely, soft foods only, analgesia if required	Group 1: 86.2% success rate, in remaining 4 patients in 1 extraoral reduction successful, in other patients Hippocratic method under muscle relaxant group 2: 55.2% success rate, in 10 of remaining patients Hippocratic method of reduction successful, in 3 extraoral reduction under muscle relaxant follow-up period 1 month	Extraoral manual reduction compared to Hippocratic method of reduction more painful, greater risk of condylar fracture in case of prominent articular eminence If reduction performed on one side at a time there is risk of renewed dislocation of already reduced side	Ib+
McGoldrick & Stassen et al., 2010	Management of acute dislocation of the temporomandibular joint in dental practice	Article review	n=0		After reduction soft foods only, avoid opening mouth widely	Various methods of manual reduction: 1. Hippocratic method of reduction 2. ipsilateral (both hands on	V/k+

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
						same side, intraoral and/ or extraoral) 3.wrist pivot technique	
Sang et al., 2010	Temporomandibular joint dislocation in Nairobi	Retrospective analysis of patient files	Data from 1995-2005, n=29, of which 25 anterior dislocation, especially recurrent dislocation cause: trauma in 5 patients ages 10-95 (-42)	In 15 patients manual reduction under general anaesthesia attempted	In 8 patients successful	Success rate of manual reduction 53%	IIIb-
Akinbami, 2011	Evaluation of the mechanism and principles of management of TM joint dislocation. Systematic review of literature and a proposed new classification of TM joint dislocation	Systematic literature review	n=425, of which 4 unilateral, in 11 non-anterior dislocation, cause 60% trauma, 73.2% recurrent dislocation, 25.4% acute dislocation, 11.3% persisting dislocation	Acute dislocations: 95.1% manual reduction, of which 80.8% without medication, 16.6% under general anaesthesia 2.6% under local anaesthesia + sedation persisting dislocations: 42.9% manual reduction (of which 86.7% under general anaesthesia 6.7% under local anaesthesia + sedation, 6.7% under local anaesthesia + sedation + Nerve block), 57.1% open reduction recurrent dislocations: 32.5% eminectomy, 29.3% blocking procedure (of which 65.9% Dautrey's),	Not specified.	Manual Hippocratic method of reduction has highest success rate alternative reduction techniques: 1) wrist pivot 2) ipsilateral 3) extraoral 4) by inducing gag reflex in cases of acute dislocation success rate of conservative treatment methods 98.8%, in cases of persisting dislocation success rate of conservative treatment methods 42.9%	V/k++

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
				6.4% minimally invasive (of which 90% autologous blood therapy)			
Huang, 2011	Management of long-standing mandibular dislocation	Case series	n=6, ages 33-75, persisting dislocation, systemic disorders, COPD	Closed/ open reduction, immobilization	Closed reduction in 2 patients unsuccessful> decline further treatment because of old age	<3 weeks' duration of dislocation: closed reduction without/ local anaesthesia /sedation/ general anaesthesia 4-12 weeks' duration of dislocation: open reduction manually + wire on mandibular angle or lever in notch >6 months' duration of dislocation: surgery at least 3 weeks IMF after reduction of persistent dislocation	IV/k+
Hegab et al., 2013	Treatment of chronic recurrent dislocation of the TM joint with injection of autologous blood alone, intermaxillary fixation alone, or both together: a prospective, randomised, controlled clinical trial	Randomized controlled trial (block randomization)	n=48, ages 23-53 16 patients per group including "subluxations!"	Group 1: autologuous blood alone Group 3: as group 1,+ IMF for 4 weeks with wire on arch bars or on brackets: Group 2: IMF for 4 weeks with wire on arch bars or on brackets	12 months follow-up, significant reduction of MMO, 3 dislocation> 2 weeks IMF IMF with wire on arch bars> gingivitis	IMF for 4-6 weeks, requires compliance and is difficult in case of edentulous patients	Ib+
Terai et al., 2014	The use of only one hand for the reduction of a TM joint dislocation: a technique suitable	Case series	n=32 acute dislocation	Unimanual reduction	Reduction	New method of reduction: unimanual technique,	IV/k-

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
	for self-reduction					other hand inactive, one side at a time, patient is able to self-reduce	
Yabe et al., 2014	Treatment of acute TM joint dislocation using manipulation technique for disk displacement	Case series	n=15	New technique, originally manual maneuver for disk displacement	Reduction	New reduction technique, with patient recumbent, one side at a time, without medication.	IV/k-
Agbara et al., 2014	TM joint dislocation: experiences from Zaria, Nigeria	Retrospective analysis of patient files	n=26, 16 m, ages 17-90 (-39.8), 96% bilateral, 46.2% acute, 42.3% chronic causes: 50% yawning, 20% trauma, 12% antipsychotics	22 patients treated: of which 50% manual treatment 9% manual treatment + IMF 10% vertical sub-sigmoid osteotomy 5% L-shaped osteotomy 27% bite block (in chronic cases)+ IMF 9% local anaesthesia 9% local anaesthesia +intravenous, 18% general anaesthesia	Manual treatment: 59% success rate, bite block: 67% success rate, surgery: 67% complications (open bite) bite block: time-consuming, can be painful, can loosen teeth, risk of injury by wire	In developing country non-surgical methods very efficient, Hippocratic method of reduction or wrist pivot technique or extraoral	IV/k++
Gorchynski et al., 2014	The “syringe” technique: a hands-free approach for the reduction of acute nontraumatic temporomandibular dislocations in the emergency department.	Prospective study	n=31, 20 f., ages 18-65 (-38) causes: 61% chewing, 29% yawning, 10% talking/ laughing, 3% dental treatment 30% with previous dislocation, 87% dislocation for less than 2 hrs	”syringe technique": (without sedation, hands-free) patient bites down with posterior molars onto syringe, syringe is then rolled back and forth to achieve reduction syringe size in 55% 10 mL, in 10% 5 mL, 35%	Success rate 97%, in 77% <1 min., 16% 1-2 min., 7%>2 min. 3% unsuccessful, as patient unable to keep/ move syringe in mouth due to pain follow-up period	New method of reduction for acute non-traumatic dislocations: hands-free, with syringe as rotation point (simple, quick, safe, efficient, without sedation)	IV/k+

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
				usually both sizes usually NSAIDs and muscle relaxant afterwards	without recurrence of dislocation		
Yesiloglu et al., 2015	The lever technique for the external reduction of temporomandibular joint dislocation	Case series	n=29, ages 24-44 (-23.6), 20 f, 21 unilateral causes: yawning during sleep in 14 patients, taking a large bite in 6 patients, dental surgery on third molar in 5, laughing in 3 X-ray for confirmation of diagnosis and asessment of pericondylar bone apposition	Muscle relaxant gauze pad on third molar on affected side, physician lifts chin upwards elastic bandage and cold pad recommended, soft foods only for 3 weeks	Reduction, 3 patients recurrent dislocation> reduction using technique again successful	New reduction technique: lever technique, disadvantage of new technique: not suited in case of appositional bone formation, use caution in case of thin mandible X-ray for confirmation of diagnosis and assessment of pericondylar bone apposition (HO)	IV/k+
Ardehali et al., 2016	Comparison of different approaches to the reduction of anterior temporomandibular joint dislocation: a randomized clinical trial	RCT	N=90 patients with recurrent dislocation in 73.3%, and no previous history of dislocation in 26.7%	Conventional manual reduction (control group), wrist pivot method, extraoral reduction (each 30 patients)	Success rate: wrist pivot > conventional > extraoral. Extraoral significantly more challenging for physician than conventional; wrist pivot significantly more difficult for patient than conventional.	Wrist Pivot as first-line therapy in patients without risk of transmission diseases biting risk and unilateral: extraoral	Ib++
Xu et al., 2016	The Supine Position Technique Method Is Better Than the Conventional Method for Manual	RCT	N=40 patients (18 to 80 years) with acute nontraumatic TMJ dislocation	Manual reduction: 50% supine technique (patient in supine position on dental chair, physician standing/sitting behind, pressure on anterior edge of ascending ramus), 50%	success in either conventional and supine technique	ability to monitor the dynamic occlusion during jaw manipulation possible only in the supine position method group. Reduced operation time and reduced pain	Ib+

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
				conventional (patient seated, physician standing in front, exerting bilateral pressure on occlusal surfaces of lower molar teeth)		perception in supine position technique method. More viable alternative to conventional method	
Okoje et al., 2017	MANAGING TEMPOROMANDIBULAR JOINT DISLOCATION IN IBADAN: A REVIEW OF 11 CASES	Case series	N=11 25-65 years 4 traumatic, 6 during mouth opening, 1 idiopathic 7 acute, 2 recurrent, 2 chronic dislocations (>14 days)	5 patients manual reduction (hippocratic method) 2 patients manual reduction (hippocratic method)+ IMF 1 patient manual reduction (hippocratic method) in general anaesthesia 2 patients spontaneous reduction 1 patient manual reduction not successful> bilateral eminectomy	Follow-up 1 day-9 months: no documented re-dislocations	Manual reduction (hippocratic method) is a successful procedure regardless of the duration of the dislocation	IV/k+
Papoutsis et al., 2018	Temporomandibular joint dislocation: a retrospective study from a Swiss urban emergency department	Retrospective cohort-study	N=32 patients. Nontraumatic: 93.7% Bilateral: 59.4% Repetitive events: 62.5%	96,9% patients received conservative treatment: reposition of the TMJ with (38.7%) or without (61.3%) analgosedation.	Surgical reposition is only indicated in complicated and very rare situations.	Conservative approaches are commonly used and should be exhausted before any surgery.	IV/k-
Stolbizer et al., 2020	Anterior dislocation of the temporo-mandibular joint: a simplified non-traumatic manual technique	Case series	N=42, patients with acute and chronic anterior TMJD, cases of trauma-related TMJD were excluded	Manual reduction: patient in a sittung position, the physician stands in front of the patient, thumbs behind the last lower molars, steady	sucessful technique in all patients, the present procedure is more comfortable for the patient than the traditional methods, this	Recommen-dation to stand in front of sitting patient for manual reduction	IV/k+

Autor, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **Conservative Treatment Methods**	LoE
				pressure in a downward and posterior direction, patient performs opening and closing mouth movements followed by lateral jaw movements, no use of sedation, local or general anesthesia	procedure decreases the risk of sudden closure of the mouth, further studies needed because of the lack of a control group		

Table 8: Administration of medication for sufficient pain management during manual reduction (for studies with sample size n<6 see Annex German S3 guideline)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
Kummoona, 2010	Surgical Managements of Subluxation and Dislocation of the Temporomandibular Joint: Clinical and Experimental Studies	Prospective intervention study	n=123 group 1: n=65, chronic subluxations/ dislocations group 2: n=15, persistent dislocations group 3: n=3, acute dislocations	group 1: osteotomy and reconstruction with CCG, capsule reinforcement with temporal fascia group 2: adhesions of the capsule to the temporal fascia detached > open reduction, eminectomy, capsulorrhaphy with temporal fascia lap group 3: manual reduction, one side at a time	Follow-up period 1-20 years, group 2: complaints in first few weeks> NSAID, muscle relaxant	Manual reduction under general anaesthesia in anxious/ young patient, generally under local anaesthesia	IIb-
Ugboko et al., 2005	A survey of temporomandibular joint dislocation: aetiology, demographics, risk factors and management in 96 Nigerian cases	Retrospective analysis of patient files	Data from 1993-2002, n=96, of which 93 anterior dislocation accidental 46 (1 declines treatment), persistent 29 (5 decline treatment), recurrent 21 (1 declines treatment), ages 9-85 (-35.5)	All initially: attempt at manual Hippocratic method of reduction	Success rate of manual reduction: accidental dislocations: 38/45 (16 without, 2 local anaesthesia, 15 under sedation, 5 general anaesthesia) persistent dislocations: 5/24 (1 local anaesthesia, 1 under sedation, 1 general anaesthesia) recurrent dislocations: 14/21 (9 without, 5 under sedation)	Manual reduction was performed: accidental acute dislocations: in 42% without medication and in 40% under sedation persistent dislocations: in 60% under general anaesthesia recurrent dislocations: in 64% without medication and in 36% under sedation	IV/k++
Chen et al., 2007	A Safe and Effective Way for Reduction of	Case series	n=7	Extraoral reduction	Reduction	Without medication (alternative method of	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
	Temporomandibular Joint Dislocation		1 patient with persisting dislocation, in all patients Hippocratic method of reduction unsuccessful	3 weeks: avoid opening mouth widely, soft foods only for a few days, analgesia if required		reduction to Hippocratic method: extraoral)	
Ardehali et al., 2009	Temporomandibular Joint Dislocation Reduction Technique A New External Method vs. the Traditional	Randomized (block randomization) controlled study, double-blind	n= 58 group 1: n=29, ages 17-75 (-26), duration of dislocation - 2 hrs , in 4 patients recurrent dislocation group 2: n=29, ages 17-80 (-32), duration of dislocation - 3 hrs , 8 patients with chronic dislocation patients with Parkinson's or schizophrenia not eligible	Group 1: manual Hippocratic method of reduction group 2: according to Chen '07 extraoral Avoid opening mouth widely, soft foods only, analgesia if required	Group 1: 86.2% success rate, of remaining 4 in 1 extraoral reduction successful, in others reduction with Hippocratic technique under muscle relaxant group 2: 55.2% success rate, of remaining cases in 10 Hippocratic technique successful, in 3 extraoral reduction under muscle relaxant follow-up period 1 month	Initially reduction to be attempted without medication, after 2 attempts (2 different methods were used here) under muscle relaxant	Ib+
Akinbami, 2011	Evaluation of the mechanism and principles of management of TM joint dislocation. Systematic review of literature and a proposed new classification of TM joint dislocation	Systematic literature review	n=425, of which 4 unilateral, in 11 non-anterior dislocation, causes: 60% trauma, 73.2% recurrent dislocation, 25.4% acute dislocation, 11.3% persisting dislocation	Acute dislocation: 95.1% manual reduction, of which 80.8% without medication, 16.6% under general anaesthesia 2.6% under local anaesthesia + sedation persisting dislocation: 42.9% manual reduction (of which 86.7% under general anaesthesia, 6.7% under local anaesthesia + sedation, 6.7% under local anaesthesia + under	Not specified	Manual reduction of acute dislocation without medication in 80.8% successful, manual reduction of persisting dislocation under general anaesthesia in 86.7% successful	V/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
				sedation + nerve block), 57.1% open reduction recurrent dislocation: 32.5% eminectomy, 29.3% blocking procedure (of which 65.9% Dautrey's), 6.4% minimally invasive (of which 90% autologous blood therapy)			
Huang, 2011	Management of long-standing mandibular dislocation	Case series	n=6, ages 33-75, persisting dislocation, systemic disorders, COPD	Closed/ open reduction, immobilization	Closed reduction in 2 patients unsuccessful > decline further treatment because of old age	<3 weeks' duration of dislocation: initially manual reduction without medication, if unsuccessful under sedation or general anaesthesia 4-12 weeks' duration of dislocation: under general, anaesthesia open reduction >6 months' duration of dislocation: surgery at least 3 weeks: IMF after reduction of persisting dislocation	IV/k+
Terai et al., 2014	The use of only one hand for the reduction of a temporomandibular joint dislocation: a technique suitable for self-reduction	Case series	n=32, acute dislocation	Unimanual reduction	Reduction	Without medication (method of reduction different from Hippocratic method, unimanual)	IV/k-

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
Yabe et al., 2014	Treatment of acute temporomandibular joint dislocation using manipulation technique for disk displacement	Case series	n=15	New technique, originally manual maneuver for disk displacement	Reduction	Without medication (method of reduction different from Hippocratic method)	IV/k-
Gorchynski et al., 2014	The "syringe" technique: a hands-free approach for the reduction of acute nontraumatic temporomandibular dislocations in the emergency department	Prospective study	n=31, 20 f, ages 18-65 (-38), causes: 61% chewing, 29% yawning, 10% talking/ laughing, 3% dental treatment 30% with previous dislocation, 87% dislocation for less than 2 hrs	Syringe technique: no sedation, hands-free Syringe size in 55% 10 mL, in 10% 5 mL, 35% usually both sizes usually NSAID and muscle relaxant afterwards	97% success rate, in 77% <1 min., 16% 1- 2 min., 7%>2 min. 3% unsuccessful, as patient unable to keep/ move syringe in mouth due to pain follow-up period: without recurrence of dislocation	New method of reduction (syringe as rotation point) does not require sedation or analgesia	IV/k+
Yesiloglu et al., 2015	The lever technique for the external reduction of TM joint dislocation	Case series	n=29, ages 24-44 (-23.6), 20 f, 21 unilateral causes: yawning during sleep in 14 patients, taking a large bite in 6 patients, dental surgery on third molar in 5, laughing in 3 X-ray for confirmation of diagnosis and assessment of pericondylar bone apposition	Muscle relaxant gauze pad on third molar of affected side, physician lifts chin upwards elastic bandage and cold pad recommended, soft foods only for 3 weeks	Reduction, 3 patients recurrent dislocation> reduction again successful using technique	Muscle relaxant prior to closed manual reduction	IV/k+
Liu et al., 2019	Clinical Trial of Manual Reduction of Temporomandibular	RCT	N=51 Patients with acute, non-traumatic dislocations	Experimental group: manual reduction in supine position after inhalation of N2O	Reduction was achieved in all patients, pain perception and therapy duration were significantly reduced	The use of N2O is recommended as it reduces both pain and duration of therapy	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
	Joint Dislocation After Inhalation of Nitrous Oxide			Control group: manual reduction in supine position without inhalation of N2O	in the experimental group compared to the control group		

