# Related factors for indication of temporomandibular joint surgery in a supplementary health operator: retrospective and cross-sectional study

*Fatores relacionados a indicação de cirurgia da articulação temporomandibular em uma operadora de saúde suplementar: estudo retrospectivo e transversal*

Tatiana Rendes Giorgetto[1]. Luciane Lacerda Franco Rocha Rodrigues[1]. Lidia Audrey Rocha Valadas[2]. António Sérgio Guimarães[1]

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## ABSTRACT

**BACKGROUND AND OBJECTIVES**: The number of temporomandibular joint (TMJ) surgeries has been growing in recent years. The objective of this study was to evaluate the factors measured for the indication of TMJ surgery.

**METHODS**: This is an observational, quantitative, retrospective, cross-sectional study. A total of 99 surgical requests for TMJ surgery, assigned to a supplementary health operator, were analyzed. Information regarding age, gender, the patients' main complaint, movement alteration, magnetic resonance results, diagnostic tests used, and previous therapy performed were collected. The T-test and the Chi-squared test were used (α=5%).

**RESULTS**: 85% of patients were female, and the mean age among women (27.07±6.33) was lower when compared to men (31.98±9.55) (p=0.03). Almost half of patients did not receive any therapeutic approach prior to the surgery indication. Less than 10% of the requests described the Wilkes classification. Among the symptoms considered for the indication of surgery. pain report in the TMJ region (63.64%) stands out. The clicking and mouth opening limitation were among the highest prevalence as 52.5% and 67.7%. respectively.

**CONCLUSION**: The factors evaluated for the indication of TMJ surgery by oral and maxillofacial surgeons in the present study do not match the recommendations of the *Colégio Brasileiro de Cirurgia e Traumatologia Buco-Maxilo-Facial* (CTBMF – Brazilian College of Oral and Maxillofacial Surgery and Traumatology). Few conservative treatments were previously recommended. Where the majority was decided without any diagnostic criteria.


**Keywords**: Diagnosis. Surgery oral. Temporomandibular joint disorders.


## RESUMO

**JUSTIFICATIVA E OBJETIVOS**: O número de cirurgias da articulação temporomandibular (ATM) vem crescendo nos últimos anos. O objetivo deste estudo foi avaliar os fatores relacionados à indicação de cirurgia da ATM.

**MÉTODOS**: Trata-se de um estudo observacional, quantitativo, retrospectivo e transversal. Foram analisadas 99 solicitações cirúrgicas para a realização da cirurgia de ATM, destinadas a uma operadora de saúde suplementar. Foram coletadas informações sobre idade, sexo, queixa principal do paciente, alteração de movimento, resultados de ressonância magnética, teste diagnóstico utilizado e terapia prévia realizada. Foram utilizados os testes T e Qui-quadrado (α=5%).

**RESULTADOS**: 85% dos pacientes avaliados eram do sexo feminino, e a média de idade entre as mulheres (27,07±6,33) foi menor quando comparada à dos homens (31,98±9,55) (p=0,03). Quase metade dos pacientes não recebeu nenhuma abordagem terapêutica antes da indicação da cirurgia. Menos de 10% das solicitações descreveram a classificação de Wilkes. Dentre os sintomas considerados para a indicação da cirurgia, destaca-se a dor na região da ATM (63,64%). A limitação do clique e da abertura da boca estiveram entre as maiores prevalências: 52,5% e 67,7%, respectivamente.

**CONCLUSÃO**: Os fatores relacionados às indicações de cirurgia da ATM pelos cirurgiões bucomaxilofaciais no presente estudo não condizem com as recomendações do Colégio Brasileiro de Cirurgia e Traumatologia Buco-Maxilo-Facial (CTBMF). Poucos tratamentos conservadores foram recomendados anteriormente, sendo que a maioria foi decidida sem a utilização de nenhum critério diagnóstico.


**Descritores**: Cirurgia bucal, Diagnóstico, Síndrome da disfunção da articulação temporomandibular.

Tatiana Rendes Giorgetto – https://orcid.org/0000-0002-4605-7921;
Luciane Lacerda Franco Rocha Rodrigues – https://orcid.org/0000-0001-5913-0713;
Lidia Audrey Rocha Valadas – https://orcid.org/0000-0002-3568-3089;
António Sérgio Guimarães – https://0000-0003-1756-8957.

1. São Leopoldo Mandic College. Dentistry Course. Orofacial Pain Laboratory. Campinas. SP. Brazil.
2. University of Buenos Aires. Department of Preventive and Community Dentistry. Buenos Aires. Argentina.

