



Review

Temporomandibular joint arthroscopy. Surgical approach description

Artroscopia de la articulación temporomandibular. Descripción del abordaje

Víctor Hugo González Angulo*

ABSTRACT

Introduction: temporomandibular joint disorders (TMD) are one of the most common problems that occur in the daily consultation of the maxillofacial surgeon. Between 40-50% of the population has some type of TMD, predominantly in women, on average 6% require treatment, just one in four people are aware of suffering from it, therefore, temporomandibular joint (TMJ) pathology occurs even in asymptomatic joints. **Objective:** this article aims to disseminate the surgical technique for diagnostic arthroscopy of the TMJ, because it is an area of maxillofacial surgery with little development in most countries, thus allowing young specialists to be encouraged to enter this surgical field. Operational technique: the use of the minimum equipment and instruments necessary for TMJ arthroscopy is described. The explanation of the surgical technique for placing the portals inside the joint space is made and making a correct diagnosis of the internal structures. **Conclusion:** because there are a few patients who do not progress adequately to conservative treatment and arthralgia or loss of joint function will persist, arthroscopy should be considered as another step in the therapeutic ladder for joint conditions.

Keywords: arthroscopy, temporomandibular joint, internal derangement, synovitis.

RESUMEN

Introducción: los trastornos internos de la articulación temporomandibular (ATM) son uno de los problemas que comúnmente se encuentran en la consulta diaria del cirujano maxilofacial. Entre 40-50% de la población presenta algún tipo de trastorno de la articulación temporomandibular, con predominio en mujeres, sólo 6% requiere algún tipo de tratamiento, y sólo una de cuatro personas es consciente de padecerlo, por lo tanto, la patología articular ocurre incluso en articulaciones asintomáticas. **Objetivo:** este artículo tiene como objetivo difundir la técnica para la artroscopia diagnóstica de la ATM, debido a que es un área de la cirugía maxilofacial con poco desarrollo en la mayoría de los países, permitiendo así incentivar a los especialistas jóvenes a ingresar a este campo quirúrgico. **Técnica operativa:** se describe el uso del equipo e instrumentos mínimos necesarios para la artroscopia de la ATM. Se realiza la descripción de la técnica quirúrgica para colocar los portales dentro del espacio articular y realizar un correcto diagnóstico de las estructuras internas. **Conclusión:** debido a que hay un pequeño número de pacientes que no progresan adecuadamente al tratamiento conservador y persisten la artralgia o la pérdida de la función articular, la artroscopia debe considerarse como otro paso en la escala terapéutica para las afecciones articulares.

Palabras clave: artroscopia, articulación temporomandibular, trastorno interno, sinovitis.

* Maxillofacial surgeon. Private practice, Polimédica 413. Mexico.

Correspondence:

Víctor Hugo González Angulo

E-mail: victor@maxilof.com, gonzalezmaxilofacial@gmail.com

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INTRODUCTION

Temporomandibular joint disorders (TMD) in any of its modalities, such as disc displacement with or without reduction, unstable discs, disc perforations, chronic synovitis (*Figure 1*) or the final stages such as osteoarthritis, are among the most common problems in the daily consultation of the maxillofacial surgeon.

Currently, the general practice dentist, the orthodontist, prosthetist, or the different specialists who treat internal disorders of the TMJ, exhaust the different modalities of non-surgical treatments for joint conditions, creating a selective filter for the maxillofacial surgeon of those patients who require joint surgical treatments.

Between 40-50% of the population has some type of TMD, predominantly in women, on average 6% require treatment, just one in four people are aware of suffering from it,¹ therefore, joint pathology occurs even in asymptomatic joints.² Arthroscopic treatment has reported success rates ranging from 77 to 95.42%.³

Joint problems are chronic degenerative conditions and there is a considerable number of patients who do not evolve adequately with conservative treatment. It is in these cases where must exhaust diagnostic imaging methods such as tomography (CT) and magnetic resonance imaging (MRI) and take the next step in the ladder of treatments for TMJ articular tissue degradations and bony modifications processes, such as arthroscopy, one of the most challenging procedures in maxillofacial surgery, where the surgeon must have extensive experience not only in the basic arthroscopic maneuvers of the TMJ such as diagnostic arthroscopy and lysis and lavage (level I), taking biopsies (level II) but also arthroscopic operative procedures such as myotomy or capsulotomy, electrocoagulation of the posterior recess and areas of synovitis or discopexy (level III)⁴ and leave it as the last option open arthroplasty, discectomy and joint replacement.

