Abstract: Temporomandibular joint (TMJ) disease classification and subsequent treatment selection are highly debated subjects within dentistry and medicine. Several suggestions for diagnostic classification and treatment algorithms have been proposed thus far without achieving a clear gold standard. A universally accepted diagnostic classification is essential for therapeutic decision-making as well as a prerequisite for prognostic evaluation and is necessary for achieving research results that are reproducible, comparable, relevant, and applicable in the clinical setting. Often, problems of the TMJ are viewed as mere symptoms or as a syndrome-like group of conditions, without clear demarcation, impeding individualized treatment planning. A Scandinavian group of experienced TMJ surgeons participated in an iterative, structured group discussion process in accordance with the Delphi method, aiming to produce recommendations for a standardized patient clinical evaluation in relation to TMJ dysfunction. Guided by this standardized evaluation, a disease-focused and simplified diagnostic classification scheme is herein suggested.

Keywords: classification, temporomandibular disorders, temporomandibular joint, temporomandibular joint disease

Introduction

Temporomandibular disorder (TMD) is a generic term that encompasses both muscular and joint disorders and affects the stomatognathic system [1]. Symptoms of TMD often include headache around the temples, masticatory muscle pain, temporomandibular joint (TMJ) pain, clicking/popping or grinding sounds from the TMJ, and problems opening the mouth fully, either as singular signs or in different combinations with one another. A recent systematic review revealed that epidemiological studies also have a somewhat divergent prevalence when taking gender into account; the prevalence of TMD in women was 36% to 52%, while that in men was 16% to 36% [2]. In the Orofacial Pain Prospective Evaluation and Risk Assessment (OPPERA) study, a TMD incidence of 4% per year was reported, although facial pain symptoms were found in 19% of the studied cohort [3]. The aetiopathology of TMD might, in part, be explained by the biopsychosocial model, where stress, anxiety, and catastrophizing seem closely linked to the onset or worsening of TMD [4,5]. TMD can be self-regulating but, sometimes, chronic pain develops. The treatment of TMD cannot be successful without identifying whether the problems primarily arise from muscles or the joints, although sometimes a mixture of the two as origins is observed. The Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) offer a comprehensive diagnostic algorithm for TMD intending to standardize the diagnostic work-up in patients with suspected TMD [6]. The initial TMD treatment is nonsurgical regarding both muscular and TMJ symptoms [7]. In a minority of patients not responding to nonsurgical treatment, TMJ surgery can be considered.

The TMJ can be affected by osteoarthritis, rheumatologic diseases, gout, luxation, anklyloses, benign or malignant tumors, and infections. TMJ internal derangement, defined as when the disk is improperly positioned in relation to the condylar-fossa complex, affects between 7.9% and 44% of the population, although few affected individuals develop clinical symptoms requiring medical attention [8-11].

To treat, but maybe most of all, to diagnose, the affected TMJ in an accurate way can be challenging, considering that the etiology might be multifactorial. Known or discussed etiologic factors include trauma, bruxism, general joint hypermobility, and hormonal or infectious causes [12-25]. If primary noninvasive treatment fails, surgical TMJ interventions may be indicated. In some cases, surgical treatment may be the first choice, such as in the case of benign or malignant tumors, acute intra-articular infection, or joint anklyloses. The definition of various TMJ diagnoses and the subsequent treatment algorithms are highly debated areas within dentistry and medicine, compromising efforts to evaluate different treatment modalities and the comparability of available research.

Several TMD diagnosis classification systems have been suggested to date [6,26-37]. The existing options for classification have the advantage of establishing some kind of order in a (TMJ) world of inaccuracy. However, although representing very important attempts to bring order into a complex field, they all remain subjected to varying degrees of discussion. The eventual shortcomings are inherent because of the scientific knowledge gaps regarding TMJ diagnosis and treatment [38]. The aetiopathology is still largely unknown and is not accounted for in existing classifications of TMJ disease (TMD), excluding most of the developmental disorders and tumors, and so cannot be said to be complete without a great deal of ignorance.