Table 9: Minimally invasive therapy in treatment of recurrent temporomandibular joint dislocation (for studies with sample size n<6 see Annex German S3 guideline)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
Safran et al., 1994	The effect of experimental hemarthrosis on joint stiffness and synovial histology in a rabbit model	Animal experiment	23 rabbits (1 was lost) without fracture	Injection of autologous blood 0.9 mL into one ankle joint-space, NaCl into another, immobilization none/10/28 days (randomization), pressure as in case of hemarthrosis	Stiffness, (arthrography) histology (blinded)	Autologous blood injection in rabbits leads to temporarily more stiffness and inflammation than NaCl - injection, immobilisation does not enhance effect	IV/k ++
Daelen et al., 1998	Treatment of neurogenic temporomandibular joint dislocation with botulinum toxin	Prospective case study	n=5 ages 35-68, 1 multiple sclerosis, 2 oromandibular dystonia, 1 apallic syndrome, 1 pseudobulbar pa ralysis » no neurogenic (=muscular) recurrent dislocation, occlusion-induced temporomandibular disorders, MRT> in 1 patient anterior disk displacement	Botulinumtoxin 10-20 ME, minimum interval 2 months, reinjection in case of recurrence of dislocation or prophylactic after normalization of interincisal distance, duration of therapy 4 months Contra-indications: pulmonary disorders because of risk of aspiration pneumonia, disorders of the neuromuscular transmission, anterior horn of spinal cord diseases, myopathies	Follow-up period 6-36 months, 5 recurrences of dislocation during treatment period, Adverse side effects: MMO significantly reduced (by up to 25%) for 3-4 months, pain for a maximum of 3 weeks, dysphagia, haematoma, dysarthria	Treatment of neurogenic dislocation with botulinum toxin	IV/k +
Hasson et al., 2001	Autologous blood injection for treatment of recurrent temporomandibular joint dislocation	Prospective case study	n=3, ages 25-55, recurrent dislocation, 1 patient not sufficiently stable for surgery,	Autologous blood injection 4 mL at top + 1 mL pericapsular application,	Follow-up period 1-3 years, no recurrence of dislocation	Autologous blood therapy	IV/k +

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
			1 patient s/p eminectomy	local anaesthesia (and sedation) or general anaesthesia 24 hrs elastic bandage, 1 week antibiotics and NSAID, 1 week soft foods only and avoid opening mouth widely, from 2nd week physiotherapy until mouth opening and mobility normal			
Schwartz et al. 2002	Treatment of temporomandibular joint disorders with botulinum toxin	Overview	n/a	n/a	n/a	Botulinumtoxin therapy for patients with craniomandibular dysfunctions (dystonia, hypermobility)	V/k +
Hooiveld et al., 2003	Short-Term Exposure of Cartilage to Blood Results in Chondrocyte Apoptosis	Laboratory study	n/a	n/a	n/a	In vitro, blood induces chondrocyte apoptosis >may cause damage to cartilage	IV/k +
et al., 2003	Treatment of recurrent temporomandibular joint dislocation with intramuscular botulinum toxin injection	Prospective case study	n=21, ages 23-91, recurrent dislocations, patients with insufficient compliance and increased surgical risk, (17 patients mentally retarded)	Botulinumtoxin, 50-100 ME per side, treatment period 6-18 months	Follow-up period 1 year, 19 patients: no recurrence of dislocation for at least 8 months after end of treatment, remaining 2 patients: recurrence of dislocation after 2 months and 6 weeks respectively > interval between injection reduced to 2.5 months> no recurrence of dislocation for 1	Botulinumtoxin as alternative treatment for patient with reduced compliance (e.g. patients with dementia), after several injections symptomfree for at least 1/2 year	IV/k +

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
					year; painreduction by 34 points on VAS, MMO reduced from 40.5 to 33 mm, occlusal bite force somewhat reduced		
Martinez-Perez et al., 2004	Recurrent temporomandibular joint dislocation treated with botulinum toxin: report of 3 cases	Case series	n=3, ages 17-24, recurrent dislocation	20 or 50MU botulinumtoxin injection repeated in case of recurrent dislocation	If 50 MU after 1 week velopharyngeal incompetence for 2 weeks, in 2 patients no recurrence of dislocation, in 1 patient reduced rate of recurrence	Botulinum toxin, effective after a few days and for 3-6 months	IV/k -
Matsushita, 2006	OK-432 (Picibanil) sclerotherapy for recurrent dislocation ot the temporomandibular joint in elderly edentulous patients: Case reports	Case series	n=2, ages 68-91, progressive supranuclear palsy, dementia	Sclerotherapy 2 mL into upper intra-articular space, 2 mL pericapsularly	Follow-up period 6 months, fever on following day, pain, swelling>analgesia Potential risks /adverse effects: pneumonia, anaphylactic shock, thrombosis	Sclerotherapy, important alternative therapy for patients with increased surgical risk (old age, multimorbidity)	V/k +
Kato et al., 2007	Autologous blood injection into the articular joint cavity for the treatment of recurrent temporomandibular joint dislocation: a case report.	Case study	n=1, age 84 recurrent dislocation s/p brain haemorrhage, conservative treatment unsuccessful, declines surgery	Autologous blood injection, 3 mL, at top + lml pericapsularly, local anaesthesia, bandage for 1 month	Follow-up period 5 months, subluxations on first days	Possible damage to cartilage caused by autologous blood therapy insufficiently researched, therefore not for younger patients or patients with joint degeneration (e.g. rheumatoid arthritis)	V/k +
Fu et al., 2009	Long-term efficacy of botulinum toxin type A for the treatment of habitual dislocation of the TM joint	Prospective case study	n=5, ages 55-81, recurrent dislocation, history of neurological/ systemic disorders: fraction of the spinous process, cerebral	Botulinumtoxin 25-50 ME/ side, single injection, IMF 4-5 days	Follow-up period 3 months (patient deceased) - 2 years 1 recurrence of dislocation on	Botulinumtoxinespecially in older patients with history of neurological/ systemic disorders	IV/k +

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
			hemiplegia, cerebral atrophy +chronic nephropathy, osteoporosis + femoral neck fracture, COPD Treatment planning based on CT		2nd day after injection		
Machon et al., 2009	Autologous blood injection for the treatment of chronic recurrent temporomandibular joint dislocation	Prospective case study	n=25	Autologous blood therapy	Follow-up period 1 year, 80% success rate	Autologous blood therapy	IV/k+
Pinto et al., 2009	The use of autologous blood and adjunctive 'face lift' bandage in the management of recurrent TMJ dislocation.	Case report	n=1, age 83, recurrent dislocation, patient unfit for general anaesthesia also not operable in any other way	Autologous blood therapy 10 mL into upper intra-articular space and pericapsularly Special compression bandage ("face lift bandage") for 1 month	Follow-up period 1 year, no recurrence of dislocation	Autologous blood therapy in case of multimorbidity, additionally head bandage for immobilization of joints	V/k+
Bouso et al., 2010	Neurogenic temporomandibular joint dislocation treated with botulinum toxin: report of 4 cases	Case series	n=4, ages 23-88 all neurogenic recurrent dislocations (hemiparesis, dystonia, spasticity, Alzheimer's, Parkinson's, myotonic dystrophy	Botulinumtoxin 25MU/ side	Follow-up period 5-22 months, in 1 patient recurrence of dislocation. after 1 year> injection 40 +10 at front >dysphagia, in 1 patient recurrence of dislocation after 5 months > injection repeated	Botulinumtoxin in case of neurogenic dislocation	IV/k+
Daif et al., 2010	Autologous blood injection as a new treatment modality for chronic re-	Randomized controlled trial	n=45, ages 20-56 15 patients per group	Group A: 2 mL blood into upper intra-articular space,	Follow-up period 1 year, pain for a few days after treatment,	Autologous blood injection into upper articular space and pericapsularly	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
	current temporomandibular joint dislocation			group B: 2 mL into upper intra-articular space + 1 mL pericapsularly; (group C: only pericapsularly>all recurrent) all elastic bandage for 24 hrs , avoid opening mouth widely + soft foods only for 1 week, antibiotics + NSAID 1 week	group B: in 80% no recurrence of dislocation group A: in 60% no recurrence of dislocation MMO significantly reduced in both groups greater success rate in group B possibly simply due to larger quantity of blood injected, independent of where		
Candirli et al., 2011	Histopathologic evaluation of autologous blood injection to the temporomandibular joint	Animal experiment	8 rabbits, in 7 autologous blood bilaterally 1 control	1 mL into upper intra-articular space, 0.5 mL pericapsularly, IMF for 24 hrs , soft foods only, histopathologic evaluation after 1 month	1 week: problems chewing or restricted mobility, histopathologic evaluation >no chondromalazia, but also no formation of scarring connective tissue, some fibrin formation only (inflammation)	Autologous blood injection in rabbits without long-term effect on fibrin formation and cartilage in joint (short-term reduction of mobility)	IV/k +
Candirli et al., 2012	Autologous blood injection to the temporomandibular joint: magnetic resonance imaging findings	Prospective case study	n=14, ages 17-74, recurrent dislocation	Autologous blood injection 4 mL at top + 1ml pericapsularly, elastic bandage 24 hrs	Follow-up period 1 month, pain for a few days after injection, MRI>no tissue changes, 3 patients dislocation in 2nd month (in 2 less frequent than before) > injection repeated	Autologous blood injection, mechanism unclear as MRI shows no structural tissue changes	IV/k ++
Hegab et al., 2013	Treatment of chronic recurrent dislocation of the temporomandibular joint with injection of autologous blood	Randomized controlled trial (block randomization)	n=7, ages 23-53 definition = to include subluxations! 16 patients per group	Group 1: injection of autologous blood 4 mL+ lml, soft foods only for 2 weeks, avoid opening mouth	12 months follow-up: all significant reduction of MMO group 1: in 6 recurrence of dislocation >2nd	Autologous blood injection repeated injections or combination with IMF for 4 weeks	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
	alone, intermaxillary fixation alone, or both together: a prospective, randomised, controlled clinical trial			widely, NSAIDs for 1 week, group 2: IMF for 4 weeks group 3: autologous blood injection + IMF for 4 weeks	injection, 2nd recurrence of dislocation.>3rd injection group 2: in 3 recurrence of dislocation>additional 2 weeks of compliance required and difficult if patient edentulous, IMF with wire arch bars> gingivitis group 3: no recurrence of dislocation, reduction to MMO more significant		
Ungor et al., 2013	Short-term results of prolotherapy in the management of temporomandibular joint dislocation	Retrospective case study	n=10, ages 17-65, 2 acute, 8 recurrent (definition here: to include subluxations!), no patients allergic to corn/ with systemic joint diseases/ bleeding disorders	Sclerotherapy l mL, local anaesthesia + 2 mL 10%glucose 4 injections in intervals of 6 weeks 2 weeks soft foods only, avoid opening mouth widely	Follow-up period 6 months, 3 patients: pain after injection, quality of life significantly improved, clicking disappeared in 7 of 8 patients, no more recurrences of dislocation the latest at after second injection	Sclerotherapy	IV/k ++
Zhou et al., 2013	Modified dextrose prolotherapy for recurrent temporomandibular joint dislocation	Prospective case study	n=45, ages 17-59 (-34) young adult patient without pre-existing comorbidities	Modified sclerotherapy: auriculo-temporal nerve block +50% dextrose 2 mL into posterior band and periarticularly 2 weeks soft foods only, avoid opening mouth widely 26 patients, one injection, 11 pa-	Follow-up period 6 months, 21 patients pain after injection, MMO, somewhat reduced for 1 week, 1 patient facial nerve paralysis 2 hours 41 patients no recurrence of dislocation (success rate 91%)	Sclerotherapy in young adult patient without pre-existing morbidity, one injection site only, new study shows wider range of indications	IV/k ++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
				tients two injections, 4 three injections			
Bayoumi et al., 2014	Arthrocentesis followed by intraarticular autologous blood injection for the treatment of recurrent temporo-mandibular joint dislocation	Case series	n=15, 12 f., ages 21-36 (-28), bilateral, recurrent dislocation, diagnosis according to clinical and radiographic criteria established by Nitzan (OPT)	Arthrocentesis under sedation or general anaesthesia with 250 mL NaCl, followed by 2 mL autologous blood into upper intra-articular space, 1ml into outer surface of joint capsule, elastic bandage 24 hrs 2 weeks: restrict movement, immobilizing head bandage and soft foods only, antibiotics (cephalosporins) and NSAID (ibuprofen) for 1 week; afterwards physiotherapy, head bandage at night only	All patients pain in the first two days Follow-up period regularly until1 1 year after treatment: significant reduction of MMO (-6.73 mm), in 80% no recurrence of dislocation, in 20% recurrence of dislocation after 2 weeks after 1 year in addition to clinical assessment also CBCT>no osseous changes	Autologous blood therapy as simple, safe and cost-efficient therapy for recurring dislocations	IV/k ++
Oshiro et al., 2014	Analysis of MRI findings in minimum invasive treatment for habitual temporomandibular joint dislocation by autologous blood injection around the temporomandibular joint capsule	Case-control study of pathophysiology for autologous blood injection	n= 14, 10 f, ages 17-82 (-57), all habitual unilateral dislocations (diagnosis according criteria established by Nitzan, 2002>clinical, CT, MRI), in 8 patients also systemic disorders controls (n=14): CMD	Autologous blood therapy 3 mL 1% Lidocaine, 3 mL autologous blood injection into upper intra-articular space, 2 mL into pericapsular tissue antibiotics from 3 days prior to surgery until surgery, NSAIDs after surgery limited mouth opening and soft foods only after surgery	Follow-up period 1 year: no recurrence of dislocation MRI- analysis of patients with autologous blood therapy: -1 h after injection (n=14): type 1 (=haematoma/ effusion): 57% grade 1, 14% grade 2, 29% grade 3 type 2 (sporadic and diffuse T2-	Autologous blood injection effective therapy, MRI as evidence of decreasing mobility of condyles	IIb+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
				controls: arthrocentesis (pump) therapy unilateral	weighting): 64% positive type 3 (=reduced condylar mobility): 57% positive -4 weeks after injection (n=9): type 1: 100% grade 0 type 2: 0% positive type 3: 89% positive -12 weeks after injection (n=14): type 1: 100% grade 0 type 2: 0% positive type 3: 79% positive MRI of controls on untreated side: -before treatment: type 1: 71% grade 0 29% grade 1 type 2: 0% positive type 3: 0% positive -4 weeks after treatment: type 1: 79% grade 0 21% grade 1 type 2: 0% positive type 3: 0% positive		
Coser et al., 2015	Autologous blood injection for the treatment of recurrent mandibular dislocation	Case series	n=11, recurrent dislocations (at least 3 times in previous 6 months, self-reduction unsuccessful),	Autologous blood injection: auriculo-temporal nerve block, Lidocaine and epinephrine	Immediately after injection: 54% local discomfort and sensation of humming nerve,	Autologous blood injection simple, quick, minimally invasive, cost efficient, low rate	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
			ages 15-50 (-27.8), 8 f. Exclusion criteria: mental illness, connective tissue disease, parafunction, short lower third of face	into pericapsular tissue Arthrocentesis with Ringer's lactate (250 mL) 2ml autologous blood injection into the upper intra-articular space, 1 mL into pericapsular tissue 2 weeks: 24 hrs elastic bandage, afterwards during sleep only, NSAIDs for 3 days, soft foods only for 3 weeks, physiotherapy	9% twice bleeding from ear, which stopped spontaneously follow-up period 24 - 35 months (-29.6): 73% no recurrence of dislocation 27% recurrence of dislocation (after 2 months and 6 months)> autologous blood injection repeated and again unsuccessful, in 54.5% MMO reduced	of complications >> promising initial treatment option before surgery	
Varedi et al., 2015	Autologous blood injection for treatment of chronic recurrent TMJ dislocation: is it successful? 1s it safe enough? A systematic review	Systematic literature search	7 studies	Autologous blood injection		In the literature autologous blood injection with successful results, concerns remain re. patho-physiological processes and long-term effects	V/k ++
Machon et al., 2017	A prospective assessment of outcomes following the use of autologous blood for the management of recurrent temporomandibular joint dislocation	RCT	N=40 Pat. with unilateral, chronic recurrent dislocations (>6 months), min. 3 dislocations per week average 29.9 years (19-60) exclusion criteri: systematic diseases	Group A: intraarticular (2ml)+ pericapsular (1ml) injection of autologous blood Group B: perikapsular injection of autologous blood (1ml) Restricted jaw movements and soft diet for 2 weeks	Follow-up after 1, 3, 6 und 12 months: No radiological degenerative changes of the condyle Therapeutic effect after 12 months in group A 80%, in group B 55% In both groups restricted MMO, but not significant Reduction of pain in both	Injection of autologous blood is indicated only when conservative methods have proven unsuccessful Autologous blood injection is safe, effective, not time-consuming, economical, and reduces morbidity in patients with chronic recurrent TMJ dislocations Although there were differences in the	Ib++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
					groups, stronger effect in group A	two groups, they were not significant	
Patel et al., 2017	Clinical and radiological outcome of arthrocentesis followed by autologous blood injection for treatment of chronic recurrent temporomandibular joint dislocation	Case series	N=10 21-55 years, Pat. With chronic recurrent dislocations (min. 2 episodes in the last 6 months)	Joint lavage, then injection of 2ml of autologous blood into the upper joint space, then 1ml pericapsular, antibiotics and analgesics for 5 days, soft diet and restricted mouth opening for 1 week, followed by physiotherapy	Follow-up 3 months: Pain reduction, reduction of clicking sounds, reduction of MMO by an average of 9.3mm, recurrent dislocations in 2 patients, no degenerative changes on MRI, significant reduction of angle between discus and condyle	Joint lavage+ autologous blood injection safe, minimally invasive and cost-effective form of therapy for chronic recurrent temporomandibular joint dislocations> improved anatomical relationship between eminentia and discus	IV/k+
Yoshida et al., 2017	Clinical outcome after 36 months of treatment with injections of autologous blood for recurrent dislocation of the temporomandibular joint	Case series	N=21 Average 64 years (17-92), 16 Pat. with systemic diseases	Injection of autologous blood	Follow-up average 64 months (41-99 months): 3 patients had recurrent dislocation after first injection within 3 years. Total 2 pat. with recurrent dislocations at end of follow-up, 17 pat. symptom-free, 2 pat. with unclear outcome 6 Pat. deceased, 7 lost to follow-up	Injection of autologous blood as a safe and effective form of therapy for recurrent temporomandibular joint dislocations, especially in comorbid patients	IV/k+
Yoshida et al., 2018	Botulinum Neurotoxin Injection for the Treatment of Recurrent Temporomandibular Joint Dislocation with and without Neurogenic Muscular Hyperactivity	CCT	N=32 Mean age 62.3 years Group A: neurogenic dislocations Group B: habitual dislocations Group A significantly younger patients	Injection of botulinum toxin intraorally into the inferior part of the M.pterygoideus lat.> if insufficient success, re-injection after 2 months A total of 102 injections (average 3.2 times/pat.) Group A required significantly more	Follow-up average 29.5 months: no significant immediate or subsequent complications	Intramuscular injection of botulinum toxin into the lat. pterygoid muscle is an effective and safe treatment for habitual dislocation of the temporomandibular joint> should be the first-line therapy for patients in whom surgical intervention is contraindicated.	IIb+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
			Group B significantly more women	injections (4.1 vs. 1.7)		Neurogenic dislocations with muscle hyperactivity require more injections than habitual dislocations Intraoral injection is more favorable because it causes less anxiety in patients and because the risk of injury to the maxillary artery is lower	
Abrahamsson et al., 2019	Treatment of temporomandibular joint luxation: a systematic literature review	Review of RCTs	8 studies including 338 patients with TMJ luxation	3 studies including 185 patients with manual reduction, 5 studies including 153 patients with minimally invasive methods: injection of autologous blood or dextrose prolotherapy	autologous blood injection in the superior joint space and pericapsular tissues in combination with IMF seems to be the treatment that has the best scientific support for recurrent TMJ luxation (dislocation)	Autologous blood injection combined with intermaxillary fixation can be recommended for patients with recurrence of TMJ luxation.	Ia+
Aamir et al., 2020	Autologous blood injection for the treatment of recurrent temporomandibular joint dislocation	RCT	N=15 Pat. with bilateral recurrent dislocation, 8-75 years (mean 53.13 years). Exclusion criteria: Age> 75 years, systemic diseases as contraindications (coagulopathies, previous joint trauma, previous joint surgery, joint infections)	Joint lavage, injection of 2ml of autologous blood into the upper joint space, injection of 1ml of autologous blood pericapsular> bilateral procedure. Followed by restricted jaw opening and soft diet, prescription of antibioca	average follow-up duration 19.60 months: Mild pain after autologous blood injection in 3 pat., redislocation in 3 pat. (20%)	Autologous blood injection for recurrent TMJ dislocations is a safe, simple and effective treatment option, recommendation of autologous blood injection esp. before more invasive procedures	Ib-
Bukhari et al., 2020	Comparison of mean decrease in mouth opening by autologous blood in-	Controlled clinical trial	N=80 patients with chronic (recurrent) dislocation	50% autologous blood in superior joint space only, 50% additionally in pericapsular tissue	Significantly more decreased mouth opening in additional application in pericapsular tissue.	Encouragement to apply ABI in superior joint space and pericapsular tissue	IIb+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re **minimally invasive therapy**	LoE
	jection in superior joint space with and without pericapsular tissue in treatment of chronic recurrent temporomandibular joint dislocation in Mayo Hospital Lahore					in chronic dislocations	
Gagnani et al., 2020	Ultrasound-guided autologous blood injection in patients with chronic recurrent temporomandibular joint dislocation	Prospective cohort study	N=19 patients with chronic recurrent TMJ dislocation	ABI in superior joint space and pericapsular tissue	Mouth opening and pain decreased significantly after ABI in superior joint space and pericapsular tissue	ABI for patients with recurrent TMJ dislocations is minimally invasive, highly effective alternative.	IV/k+