In level I arthroscopy, a single cannula is placed, it is indicated to establish a diagnosis or perform a lavage of the internal structures with direct vision, as well as in arthroscopic surgeons who begin their learning curve.⁴ At level II, two cannulas are placed, one for the arthroscope and the second for the working medium, indicated for biopsies, electrocauterization of synovitis, myotomy, etc.⁵ Level III is indicated when it is necessary to perform advanced techniques such as discopexy where pain and loss of function continue

after conservative treatments have been exhausted⁶ or even for debridement of fibrous ankylosis.⁷

TMJ arthroscopy was first introduced in 1975 in Japan by Ohnishi,⁸ then in the 1980s Murakami in Japan described arthroscopic anatomy,⁹ the technique and instrumentation were developed in the United States of America by McCain,¹⁰ Spain has joined in the implementation of great arthroscopic surgeons.

Objectives. This article aims to disseminate the surgical technique for diagnostic arthroscopy of the TMJ, because it is an area of maxillofacial surgery with little development in most countries, thus allowing young specialists to be encouraged to enter this surgical field.

OPERATIONAL TECHNIQUE

TMJ arthroscopy is a minimally invasive technique for the treatment of internal TMJ disorders mainly in II, III IV Wilkes stages.

ARMAMENTARIUM

TMJ endoscopes are known as small joint arthroscopes and can be used for fingers, wrists, etc. Few commercial companies consider TMJ as a specific field for the manufacture of their endoscopes.

The minimum equipment for intra-articular instrumentation is an arthroscope (*Figure 2*), two cannulas, one for the endoscope and other for the working route (*Figure 3*), a blunt and sharp trocar, a probe, and forceps (*Figure 4*). The arthroscopic tower system includes a type C camera with a video processor, light source, a fiber optic cable to transport the light to the arthroscope, a video recorder, monitor, and an ablation cutting system.

Depending on criteria of the arthroscopic surgeon, system 1.8 (McCain system), 1.9 (Richard Wolf system) or 2.3 (Stryker system) can be used.

The angulation of the tip of the endoscope can have different measurements, which will allow visualization of the internal structures; the most useful for TMJ is 30 degrees. It is possible to find angles of 0, 30, 70 and 90 degrees (*Figure 5*). These endoscopes must have their insertion cannula to protect them from fractures or accidents inside the joint. It is useful to have at least two trocars on the same system to be able to perform adequate triangulation.

The instruments for intra-articular manipulation of the structures should be at least a probe and a forceps to be able to take a biopsy (*Figure 6*) or removal of adhesions and a tip for the ablation equipment.

The temporomandibular joint could be considered a pseudo-virtual space because it will remain almost collapsed until it is distended with fluid, so it can be navigated through, becoming a real space.

TECHNIQUE FOR TMJ ARTHROSCOPY

It is important to isolate the surgical site, therefore, it is necessary to perform trichotomy of the preauricular region to avoid the displacement of hair towards the intra-articular space and reduce the risk of post-surgical infections. A transparent dressing is used to isolate the oral cavity from the articular region and facilitate translation and rotation movements of the TMJ (*Figure 7*).

There is a variety of marking to find the intra-articular anatomical structures, one of the best known is the Holmlund and Hellsing line (HHL), where a straight line is marked from the tragus to the external canthus, with two points; the first, 10 mm anterior and 2 mm inferior; the second 20 mm and 10 mm lower.¹¹ Other surgeons use palpation; when manually translating the TMJ, a concavity is created in the space in front of the tragus, below the root of the zygoma and glenoid cavity and posterior to the condylar head, as described by McCain in his original article (*Figure 8*).¹⁰

At this point, the supra-discal space is distended with 3-5 mL of fluid.¹⁰ The direction of the needle will be 45 degrees from inferior to superior and 45 degrees from lateral to medial to touch with the tip of the needle at the glenoid fossa (*Figure 9*).⁴ The rebound effect must be present in the syringe, which ensures that it is in the indicated region. The needle must be removed quickly to avoid leakage of intra-articular fluid and not lose the distention created.