The Delphi method is an acknowledged and well-used process by which to reach a formal consensus through a step-wise iterative procedure to converge expert opinions [39]. This structured group communication process is especially applicable within fields of quantitative data not suited for randomized trials, such as the disease-focused view of TMJ dysfunction. In the field of TMJ surgery, the development of a consensus may improve objectivity by deducing complex decision procedures, based on expert experience, into structured patient evaluation schemes and diagnostic classifications.

This report aims to provide a disease-focused view of TMJ dysfunction through a standardized patient evaluation scheme and to suggest a disease-focused diagnostic classification system. By presenting criteria for diagnostic classification, the overall goal to improve patient selection and intercomparison of research may eventually improve success rates and aid in justifying different treatment modalities based on diagnostics.

Materials and Methods

The present project of suggesting and defining the diagnostic classification of TMJD was conducted as a modification of a previously described Delphi process for dental research [39]. Because of the complexity of the task, involving defining the patient evaluation approach and a number of possible diagnoses, the method of using questionnaires was not considered applicable. To avoid bias due to individual judgment, particularly if using questionnaires with closed-ended questions, open discussions were deemed necessary. For the intended outcome, an iterative focus-group discussion approach with controlled feedback until convergence of opinion was obtained. The predefined level of agreement was to strive for total consensus. Due to the working process with repeated physical meetings
and focus discussions, six participants were considered a sufficient and feasible number of individuals to involve. The invited participants (TR, AR, MU, BL, ToB, and HOB) all had a minimum of 10 years of experience in the field of TMD surgery. All surgeons who were approached agreed to participate. No expenses were covered, and no commissions or other incentives were offered. Thus, all authors were free from financial incentives or other influencing biases. Prior to the first meeting, a literature search was conducted to identify relevant previous classifications of TMD disorders. The retrieved publications were scrutinized from the perspective of diagnosis, and special emphasis was placed on elucidating algorithms for treatment intervention [6,26-37,40-42]. The first meeting focused on discussions to outline the project and included the following items: (I) current classifications from a surgical/orthopedic point-of-view, and the eventual requirement of supplementary definitions, (II) the need to identify relevant conditions for inclusion in the project, (III) the need to define conditions for exclusion, and (IV) the need to determine clinical relevant components of disease description. Excluded diagnoses related to TMD and TMJD included extra-articular pathology (e.g., hyperplastic coronoid process, Eagle’s syndrome, myofascial pain, and headache) and conditions regarded as developmental, syndrome-related, or growth anomalies such as condylar hypo- and hyperplasia. The subsequent meetings were moderated by the first author (BL), who also sent notes of the conclusions reached at each meeting. All the participants were asked to check for accuracy and to comment on these via mail between the meetings. After replies were retrieved from all involved surgeons, all comments were collated into the master document using the “track changes” function. The revised document was discussed again at the next meeting, and the process was repeated until no further criticisms or divergent situations regarding the document occurred. After an iterative process of five rounds of physical meetings and written feedback, a consensus was reached.

Results
Patient evaluation
Patient history
Thorough patient history is fundamental in making a correct diagnosis and ensuring the best treatment is selected. General patient history should include present and previous diseases, medications, allergies, local and general pain intensity, pain variations, triggers for pain, the function of the jaw, heredity, social context, lifestyle factors such as diet, sleep, physical training, and the ability to relax. Correctly recorded, the patient history can offer important information about patients’ coping strategies in everyday life and the expectations for treatment, which in turn will have a great impact on the treatment outcome. Headache should be accounted for in the patient interview, as tension headache could be secondary to TMD. For other types that are undiagnosed yet show a seemingly significant prevalence, referral to a neurologist is recommended. Comorbidities of relevance and impaired coping ability should be addressed in the treatment-planning phase.

The specific history includes current complaints, duration, onset-associating events, diurnal variation of symptoms, precipitation factors, previous trauma or orthodontic treatment, presence of day- and night parafunction (e.g., grinding, clenching, and tongue thrust), perceived changes in occlusion, alleviation factors, aggravating factors, and functional impairment (e.g., chewing, mouth opening, talking, mimics, and kissing). Noises from the joints, such as crepitation and clicking, are common complaints. Here, it is important to distinguish between painful and nonpainful noises. Any previous treatment for TMD/TMJD should be noted and weighed in the treatment planning and prognoses.