**HIGHLIGHTS**

- Pain was the main symptom considered for the indication of TMJ surgery.
- Most of the factors evaluated for the indication of TMJ surgery by do not match the recommendations of the *Colégio Brasileiro de Cirurgia e Traumatologia Oral e Maxilo-facial* (Brazilian College of Oral and Maxillofacial Surgery and Traumatology).
- Few conservative treatments were previously recommended.

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**Correspondence to**:
Lidia Audrey Rocha Valadas
**E-mail**: lidiavaladas@gmail.com

## INTRODUCTION

Pain is defined, according to the International Association for the Study of Pain[1], as an unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential tissue damage. The presence of pain has been one of the main factors investigated for the diagnosis of temporomandibular disorders (TMD) and, consequently, for the indication of temporomandibular joint (TMJ) surgeries[2].

TMD may have muscular or joint origin, and in some cases, it may involve both structures: masticatory muscles and TMJ[3]. In those situations, the clinical signs and symptoms are very similar, and the treatments will vary from case to case, even when dealing with the same disease.

Most patients improve due to a combination of non-invasive therapies, including patient education[4], self-care, cognitive behavioral therapy[5], pharmacotherapy, physical therapy interventions, osteopathic treatment[6] and occlusal devices[7,8]. Nonsteroidal anti-inflammatory drugs and muscle relaxants are recommended initially, and benzodiazepines or antidepressants may be added for chronic cases[9,10].

Referral to an oral and maxillofacial surgeon to perform TMJ surgeries is only done in specific cases when conservative treatment is not indicated or possible[3]. TMJ surgery is a complex procedure that is considered exceptional, not an elective procedure, and involves a great potential for complications, especially with regards to local innervation and facial nerves.

Thus, it is necessary for the oral and maxillofacial surgeons to know how to correctly perform the diagnosis before referring the patient to a TMJ surgery. Even in cases of conservative therapies with an unfavorable prognosis, the diagnosis should be reviewed and consulted with other colleagues in the health area, regarding possible comorbidities or misdiagnosis. Ideally, the patient with TMD is evaluated and treated by professionals specialized in temporomandibular disorders and orofacial pain to avoid unnecessary surgeries or misdiagnoses.

However, this is not a reality in the dental service. Many professionals end up indicating a TMJ surgery for patients with the most different dysfunctions, without making the correct diagnosis[11].

In addition, there is a lack of data regarding the literature concerning surveys about factors evaluated for the indication of TMJ surgeries performed by oral and maxillofacial surgeons, and to analyze whether these factors are being performed correctly.

Therefore, the objective of the present study was to analyze the main indications for TMJ surgeries through the database of a supplementary health operator, comparing it with the recommendations of the CTBMF.

## METHODS

This is a cross-sectional retrospective analytical observational study that followed STrengthening the Reporting of OBservational studies in Epidemiology (STROBE) Statement.

Data were collected from bases of a supplementary health operator with the analysis of a material referring to requests for TMJ surgery, between the years 2016 and 2019. The database is from a multinational private supplementary health operator present in more than 70 countries with a branch located in São Paulo (SP, Brazil) that has approximately 40.000 policyholders. The information was only collected from the database and image exams provided by the company.

### Sample and data collection

The sample evaluated was composed by convenience and it's the same referring to the number of surgeries requested by oral and maxillofacial surgeons. This is a convenience sample in which all guides in the database were considered during the study period. A significance level of 5% was considered and an error margin based on a sample of n = 99 was calculated. The major error margin was 10%, assuming the error margin of the sample.

Since only one researcher was available, the variables were standardized to reduce the risk of bias.

For this study, individual customers of an insurance company, aged between 17 and 59 years, of both genders, and referred by oral and maxillofacial surgeons for TMJ surgery were included. Missing or illegible surgical orders were excluded.

The absence or presence of the following criteria were considered: pain; TMJ pain; headache; facial pain; popping jaw; mouth opening limitation; CP diagnostic test; Mahan diagnostic test; treatment with physiotherapy; therapy with interocclusal splint; drug therapy. This information were collected and tabulated in Excel spreadsheets (Microsoft Corp™. Redmond. WA. USA).

### Quantitative variables

For every surgical request observed, the factors related to the indication of TMJ surgery were evaluated. Subsequently, the data were analyzed descriptively (total number and percentages) to assess the main criteria evaluated by oral and maxillofacial surgeons and their respective prevalence.