It is in this region where the first working route should be placed, with the acute trocar. There are surgeons who make an incision with a number 11 scalpel blade prior to introducing the trocar,⁵ however, this is the operator's decision. A rotating movement must be made to touch the root of the zygoma, to contour it inferiorly in the direction of the glenoid cavity. It is at this point where the blunt trocar should be changed to avoid injuries to the joint structures. Gentle pressure is applied until feel it fall into the void, this will be the point that indicates that have introduced the instrument to the posterior recess. The blunt trocar is removed, and the endoscope is inserted. Intra-articular anatomy must be observed, if not appreciated the synovial membrane, should be consider repeating the previous steps to avoid accidents related to the anatomical structures adjacent to the TMJ.¹²

At this point, must avoid constantly introducing liquid into TMJ cavity so as not to dissect aponeurotic spaces in the neck, therefore, the drainage route is placed. The second point of the HHL can be used, as is used in the arthrocentesis technique.¹³ Liquid output will be obtained, taking care that the amount introduced is the same as the amount drained.

At this point, the diagnosis of the posterior recess is carried out, with the bilaminar zone (*Figure 10*), the auditory canal afterwards, anteriorly the mandibular condyle, with its transition between the bilaminar zone and the disc, as well as medially the pterygoid shadow.¹⁴

Once the diagnosis of the anatomical regions has been made, the surgeon can navigate to the anterior recess. It is a difficult movement that requires patience and tact to avoid instrument breakage. To do this, the lens is removed to the lateral limit of the capsule, and then redirected anteriorly, trying to travel between the lateral pole of the mandibular condyle and medial to the joint capsule, performing rotating movements. With the help of our first assistant, the mouth will be closed so that the mandibular condyle travels to centric relation, releasing the anterior recess.

Once in the anterior recess, we perform the visual diagnosis, observing the transition line between disc-articular capsule anteriorly (*Figure 11*), medially the pterygoid shadow.⁹

When positioning the arthroscope laterally, sometimes the translucency of the light is observed. The distance must be measured with the second working trocar to be able to deduce the position of our lens, this technique is called triangulation (*Figure 12*).^{15,16}

This point will be the insertion place of the second route. A small incision can be made with a scalpel blade 11, and then with circular movements introduce the cannula with the sharp trocar. When observing the silhouette of the instrument on the monitor, it is time to change by blunt trocar. Must make sure to insert the entire sheath into our joint space, so as not to lose our cannula when replacing the instruments.

Through this second route we can introduce the tip of the ablation cutting system to perform the capsulotomy or myotomy of the pterygoid muscle. Once this is done, with a probe, you can navigate again to the posterior recess to reduce the position of the mandibular disc.

There are different ways described for suturing the mandibular disc, McCain performs the lateral suture, Yang performs the suture through the auditory canal, leaving the technique to the discretion of the operator,³ however the description of these is beyond



Figure 1: Synovitis in left temporomandibular joint posterior recess.



Figure 2: Small joint endoscope at 30 degrees.

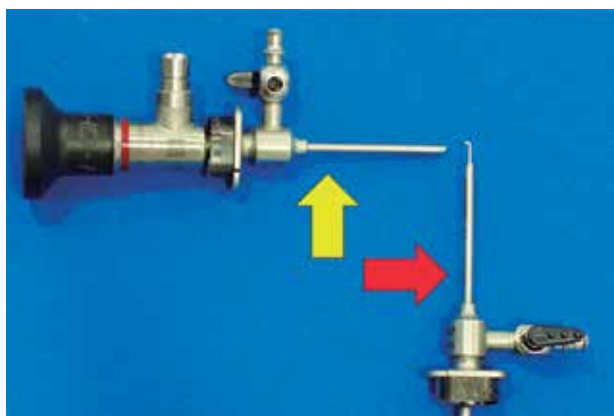


Figure 3: Arthroscope sheath (yellow arrow), for working route (red arrow).



Figure 4: Cannula with blunt and sharp trocar.