Table 10: Surgical methods to facilitate reduction in cases of chronic/persistent and/or longstanding dislocation

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
Littler, 1980	The role of local anaesthesia in the reduction of longstanding dislocation of the temporomandibular joint	Case report	Age 54, f, for 7 weeks	Conventional, with physician sitting in front of/ behind patient/ according to Fordyce, local anaesthesia 2 mL each side 3% Prilocaine_HCl + Octapressin, allow 10 min. to take effect, one side at a time, amoxicillin for 1 week	After 6 weeks full lateral mobility (vertical?)	V/k+
Blank et al., 1982	Treatment of protracted bilateral mandibular dislocation with ProplastVitallium prostheses	Literature search, case study	Age 37, m, trauma, manual closed reduction unsuccessful although under anaesthesia, pain for 18 months, reduced ramus height, retrognathia, tenseness, crepitus, X-ray (orthopantomography), CT: dislocation with osteoarthritic changes, mandibular plane angle 48°	General anaesthesia, condylectomy, eminectomy, Proplast-Vitallium prostheses, IMF for 3 weeks, from 4th week active physiotherapy	Initially trismus, mouth opening 2 cm, mandibular plane angle 40°; after 2 months 3.5 cm, after 8 months X-ray, for 1 year no pain, but aches in cold and damp weather	V/k+
Tipps et al., 1982	Prolonged Bilateral Mandibular Dislocation	Case report	Age 50, f, for 13 months (second dislocation), Crohn's disease, 2 strokes, COPD, substance abuse, depression, emaciated, edentulous, X-ray: bone flattening and erosion	General anaesthesia, manual treatment unsuccessful, bilateral eminectomy, myotomy, condylectomy, MMF, meniscectomy, silastic prosthesis, Barton's bandage, MMF 5 days	After 6 months normal function re stored (?), vertical opening 4 cm	V/k+
Wijmenga et al., 1986	Protracted dislocation of the temporomandibular joint	Non-systematic literature search, case series	29,w, tooth extraction 2 months earlier, open bite, X-ray 60, w, for 10 days, dentures, dislocation on the left side 46,w, dentures, for 7 months (after extraction of wisdom tooth), reduced mouth opening	Manual reduction unsuccessful, Vitallium splint with t rotation point in molar region and extensions for 3 days + plaster-of-Paris head bandage> general anaesthesia, manual reduction, 2 weeks head-chin bandage for fixation manual reduction under local anaesthesia, chin up, molars down/back, for 1 week soft foods only, avoid opening mouth widely manual reduction unsuccessful, closed reduction under general anaesthesia and muscle relaxant (succinylcholine) successful on	After 4 months fully functional No problems since After 1 year no problems	IV/k+

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
				left side only, 2 weeks later bilateral condylectomy, intermaxillary elastic traction for 8 weeks		
Smith et al., 1994	Sagittal split mandibular osteotomy for irreducible dislocation of the temporomandibular joint A case report	Case report	Age, 57, m, schizophrenia, for 3 weeks, bilateral, reduction successful but recurrence of dislocation > eminectomy but recurrence of dislocation, reduction unsuccessful despite head-chin-cap-bandage	Sagittal split osteotomy of ramus (orthognatic technique), no IMF	After 6 months no recurrence of dislocation	V/k+
Kurita et al., 1996	Closed reduction of chronic bilateral temporomandibular joint dislocation	Case report	Age 71, w, for 8 weeks	Manual reduction under general anaesthesia unsuccessful, with retractors no reduction and arrhythtmia, MMF	After 9 months full reduction >non-surgical treatment if patient inoperable	V/k+
Caminiti et al., 1998	Chronic Mandibular Dislocation: The Role Of Non-Surgical and Surgical Treatment	Non-systematic literature search, case series	Age 73, f, for 10 years crossbite/ malocclusion, dentures, >OPT: re dislocation age 16, f, for 2 years (sustained in a fall), OPT age 45, f, for 4 months, sustained in a fall, OPT: bilateral dislocation, X-ray to determine degree of dislocation	Closed reduction under anaesthesia unsuccessful, open reduction, bandage support to lower jaw, open surgery intended under anaesthesia + muscle relaxant, already closed reduction successful, MMF 2 weeks, closed reduction without any/ with local anaesthesia/ general anaesthesia+ muscle relaxant unsuccessful, bilateral open reduction after eminectomy was performed and fossa cleared by traction on splint and assisted by retractors and “Bristol elevator”, MMF for 5 weeks	Recurrence of dislocation, declines further treatment no recurrence of dislocation within 2 months Follow-up period 1 year no recurrence of dislocation	IV/k+ If manual reduction unsuccessful exposure of joint and open reduction by maxillo-mandibular traction combined with retractors and elevators, previously eminectomy, if required
Kummoona, 2010	Surgical Managements of Subluxation and Dislocation of the Temporomandibular Joint: Clinical and Experimental Studies	Case study	Group 1: subluxation group 2: 15 patients with long-standing dislocation (e.g. 3 weeks) group 3: 43 patients, acute dislocations	Detach adhesions of capsule to temporal fascia >open reduction, eminectomy, capsulorrhaphy with temporalis flap group 3: manual reduction, one side at a time	Not specified	IIb-

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
			only 1 patient with dislocation, others subluxation			
Aquilina et al., 2004	Reduction of a chronic bilateral temporomandibular joint dislocation with intermaxillary fixation and botulinum toxin	Case report	Age 71, m, after stroke 8 weeks before, reduced mobility and pain	Reduction under general anaesthesia and muscle relaxant IMF on screws for 2 weeks 3 days from beginning bilateral IMF Botulinumtoxin injection into lateral pterygoid muscle (30MU intraorally + 30MU extraorally) + anterior fibres of temporal muscle (20MU)	After 6 weeks no recurrence of dislocation, after injection of botulinumtoxin pain further reduced	V/k+
Ugboko et al., 2005	A survey of temporomandibular joint dislocation: aetiology, demographics, risk factors and management in 96 Nigerian cases	Retrospective analysis of patient files	Data from 1993-2002, n=96, 39w, ages 9- 85 (-35.5), causes: in 44 patients yawning, 10 systemic disorders (4 epilepsy), acute in 46 (1 no treatment), persistent in 29 (5 no treatment), recurrent in 21 (1 no treatment), 93 anterior, of which 6 unilateral	Persistent: in 5/24 manual reduction successful (1 with local anaesthesia, 1 under sedation, 1 under general anaesthesia), 6 IMF, 2 condylectomy, 2 inverted L-shaped osteotomy (no risk of impingement), 3 oblique osteotomy of ramus, 6 vertical sub-sigmoid osteotomy	After condylectomy persistent frontal open bite in one case one persistent frontal open bite	IV/k++
Debnath et al., 2006	Bilateral vertical-oblique osteotomy of ramus (external approach) for treatment of a long-standing dislocation of the temporomandibular joint: A case report	Case report	36, m, for 3 months pain and open lock after yawning, lower jaw prognathic, no horizontal movement. possible, frontal open bite, orthopantomogram >bilateral dislocation	General anaesthesia, manual Hippocratic method of reduction (with physician in front of/ behind patient, according to Fordyce>retropositioning with mouth prop as intraoral lever unsuccessful, Wires on mandibular angle > unsuccessful, lever on mandibular symphysis with intraoral bite block as rotation point >unsuccessful Bilateral vertical-oblique osteotomy of ramus (extraoral due to pre-existing holes in mandibular angle), temporal muscle severed, vertical height restored +open bite corrected+ normal occlusion restored	After 1 month: active mouth opening exercises follow-up period 18 months, orthopantomogram: changes to condyle, minimal changes to length of coronoid process	V/k+

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
				No MMF		
Lee et al., 2006	Reduction of prolonged bilateral temporomandibular joint dislocation by midline mandibulo-tomy	Case report	74, w, for 5 months (trauma), OPT, CT, under sedation unsuccessful	2 months later anaesthesia + muscle relaxant> attempt at manual reduction, then with retrractors, **intraoral midline mandibulotomy,** screw fixation of symphysis with 2 plates IMF for 10 days, physiotherapy for 3 weeks	>30mm mouth opening, follow-up period 2 years, no recurrence of dislocation	V/k+
Deng et al., 2007	Endoscope-assisted reduction of long-standing condylar dislocation	Case report	3, w, open lock for at least 3 weeks, sustained burns in explosion 4 months earlier (possible cause) and was intubated during treatment (possible cause), reduction unsuccessful> referral + X-ray	Anaesthesia + muscle relaxant (vecuronium = nACh receptor antagonist)>manual reduction >unsuccessful Scar tissue as a result of burns, and therefore hardening of skin and muscles, slight damage to skin caused by manual reduction, heightened risk of infection after surgery due to poor blood circulation in area» surgical reduction impossible, therefore endoscopic reduction: In upper intra-articular space also disk displacement, elevator over disk and condyle> apply pressure in caudal direction bilaterally while assistant applies pressure to chin in dorsal direction MMF 1 week	X-ray, follow-up after 2 years by telephone >endoscopic with minimal risks: smaller wound, reduced blood loss »for patients with increased surgical risk	V/k+
Akinbami, 2011	Evaluation of the mechanism and principles of management of temporomandibular joint dislocation. Systematic review of literature and a proposed new classification of temporomandibular joint dislocation	Systematic literature review	n=425, of which 4 unilateral, 11 non-anterior dislocations, causes 60% trauma, 73.2% recurrent dislocation, 25.4% acute dislocation, 11.3% persisting dislocation	Persisting dislocation: 42.9% manual reduction (of which 86.7% under general anaesthesia, 6.7% under local anaesthesia + under sedation, 6.7% under local anaesthesia + sedation + nerve block), 57.1% open reduction (in 11.4% redressive methods, in 45.7% open reduction methods)	Not specified	V/k++
Huang, 2011	Management of long-standing mandibular dislocation	Case series	n=6,	1+2) manual reduction without anaesthesia unsuccessful, families decline further treatment	Not specified 3) follow-up period 6 months	IV/k+