This study was approved by the Ethics Committee of *Faculdade São Leopoldo Mandic* (São Leopoldo Mandic College); Opinion Number 3.499.562.

### Statistical analyzes

The information collected from the database was tabulated and evaluated by the GraphPad Prism 8.4 software (GraphPad Prism Software Inc., San Diego. CA. USA). The T-test was used to assess the difference between the average age and gender. To assess the factors associated with popping and opening limitation, the Chi-squared test was used. The significance level was assumed at 5%.

## RESULTS

A total of 99 surgical requests from patients referred for TMJ surgery were evaluated. The vast majority (85%) of the patients were female. The mean age of patients evaluated was 31.29±9.55 years and the mean by gender was 27.07±6.33 years for women and 31.98±9.55 for men. Table 1 shows the descriptive analysis of factors associated with the patients.

Among the most common symptoms reported in the medical records, there is pain in the TMJ region (63.64%), followed by headache (26.26%), otalgia (9.09%), facial pain (6.06%) and pain in the temporal region (3.03%).

**Table 1.** Descriptive assessment of patient-related factors and reported complaints.

| Variables | n | % |
|---|---|---|
| Gender | | |
| Male | 14 | 14.14 |
| Female | 85 | 85.86 |
| Pain | | |
| No | 81 | 81.82 |
| Yes | 18 | 18.18 |
| Headache | | |
| No | 73 | 73.14 |
| Yes | 26 | 26.26 |
| Facial pain | | |
| No | 93 | 93.94 |
| Yes | 6 | 6.06 |
| TMJ pain | | |
| No | 36 | 36.36 |
| Yes | 63 | 63.64 |
| Otalgia | | |
| No | 90 | 90.91 |
| Yes | 9 | 9.09 |
| Pre-auricular pain | | |
| No | 92 | 92.93 |
| Yes | 7 | 7.07 |
| Temporal pain | | |
| No | 96 | 96.97 |
| Yes | 3 | 3.03 |
| Tinnitus | | |
| No | 96 | 96.97 |
| Yes | 3 | 3.03 |
| Bruxism | | |
| No | 97 | 97.98 |
| Yes | 2 | 2.02 |
| Clicking | | |
| No | 47 | 47.47 |
| Yes | 52 | 52.53 |
| Mouth opening limitation | | |
| No | 32 | 32.32 |
| Yes | 67 | 67.68 |
| Closed lock | | |
| No | 98 | 98.99 |
| Yes | 1 | 1.01 |

Regarding the imaging tests used and the diagnoses obtained in the MRI report, it was observed that 87.88% of the participants had some type of disc displacement (31% with unilateral reduction, 39.4% with bilateral reduction, 23.23% without unilateral reduction, and 11.1% without bilateral reduction). As for the Wilkes classification, 90.9% of the patients were not classified, while only 5% were in classification III, and 4.04% were in classification IV. The descriptive analysis of these factors can be found in table 2.

Regarding the previous therapeutic approach reported, only 3% of the patients underwent transcutaneous electrical nerve stimu-

**Table 2.** Descriptive assessment of factors related to the magnetic resonance report and previous conduct performed.

| Variables | n | % |
|---|---|---|
| Magnetic resonance images | | |
| Disc displacement with unilateral reduction | | |
| No | 68 | 68.69 |
| Yes | 31 | 31.31 |
| Disc displacement with bilateral reduction | | |
| No | 60 | 60.61 |
| Yes | 39 | 39.39 |
| Disc displacement without unilateral reduction | | |
| No | 76 | 76.77 |
| Yes | 23 | 23.23 |
| Disc displacement without bilateral reduction | | |
| No | 88 | 88.89 |
| Yes | 11 | 11.11 |
| Other type of disc displacement | | |
| No | 12 | 12.12 |
| Yes | 87 | 87.88 |
| Unilateral joint effusion | | |
| No | 81 | 81.82 |
| Yes | 18 | 18.18 |
| Bilateral joint effusion | | |
| No | 75 | 75.76 |
| Yes | 24 | 24.24 |
| Surgery history | | |
| No | 97 | 97.98 |
| Yes | 2 | 2.02 |
| WILKES Image Classification | | |
| No | 90 | 90.91 |
| 3* | 5 | 5.05 |
| 4** | 4 | 4.04 |
| Previous therapeutic conduct | | |
| Transcutaneous electrical nerve stimulation | | |
| No | 96 | 96.97 |
| Yes | 3 | 3.03 |
| Physiotherapy | | |
| No | 82 | 82.83 |
| Yes | 17 | 17.17 |
| Occlusal splint | | |
| No | 72 | 72.73 |
| Yes | 27 | 27.27 |
| Drugs | | |
| No | 74 | 74.75 |
| Yes | 25 | 25.25 |

lation (TENS), 17% underwent physical therapy interventions, 27.3% used occlusal splint and 25.25% received some type of drug therapy. It is noted that almost half (47 of the 99) of evaluated medical records did not report any type of therapeutic conduct prior to the surgery.