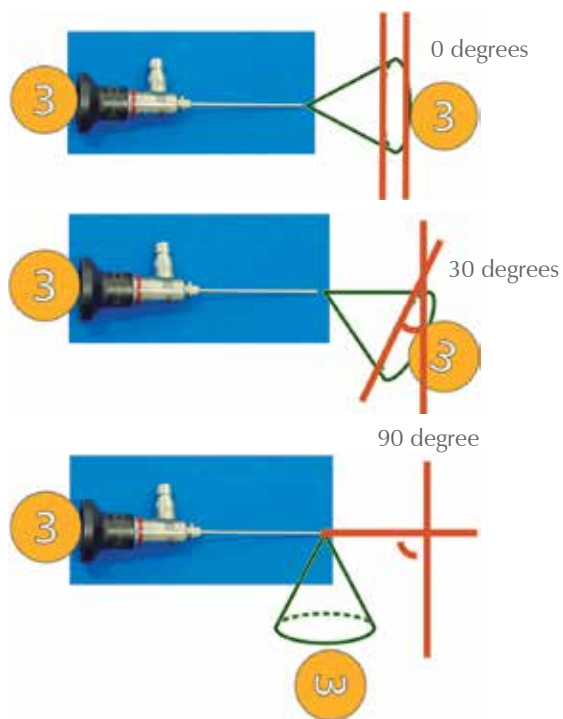


Figure 5: Different degrees of endoscopic vision.



Figure 6: Probe and biopsy forceps.

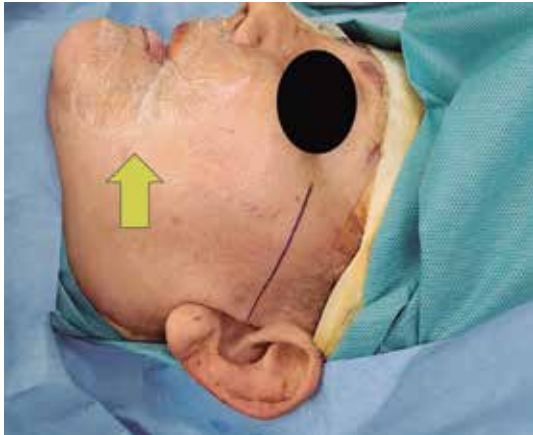


Figure 7: Tegaderm transparent dressing isolating oral cavity and Holmlund and Helsing line.

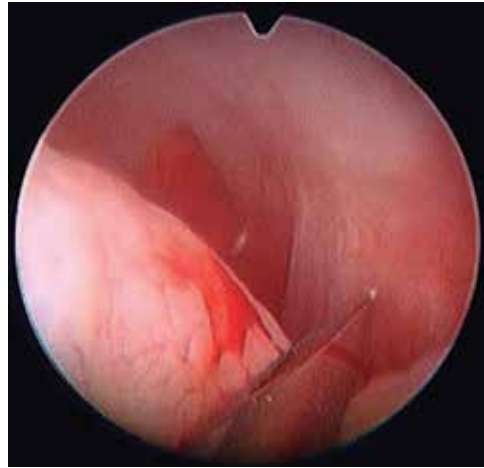


Figure 10: Posterior recess, bilaminar area.



Figure 8: Manual subluxation of the temporomandibular joint and marking of the preauricular depression area.



Figure 11: Anterior recess; limit of the disk and union with the capsule. Right temporomandibular joint.



Figure 9: Initial puncture direction.

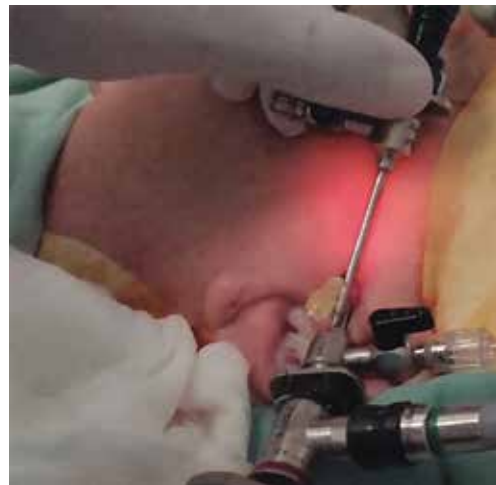


Figure 12: Transillumination for triangulation.

the main objective of this article, which is to describe the basic technique for arthroscopic diagnosis.