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
			-first two, m, over 75, systemic disorder, dislocation after discharge from intensive care -72, w, COPD, after discharge from intensive care, after 3 weeks reduction -68, m, after discharge from intensive care -33, m, dislocation for 30 days -54, m, car accident, dislocation for at least 1 month, orthopantomogram> dislocation on the left	3) closed manual reduction under sedation (duration 15 min), bandage for 2 weeks 4) manual open reduction + traction with wires on mandibular angle, duration 40 min., archbars < fixation to prosthesis (upper fixation with screws, lower fixation with wires), IMF 5) reduction attempt by dentist unsuccessful, hospital: CT, MRT, reduction unsuccessful, attempt under general anaesthesia for 60 min., unsuccessful after 10 weeks patient agrees to surgery, open reduction with retractors in semilunar notch, duration 60 min, overbite, IMF for 4 weeks, 6) closed reduction under general anaesthesia, IMF, Recommendation: <3 weeks of dislocation: closed reduction without/ local anaesthesia/ sedation/ general anaesthesia 4-12 weeks: manual open reduction + wire on mandibular angle or lever in notch > 6 months: surgery (authors recommend not to detach temporal muscle completely from coronoid process)	4) on 2nd day: recurrence of dislocation, family declines further treatment, 5) elastic traction for 1 week, after 4 weeks mouth-opening exercises (20mm only) 6) follow-up period 3 months	<3 weeks of dislocation: closed reduction without medication, if unsuccessful under local anaesthesia, if unsuccessful under sedation, if unsuccessful under general anaesthesia 4-12 weeks: open reduction (wire on mandibular angle or lever in notch) >6 months: surgery For at least 3 weeks: MMF after reduction of persistent dislocation
Nwashindi et al., 2013	Bilateral temporomandibular joint traction: a case report of a promising technique for irreducible	Case report	age 29, m, open lock for 5 days after car accident, X-ray>bilateral dislocation	Manual reduction under sedation attempted 4 times > unsuccessful, reduction under general anaesthesia > unsuccessful traction with wires on mandibular angle (under additional local anaesthesia), MMF 1 week	X-ray, outpatient treatment weekly follow-ups	V/k+

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
	temporomandibular joint dislocation					
Chin et al., 2016	Delayed Management of Unrecognized Bilateral Temporomandibular Joint Dislocation: A Case Report	Case report	N=1 24 years (m), bilateral anterior dislocation after car accident+ intubation+ seizure 5 months ago	Man. Rep.> unsuccessful, man. Rep. in general anesthesia> unsuccessful> open reposition> debridement, than reposition> only on one side successful> on the other side additional eminectomy, 2 weeks IMF	Follow-up 1 year: no new dislocations, satisfactory occlusion	V/k+
Jeyaraj et al., 2016	A Conservative Surgical Approach in the Management Of Longstanding Chronic Protracted Temporomandibular Joint Dislocation: A Case Report and Review of Literature	Case report	N=1 64 years (w), chronic unilateral dislocation (3 months) with formation of a pseudo joint.	man. Rep.> unsuccessful, man. Rep. with LA> unsuccessful, man. Rep. under general anesthesia> unsuccessful. open surgery: debridement, removal of pseudoarticulation, open rep, capsular retraction	Follow-up 14 months: no redislocation, neither early nor late complications, restoration of facial symmetry and occlusion	V/k+
Marques-Mateo et al., 2016	Temporomandibular chronic dislocation: The long-standing condition	Case report	N=4 Pat. with chronic anterior dislocations (min. 6 weeks) Pat. 1: 70 years (w), bilateral dislocation for 6 weeks Pat. 2: 34 years (w), unilateral dislocation for 6 years Pat. 3: 76 years (w), bilateral dislocation since 8 weeks	Pat. 1: closed rep. in LA+ muscle relaxant not successful> open rep. under general anesthesia. Pat. 2: eminectomy in history, now condylotomy+reposition+ fixation with miniplates Pat. 3: man. Rep. with muscle relaxant not successful> Rep. under general anesthesia, IMF for 3 weeks Pat. 4: closed rep+ LA+ muscle relaxant unsuccessful, closed rep under general anesthesia unsuccessful, open rep unsuccessful> discectomy+ eminectomy+ condylectomy+ debridement, IMF for 2 weeks.	Pat. 1: Follow-up 5 years: no reluxations Pat. 2: Follow-up 8 years: no change in occlusion Pat. 3: Follow-up 3 years: no reluxations Pat. 4: Follow-up 1 year: asymptomatic	IV/k+

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
			Pat. 4: 50 years (m), bilateral dislocation since 4 months			
Brozyna et al., 2018	Dislocation of mandible in 48 year old patient - the continuation of a therapy	Case report	N=1 47 years (w), chronic bilateral dislocation (2 months)	Man. Rep. not successful> bilateral condylectomy, followed by physiotherapy.	Not specified	V/k-
Isler et al., 2018	Management of the Bilateral Chronic Temporomandibular Joint Dislocation	Case report	N=1 28 years (m), chronic dislocation since 5 years, injection of autologous blood unsuccessful	Bilateral eminectomy under general anesthesia, 3 weeks postoperatively only limited jaw movements	Not specified	V/k-
Segami et al., 2018	A modified approach for eminectomy for temporomandibular joint dislocation under local anaesthesia: report on a series of 50 patients	Case series	N=50 Habitual dislocation in 39 patients, chronic in 11 patients, all patients had dementia or mental retardation, 48 patients with comorbidities that were a contraindication to surgery	Administration of diazepam for sedation, if necessary additionally N2O, injection of LA subcutaneously, visualization and incision of the lateral joint capsule, modulation of eminentia for satisfactory joint articulation, postoperatively no physiotherapy. In 2 patients additional discectomy, in 4 patients condylectomy, in 5 patients discectomy+condylectomy	Intraoperative cardiopulmonary complications in 10 pat.> hypo- or hyypertension, arrhythmia Postoperative complications in 25 pat.> local infection, delirium, pneumonia, cardiovascular events, transient damage to facial nerve in 11 pat.> not longer than 6 months 2 Pat. deceased (cardiopulmonary arrest, fall) Follow-up 28-35 months: re-dislocation in 6 patients, success rate with eminectomy alone 86%,	IV/k++

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
					with combined eminectomy 91%	
Güven et al., 2019	Nearthrosis in true long-standing temporomandibular joint dislocation; a report on pathogenesis and clinical features with review of literature	Case series	N=2 Pat. 1: 85 years (m), comorbidities: Dementia, epilepsy, bilateral dislocation since 18 months, Pat.2: 80 years (m), comorbidities: schizophrenia, depression, cardiovascular diseases, unilateral dislocation for 14 months	Pat. 1: bilateral eminectomy, chin cap for 3 weeks. Pat. 2: man. Rep. with local anesthesia and sedation> unsuccessful, patient refuses further therapy due to comorbidities	Not specified	IV/k-
Okamoto et al., 2019	Eminectomy with restraint of the joint capsule to treat chronic and recurrent dislocation of the temporomandibular joint	Case series	N=8 60 years (24-87), Pat. with chronic and recurrent dislocation of the temporomandibular joint, Pat. with systemic diseases (schizophrenia, bulimia, multi-infarct dementia, cerebrovascular diseases, lymphoma).	Eminectomy, capsular tightening with temporalis fascia, IMF for 1 week.	Reluxation in 1 case after 6 months	IV/k-
Segami et al., 2019	Surgical strategy for long-standing dislocation of the temporomandibular joint: experience with 16 medically compromised patients	Case series	N=16 72 years (21-94), chronic dislocations (min. 4 weeks), total pat. with multiple comorbidities and either dementia or a mental illness	Eminectomy in 5 patients, eminectomy+ condylectomy in 2 patients, eminectomy+ condylectomy+ discectomy in 3 patients, eminectomy+ curettage of fibrotic tissue in 1 patient, eminectomy+ discectomy+ myotomy in 3 patients, incomplete reduction in 2 patients.	Follow-up 6-72 months: 2 patients cardiopulmonary arrest postoperatively> 1 patient dies. No recurrence of dislocation in 12 patients, poor outcome in the remaining 4 (2 of them incomplete reduction)	IV/k++

Autor, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
Toufeeq et al., 2019	Bilateral Dislocation of Mandibular Condyles following General Anesthesia—An Overlooked Problem: A Case Report	Case report	N=1, case of dislocation of TMJ following tracheal intubation overlooked for a prolonged period, dislocation of the mandibular condyle into the temporal fossa	General anesthesia, preauricular approach, condylectomy of the zygomatic arch, immobilization for 4 weeks, then physiotherapy	6 months follow up uneventful, slight deviation of the mandible was observed, any delay in the reduction may induce fibrosis of the soft tissues around the joint that may further make reduction difficult and necessitates condylectomy	V/k+
Karakida et al., 2020	A Case of Long-standing Temporomandibular Joint Dislocation: Restoration of Oral Function Following Condylectomy	Case report	N=1 (53-year-old female with TMJ dislocation persisting for over 1 year)	Bilateral mandibular condylectomy	Despite inability to provide comprehensive treatment, via condylectomy achievement of oral feeding and improvement of quality of life.	V/k+
Das et al., 2020	Is a Minimally Invasive Endoscopic Approach a Promising Management Modality Among Patients With Chronic Protracted Temporomandibular Joint Dislocation?	Case report	N=1 73-year-old female with parkinson disease, with persisting dislocation for 3-4 months	arthroscopic lateral pterygoid myotomy of the disc along with superior and inferior bellies using holmium laser ablation. Manual reduction now possible	Arthroscopically guided laser-assisted management of chronic protracted TMJ dislocation adresses pathophysiological changes and can be promising modality in avoiding more invasive total joint replacements.	V/k+

Table 11: Surgical methods to facilitate spontaneous reduction: eminectomy (for studies with sample size n<6 see Annex German S3 guideline)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
Helman et al., 1984	Eminectomy as surgical treatment for chronic mandibular dislocations	Case series	n=8, ages 21-54	Eminectomy, pressure bandage for 24 hrs	In 1 patient recurrence of dislocation, in 1 patient paresis in initial 8 weeks, in 1 patient 2nd surgery, as not sufficient amount of eminence removed medially, in 1 patient persisting pain, X-ray: in all patients no degenerative changes to bony surface of joint	In case of steep tubercle and in patients with neurological disorders (epilepsy, Parkinson's), completely remove eminentia	IV/k+
Oatis et al., 1984	The bilateral eminectomy as definitive treatment	Case series	n=48, ages 19-63 including subluxations!	Eminectomy, steroids and antibiotics 1st day post-surgery, headscarf for 48 hrs, over 1 month gradual reintroduction of more solid foods and increasing mouth opening, mild analgesia	3 recurrences of dislocation, 20% facial nerve paraesthesia for 1 week - 3 months, in 5 patients muscular spasm and stiffness for 1-6 weeks, sometimes crepitus and reduced MMO	93% no recurrence of dislocation, 82% fully asymptomatic	IV/k++ large sample size
Undt et al., 1997b	Treatment of recurrent mandibular dislocation, part II: Eminectomy	Case series	n=11, ages 17-84	Eminectomy, detached parts of joint capsule and temporomandibular ligament sewn to bone for 2 weeks: IMF and soft foods only	Follow-up period 7 months - 5 years, 1 recurrence of dislocation under neuroleptics, reduced pain (6 patients) but newly added crepitus (6 patients), in 1 osteoarthrosis	Remove medial eminence completely, make sure to smoothen surface well to prevent recurrence of dislocation and crepitus	IV/k+
Shorey et al., 2000	Dislocation of the temporomandibular joint	Overview	n=0	Currently, eminectomy shows best long-term results when medial articular eminence is completely removed, and is best documented, especially.in patients with neurogenic recurrent dislocations			V/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
Sato et al., 2003	Clinical evaluation of arthroscopic eminoplasty for habitual dislocation of the temporo-mandibular joint: Comparative study with conventional open eminectomy	Controlled study	n=24 group 1: n=11, ages 31- 89 (-66), 7 with neurological disorders group 2: n=13, ages 21- 80 (-34), 1 patient with neurological disorder	Group 1: open eminoplasty (eminectomy) group 2: arthroscopic eminoplasty (eminectomy)	Follow-up period 6 - 78 months, open: recurrence of dislocation in 3 patients 28% reduced pain, in 1 patient newly added pain, in 1 patient newly added crepitus, in 1 patient facial nerve paralysis, in 1 patient periauricular paraesthesia for 3 months arthroscopic: recurrence of dislocation in 4 patients 25% reduced pain, in 1 patient newly added pain, clicking/ crepitus disappeared in patients with noise previously and newly added crepitus in 4 patients, in 2 patients paresthesia around puncture site for 1 month	Arthroscopic surgery: shorter duration, reduced blood loss results dependent on trial population (open if older and sicker) No significant differences	IIb+ small patient sample
Cardoso et al., 2005	Comparative study of eminectomy and use of bone miniplate in the articular eminence for the treatment of recurrent temporomandibular joint dislocation	Retrospective case study	n=11, ages 18-40 group 1: n=6, group 2: (=”control”): n=5	Group 1: blocking procedure with L-shaped titanium miniplate group 2: eminectomy	Follow-up period 3.5 - 16 months, no recurrence of dislocation, in 1 patient temporary auriculotemporal nerve lesion, group 1: MMO - 41.33mm, 2/4 of patients pain-free, clicking disappeared	Eminectomy as efficient as blocking procedure with plate re. prevention of recurrence of dislocation, better results re MMO, pain, noises	IIIb+ small group size