Among the factors included in the surgical request to indicate the performance of the surgery were: bruxism (2.02%), presence of tinnitus (3.03%), clicking (52.53%) and locking when opening the mouth (only 1 patient). Another factor evaluated was the limitation of mouth opening, present in 67.7% of the medical records, however, only 5 records out of a total of 67 contained information on the opening measurement information (variation between 18 and 30 mm).

Table 3 demonstrates factors associated with the presence of popping in the sample evaluated. Presence of pain in the TMJ region and otalgia were the only factors associated with the presence of popping ($p<0.05$). However, other factors such as the presence of joint effusion (uni or bilateral), disc displacement with or without reduction (unilateral or bilateral), headache, preauricular or temporal pain, presence of tinnitus and gender were not associated with the presence of snap ($p>0.05$).

Table 4 shows factors associated with the presence of mouth opening limitation. In this case, only pain in the TMJ region was associated with opening limitation.

**Table 3.** Assessment of factors associated with the presence of tinnitus in patients indicated for temporomandibular joint surgery.

| Variables | Tinnitus Yes n (%) | Tinnitus No n (%) | p-value ($x^2$) |
|---|---|---|---|
| Magnetic resonance images | | | |
| Disc displacement with unilateral reduction | | | |
| No | 31 (45.59) | 37 (54.41) | |
| Yes | 16 (51.61) | 15 (48.39) | 0.578 |
| Disc displacement with bilateral reduction | | | |
| No | 30 (50) | 30 (50) | |
| Yes | 17 (43.59) | 22 (56.41) | 0.533 |
| Disc displacement without unilateral reduction | | | |
| No | 36 (47.37) | 40 (52.63) | |
| Yes | 11 (47.83) | 12 (52.17) | 0.969 |
| Disc displacement without bilateral reduction | | | |
| No | 41 (46.59) | 47 (53.41) | |
| Yes | 6 (54.55) | 5 (45.53) | 0.618 |
| Other type of disc displacement | | | |
| No | 4 (40) | 6 (60) | |
| Yes | 43 (48.31) | 46 (51.69) | 0.618 |
| Unilateral joint effusion | | | |
| No | 39 (48.15) | 42 (51.85) | |
| Yes | 8 (44.44) | 10 (55.56) | 0.776 |
| Bilateral joint effusion | | | |
| No | 34 (45.33) | 41 (54.67) | |
| Yes | 13 (54.17) | 11 (45.83) | 0.451 |

Continue...

**Table 3.** Assessment of factors associated with the presence of tinnitus in patients indicated for temporomandibular joint surgery – continuation

| Variables | Tinnitus Yes n (%) | Tinnitus No n (%) | p-value ($x^2$) |
|---|---|---|---|
| Magnetic resonance images | | | |
| Surgery history | | | |
| No | 45 (46.39) | 52 (53.61) | |
| Yes | 2 (100) | 0 (0) | 0.133 |
| TMJ Pain | | | |
| No | 25 (69.44) | 11 (30.56) | |
| Yes | 22 (34.92) | 41 (65.08) | 0.001* |
| Otalgia | | | |
| No | 40 (44.44) | 50 (55.56) | |
| Yes | 7 (77.78) | 2 (22.22) | 0.049* |
| Pre-auricular pain | | | |
| No | 45 (48.91) | 47 (51.09) | |
| Yes | 2 (28.57) | 5 (71.43) | 0.299 |
| Temporal pain | | | |
| No | 44 (45.83) | 52 (54.17) | |
| Yes | 3 (100) | 0 (0) | 0.064 |
| Headache | | | |
| No | 32 (43.84) | 41 (56.16) | |
| Yes | 15 (57.69) | 11 (42.31) | 0.224 |
| Tinnitus | | | |
| No | 45 (46.88) | 51 (53.13) | |
| Yes | 2 (66.67) | 1 (33.33) | 0.499 |
| Gender | | | |
| Male | 5 (35.71) | 9 (64.29) | |
| Female | 42 (49.41) | 43 (50.59) | 0.342 |
| Total | 47 (47.47) | 52 (52.53) | |