A specific history of pain characteristics gives important information and can preferentially include a pain drawing to distinguish between local and widespread pain. Distinguishing between pain at rest and in function is important since pain at rest signals that the pain has become widespread and chronic. A 10- or 100-point visual analog scale/numeric rating scale (NRS) are examples of valuable tools for the collection of the subjective rating of pain, functional disability, and psychosocial influence of symptoms.

Assessment using questionnaires
A large array of validated questionnaires is available and can be an important source for assessment tools. In order not to exhaust the patient, a limited number of questionnaires, with a reasonable number of questions, should be chosen. For patients with TMJD, measurements of that may be of interest include pain intensity, functional disabilities and quality of life (QoL), sleep-disordered breathing, and psychological disorders. One way of measuring jaw function is the Mandibular Function Impairment Questionnaire, which is used to measure functional aspects of social life, verbal ability, yawning, and chewing [43]. In contrast, the Jaw Functional Limitation Scale assesses global pain, mastication, mobility, and verbal and emotional dysfunction on an NRS scale [44]. The Oral Health Impact profile-TMD (OHiP-TMD) questionnaire is a biopsychosocial, patient-centered, outcomes measure for assessing QoL in patients with TMD [45]. Another questionnaire of note is the Roland-Morris scale, which measures QoL when living with pain [46]. The Euro QoL Research Foundation (EQ-5D) health-related QoL questionnaire asks questions about mobility, self-care, usual activities, pain/discomfort, and anxiety/depression and is similar in structure to the Roland-Morris scale.

Since sleeping disorders may influence the perception of pain and vice versa, it may be relevant to evaluate the patient’s sleep quality during the assessment phase. The Lausanne Neck circumference, Obesity, Snoring, Age, Sex (NoSAS) is a questionnaire for screening sleep-disordered breathing, while the insomnia severity index is a psychometric indicator that detects insomnia and evaluates the treatment response [47,48].

It is also important to identify psychological disorders. A personality with catastrophic thinking in terms of expected pain and fear of pain and anxiety or depression is in danger of developing persistent postsurgical pain [49-52]. Examples of questionnaires for the preoperative screening of psychosocial disorders are the Hospital Anxiety and Depression Scale, one- and two-item measures of pain beliefs and coping strategies, and the Pain Catastrophizing Scale for measuring catastrophizing [53-55]. High scores on these scales indicate the existence of psychological disorders, and referrals to a psychologist or a pain clinic at the hospital may be needed.

Clinical examination
The examination of patients with musculoskeletal symptoms in the orofacial area should include a review of symptoms and the functioning of the following:

- The masticatory muscles
- The TMJs
- Related structures, such as the musculature of the neck
- Organs associated with the orofacial area, such as the teeth and salivary glands
- The peripheral nervous system

The masticatory muscles can be examined by bilateral palpation of each group of muscles. Palpation and the self-evaluation of pain symptoms from the muscles should be both at rest and in function. The functioning of the jaw should be examined during the opening, protrusion, and lateral excursions.

Jaw function is examined through the evaluation of the opening and closing patterns, measures of maximal interincisal opening, pain on interincisal opening, protrusion, and lateral excursions. The rotation and translation of the condylar head during mouth opening should be examined. Tenderness of the TMJ is evaluated with palpation lateral to the TMJ and by palpation in the external auditory canal. Pain anterior to the ear may be related to pathology in the TMJ, whereas pain posterior to the ear can indicate either TMJ or ear pathology. Joint sounds, such as clicking, popping, snapping, or crepitation during mandibular function, are registered by digital palpation of the TMJ or by using a stethoscope. Palpation of the joints during mouth opening also provides information on the range of motion in terms of rotation and translation of the condylar heads. It is important to try to standardize and compare pain characteristics between before and after treatment.

Examination of the teeth, periodontal status, and occlusion are also mandatory to exclude other sources of symptoms. Further, intraoral signs of parafunction, such as excessive tooth wear and tooth impressions on the tongue and buccal mucosa should be registered.