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
					in 2/3 of patients, noise remaining in 2 affected patients, and 2 patients with newly added noise group 2: MMO -44.8mm, 2/3 of patients pain-free, clicking disappeared in 2/3 of patients, noise disappeared in 1/3 of patients		
Güven, 2009	Management of chronic recurrent temporomandibular joint dislocations: A retrospective study	Retrospective case study	n=19, group 1: n=12, ages 22-34 group 2: n=7, ages 37-80, systemic disorders (1 amyotrophic lateral sclerosis, 1 epilepsy)	Group 1: blocking procedure, transplant from chin, inlay technique, greenstick fracture of lower segment intended, no fixation e.g. with wires, without capsulotomy group 2: eminectomy, always bilateral also if dislocation unilateral only	Group 1: follow-up period 2-6 years, MMO reduced by 11.67 mm group 2: follow-up period 1-12 years, MMO reduced by 7mm	Eminectomy in older patients and patients with existing morbidities as successful as blocking procedure	IIIb+
Vasconcelos et al., 2009b	Treatment of chronic mandibular dislocations by eminectomy: follow-up of 10 cases and literature review	Retrospective case study	n=10, ages 22-52	Eminectomy	Follow-up period 2 -63 months (-37.4), no recurrence of dislocation, MMO reduced by -7.1mtn, 3/4 of patients pain-free, 1 patient with newly added pain in 2/4 of patients noise disappeared, in 1 patient newly added noise	Not specified	IV/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
Sang et al., 2010	Temporomandibular joint dislocation in Nairobi	Retrospective analysis of patient files	Data from 1995-2005 n=29, of which 25 anterior. dislocations, especially recurrent dislocations, cause: trauma in 5 patients ages 10-95 (-42)	16 patients eminectomy	In 12 patients successful, in 4 "result not satisfactory" (postsurgical complications: trismus etc., not specified in detail)	Eminectomy 75% success rate	IIIb-
Martins et al., 2014	Recurrent dislocation of the temporo-mandibular joint: a literature review and two case reports treated with eminectomy	Systematic literature search	Not specified	Not specified	Not specified	Eminectomy surgical treatment of choice eminectomy less invasive, shorter duration of surgery, no autologous or allogeneic transplantation large studies with long-term follow-up period show no recurrence of dislocation after eminectomy	IV/k++
Almeida et al., 2016	Stability of treatments for recurrent temporomandibular joint luxation: a systematic review	Systematic Review	48 studies with n=149 patients with recurrent TMJ dislocation	Eminectomy (n=32), Down-fracture of zygomatic arch (n=56), miniplating of articular eminence (n=39), glenotemporal osteotomy of zygomatic arch (n=22)	not possible to determine which treatment options guarantee long-term elimination of recurrent TMJ luxation. surgeons empirically consider eminectomy to be the 'gold standard' (as "rescue procedure"). Longer follow-ups of 3 yrs and multicentered clinical trials needed	Eminectomy: gold standard	V/k++
Cremer et al., 2016	Eminektomie nach Myrhaug	Case series	N=8	Eminectomy according to Myrhaug, 3	Follow-up 4 weeks to 2.5 years: good healing process,	Eminectomy as an effective surgical method for the therapy of	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
	Wirksame chirurgische Therapie bei habitueller Kiefergelenkluxation		Patients with recurrent habitual temporomandibular joint dislocations, comorbid patients (Tourette's syndrome, trisomy 21, epilepsy, Alzheimer's dementia, Parkinson's disease, Jacobsen's syndrome), mean age 52.5 years	times unilateral, 5 times bilateral	no further dislocations, stable occlusion, clicking in 2 patients.	recurrent temporomandibular joint dislocation, which is associated with few complications and low morbidity In case of unilateral dislocation, unilateral eminectomy can be performed	
Jeyaraj et al., 2018	Chronic Recurrent Temporomandibular Joint Dislocation: A Comparison of Various Surgical Treatment Options, and Demonstration of the Versatility and Efficacy of the Dautrey's Procedure	RCT	N=75 18-59 years (average 38 years) Inclusion criteria: recurrent dislocations (min. 3 dislocations), pain on mouth opening, preauricular pain on chewing, MMO> 55mm In all patients conservative therapy for min. 3 months unsuccessful Exclusion criteria: Age< 18 years, patients on neuroleptics for neuro-psychiatric diseases, patients with seizures, patients in whom surgical therapy	Group A: n=25, Dautrey locking plasty, fixation with minis-crews. Group B: n=25, eminectomy+ antibiotics pre- and postoperatively Group C: n=25, eminectomy+ disc plication to retrodiscal tissue and to the fascia temporalis+ antibiotics pre- and postoperatively	Follow-up 8-36 months: Re-dislocation in 1 patient each from group B and C, no re-dislocations in group 1. Significant reduction of MMO after 12 months in each group, largest reduction in group A. In group B incidence of residual pain and clicking noises highest, in group A no residual pain or clicking noises >Group C (eminectomy+arthroplasty) better results than group B (eminectomy)	Eminectomy safe therapy as complications are very rare Eminectomy compared to locking plasty less time consuming, less invasive, respects the integrity of the capsule-ligament apparatus and does not require osteotomy	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
			is contraindicated		>overall best results in group A (Dautrey locking arthroplasty): less reluxations, less clicking noises, better pain reduction		
Segami et al., 2018	A modified approach for eminectomy for temporomandibular joint dislocation under local anaesthesia: report on a series of 50 patients	Case series	N=50 Habitual dislocation in 39 pat., chronic in 11 pat., all pat. had dementia or mental retardation, 48 pat. with comorbidities that were contraindications to surgery	Administration of diazepam for sedation, if necessary additionally N2O, injection of LA subcutaneously, visualization and incision of the lateral joint capsule, modulation of eminentia for satisfactory joint articulation, postoperatively no physiotherapy. In 2 patients additional discectomy, in 4 patients condylectomy, in 5 patients discectomy+condylectomy	Intraoperative cardiopulmonary complications in 10 pat.> hypo- or hypertension, arrhythmia Postoperative complications in 25 pat.> local infection, delirium, pneumonia, cardiovascular events, transient damage to facial nerve in 11 pat.> not longer than 6 months 2 Pat. deceased (cardiopulmonary arrest, fall) Follow-up 28-35 months: re-dislocation in 6 patients, success rate with eminectomy alone 86%, with combined eminectomy 91%.	This form of eminectomy is more suitable for older patients due to the scar at the level of the eminentia. This method should be used only in patients with contraindications to general anesthesia.	IV/k++
Tocaciu et al., 2018	Surgical management of recurrent dislocation of the temporomandibular joint:	Case series	N=14 Pat. with recurrent dislocations of the temporomandibular joint,	In all patients eminectomy + disc plication.	Follow-up for min. 12 months (max. 67 months): no new dislocation in any	In patients with recurrent dislocations, eminectomy is the surgical procedure of	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
	a new treatment protocol		in 4 pat. spontaneously without triggers	In the 4 patients with spontaneous dislocation, additional myotomy of the lat. pterygoid muscle	patient, 11 patients pain-free	choice, if necessary combined with capsular retraction and myotomy of the lat. pterygoid muscle	
Okamoto et al., 2019	Eminectomy with restraint of the joint capsule to treat chronic and recurrent dislocation of the temporomandibular joint	Case series	N=8 60 years (24-87), Pat. with chronic and recurrent dislocation of the temporomandibular joint, Pat. with systemic diseases (schizophrenia, bulimia, multi-infarct dementia, cerebrovascular diseases, lymphoma).	Eminectomy, capsular tightening with temporalis fascia, IMF for 1 week	Reluxation in 1 case after 6 months	Eminectomy for chronic and habitual dislocations, also well suited for patients with systemic diseases	IV/k-

Table 12: Blocking procedure as a restrictive technique for prevention of recurrence of dislocation (for studies with sample size n<6 see Annex German S3 guideline)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
Iizuka et al., 1988	Chronic recurrent anterior luxation of the mandible	Case series	n=12, ages 17-59	Dautrey's blocking procedure	Follow-up period 6 months - 5 years, no recurrence of dislocation, 3 patients for 1 month facial nerve palsy after 3 months initial pain disappeared	For Dautrey's blocking procedure fascia and periosteum should not be detached anteriorly from the zygomatic rch, otherwise fracture	IV/k+
Undt et al., 1997a	Treatment of recurrent mandibular dislocation, part I: Leclerc blocking procedure	Case series	n=9, ages 17-64 (-31.2) in case of steep eminence	Dautrey's blocking procedure	Follow-up period 2.5 - 5 years, 3 recurrences of dislocation due to resorption/ epileptic fit, translation	Dautrey's blocking procedure not recommended for older patients or patients with epilepsy,	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
					limited, clicking sound, pain	due to higher rate of recurrence of dislocation and complications (pain and noises)	
Kobayashi et al., 2000	Correction of recurrent dislocation of the mandible in elderly patients by the Dautrey procedure	Case series	n=12, ages 38-94, neurogenic dislocations, older patients	Dautrey's blocking procedure, 3 under local anaesthesia, oxidized regenerated cellulose and/or fibrin glue for fixation of zygomatic arch	Follow-up period 1.5 - 8 years, no recurrence of dislocation	Dautrey's blocking procedure under local anaesthesia also possible for older patients with history of cerebrovascular disease	IV/k+
Shibata et al., 2002	Treatment of habitual temporomandibular joint dislocation with miniplate eminoplasty: a report of nine cases	Case series	n=9, ages 46-87 all with existing morbidities (cerebral infarction, dementia, total paralysis, mentally retarded)	Blocking procedure with T-shaped titanium miniplate	Follow-up period 9-54 months, no recurrence of dislocation, 1 plate breakage	Blocking procedure with plate	IV/k+
Kuttenberger et al., 2003	Long-term results following miniplate eminoplasty for the treatment of recurrent dislocation and habitual luxation of the temporomandibular joint	Retrospective case study	n=20 including subluxations!	Miniplate blocking procedure	Follow-up period 2-7 years, 7 plate breakage, no recurrence of dislocation, pain reduced	Miniplate blocking procedure not recommended for recurrent dislocation due to high incidence of plate breakage	IV/k+
Cardoso et al., 2005	Comparative study of eminectomy and use of bone miniplate in the articular eminence for the treatment of recurrent temporomandibular joint dislocation	Retrospective case study	n=11 group 1: n=6, ages 18-40 group 2 (="controls"): n=5, ages 18-40	Group 1: blocking procedure with L-shaped titanium miniplate group 2: eminectomy	Follow-up period 3.5 - 16 months, no recurrence of dislocation, in 1 patient temporary auriculotemporal nerve lesion, group 1: MMO - 41.33 mm, 2/4 of patients pain-free, clicking sound disappeared in 2/3 of patients, remaining noise	Miniplate blocking procedure with miniplate as efficient re. recurrent dislocation as eminectomy, not as efficient re MMO, pain and noises	IIIb+ small sample size

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
					in 2 affected patients, and 2 patients with newly added noise group 2: MMO - 44.8mm, 2/3 of patients pain-free, clicking sound disappeared in 2/3 of patients, noise disappeared in 1/3 of patients		
Medra et al., 2007	Glenotemporal osteotomy and bone grafting in the management of chronic recurrent dislocation and hypermobility of the temporomandibular joint	Prospective case study	n=60, of which 20 with hypermobility!, ages 18-36	Blocking procedure: osteotomy, without capsulotomy, periosteum of inner surface of eminence to be kept intact to prevent resorption, autologous transplant (40 from iliac crest, 20 calvarial bone graft), inlay technique with sufficient space to condyle to avoid impingement, fixation with wire (10 patients), titanium miniplates (40), microplates (10) calvarial bone graft prefereable to transplant from iliac crest, as can be harvested by mere extension of incision, and is less frequently resorbed	Follow-up period 1-8 years, no resorption, 1 recurrence of dislocation due to accident in 5 patients for up to 3 months paralysis of anterior ramus of facial nerve, pain and clicking sound disappeared and mobility improved, 3 patients impingement by wires > removed (to be removed in any case)	Blocking procedure using autologous transplant, calvarial bone graft preferable to transplant from iliac crest, as can be harvested by mere extension of incision, and is less frequently resorbed	IV/k++
Güven, 2009	Management of chronic recurrent temporomandibular	Retrospective case study	n=19, group 1: n=12, ages 22-34	Group 1: blocking procedure, transplant from	Group 1: Follow-up 2-6	Blocking procedure using autologous material with same	IIIb+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
	joint dislocations: A retrospective study		group 2: n=7, ages 37-80, systemic disorders (1 amyotrophic lateral sclerosis, 1 epilepsy)	chin, inlay technique, greenstick fracture of lower segment intended, no fixation e.g. with wires, without capsulotomy group 2: eminectomy, always bilateral also if dislocation unilateral	years, MMO reduced by 11.67mm group 2: follow-up 1-12 years, MMO reduced by 7mm	success rate as eminectomy	young patients
Vasconc elos et al., 2009a	Treatment of chronic mandibular dislocations using miniplates: follow-up of 8 cases and literature review	Retrospective case study	n=8, ages 22-42	Blocking procedure with L-shaped titanium miniplate, fixation of short arm with 2 screws, long arm: below and in front of eminence	Follow-up period 48-69 months, 1 recurrence of dislocation after plate breakage, 2 unilateral patients plate breakage >eminectomy	Blocking procedure with miniplates	IV/k++
Ying et al., 2013	Modified Leclerc blocking procedure with miniplates and temporal fascial flap for recurrent temporomandibular joint dislocation	Prospective case study	n=7, ages 23-58 exclusion criteria: patient edentulous, old age, poor physical condition, disorders with uncontrolled muscle activity.	Dautrey's blocking procedure, break twice> 2 miniplates +temporal fascia sewn to lateral capsule	Follow-up period 6-24 months, no recurrence of dislocation, 3/5 patients pain-free, noise disappeared in all patients, however in 1 patient neu	Modified Dautrey's blocking procedure, especially for younger patients	IV/k++ small sample size
Baptist et al., 2017	Dautrey's Procedure Revisited in Management of Recurrent Mandibular Dislocation	Case series	N=6 Pat. with chronic recurrent bilateral dislocations	Dautrey's interlocking plastic> bilateral in all patients, no IMF afterwards, soft diet postoperatively	Follow-up 2-6 years: no new dislocations	In Dautrey locking plasty, fixation with wire provides sufficient stability to grant the position of the osteotomized bone and thus avoid reluxation	IV/k+
Jeyaraj et al., 2018	Chronic Recurrent Temporomandibular Joint Dislocation: A Comparison of Various Surgical	RCT	N=75 18-59 years (average 38 years)	Group A: n=25, Dautrey locking plasty, fixation with minis-crews.	Follow-up 8-36 months: Re-dislocation in 1 patient each from group B and	There is no upper age limit for patients for Dautrey locking plasty, or upper age limit can be	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
	Treatment Options, and Demonstration of the Versatility and Efficacy of the Dautrey's Procedure		Inclusion criteria: recurrent dislocations (min. 3 dislocations), pain on mouth opening, preauricular pain on chewing, MMO> 55mm In all patients conservative therapy for min. 3 months unsuccessful Exclusion criteria: Age< 18 years, patients on neuroleptics for neuro-psychiatric diseases, patients with seizures, patients in whom surgical therapy is contraindicated	Group B: n=25, eminectomy+ antibiotics pre- and postoperatively Group C: n=25, eminectomy+ disc plication to retrodiscal tissue and to the fascia temporalis+ antibiotics pre- and postoperatively	C, no re-dislocations in group 1. Significant reduction of MMO after 12 months in each group, largest reduction in group A. In group B incidence of residual pain and clicking noises highest, in group A no residual pain or clicking noises >Group C (eminectomy+arthroplasty) better results than group B (eminectomy) >overall best results in group A (Dautrey locking arthroplasty): less reluxations, less clicking noises, better pain reduction	extended to 45 years. Dautrey locking plasty shows the best results in the treatment of recurrent temporomandibular joint dislocations> no reluxations, few complications. Recommendation to fix the osteotomy with miniscrews in case of Dautrey's locking plasty> reduces the risk of recurrent dislocations	
Ihab et al., 2020	Assessment of patient-specific titanium onlay versus autogenous inlay eminoplasty technique for treatment of recurrent temporomandibular joint dislocation: a	RCT	N=10 25-55 years, recurrent bilateral dislocations (min. 2/day), 5 patients per group Exclusion criteria: systemic diseases	Group A: Experimental group: individual titanium implant for augmentation of the eminentia using the onlay procedure	Follow-up 1 year: no re-dislocation in either group, no postoperative joint sounds, implant instability or radiological evidence of resorption> results show no significant difference between groups	Patient-specific eminoplasty is another treatment option for recurrent TMJ dislocation, with MMO not significantly greater than autologous inlay technique	Ib+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
	randomized clinical trial		(diabetes, coagulation disorders, osteoarthritis, anamnestic TMJ surgery, osteoporosis, osteophytes)	Group B: Control group: autologous bone was harvested from the chin and attached to the eminentia as an inlay graft Both groups: postoperative soft diet, avoidance of wide mouth opening for 3 weeks			
Ihab et al., 2020	Patient-specific titanium onlay eminoplasty: A novel protocol for treatment of recurrent temporomandibular joint dislocation	Case series	N=5, patients with a history of at least two incidents of condylar dislocation per day, exclusion criteria: bleeding disorders, osteoarthritis, previous TMJ surgeries, osteoporosis and other bone metabolic disorders, diabetics, undergoing or planning chemo- or radiotherapy	Preoperative CT planning on a skull model, surgery under general anesthesia via an endaural incision, insertation of the implant and fixation with three srews, postoperative amoxicillin clavulanic acid 1g tab every 12 hours for the first week, soft diet, the postoperative recovery was uneventful, the mean maximal incisal mouth opening was reduced by 14,6mm	Neither recurrence nor condylar changes after 1-year follow-up period	the patient-specific titanium eminoplasty provided highly precise, less morbid and stable range of condylar movements, needs further investigations with larger sample size and longer follow-up periods for verifying the long-term results of this approach	IV/k+