**Table 4.** Assessment of factors associated with the presence of mouth opening limitation in patients indicated for temporomandibular joint surgery.

| Variables | Mouth opening limitation Yes n (%) | Mouth opening limitation No n (%) | p-value ($x^2$) |
|---|---|---|---|
| Magnetic resonance images | | | |
| Disc displacement with unilateral reduction | | | |
| No | 23 (33.82) | 45 (66.18) | |
| Yes | 9 (29.03) | 22 (70.97) | 0.636 |
| Disc displacement with bilateral reduction | | | |
| No | 21 (35) | 39 (65) | |
| Yes | 11 (28.21) | 28 (71.79) | 0.480 |
| Disc displacement without unilateral reduction | | | |
| No | 26 (34.21) | 50 (65.79) | |
| Yes | 6 (26.09) | 17 (73.91) | 0.465 |

Continue...

**Table 4.** Assessment of factors associated with the presence of mouth opening limitation in patients indicated for temporomandibular joint surgery – continuation

| Variables | Mouth opening limitation Yes n (%) | Mouth opening limitation No n (%) | p-value ($x^2$) |
|---|---|---|---|
| Magnetic resonance images | | | |
| Disc displacement without bilateral reduction | | | |
| No | 28 (31.82) | 60 (68.18) | |
| Yes | 4 (36.36) | 7 (63.64) | 0.761 |
| Other type of disc displacement | | | |
| No | 10 (100) | 0 (0) | |
| Yes | 71 (79.78) | 18 (20.22) | 0.116 |
| Unilateral joint effusion | | | |
| No | 27 (33.33) | 54 (66.67) | |
| Yes | 5 (27.78) | 13 (72.22) | 0.649 |
| Bilateral joint effusion | | | |
| No | 24 (32) | 51 (68) | |
| Yes | 8 (33.33) | 16 (66.67) | 0.903 |
| Surgery history | | | |
| No | 31 (31.96) | 66 (68.04) | |
| Yes | 1 (50) | 1 (50) | 0.589 |
| TMJ Pain | | | |
| No | 16 (44.44) | 20 (55.56) | |
| Yes | 16 (25.40) | 47 (74.60) | 0.049* |
| Otalgia | | | |
| No | 29 (32.22) | 61 (67.78) | |
| Yes | 3 (33.33) | 6 (66.67) | 0.946 |
| Pre-auricular pain | | | |
| No | 30 (32.61) | 62 (67.39) | |
| Yes | 2 (28.57) | 5 (71.43) | 0.826 |
| Temporal pain | | | |
| No | 32 (33.33) | 64 (66.67) | |
| Yes | 0 (0) | 3 (100) | 0.224 |
| Headache | | | |
| No | 23 (31.51) | 50 (68.49) | |
| Yes | 9 (34.62) | 17 (65.38) | 0.771 |
| Tinnitus | | | |
| No | 31 (32.29) | 65 (67.71) | |
| Yes | 1 (33.33) | 2 (66.67) | 0.970 |
| Gender | | | |
| No | 5 (35.71) | 9 (64.29) | |
| Yes | 27 (31.76) | 58 (68.24) | 0.770 |
| Total | 32 (32.32) | 67 (67.68) | |

## DISCUSSION

The present cross-sectional study evaluated 99 surgical requests for TMJ referred by oral and maxillofacial surgeons between 2016 and 2019, and a high rate of surgical treatment without a standardized diagnostic criteria was found.

The management of temporomandibular disorders can range from simple non-surgical interventions to total prosthetic joint replacement. Surgeons need to be aware that most patients can be treated non-surgically[12].

Some authors have evaluated the knowledge about temporomandibular disorders and factors that may influence the diagnosis and proposed treatment, such as years of training, type of specialization and place of graduation[13,14]. Often, due to lack of information, the general practitioner who receives a patient with TMD makes the referral to an oral and maxillofacial surgeon instead of a specialist in TMD. As the education for these professionals regarding TMD diagnosis and treatment decisions for these professionals is often limited, and as their training is more clearly directed to more invasive procedures related to this specialty, the professional ends up opting only for the invasive approach, even before trying a noninvasive approach.