Imaging
Imaging and radiological examinations should always follow the principle of As Low As Reasonably Achievable for radiation. Since the correlation
between clinical symptoms and findings with different imaging modalities may diverge substantially, imaging results alone should never be used to form the basis for diagnosis. Panoramic radiography may be useful to rule out pathology of the surrounding tissue as a cause of the complaints of pain and reduced function of the musculoskeletal system. However, panoramic radiography is not the preferred modality for evaluation of the TMJ.

Computed tomography (CT) or cone-beam CT (CBCT) is the radiographic examination modality of choice in the diagnosis of hard tissue changes in the TMJ [56-58]. Different characteristics of the pathology revealed on CT/CBCT are presented in Tables 1 and 2.

Magnetic resonance imaging (MRI) scans should be obtained with or without contrast in patients where there is suspicion of a case of generalized arthritis (JIA, RA) or swelling or possible soft tissue changes in the TMJ [59]. MRI is the best way of visualizing the disk position. The different characteristics of the pathology revealed via MRI are presented in Tables 1 and 2.

Ultrasound imaging of the TMJ has become increasingly used, especially in children with JIA, but the interpretation of the findings may be difficult [60].

Serologic screening
Serological tests are commonly used to support the diagnosis of many diseases. With regard to TMJ disorders, serological tests are used to identify any undiagnosed rheumatic disorder and as a part of the examination of specific TMJ disorders. Serologic panels (e.g., rheumatoid factor and antinuclear antibody for the screening of rheumatic disorders) are neither sensitive nor specific to rheumatic disorders and, thus, panel results should only constitute a small part, if any, of the information gathered for the most likely diagnosis [61-63]. The most commonly used serological analyses are those aimed at detecting infections of the TMJ, typically, beta-hemolytic streptococci (antistreptolysin O titer, streptozyme) and Chlamydia trachomatis (immunofluorescence, ELISA of blood, urine) [64]. Serological tests are useful in elucidating reactive arthritis and Lyme arthritis but have little clinical value in TMJ disorders in general [22,65,66]. However, research with an emphasis on the analysis of inflammatory mediators and DNA markers in the blood and synovial fluid is ongoing and, possibly, serological screenings will become more sensitive and specific in the future to enable improved screening for TMJ disorders [67-69]. C-reactive protein (CRP) and erythrocyte sedimentation rate are important tests to rule out infectious arthritis or giant-cell arteritis, respectively.

Diagnostic criteria and classification
Strict diagnostic criteria are not regarded as applicable within the field of TMJ disorders since the symptoms that can appear among patients with the same diagnosis may vary substantially. In the description that follows, the characteristics should be regarded as indicative findings, meaning that not all need to be present for a given diagnosis. Thus, one or several may be found as positive in a given case. The described diseases are divided into symptom- or pathology-based conditions. In the case of the former, the main finding is various symptoms rather than actual pathologic changes of the anatomical structures of the joint, while, in the latter, a combination of both is typically observed.

Symptom-based conditions
Myalgia (muscle pain) can be either a symptom in several different entities or its diagnosis (Table 1), and conservative treatment may be considered based on the severity of symptoms. In the case of combined myalgia and joint pathology, patients can be reevaluated following conservative treatment if complaints persist. An important phenomenon to identify, in order to prevent erroneous diagnosis, is referred pain. The clinician should be aware that, although rare, referral of pain to the TMJ region might occur from other anatomical areas outside the vicinity of the craniofacial region.

Muscle-induced limited mouth opening (trismus) is important to differentiate from a joint-induced inability to open the mouth fully since the treatment for these two conditions differs (Table 1). Trismus is handled with nonsurgical treatment. Rare causes of trismus, such as neuromuscular disease, tetanus infection, or muscular fibrosis, should be kept in mind for diagnostic exclusion.

Arthralgia is defined as pain from the region of the TMJ not caused by intra-articular pathology but rather originating from structures adjacent to or surrounding the joint, such as the capsule, ligament, or muscle attachments (Table 1). Arthralgia is to be considered as a symptomatic exclusion diagnosis for TMJD. If interventions such as arthroscopy are performed for diagnostic reasons or if the patient is initially misdiagnosed, no or very mild signs of inflammation may be seen.