Table 13: Surgical correction of capsular ligament complex

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **surgery on capsular ligament complex**	LoE
Georgiade, 1965	The surgical correction of chronic luxation of the mandibular condyle	Case series	n=7 "patients with extreme hypermobility"> subluxation!	Ligation (condylar neck to arcus) soft foods only	"successful"	Ligation	IV/k-
McFarlane, 1977	Recurrent dislocation of the mandible: Treatment of seven cases by a simple surgical method	Case series	n=7, ages 18-60 3 patients with hypermobility of other joints	Capsulorrhaphy IMF 1 week	Follow-up period 5 years, no new dislocation	Capsulorrhaphy	IV/k+
Torres et al., 2012	Arthroscopic electrothermal capsulorrhaphy for the treatment of recurrent temporomandibular joint dislocation	Retrospektive case study	n=11, ages 17-97 (-45) patients with temporomandibular joint disorders such as disk displacements or earlier surgery on temporomandibular joint not eligible	Arthroscopic electrothermal capsulorrhaphy, shrinkage of synovia limited to 15% >problem: no objective end point, elastic fixation on brackets for 3 weeks + 3 weeks nights only, 3 days liquid foods, soft foods only 6 weeks	Follow-up period 6 months - 6 years 2 recurrences of dislocation (1 patient capsulorrhaphy repeated + autologous blood, dislocation continues to recur nevertheless)	Arthroscopic electrothermal capsulorrhaphy	IV/k+
Ybema et al., 2012	Arthroscopic cauterization of retrodiscal tissue as a successful minimal invasive therapy in habitual temporo-mandibular joint luxation	Retrospective case study	n=16, ages 17-57, patients with sometimes extremely wide MMO, patients under neuroleptics not eligible	Arthroscopic cauterization in bilaminary zone+ 0.5 mL40mg/ mL methylprednisolon into area, NSAID 2 weeks	After 6 months: MMO significantly reduced, reduced pain in 1 patient of 2, 1 patient. with newly added clicking sound follow-up period 31 - 139 months,1 patient persisting pain and recurrence of dislocation, success rate 95% target cicatrisation/ fibrosis, as probably often	Electrothermal arthroscopic capsulorrhaphy	IV/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **surgery on capsular ligament complex**	LoE
					reason for success of surgery		
Vyloppilli et al., 2017	Surgical Correction of TMJ Bilateral Dislocation with Eminectomy and Capsulorrhaphy as an Adjuvant: Case Reports	Case series	N=2 23-25 years (w), recurrent bilateral dislocations	Man. Rep. under local anesthesia+ muscle relaxants+ head dressing> both pat. reluxations within 2 months>. Eminectomy+capsular retraction+ antibiotics for 5-7 days+ soft diet for 2 weeks.	Follow-up 1 year: no re-dislocations, anxiety reduction> adequate mouth opening	Capsular tightening is a restrictive procedure, but without long-term value, as the tightened capsule stretches again	IV/k+
Renapurkar et al., 2018	Injectable Agents Versus Surgery for Recurrent Temporomandibular Joint Dislocation	Survey article	Not applicable	Minimally invasive: sclerotherapy, injection of autologous blood, injection of botulinum toxin. Open-surgical: capsule lifting, eminectomy, eminoplasty with augmentation, myotomy of the M.pterygoideus lat.	Not applicable	In case of failure of minimally invasive therapy open surgery: primarily capsular retraction (as less invasive), then eminectomy	IV/k+
Okamoto et al., 2019	Eminectomy with restraint of the joint capsule to treat chronic and recurrent dislocation of the temporomandibular joint	Case series	N=8 60 years (24-87), Pat. with chronic and recurrent dislocation of the temporomandibular joint, Pat. with systemic diseases (schizophrenia, bulimia, multi-infarct dementia, cerebrovascular diseases, lymphoma)	Eminectomy, capsular tightening with temporalis fascia, IMF for 1 week	Reluxation in one case after 6 months	Eminectomy in combination with capsular retraction well suited for patients with chronic and recurrent dislocations	IV/k-

Table 14: Studies regarding adjuvant immobilization (only studies with sample size n>3)

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
Caminiti et al., 1998	Chronic Mandibular Dislocation: The Role Of Non-Surgical and Surgical Treatment	Non-systematic literature search, case series	n=3 age 73, f, for 10 years crossbite/ malocclusion, dentures, orthopanthomography: dislocation on the right side age 16, f, for 2 years (sustained in a fall), orthopanthomography age 45, f, 4 months earlier sustained in a fall, orthopanthomography: bilateral dislocation, X-ray to determine degree of dislocation	MMF for 2-5 weeks after manual or open reduction, bandage if general state of health is poor	IV/k+
Hasson et al..2001	Autologous blood injection for treatment of recurrent temporomandibular joint dislocation	Prospective case study	n=3, ages 25-55, recurrent dislocation, 1 patient not sufficiently stable for surgery 1 patient s/p eminectomy	Elastic bandage for 24 hrs after autologous blood injection	IV/k+
Fu et al., 2009	Long-term efficacy of botulinum toxin type A for the treatment of habitual dislocation of the temporomandibular joint	Prospective case study	n=5, ages 55-81, recurrent dislocation, history of neurological/ systemic disorders: fraction of the spinous process, cerebral hemiplegia, cerebral atrophy +chronic nephropathy, osteoporosis + femoral neck fracture, COPD Treatment planning based on CT	MMF for 4-5 days after botulinumtoxin injection	IV/k+
Güven, 2009	Management of chronic recurrent temporomandibular joint dislocations: A retrospective study	Randomized controlled trial	n=19, group 1: n=12, ages 22-34	MMF for 1 week after blocking procedure	IIIb+

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
			group 2: n=7, ages 37-80, systemic disorders (in 1 amyotrophic lateral sclerosis, in 1 epilepsy)		
Daif et al., 2010	Autologous blood injection as a new treatment modality for chronic recurrent temporomandibular joint dislocation	Randomized controlled trial	n=45, ages 20-56 15 patients per group	Elastic bandage for 24 hrs after autologous blood injection	Ib+
Huang et al., 2011	Management of long-standing mandibular dislocation	Case series	n=6, ages 33-75, persisting dislocations, systemic disorders, COPD	Bandage after manual reduction of persisting dislocation, MMF after open reduction	IV/k+
Torres et al., 2012	Arthroscopic electrothermal capsulorrhaphy for the treatment of recurrent temporomandibular joint dislocation	Retrospective case study	n=11, ages 17-97 (-45) patients with temporomandibular joint disorders, such as disk displacement, or earlier surgery on temporomandibular joint not eligible	Elastic fixation on brackets for 3 weeks + 3 weeks at night only after electrothermal arthroscopic capsulorrhaphy	IV/k+
Hegab et al., 2013	Treatment of chronic recurrent dislocation of the temporomandibular joint with injection of autologous blood alone, intermaxillary fixation alone, or both together: a prospective, randomised, controlled clinical trial	Randomized controlled trial (block randomization)	n=48, ages 23-53 16 patients per group include subluxations!	MMF for 4 weeks with wire, arch bars, or on brackets after autologous blood injection	Ib+
Agbara et al., 2014	Temporomandibular joint dislocation: experiences from Zaria, Nigeria	Retrospective analysis of patient files	n=26, 16, m, ages 17-90 (-39.8), 96% bilateral, 46.2% acute, 42.3% chronic causes: 50% yawning, 20% trauma, 12% antipsychotics	MMF optional after manual reduction, MMF after bite block therapy	IV/k++

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
Coser et al., 2015	Autologous blood injection for the treatment of recurrent mandibular dislocation	Case series	n=11, recurrent dislocations (at least 3 times during last 6 months, self- reduction unsuccessful), ages 15-50 (-27.8), 8 f. Exclusion criteria: mental illnesses, connective tissue disease, parafunction, short lower third of face	24 hrs elastic bandage for 2 weeks afterwards during sleep only after autologous blood therapy	IV/k+
Jaisani et al., 2015	Use of cervical collar in temporomandibular dislocation (abstract only)	Case series	Not specified	Cervical collar/ neck brace/ Stif neck after non-surgical methods of reduction	V/k-
Yesiloglu et al., 2015	The lever technique for the external reduction of temporomandibular joint dislocation	Case series	n=29, ages 24-44 (-23.6), 20 f, 21 unilateral causes: yawning during sleep in 14 patients, taking a large bite in 6 patients, dental surgery on third molar in 5, laughing in 3 X-ray for confirmation of diagnosis and asessment of pericondylar bone apposition	Elastic bandage after manual reduction	IV/k+
Chin et al., 2016	Delayed Management of Unrecognized Bilateral Temporomandibular Joint Dislocation: A Case Report	Case report	N=1 24 years (m), bilateral anterior dislocation after car accident+ intubation+ seizure 5 months ago	IMF for 2 weeks after manual reduction	V/k+
Dellon et al., 2016	Jaw Dislo-cation as an Unusual Complication of Upper Endoscopy	Case report	N=1 48 years (w), unilateral anterior dislocation after endoscopy	jaw strap for 7 days after manual reduction	V/k-
Rakotomavo et al., 2016	Temporomandibular joint dislocation during status epilepticus	Case report	N=1 32 years (w), unilateral dislocation after epileptic seizure in	IMF with elastic bands after manual reduction (no specification of the duration)	V/k-

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
			which a biting wedge was used		
Yoshioka et al., 2016	Autologous Blood Injection for the Treatment of Recurrent Temporomandibular Joint Dislocation	Case series	N=5 Inclusion criteria: Age> 16 years, recurrent temporomandibular joint dislocations diagnosed according to Nitzan's criteria, failure of conservative therapy methods. Exclusion criteria: inflammatory or tumorous diseases of the temporomandibular joint, diseases of the temporomandibular joint caused by metabolic diseases, severe systemic diseases, therapy with anticoagulants, psychiatric diseases	head bandage for 7 days after injection of autologous blood	IV/k-
Gholami et al., 2017	Chronic Long-Standing Temporomandibular Joint Dislocation: Report of Three Cases and Review of Literature	Case series	N=3 Pat.1: 50 Jahre (w), chronisch bilaterale Dislokation seit 4 Monaten Pat.2: 70 Jahre (w), chronische bilaterale Dislokation seit 8 Monaten Pat.3: 73 Jahre (w), chronisch bilaterale Dislokation seit 4 Monaten Pat.1: 50 years (w), chronic bilateral dislocation since 4 months Pat.2: 70 years (w), chronic bilateral dislocation since 8 months	IMF für 10 Tage nach Myotomie des M.pterygoideus und offener Rep. IMF for 10 days after myotomy of the pterygoid muscle and open rep.	IV/k+

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
			Pat.3: 73 years (w), chronic bilateral dislocation since 4 months		
Silveira et al., 2017	Traumatic Anterosuperior Dislocation of the Intact Mandibular Condyle into the Temporal Fossa	Case report	N=1 27 years (m), fracture of the arcus zygomaticus, the right condyle, the mandible on the right side and anterior-superior dislocation of the left condyle into the fossa temporalis	IMF for 2 weeks after open reduction	V/k+
Srinath et al., 2017	Superolateral dislocation of the intact mandibular condyle: report of a rare case with a review	Case report	N=1 48 years (w), superolateral dislocation after fall 2 days ago	IMF for10 days after manual reduction	V/k+
Anjari et al., 2018	Non-traumatic dislocation	Case report	N=1 66 years (m), chronic bilateral dislocation after dental treatment	IMF for 3 weeks after manual reduction	V/k-
Boccalatte et al., 2018	Reduction of bilateral dislocation of TMJ and Rendu Osler Weber syndrome: case report and physiopathological model	Case report	N=1 46 years (m), bilateral anterior dislocation, patient with intubation after lung transplantation, taking haloperidol and risperidone because of delirium, comorbid: hereditary hemorrhagic telangiectasia	Head bandage after manual reduction (no specification of duration)	V/k+
Campbell et al., 2018	Condylectomy: treatment of recurrent unilateral dislocationof the temporomandibular joint in a patient with Ehlers-Danlos syndrome	Case report	N=1 21 years (w) with Ehlers-Danlos syndrome, unilateral dislocation, conservative therapy not successful	IMF for 4 weeks after unilateral condylectomy	V/k+
Kargol et al., 2018	When words hurt … literally. A case report	Case report	N=1 15 years (m), bilateral anterior dislocation in	IMF with elastic bands after manual	V/k-

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
	of temporomandibular joint dislocation in a patient with Tourette's syndrome		Tourette syndrome, anamnestic history of subluxations	reduction (no specification of duration)	
Segami et al., 2018	Tethering technique using bone screws and wire for chronic mandibular dislocation: a preliminary study of refractory cases	Case series	N=8 Mean age 74 years (65-84), 5 patients with chronic dislocation, 3 patients with habitual dislocation	Head bandahe after blocking procedure (no specification of duration)	IV/k+
Nabil et al., 2019	Long-Term Follow-Up following Condylotomy in a Case of Traumatic Unilateral Anterosuperior Mandibular Condyle Dislocation	Fallbericht	N=1 19 years (m), unilateral dislocation (anterior-superior) after motorcycle accident	IMF for 6 weeks after condylectomy	V/k+
Okamoto et al., 2019	Eminectomy with restraint of the joint capsule to treat chronic and recurrent dislocati-on of the temporo-mandibular joint	Case series	n=8 60 years (24-87), Pat. with chronic and recurrent dislo-cation of the tem-poromandibular joint, Pat. with systemic diseases (schizophrenia, bulimia, multi-infarct dementia, cerebrovascular diseases, lympho-ma).	IMF for 1 week after eminectomy	IV/k-
Ruiz et al., 2019	Spontaneous Temporomandibular Joint Dislocation	Case report	N=1 36 years (w), bilateral dislocation after 14-day tracheostomy after accident> unclear when the dislocation occurred	IMF for 4 weeks after manual reduction	V/k-
Toufeeq et al., 2019	Bilateral Dislocation of Mandibular Condyles following General Anesthesia—An Overlooked Problem: A Case Report	Case report	N=1, case of dislocation of TMJ following tracheal intubation overlooked for a prolonged period, dislocation of the mandibular condyle into the temporal fossa	immobilization for 4 weeks after condylectomy	V/k+

Author, Year	Title	Study Design	Patient Sample	Type and duration of adjuvant **immobilization**	LoE
Xu et al., 2019	Computer-Aided Design and Computer-Aided Manufacturing Cutting Guides in Eminoplasty for the Treatment of Temporomandibular Joint Dislocation	Case series + survey article	N=2 67-69 years, recurrent chronic dislocations 28 studies, total n=268	IMF for 2 weeks after eminoplasty	IV/k++
Cohen et al., 2020	Temporomandibular Joint Dislocation following Pterygomasseteric Myotomy and Coronoidectomy in the Management of Postradiation Trismus	Case series	N=2 Pat. 1: 64 years (m), unilateral dislocation after coronoidectomy and pterygoid myotomy Pat. 2: 68 years (m), unilateral dislocation after unilateral mandibulectomy and bilateral coronoidectomy	IMF for 2 weeks after manual reduction	IV/k+
Turgut et al., 2020	Bilateral temporomandibular joint luxation in a 6-month-old child: Case report	Case report	N=1 Pat. 6 months old	Chin cap for 4 weeks after manual reduction	V/k+
Li et al., 2021	Bilateral temporomandibular joint dislocations post-bronchoscopy in a case of paclitaxel-induced pneumonitis	Case report	N=1 62 years (w), bilateral dislocation after upper bronchoscopy	Chin cao for 6 weeks after manual reduction	V/k-

Table 15: Reported complications (no studies with sample size n<6)

Reported **complications**	Author, Year	Therapy	Prevalence	Number of patients, LoE
Recurrence of dislocation	Helman et al., 1984	Eminectomy	12.5%	n=8, IV/k+
	Oatis et al., 1984	Eminectomy	6.8%	n=44, IV/k++
	Shorey et al., 2000	Dautrey's blocking procedure Eminectomy	9% 5%	n=58 (several studies), n=175 (several studies), V/k++
	Sato et al., 2003	Eminectomy	27.3% (no additional surgery required, as infrequent or self-reduction successful)	n=11, IIb+ n=13

Reported **complications**	Author, Year	Therapy	Prevalence	Number of patients, LoE
		arthroscopic eminectomy	30.8% (no additional surgery required as infrequent or self-reduction successful)	
	Ziegler et al., 2003	Botulinumtoxin	9.5% during treatment period > interval of injections shortened 19% after follow-up period (7-19 months after treatment)	n=21, IV/k+
	Vasconcelos et al., 2009a	Augmentation	12.5%	n=8, IV/k++
	Daif et al., 2010	Injection of autologous blood into upper intra-articular space, injection of autologous blood into upper intra-articular space + pericapsularly only	40% 20%	n=15 n=15 Ib+
	Candirli et al., 2012	Autologous blood injection	21.4% after follow-up	n=14, IV/k++
	Tones et al., 2012	arthroscopic cauterisation	18.2%	n=11, IV+
	Ybema et al., 2012	arthroscopic cauterisation	6.3%	n=16, IV/k++
	Hegab et al., 2013	Autologous blood therapy IMF	37.5%> require second (25%) or third (12.5%) injection 18.8% (2 weeks after treatment)	n=16, Ib+ n=16
	Ungor et al., 2013	Sclerotherapy	10% after first injection	n=10, IV/k++
	Zhou et al., 2013	Sclerotherapy	8.9% after completion of treatment (57.8% require one injection, 24.4% require two injections, 8.9% require three injections)	n=45, IV/k++
	Bayoumi et al., 2014	Autologous blood therapy	20% (2 weeks after injection)	n=15, IV/k++
	Coser et al., 2015: IV+	Autologous blood therapy	27% recurrence of dislocation (2 months and 6 months after injection)	n=11, IV/k+
	Almeida et al., 2016	Blocking procedure	2,27%	n=88, V/k++
	Jeyaraj et al., 2017	Eminectomy	4% (in the group of eminectomy with n=50)	n=75, Ib+