The results of the present study are in line with this reality. Among the therapies described in the medical records referred for TMJ surgery are TENS, physical therapy interventions, plaque and use of drugs. Sixty (60) of the 99 medical records evaluated did not describe any previously treatment performed, which is not up to the parameters and recommendations for oral and maxillofacial procedures[15].

The present study also evaluated factors related to the presence of clicking and mouth opening limitation reported in the referred medical records. The pop was related to the pain in the TMJ region and otalgia, which is consistent with the current literature. However, even though 68% of the patients had mouth opening limitation (classified as yes and no by the surgeon), only 4 forms described the measurement in millimeters. Opening limitation was related only to pain in the TMJ region. These findings demonstrate the limitation of this present study in terms of data collection. Only what was reported by the professional in the medical record was used for this analysis. Thus, to mention the possibility of information bias in this type of study is important. It is not possible to know if the described opening limitation really existed due to the evaluators lack of training.

In addition to the divergence regarding the proposed treatment, it was possible to evaluate the importance of the diagnostic tools presented. Most of the medical records contained information about the magnetic resonance report (only 7 of the 99 cases evaluated did not report). Among the information in the reports were disc displacement with unilateral and bilateral reduction (31% and 39%), disc displacement without unilateral and bilateral reduction (23% and 11%) and unilateral and bilateral joint effusion (18% and 24%), justifying TMJ surgery. However, it is known that all alterations mentioned above can be treated in a less invasive or noninvasive way, and only in cases of recurrence the surgery is suggested. It is worth mentioning that the evidence for surgery is very limited. mainly to clinical case reports and retrospective studies[16].

Recurrent TMJ dislocation is not as well understood as acute or chronic dislocation[17]. Although generally described in middle-aged or senior populations, recurrent TMJ dislocation can occur at all ages, including infants[18]. Without the ideal treatment modality reported by a recent systematic review[17], recurrent TMJ

dislocation remains a treatment challenge. The lack of new current scientific evidence for the treatment of recurrent TMJ dislocation may be one of the reasons why the professionals observed in this present study were recommending surgery. However, this does not justify invasive treatment as the first choice.

The use of multidisciplinary teams (oral maxillofacial surgeons together with specialists in temporomandibular disorders) for the diagnosis of temporomandibular disorders should be encouraged to allow all management options to be properly discussed in selected cases, rather than progressing unnecessarily to surgical intervention. Even with the diagnostic criteria already defined in the literature, professionals do not seem to use them. In the present study, among the factors evaluated for the indication of TMJ surgery were pain in the orofacial region (headache. facial pain. TMJ pain. otalgia. preauricular pain. temporal pain). Presence of tinnitus and popping. locking and limitation of mouth opening. and presence of bruxism.

As previously reported in the literature review, there are other less invasive and more cost-effective ways of treating these signs/symptoms. Data obtained through insurance companies reveals that TMJ surgery can cost from 25 to 54 thousand Brazilian Reais, depending on the hospital and the team selected. On the other hand, conservative treatment, which usually involves an initial consultation and another 10 sessions, has a high cost for the insurance company, making the discrepancy between the treatment and the cost of treatment clear. The present study evaluated data from patients who have medical insurance, in this way, the total cost of treatment is not paid by the patient (reducing the financial impact for the same), however, it can cause a financial impact for the insurer. In addition, the surgery has an impact on the patient's life.

It is important to emphasize the value importance of knowledge on the part of oral and maxillofacial surgeons in the diagnosis and treatment of temporomandibular disorders, as well as interprofessional collaboration (surgical and TMD specialties) to ensure the best treatment decision for the patient, not only in relation to the cost, but also to reduce the reduction of the impact of the treatment in the quality of life of these people. To date, TMJ surgery is the last treatment option that professionals should consider.

Thus, by preventing unnecessary surgeries from being indicated and by performing more conservative procedures, there is a reduction in costs for the insurance company and less discomfort for the patient.

## CONCLUSION

Factors evaluated for the indication of TMJ surgery by oral and maxillofacial surgeons do not match the recommendations of the CTBMF. Few conservative treatments have been recommended previously. and most were decided upon without any diagnostic criteria being used.

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## AUTHORS' CONTRIBUTIONS

**Tatiana Rendes Giorgetto**
Conceptualization, Research, Writing - Preparation of the original
**Luciane Lacerda Franco Rocha Rodrigues**
Conceptualization, Writing - Review and Editing, Validation
**Lidia Audrey Rocha Valadas**
Writing - Review and Editing, Validation
**António Sérgio Guimarães**
Funding acquisition, Writing - Review and Editing, Visualization

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