Pathology-based conditions
Disk displacement with reduction is mainly caused by an overstretched posterior disk ligament failing to maintain the disk in the correct position during mouth closing (Table 2). The disk is reduced upon mouth opening, characteristically causing a clicking or popping sound. Clinical denominations of this entity include clicking and reciprocal clicking. Disk displacement with reduction but without pain should be regarded as an anatomical variant rather than pathology and should be treated neither nonsurgically nor surgically. However, clicking without pain causing severe social disturbance may be considered for surgery, although comforting information should be the first choice of intervention for such cases.

In disk displacement without reduction, the disk is maintained in the wrong position during all jaw movements (Table 2). Alternative expressions used for this diagnosis are locking, closed lock, chronic closed lock, and acute closed lock. A reduced mouth opening is generally regarded as an interincisal distance of less than 35 mm, but cases should be interpreted individually. Spontaneous recovery is seen in approximately 40% of the patients within a two-year expectancy [70]. The first choice of treatment is conservative and, if surgery is chosen, arthroscopy or arthrocentesis with or without image guidance [56,71] are the methods of choice.

Table 1 Clinical characteristics for symptomatic conditions without pathological changes in joint tissues

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Characteristics†</th>
<th>Imaging</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myalgia</td>
<td></td>
<td>Panoramic radiograph may be considered for differential diagnosis†</td>
</tr>
<tr>
<td>Muscle-induced limited mouth opening (trismus)</td>
<td></td>
<td>Panoramic radiograph may be considered for differential diagnosis†</td>
</tr>
<tr>
<td>Arthralgia</td>
<td></td>
<td>Panoramic radiograph may be considered for differential diagnosis†</td>
</tr>
</tbody>
</table>

† The main value of the panoramic radiograph in TMJ diagnostics is the possibility to rule out other pathologies that might explain the patient’s symptoms.
Osteoarthritis is primarily a degenerative condition of the joint (Table 2). Crepitation without pain is to be regarded as an example of physiological crepitation, as the only finding, is not an indication to move forward with treatment because it cannot be resolved. If there is no effect from conservative treatment, arthrocentesis or arthroscopy may be considered. The patient should be made aware that the success rate of this approach is relatively low when compared with arthrocentesis or arthroscopy of an arthritic joint [72]. Repetitive corticosteroid injection is not recommended, due to its possible catabolic effect on joint tissue that may enhance this degenerative process.

Traumatic arthritis is induced by trauma and should be distinguished from other arthritides (Table 2). Traumatic arthritis is managed with conservative treatment, including expectancy, soft diet, and nonsteroidal anti-inflammatory drugs. Splint therapy may be considered if parafunction is regarded as part of the etiology. In infectious arthritis, joint inflammation is caused by a bacterial infection (Table 2). Infectious arthritis has four potential primary causes: surgical intra-articular intervention, joint penetrating trauma, hematologic spread or spread from dental infection (often, the lower molars) via the form of practice to avoid forcing the mandible into extreme positions.

### Table 2  Clinical characteristics for symptomatic conditions accompanied with pathological changes in joint tissues

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Disc displacement with reduction</strong></td>
<td>• Clicking/popping/catching of TMJ* during jaw movements&lt;br&gt;• Intermittent locking (temporary reduced mouth opening coinciding with ceasing clicking)&lt;br&gt;• With or without pain</td>
</tr>
<tr>
<td><strong>Disc displacement without reduction</strong></td>
<td>• Reduced mouth opening, may be painful&lt;br&gt;• May be proceeded by previous clicking/popping/catching disappearing when locking occurred&lt;br&gt;• Unilateral&lt;br&gt;• Duration (acute or chronic)&lt;br&gt;• Inability to chew properly</td>
</tr>
<tr>
<td><strong>Osteoarthritis</strong></td>
<td>• Scrapping noise during jaw movements&lt;br&gt;• Pain&lt;br&gt;• Osteoarthritis of other joints&lt;br&gt;• Inability to chew properly</td>
</tr>
<tr>
<td><strong>Traumatic arthritis</strong></td>
<td>• Trauma to the jaw&lt;br&gt;• TMJ pain&lt;br&gt;• Occlusal change&lt;br&gt;• Reduced and painful mouth opening&lt;br&gt;• Inability to chew properly&lt;br&gt;• Swelling over joint can occur&lt;br&gt;• Patient may have woken up with the condition (due to excessive teeth clenching and/or grinding); if so, often during period of increased psychosocial stress</td>
</tr>
<tr>
<td><strong>Infectious arthritis</strong></td>
<td>• Pain, swelling, redness and increased temperature lateral to the TMJ, fever&lt;br&gt;• Occlusal changes&lt;br&gt;• Recent intra-articular intervention&lt;br&gt;• Previous TMJ penetrating trauma</td>
</tr>
<tr>
<td><strong>Mandibular subluxation</strong></td>
<td>• On occasion, inability to close mouth without maneuvering the mandible</td>
</tr>
<tr>
<td><strong>Mandibular dislocation</strong></td>
<td>• Inability to close mouth&lt;br&gt;• Fixed jaw in open position&lt;br&gt;• Chin protruded or deviated&lt;br&gt;• Occurred during effort to maximally open mouth&lt;br&gt;• Pain</td>
</tr>
<tr>
<td><strong>Ankylosis</strong></td>
<td>• Inability to perform jaw movements&lt;br&gt;• Severely reduced mouth-opening capacity&lt;br&gt;• Jaw exercises give no improvement on range of motion&lt;br&gt;• With or without pain</td>
</tr>
</tbody>
</table>