Reported **complications**	Author, Year	Therapy	Prevalence	Number of patients, LoE
	Patel et al., 2017	Autologous blood therapy	20%	n=10, IV/k+
	Yoshida et al., 2017	Autologous blood therapy	9,53%	n=21, IV/k+
	Segami et al., 2018a	Redressive method	12%	n=50, IV/k++
	Segami et al., 2018b	Blocking procedure	12,5%	n=8, IV/k+
	Okamoto et al., 2019	Eminectomy	12,5%	n=8, IV/k+
	Aamir et al., 2020	Autologous blood therapy	20%	n=15, Ib-
	Garcia Martin et al., 2020	Arthroscopic eminoplasty	18,18%	n=11, IV/k+
Permanence, recurrence or deterioration of accompanying symptoms and complaints (pain, clicking sound, crepitus)	Helman et al., 1984	Eminectomy	12.5%	n=8, IV/k+
	Oatis et al., 1984	Eminectomy	11.4%	n=44, IV/k++
	Undt et al., 1997a	Dautrey's blocking procedure	66.6%	n=8, IV/k+
	Undt et al., 1997a	Eminectomy	71.4%	n=14, IV/k+
	Segami et al., 1999	Arthroscopic eminectomy	60%	n=5, IV/k+
	Shorey et al., 2000	Dautrey's blocking procedure Eminectomy	7% <5%	n=58 (several studies), n=175 (several studies) V/k++
	Sato et al., 2003	Eminectomy arthroscopic eminectomy	9.1% pain persistent/new, 18.2% noises persistent/new 15.4% pain persistent/new, 53.8% noises persistent/new	n=11, IIb+ n=13
	Cardoso et al., 2005	Blocking procedure	33.3%	n=6, IIIb+
	Vasconcelos et al., 2009b	Eminectomy	27.5%	n=10, IV/k++
	Ybema et al., 2012	Arthroscopic. Cauterisation	12.5%	n=16, IV/k++

Reported **complications**	Author, Year	Therapy	Prevalence	Number of patients, LoE
	Ungor et al., 2013	Sclerotherapy	0.1%	n=10, IV/k++
	Ying et al., 2013	Dautrey's blocking procedure	42.9%	n=7, IV/k++
	Cremer et al., 2016	Eminectomy	25%	n=8, IV/k+
	Jayaraj et al., 2017	Eminectomy	20%	n=75, Ib+
	Aamir et al., 2020	Autologous blood therapy	20%	n=15, Ib-
Significant reduction of MMO	Ziegler et al., 2003	Botulinumtoxin (-7mm)	Only established in 4 patients	n=21, IV/k+
	Güven, 2009	Blocking procedure (-11mm), eminectomy (-3mm)	Mean of all patients	n=12, IIIb+ n=7
	Daif et al., 2010	injection of autologous blood into upper intra-articular space (-3.6mm) injection of autologous blood into upper intra-articular space + pericapsular only (-5.3mm)	Mean of all patients	n=15 n=15 Ib+
	Ybema et al., 2012	Arthroscopic cauterisation (-7mm)	Mean of all patients	n=16, IV/k++
	Hegab et al., 2013	Autologous blood therapy (-8.5mm) IMF (-9.13mm) Autologous blood therapy + IMF (-1 lnun)	Mean of all patients	n=16, Ib+ n=16 n=16
	Jeyaraj et al., 2017	Group A (n=25) blocking procedure, group B (n=25) eminectomy	Mean of all patients	n=75, Ib+
	Patel et al., 2017	Autologous blood therapy	Mean of all patients	n=10, IV/k+
	Machon et al., 2018	Autologous blood therapy	Mean of all patients	n=40, Ib++

Reported **complications**	Author, Year	Therapy	Prevalence	Number of patients, LoE
	Bukhari et al., 2020	Autologous blood therapy	Mean of all patients	n=80, IIb+
Breakage of plate in blocking procedure	Vasconcelos et al., 2009a	Blocking procedure	25%	n=8, IV/k++
	Segami et al., 2018b	Blocking procedure	25%	n=8, IV/k+
Zygomatic fracture	Shorey et al., 2000	Dautrey's blocking procedure	5%	n=58 (several studies), V/k++
Dysphagia	Daelen et al., 1998	Botulinumtoxin therapy	12%	n=25, IV/k+
	Bouso et al., 2010	Botulinumtoxin therapy	25%	n=4, IV/k+
Nerve lesions (temporary, for a maximum of 3 months)	Helman et al.,	Eminectomy	12.5%	n=8, IV/k+
	Oatis et al., 1984	Eminectomy	20.5%	n=44, IV/k++
	Iizuka et al., 1988	Dautrey's blocking procedure	25%	n=12, IV/k+
	Shorey et al., 2000	Dautrey's blocking procedure Eminectomy	8% 12%	n=58 (several studies) n= 175 (several studies) V/k++
	Sato et al., 2003	Eminectomy, arthroscopic emi-nectomy	18.2% 15.4%	n=11, IIb+ n=13
	Medra et al., 2007	Blocking procedure	12.5%	n=40, IV/k++
	Ungor et al., 2013	Sclerotherapy	0.1% (for 60 min.)	n=10, IV/k++
	Kummoona, 2010	Reconstruction of the temporoman-dibular joint or open reduction	12.5%	n=80, IIb-
	Balaji et al., 2018	Blocking procedure	5,26%	N=19, IV/k+
	Segami et al., 2018a	Redressive method	22%	N=50, IV/k++
	Garcia Martin et al., 2020	Arthroscopic emi-noplasty	18,18%	N=11, IV/k+

Reported **complications**	Author, Year	Therapy	Prevalence	Number of patients, LoE
Malocclusion	Agbara et al., 2014	Osteotomies	67%	n=3, IV/k++

Table 16: Non-surgical treatment methods (studies with sample size n<6)

Author, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
Littler, 1980	The role of local anaesthesia in the reduction of longstanding dislocation of the temporomandibular joint	Case report	n=1 age 54 persistent (for 7 weeks)	Reduction with physician in front of/ behind patient/ according to Fordyce unsuccessful, 2 mL each side 3% Citanest + Octapressin, allow 10 min. to take effect, then perform reduction one side at a time, ~~a~~moxicillin for 1 week	After 6 weeks full lateral mobility (vertical?)	V/k+
Kai et al., 1991	Conservative treatment of a patient with habitual anterior dislocation of the temporomandibular joint. Relation to incoordination of the disc.	Case report	n=1 age 31, dislocation whenever mouth is opened >28 mm, masticatory muscles tense, impaired occlusion, clicking sound when mouth is opened arthrotomography, fluorography	Bite splint	No recurrence of dislocation, clicking continues	V/k+
Kurita et al., 1996	Closed reduction of chronic bilateral temporomandibular joint dislocation	Case report	n=1, age 71, persistent (for 8 weeks)	Manual reduction under general anaesthesia unsuccessful, with bone retractor unsuccessful and arrhythmia, IMF	After 9 months full reduction	V/k+
Lowery et al., 2004	The wrist pivot technique, a novel technique for temporomandibular joint reduction	Case report	n=1, age 53 Hippocratic method of reduction under sedation + analgesia unsuccessful	Wrist pivot technique	Reduction	V/k-
Chan et al., 2008	Mandibular reduction	Review article	n=0	1) patient in sitting position, head stabilized on head rest, patient's lower jaw below physician's elbow, bite block + fingers splint on thumb, fingers wrap around chin and exert upward		V/k-

Author, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
				pressure to achieve lever action on and rotation of condyle 2) patient recumbent 3) from behind 4) ipsilaterally: first extraorally, then intraorally then in combination 5) wrist pivot technique: parallely on both sides 6) by inducing gag reflex		
Hsiung et al., 2008	Closed reduction of a temporomandibular joint dislocation: is this possible with regional anaesthesia?	Case report	n=1 age 15	Sedation + analgesia, topical anaesthesia, nerve block manual Hippocratic method of reduction	Reduction	V/k-
Young et al., 2009	Use of Masseteric and Deep Temporal nerve block for Reduction of Mandibular Dislocation	Case report	n=1 age 84 unilateral dislocation	Reduction without medication unsuccessful, no sedation due to old age >local anaesthesia capsule + masseteric and temporal nerve block	Little pain under reduction	V/k+
Cheng, 2010	Unifled Hands Technique for Mandibular Dislocation	Case series	n=4 years FU, 3 patients, unilateral	Manual Hippocratic method of reduction under sedation unsuccessful > for added force place both thumbs intraorally on same side	Reduction	IV/k-
Shakya et al., 2010	Chronic bilateral dislocation of temporomandibular joint	Literature overview and case report	n=1 age 48, persisting dislocation (for 4 months)	Local anaesthesia in pterygoid region, manual Hippocratic method of reduction For 1 week: avoid opening mouth widely and Barton's bandage	Follow-up period 3 months, no recurrence of dislocation	V/k+

Author, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
				After 3 weeks: re-introduction of dentures		
Thangarajah et al., 2010	Bilateral temporo-mandibular joint dislocation in a 29-year-old man: a case report	Case report	n=1, age 29	Manual Hippo-cratic method of reduction under sedation unsuc-cessful and re-maining pain> re-fuses local anaes-thesia and re-ceives general an-aesthesia + mus-cle relaxant then manual Hippo-cratic method of reduction 24 hrs Philadel-phia collar, no ex-cessive move-ments of jaw	Reduction	V/k+
Cohen et al., 2014	New facial asym-metry: a case of unilateral tem-poromandibular joint dislocation	Case report	n=1, w, age 78, pain in left. jaw af-ter endoscopy, X-ray and CT diagno-ses	Manual reduction under sedation	Reduction	V/k-
Han et al., 2014	Dislocation of the temporomandibu-lar joint following general anaesthe-sia	Case series	N=2, age 34, m, with history of dis-location in, age 18, f	Manual reduction	Reduction	V/k-
Karthik et al., 2014	Temporomandib-ular joint disloca-tion due to atypi-cal antipsychotic-induced acute dystonia: a case report	Case report	n=1, m, 25 dislocation under risperidone 2mg/day and un-der amisulpride 100mg/day	Promethazine in-stead of Risperi-done, anticholin-ergics, benzodiaz-epines; prometha-zine and baclofen instead of amisul-pride, manual re-duction under lo-cal anaesthesia; later olanzapine	Reduction	V/k-
Lorenzo et al., 2014	Bilateral temporo-mandibular joint dislocation after upper gastrointes-tinal endoscopy in an intensive care unit patient: a rare complication	Case report	n=1, m, no previ-ous CMD or dislo-cations After gastrointes-tinal endoscopy, patient unable to close jaws and temporomandibu-lar joint socket empty	Manual reduction with Nélaton ma-noeuvre	Reduction	V/k-

Author, Year	Title	Study Design	Patient Sample	**Therapy**	Results	LoE
Forshaw, 2015	Reduction of temporomandibular joint dislocation: an ancient technique that has stood the test of time	The history of manual Hippocratic method of reduction: remains the best-proven technique				V/k-
Hebard, 2015	iTMJ reduction	Case report	n=1, age 67, m., recurrent dislocations	3 mL 1% Lidocaine into medial pterygoid muscle Hippocratic method of reduction 3 hrs Barton's bandage	Reduction	V/k+
Momani et al., 2015	Rehabilitation of a Completely Edentulous Patient with Nonreducible Bilateral Anterior Dislocation of the Temporomandibular Joint: A Prosthodontic Challenge-Clinical Report	Case report	n=1, age 83, f, recurrent dislocations	Manual reduction, 3 attempts (under muscle relaxant, under sedation, general anaesthesia) > unsuccessful Patient refuses new attempts at reduction, too sick for surgery > palliative care with dentures to prevent malnutrition	Follow-up period after 1 year: more foods manageable, reduced pain, MMO wider	V/k+
Ogawa et al., 2015	Conservative reduction by lever action of chronic bilateral mandibular condyle dislocation (abstract only)	Case report	n=1, age 31, f, dislocation for 3 years, no reduction	Treatment of chronic dislocation by conservative reduction by lever action, as patient refuses general anaesthesia > reduction after 3 weeks braces for 2 months	After 6 days subluxation of tooth	V/k+
Sriganesh et al., 2015	Temporomandibular joint dislocation during tracheal intubation in a patient with Sjogren syndrome	Case report	n=1, age 34, f, patient required intubation soon after onset of Sjögren's syndrome > during extubation dislocation suspected (unable to close mouth, X-ray)	Manual Hippocratic method of reduction under propofol	Reduction	V/k-

Table 17: Medication for appropriate pain management during manual reduction (studies with sample size n<6)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
Littler, 1980	The role of local anaesthesia in the reduction of longstanding dislocation of the temporomandibular joint	Case report	n=1 age 54 persistent (for 7 weeks)	Reduction with physician in front of/ behind patient/ according to Fordyce unsuccessful, 2 mL each side 3% Citanest + Octapressin , allow 10 min. to take effect, then perform, reduction one side at a time, amoxicillin for 1 week	After 6 weeks full vertical excursion movements	Persisting dislocation, reduction under local anaesthesia successful	V/k+
Hsiung et al., 2008	Closed reduction of a temporomandibular joint dislocation: is this possible with regional anaesthesia?	Case report	n=1 age 15	Sedation + analgesia, topical anaesthesia, nerve block manual Hippocratic method of reduction	Reduction	Sedation + analgesia + local anaesthesia (surface anaesthesia + nerve block)	V/k-
Young et al., 2009	Use of Masseteric and Deep Temporal nerve block for Reduction of Mandibular Dislocation	Case report	n=1 age 84 unilateral dislocation	Reduction without medication unsuccessful, no sedation due to old age > local anaesthesia capsule + masseteric and temporal muscle nerve block	Reduction under little pain	Old age possible contra-indication of sedation, requires long time to take effect if administered orally, instead local anaesthesia + nerve block	V/k+
Thangaraj ah et al., 2010	Bilateral temporomandibular joint dislocation in a 29-year-old man: a case report	Case report	n=1, age 29	Manual Hippocratic method of reduction under sedation unsuccessful and persisting pain> refuses local anaesthesia and receives general anaesthesia + muscle relaxant then Hippocratic	Reduction	Adjust dosage of medication to patient's requirements, always use sedation combined with analgesia (analogsedation)	V/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **medication during manual reduction**	LoE
				method of reduction 24 hrs Philadelphia collar, no excessive movements of jaw			
Hebard, 2015	iTMJ reduction	Case report	n=1, age 67, m, recurrent dislocations	3m 11% Lidocaine into medial pterygoid muscle Hippocratic method of reduction 3 hrs Barton's bandage	Reduction	If initially unsuccessful without medication, local anaesthesia in Medial pterygoid muscle before manual reduction	V/k+
Sriganesh et al., 2015	Temporomandibular joint dislocation during tracheal intubation in a patient with Sjogren syndrome	Case report	n=1, age 34, f, patient required intubation soon after onset of Sjögren's syndrome > during extubation dislocation suspected (unable to close mouth, X-ray)	Manual Hippocratic method of reduction under propofol	Reduction	Propofol for sedation	V/k-