CONCLUSIONS

Because there are a few patients who do not progress adequately to conservative treatment and arthralgia or loss of joint function will persist, arthroscopy should be considered as another step in the therapeutic ladder for joint conditions. With it, a visual diagnosis can be established, essential for consistent treatment without speculation, which cannot be performed with other diagnostic methods such as magnetic resonance imaging, tomography, conventional radiology, etc.

REFERENCES

- González Olivares H, López Saucedo F, Pérez Nova A. Prevalencia de disfunción de la articulación temporomandibular en médicos residentes del Hospital de Especialidades Centro Médico Nacional «La Raza». *Rev Odont Mex*. 2016; 20 (1): 8-12.
- Suzuki A, Hasebe M, Hamada Y. Intra-articular pathologies detected by magnetic resonance imaging in patients with temporomandibular disorders undergone successful non-surgical treatment. *J Oral Maxillofac Pathol*. 2024; 36 (6): 804-809.
- Yang C, Cai XY, Chen MJ, Zhang SY. New arthroscopic disc repositioning and suturing technique for treating an anteriorly displaced disc of the temporomandibular joint: part I--technique introduction. *Int J Oral Maxillofac Surg*. 2012; 41 (9): 1058-1063.
- Moreno-Sánchez M, Monje Gil F. Lysis and lavage: what else in temporomandibular joint surgery? *Atlas Oral Maxillofac Surg Clin North Am*. 2022; 30 (2): 159-164.
- González-García R, Martín-Granizo R. Arthroscopic disc repositioning techniques of the temporomandibular joint: part 1: sutures. *Atlas Oral Maxillofac Surg Clin North Am*. 2022; 30 (2): 175-183.
- Xie Q, Li P, Yang C, Chen M, Li H, Bai G et al. Feasibility of simultaneous TMJ arthroscopy in ADDwoR patients undergoing orthognathic surgery for jaw deformity. *J Craniomaxillofac Surg*. 2024; 52 (3): 347-354.
- Murakami K. Current role of arthrocentesis, arthroscopy and open surgery for temporomandibular joint internal derangement with inflammatory/degenerative disease; -pittfalls and pearls. *J Oral Maxillofac Surg Med Pathol*. 2022; 34: 1-11.
- McCain JP, de la Rúa H, LeBlanc WG. Puncture technique and portals of entry for diagnostic and operative arthroscopy of the temporomandibular joint. *Arthroscopy*. 1991; 7 (2): 221-232.
- Murakami K, Hoshino K. Regional anatomical nomenclature and arthroscopic terminology in human temporomandibular joints. *Okajimas Folia Anat Jpn*. 1982; 58 (4-6): 745-760.
- McCain JP. Arthroscopy of the human temporomandibular joint. *J Oral Maxillofac Surg*. 1988; 46 (8): 648-655.
- Holmlund A, Hellsing G. Arthroscopy of the temporomandibular joint. An autopsy study. *Int J Oral Surg*. 1985; 14 (2): 169-175.
- Tsuyama M, Kondoh T, Seto K, Fukuda J. Complications of temporomandibular joint arthroscopy: a retrospective analysis of 301 lysis and lavage procedures performed using the triangulation technique. *J Oral Maxillofac Surg*. 2000; 58 (5): 500-505; discussion 505-506.
- Nitzan DW, Naaman HL. Athrocentesis: what, when, and why? *Atlas Oral Maxillofac Surg Clin North Am*. 2022; 30 (2): 137-145.
- Hossameldin RH. Usual and nonusual findings in temporomandibular joint arthroscopy. *Atlas Oral Maxillofac Surg Clin North Am*. 2022; 30 (2): 147-157.
- Moses JJ, Lo H. Percutaneous transillumination-assisted arthroscopic puncture technique. *J Oral Maxillofac Surg*. 1991; 49 (7): 772-774.
- Verde L, Muñoz-Guerra MF, Rodríguez-Campo FJ, Escorial V. Temporomandibular joint: approach to the intermediate space by triangulation with transillumination reference. *J Oral Maxillofac Surg*. 2023; 81 (6): 684-688.

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