*Temporomandibular joint. §Magnetic resonance imaging. †Computer tomography*
can be beneficial.

Mandibular dislocation is an anterior displacement of the condylar head beyond the articular eminence that renders the mandible unable to reposition normally (Table 2). Treatment of mandibular dislocation involves immediate repositioning of the condyle and, on occasion, local anesthetics, sedation, or even general anesthesia may be indicated. Further, follow-up conservative treatment may be beneficial. In extreme cases of recurrent mandibular dislocations, surgical treatment can be indicated. Possible etiologies of recurrent mandibular dislocation to consider during treatment planning include neuromuscular diseases.

In ankylosis, the condylar head is typically fixed to the fossa, preventing joint movement (Table 2). The ankylosis can be bony, fibrotic, or osteofibrotic. Findings on CT scans may be less severe when compared with macroscopic findings obtained during surgery due to the mineralization process. In cases of medial hypertrophic bone formation, CT with angiography should be considered to detect vessels possibly embedded in the ankylosed mass.

Arthritis, or joint inflammation, is most commonly a monoarthritis of the TMJ but can also be part of chronic rheumatic disease (Table 3). Clinical findings that should alert the clinician that an undiagnosed case of systemic arthritis might be at hand are bilateral TMJ arthritis, bilateral disk displacement without reduction, young individuals with pronounced radiographic changes, and extensive/pronounced/atypical inflammatory reaction to trauma or previous TMJ surgery. The suspicion of undiagnosed disease is increased if any of the above is observed in combination with the following:

- Indication of Ehlers-Danlos hypermobility type by way of extensive joint hypermobility, psychosocial load, and unclear pain such as that appearing out of proportion or without explanation
- Indication of psoriasis: by way of undiagnosed/unclear skin problem, frequent eczema of the external auditory canal, and pronounced dandruff
- Hereditary psoriasis or rheumatologic diseases
- Psoriasis diagnosis
- Symptoms from other joints

When faced with a patient history of infection with Campylobacter jejuni, Yersinia enterocolitica, Chlamydia trachomatis, Salmonella spp., or Shigella spp. preceding TMJ arthritis, the clinician should consider the possibility of reactive arthritis as a cause.
Table 4  Account of symptom- and pathology-based conditions and their possible treatment options