Table 18: Minimally invasive therapy (studies with sample size n<6)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **minimally invasive therapy**	LoE
Safran et al., 1994	The effect of experimental hemarthrosis an joint stiffness and synovial histology in a rabbit model	Animal experiment	23 rabbits (1 was lost) without fracture	Injection of autologous blood 0.9 mL into one ankle joint, NaCl into another, immobilization none/10/28 days (randomization) pressure as in case of haemarthrosis	Stiffness, (arthrography) histology (blinded)	Injection of autologous blood in rabbits temporarily increased stiffness and inflammation compared to NaCl-injection, immobilisation does not enhance effect	IV/k++
Daelen et al., 1998	Treatment of neurogenic temporomandibular joint dislocation with botulinum toxin	Prospective case study	n=5 ages 35-68, 1 multiple sclerosis, 2 oromandibular dystonia, 1 apallic syndrome, 1 pseudobulbar palsy » neurogenic (=muscular) recurrent dislocation, occlusion-induced temporomandibular disorders not eligible, MRT>1 patient anterior disk displacement	Botulinumtoxin 10-20 ME, minimum interval 2 months, reinjection in case of recurrence of dislocation or prophylactic after normalization of interincisal distance, duration of therapy 4 months Contra-indications: pulmonary disorders because of risk of aspiration pneumonia, disorders of the neuromuscular transmission, anterior horn diseases, myopathies	Follow-up period 6- 36 months, 5 recurrences of dislocation during treatment period, adverse side-effects: MMO significantly reduced (up to 25%) for 3-4 months, for a maximum of 3 weeks pain, dysphagia, haematoma, dysarthria	Treatment with botulinum toxin in case of neurogenic dislocation	IV/k+
Hasson et al., 2001	Autologous blood injection for treatment of recurrent temporomandibular joint dislocation	Prospective case study	n=3, ages25-55, recurrent dislocation, 1 patient not sufficiently stable for surgery, 1 patient s/p eminectomy	Injection of autologous blood 4 mL upper joint space + 1 mL pericapsularly, local anaesthesia (and sedation) or general anaesthesia	Follow-up period 1- 3 years, no recurrence of dislocation	Autologous blood therapy	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **minimally invasive therapy**	LoE
				24 hrs elastic bandage, for 1 week antibiotics and NSAID, for 1 week soft foods only and avoid opening mouth widely, from 2nd week physiotherapy until normal mouth opening and movement restored			
Schwartz et al., 2002	Treatment of temporomandibular joint disorders with botulinum toxin	Übersicht	n/a	n/a	n/a	Botulinumtoxin for treatment of patients with craniomandibular dysfunctions (dystonia, hypermobility)	V/k+
Hooiveld et al., 2003	Short-Term Exposure of Cartilage to Blood Results in Chondrocyte Apoptosis	Laboratory study	n/a	n/a	n/a	In vitro, blood induces chondrocyte apoptosis >may cause damage to cartilage	IV/k+
Martinez-Perez et al.,.2004	Recurrent Temporomandibular Joint dislocation treated with botulinum toxin: report of 3 cases	Case series	n=3, ages 17-24, recurrent dislocation	20 or 50 MU Botulinumtoxin, repeat injection if dislocation recurs	Injection of 50 MU: after 1 week velopharyngeal incompetence for 2 weeks, 2 patients without recurrence of dislocation., 1 patient with reduced rate of recurrence	Botulinumtoxin, effect after a few days and for 3-6 months	IV/k-
Matsushita, 2006	OK-432 (Picibanil) sclerotherapy for recurrent dislocation of the temporomandibular joint in elderly edentulous patients: Case reports	Case series	n=2, ages 68.91, progressive supranuclear palsy, dementia	Sclerotherapy 2 mL upper intraarticular space, 2 mL pericapsular	Follow-up period 6 months, On day after treatment: fever, pain, swelling> analgesia Poatential adverse side-effects pneumo-	Sclerotherapy, important alternative therapy for patients with increased surgical risk (old age, moltimorbidity)	V/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **minimally invasive therapy**	LoE
					nia, anaphylactic shock, thrombosis		
Kato et al., 2007	Autologous blood injection into the articular cavity for the treatment of recurrent temporomandibular joint dislocation: a case report.	Case study	n=1, age 84, recurrent dislocation s/p brain haemorrhage, conservative treatment unsuccessful, declines surgery	Injection of autologous blood 3ml, at top + lml pericapsularly, local anaesthesia, bandage for 1 month	Follow-up period 5 months, on first days: subluxations	Autologous blood therapy, insufficiently reserarched re. potential damage to cartilage, therefore not for younger patients or patients with joint degeneration (e.g. rheumatoid arthritis)	V/k+
Fu et al., 2009	Long-term efficacy of botulinum toxin type A for the treatment of habitual dislocation of the temporomandibular joint	Prospective case study	n=5, ages 55-81, recurrent dislocation, history of neurological/ systemic disorders: fraction of the spinous process, cerebral hemiplegia, cerebral atrophy +chronic nephropathy, osteoporosis + femoral neck fracture, COPD Treatment planning based on CT	Botulinumtoxin 25-50 ME/ side, single injection, IMF for 4-5 days	Follow-up period 3 months (patient deceased) - 2 years 1 recurrence of dislocation on 2nd day after injection	Botulinumtoxin especially in case of older patients with history of neurological/ systemic disorders	IV/k+
Pinto et al., 2009	The use of autologous blood and adjunctive “face lift” bandage in the management of recurrent TMJ dislocation.	Case report	n=1, age 83, recurrent dislocation, unfit for general anaesthesia, also not operable in any other way	Autologous blood therapy, 10 mL into upper intra-articular space and pericapsularly compression bandage ”face lift bandage” for 1 month	Follow-up period 1 year, no recurrence of dislocation.	Autologous blood therapy in case of multimorbidity, in addition head bandage for immobilization of joints	V/k+
Bouso et al., 2010	Neurogenic temporomandibular joint dislocation treated with botulinum	Case series	n=4, ages 23 - 88, all neurogenic recurrent dislocations (hemiparesis,	Botulinumtoxin 25MU/side	Follow-up period 5- 22 months, 1 patient with recurrence of dislocation after 1	Botulinumtoxin treatment of neurogenic dislocation	IV/k+

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **minimally invasive therapy**	LoE
	toxin: report of 4 cases		dystonia, spasticity, Alzheimer's disease, Parkinson's disease, myotonic dystrophy		year> injection 40 +10 at front >dysphagia, 1 patient with recurrence of dislocation. after 5 months > renewed injection		
Candirli et al., 2011	Histopathologic evaluation of autologous blood injection to the temporomandibular joint	Animal experiment	8 rabbits, 7 autologous blood bilaterally, 1 control	1 mL into upper intra-articular space, 0.5 mL pericapsularly, IMF for 24 hrs , soft foods only, after 1 month histopathologic evaluation	1 week problems chewing or reduced mobility, histopathologic evaluation >no chondroporosis, but also no formation of connective tissue, some fibrin formation only (inflammation)	Injection of autologous blood in rabbits without long-term effect on fibrin formation and cartilage in joint (mobility reduced only briefly)	IV/k+
Stark et al., 2015	Recurrent TMJ Dislocation Managed with Botulinum Toxin Type A Injections in a Pediatric Patient (abstract only)	Case report	n=1, child, idiopathic muscular hyperactivity > recurrent dislocations	Injection of botulinum toxin type A into lower lateral pterygoid muscles	Not specified	Treatment of recurrent dislocations in child caused by idiopathic muscular hyperactivity with Botulinumtoxin injections	V/k+
Yoshioka et al., 2016	Autologous Blood Injection for the Treatment of Recurrent Temporomandibular Joint Dislocation	Case series	N=5 Inclusion criteria: Age> 16 years, recurrent temporomandibular joint dislocations diagnosed according to Nitzan's criteria, failure of conservative therapy methods. Exclusion criteria: inflammatory or tumorous diseases of the temporomandibular joint, diseases of the temporomandibular	Injection of 3ml of autologous blood into the upper joint space, injection of 1ml of autologous blood pericapsular, followed by soft diet and head bandage for 7 days, repeated injection if dislocation recurs	Not specified	Autologous blood injection as a safe form of therapy, less time-consuming than open surgical procedures, minimally invasive> low risk of complications	IV/k-

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **minimally invasive therapy**	LoE
			joint caused by metabolic diseases, severe systemic diseases, therapy with anticoagulants, psychiatric diseases				
Oztel et al., 2017	Botulinum toxin used to treat recurrent dislocation of thetemporomandibular joint in a patient with osteoporosis	Case report	N=1 99 years (w), recurrent bilateral dislocations, comorbid: cerebrovascular disease + osteoporosis	Man. Rep. after Nelaton under sedation, IMF> not successful due to osteoporosis> injection of botulinum toxin bilaterally into the M.pterygoideus lat.	Follow-up 6 months: no recurrence of dislocations and no problems with tolerance of therapy	Injection of botulinum toxin especially suitable for comorbid patients	V/k+
Renapurkar et al., 2018	Injectable Agents Versus surgery for Recurrent Temporomandibular Joint Dislocation	Survey article	not applicable	Minimally invasive: sclerotherapy, injection of autologous blood, injection of botulinum toxin. Open-surgical: capsule lifting, eminectomy, eminoplasty with augmentation, myotomy of the M.pterygoideus lat.	not applicable	Pat. with recurrent dislocations should be treated with minimally invasive therapy> injection of autologous blood or sclerotherapy If minimally invasive therapy fails, open surgery: primarily capsular retraction (as less invasive), then eminectomy	IV/k+
Tocaciu et al., 2019	Surgical management of recurrent TMJ dislocation—a systematic review	literature review	33 studies in the last 10 years regarding recurrent temporomandibular joint dislocations	Minimally invasive: autologous blood injection, sclerotherapy, capsular tightening, botulinum toxin injection, dextrose therapy. Offe-surgical: eminectomy, eminoplasty, myotomy, disc plication	Injection of autologous blood into the superior joint space and pericapsular shows a success rate of 80% at 16 months follow-up, injection of botulinum toxin into the pterygoid muscle of 80% at 6 months follow-up, dextrose therapy of 91% at 18 months follow-up (only	No optimal therapy for recurrent temporomandibular joint dislocations can be determined To date, best evidence for autologous blood injection and dextrose therapy as minimally invasive procedures	V/k++

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **minimally invasive therapy**	LoE
					one study available), disc plication of 100% at 12 months follow-up (small case group) All surgical therapies are associated with a reduction in MMO		

Table 19: Surgical methods to facilitate spontaneous reduction: eminectomy (studies with sample size n<6)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **eminectomy**	LoE
Myrhaug, 1951	A New Method of Operation for Habitual Dislocation of the Mandible - Review of Former Methods of Treatment	Literature overview and case series	n=2, ages 22 - 27, 1 epilepsy	Eminectomy in case of steep tubercle	Follow-up period 14 months no recurrence of dislocation, in 1 patient crepitation	For patients with steep tubercle	IV/k+
Segami et al., 1999	Arthroscopic eminoplasty for habitual dislocation of the temporomandibular joint: preliminary study	Preliminary study	n=5 Always bilaterally, even if dislocation is unilateral	Arthroscopic eminectomy	Follow-up period 6 - 36 months, 2 clicking, 1 crepitus, MMO reduced by 3 mm	High level of arthroscopic experience required, not necessary to remove much on medial side	IV/k+
Güven, 2005	Inappropriate Treatments in Temporomandibular Joint Chronic Recurrent Dislocation: A Literature Review Presenting Three Particular Cases	Case series	n=3, ages 37-67 s/p surgery with screw >pain and recurrent dislocations	Remove screws, eminectomy	No recurrence of dislocation	Eminectomy as definitive treatment if problems/ pain persist after blocking procedure with screws	IV/k+
Cascone et al., 2008	A New Surgical Approach for the Treatment of Chronic Recurrent Temporomandibular Joint Dislocation	Case report	n=1, age 21 very high eminence	Eminectomy and discopexy	Follow-up period 12 months, no recurrence of dislocation, patient pain-free >also removes cause	Eminectomy + discopexy	V/k+
Mayrink et al., 2012	Recurrent Mandibular Dislocation Treated by Eminectomy	Case series	n=3, ages 20-48 All with prominent eminence and deep fossa	Eminectomy, planning based on CT Biomedical modelling	Follow-up period 12 months - 2 years, no recurrence of dislocation, MMO reduced	Planning based on 3D - model will optimize treatment, no limitations because of patient's age	IV/k+

Table 20: Restrictive techniques for prevention of recurrence of dislocation (studies with sample size n<6)

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
Revington, 1986	The Dautrey procedure — a case for reassessment	Case report	n=1	Dautrey's blocking procedure	Recurrence of dislocation after 2 weeks > positioning and fixation of zygomatic arch further medially	When applying Dautrey's blocking procedure adjust for size of condyle, positioning of arcus much further medially	V/k+
Loh et al, 1989	Subsequent treatment of chronic recurrent dislocation of the mandible after eminectomies	Case report	n=1, age 29, 2 years previously: eminectomy >recurrence of dislocation as insufficient eminence removed medially	Dautrey's blocking procedure one side fracture of arcus> plate with screws IMF for 1 week	Follow-up period 20 months, no recurrence of dislocation	Distal fracture in context of Dautrey's blocking procedure, fixation with plate > Dautrey's blocking procedure possible also for older patients	V/k+
Smith, 1991	Recurrent dislocation of the temporomandibular joint: A new combined augmentation procedure	Case report	n=1, age 23 s/p Dautrey's blocking procedure on right side, recurrence of dislocation due to resorption	Combined procedure: autologous transplant from iliac crest compact tissue (compact + spongy bone) + further augmentation and fixation of transplant with plate	Follow-up period 1 year, no recurrence of dislocation	Augmentation of eminentia, autologous+ allogeneic (combined), if Dautrey's blocking procedure unsuccessful or if arcus too far lateral for Dautrey's blocking procedure	V/k+
To, 1991	A complication of the Dautrey procedure	Case report	n=1, age 36	Dautrey's blocking procedure, distal fracture on left side> 2 wires, proximal fracture on right side> wire	Follow-up period 3 years, eminentia and arcus resorption, no recurrence of dislocation	Distal fracture in context of Dautrey's blocking procedure, fixation with wire > Dautrey's blocking procedure possible also for older patients	V/k+
Bakardjiev, 2003	Treatment of chronic mandibular dislocations by bone plates: Two case reports	Case series	n=2, ages 34-51	Blocking procedure with L-shaped plate, 2 screws	Follow-up period 6 months, no recurrence of dislocation	Blocking procedure with plate	IV/k-

Author, Year	Title	Study Design	Patient Sample	Therapy	Results	Key Messages re. **restrictive techniques**	LoE
Wong et al., 2004	Recurrent Dislocation of Temporomandibular Joint Treated by the Dautrey Procedure — A Case Report and Literature Review	Case report	n=1, age 75, steep eminence	Dautrey's blocking procedure, avoid damage to fascia and periosteum, especially on temporo-zygomatic suture, no fixation	30-months follow-up, no recurrence of dislocation	Dautrey's blocking procedure	V/k+
Güven, 2005	Inappropriate Treatments in Temporomandibular Joint Chronic Recurrent Dislocation: A Literature Review Presenting Three Particular Cases	Case series	Ages 37-67 s/p surgery with screw >pain and recurrence of dislocation	Removal of screw, eminectomy	No recurrence of dislocation	Blocking procedure with screws only may lead to bone erosion, pain and impairment of function	IV/k+
Stergiou et al., 2007	The management of recurrent, fixed anterior dislocations of the mandible with a T-shaped miniplate	Case report	n=1, age 76 pneumatisation of eminence	Blocking procedure with T-shaped miniplate with lower part bending inwards so that positioned below eminence level without opening joint capsule	Follow-up period 1 year, no recurrence of dislocation	Blocking procedure with plate not recommended due to plate breakage	V/k+
Cavalcanti et al., 2011	Treatment of chronic mandibular dislocations using a new miniplate	Case report	n=1	Blocking procedure with new plate which does not need to be adjusted	Follow-up period 18 months: no dislocation, after surgery MMO reduced	Blocking procedure with new plate without bending, >less prone to breakage	V/k-
da Costa Ribeiro et al., 2014	Dautrey's procedure: an alternative for the treatment of recurrent mandibular dislocation in patients with pneumatization of the articular eminence	Case series	n=2, ages 23-26 pneumatisation of eminence	Dautrey's blocking procedure, fixiation with L-shaped miniplate with 4-screw fixation	Follow-up period 1-2 years, no recurrence of dislocation, in 1 patient continued clicking no eminectomy if eminence pneumatized	Dautrey's blocking in case of pneumatized articular eminence	IV/k+

11. Conflict of interest declaration

Following the rules of the model declaration issued by AWMF any possible conflicts of interest were duly evaluated among all participants of the consensus procedure and reviewed by both the coordinator (AN) and the monitor of the recommendation (LS). No financial or other ties or other conflicts of interest were determined and no participant had to be excluded from participating in this clinical recommendation due to potential conflicts of interest. For a detailed conflict of interest register, please refer to the recommendation report.

12. Authors and participants in the consensus process

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https://www.awmf.org/leitlinien/detail/ll/007-063.html

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The present recommendations issued by ESTMJS are structurally based on (note: contents are not always congruent) with the "German S3 Guidelines 007-063 on Condylar Dislocation" and were established following closely the methodology of the German Association of the Scientific Medical Societies (AWMF), which have been systematically developed to assist physicians in their decision-making process in specific situations. They base on the current scientific knowledge and field-tested proven methods and ensure added safety in medicine, but also consider aspects of cost efficiency. These "Guidelines" (viz. recommendations) are not legally binding for practitioners and therefore can neither constitute grounds for liability nor grounds for any exemption from liability.

ESTMJS as a non-profit scientific society takes the utmost care when compiling and publishing the recommendations nevertheless ESTMJS is unable to guarantee accuracy of the information contained therein.

Especially regarding dosage information, please always refer to manufacturer's information!

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For the literature implemented for the 2016 German guideline text, please also cf AWMF long version published in 2016: https://www.awmf.org/leitlinien/detail/ll/007-063.html