<table>
<thead>
<tr>
<th>Condition</th>
<th>Nonsurgical treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Myalgia</td>
<td>Distraction osteogenesis, Costochondral graft, Total joint replacement (prosthesis)</td>
</tr>
<tr>
<td>Arthralgia</td>
<td>Arthrocentesis, Cortisone injection, Hyaluronic acid injection, Surgical treatment</td>
</tr>
<tr>
<td>Muscular-induced limited mouth opening (trismus)</td>
<td>Botox injection, Autologous blood injection, Dautrey/Le Clerc procedure</td>
</tr>
<tr>
<td>Disc displacement with reduction (moderate to severe pain)</td>
<td>Disc repositioning, Modified condylectomy, Arthroscopic posterior ligament surgery, Arthroscopic resection</td>
</tr>
<tr>
<td>Disc displacement without reduction</td>
<td>Disc repositioning, Modified condylectomy, Arthroscopic posterior ligament surgery, Arthroscopic resection</td>
</tr>
<tr>
<td>Osteoarthritis</td>
<td>Arthrocentesis, Cortisone injection, Hyaluronic acid injection</td>
</tr>
<tr>
<td>Arthritis</td>
<td>Cortisone injection, Arthrocentesis, Arthroscopic resection</td>
</tr>
<tr>
<td>Traumatic arthritis</td>
<td>Nonsurgical treatment</td>
</tr>
<tr>
<td>Infectious arthritis</td>
<td>Requires prompt interventions including: Arthrocentesis, Intraoperative antibiotics, Unloading but not immobilization</td>
</tr>
<tr>
<td>Mandibular subluxation</td>
<td>1) Repositioning, Autologous blood injection</td>
</tr>
<tr>
<td>Mandibular dislocation</td>
<td>1) Repositioning, Arthroscopic posterior ligament surgery, Enucleotomy, Dautrey/Le Clerc procedure, Arthroscopic blood injection, Botex injection</td>
</tr>
<tr>
<td>Ankylosis</td>
<td>Surgical treatment: Gap-osteotomy, Gap-osteotomy with interposition of muscle/fascia or fat, Total joint replacement (prosthesis)</td>
</tr>
</tbody>
</table>

*The order of bullets should not be interpreted as a ranking of the preferred method.

without

w/wo, with/without

* E.g., information/awareness/coping strategies, physiotherapy, splint therapy, acupuncture, soft diet, non-steroid anti-inflammatory drugs, etc. † This relates to conditions in absence of TMD, such as synovial chondromatosis, unilateral condylar hyperplasia, etc.

to provide a complex subjective process of clinical decision-making. The formal structure of the Delphi methodology enables these divergent experiences to be pooled into a more objective view of clinical decision-making [99]. However, as science develops, this type of procedure needs to be renewed.

Several important attempts to bring order into the diagnostic classification of TMD/TMDJ have been published [6,26-37]. Although constituting important contributions to developing a standard, no classification has, so far, been universally accepted. One example of the criticisms raised is the lack of detailed descriptions, leaving room for variety in the interpretation. The staging of pathologic findings rather than specific diagnostic denotations may also give the false impression that a certain state is a consequence of another [27,42]. However, to date, the aethiopathologic relationship between risk factors, symptoms, and clinical findings remains unclear [31]. Another common assumption is that there is a positive correlation between disease severity and an increasing need for more invasive treatments; this is not always the case [35]. Further, imaging is often given an exaggerated level of importance in diagnosis and therapeutic decisions when research actually shows that the correlation between radiographic findings and functional impairment can be low [91,97]. In DC/TMD, the validity and specificity for internal derangements are reported as low [6]. The current suggestion of a disease-focused diagnostic classification should be regarded as a humble approach to the complexity of these conditions, complementary to existing classifications and thus, a contribution to clarity. The lack of solid evidence supporting the different choices of treatment and diagnostic classification can partly explain the divergent opinions. Research evaluating different surgical interventions will be no less rational than the diagnoses on which patient selection is based. The absence of a diagnostic consensus regarding TMJD has the consequence that studies can neither be compared nor repeated, weakening the systematic assembly of data. Therefore, today, an ethical and health-economic dilemma in conducting surgery lacking solid scientific support is faced. With increasing requirements from decision-makers to provide evidence-based health care that is economically justified, equal, and having well-acknowledged patient benefits, the need for diagnostic consensus is not only of the utmost importance but is also a prerequisite to fulfilling these demands. The importance of patient involvement in treatment planning is evident, especially in the absence of incomplete outcomes data. The extension of this Delphi process might aid clinicians in the difficult task of making responsible and ethical recommendations to the patient.

In conclusion, a disease-focused surgical classification for TMD dysfunction has been suggested. This classification system can be used as a tool for the systematic evaluation of patients and for promoting the evidence-based selection of TMJ surgical treatments.

Conflict of interest
None.
References

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