



Expanding Articular Space during Opened TMJ Surgery - New Technique Description

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Abstract

Background: Patients with severe Temporomandibular Joint (TMJ) diseases might need some type of joint procedure. TMJ surgical procedures can be somewhat difficult and demand a skilled surgeon, with good anatomy knowledge, to perform them. Clear vision of the articular spaces during any opened TMJ arthroplasty is not easy even though neuromuscular blocking agents can be administered during general anesthesia as the condyle still seats inside the articular fossa reducing plain identification of joint structures.

Purpose: This article presents a simple assisting surgical procedure called Screw-Wire-Holder technique, which facilitates pulling the condyle outside the articular fossa, in a downward and forward direction, making possible not only joint visualization but also the ideal execution of inside joint needed procedures.

Materials and Methods: A total of thirty two TMJ arthroplasty were performed using this minor surgical auxiliary concomitant procedure.

Results: No undesirable results were found when all patients were submitted to this technique during their opened TMJ surgeries. Authors have not come across to any difficulties to perform the procedure nor undesirable effects of were ever experienced.

Conclusion: The SWH technique is a simple and very helpful procedure which can facilitate TMJ arthroplasty visualization. No complications, if any, are rarely observed. As best of our knowledge there is no such technique report and/or description in the international scientific literature.

Keywords: TMJ Arthroplasty; TMJ Surgery; Mandible Manoeuvre; Articular Space; Joint Space

Introduction

The Temporomandibular joint (TMJ) has been anatomically studied for many researches [1-7] and mandible movements, in great part, are dependent upon a healthy TMJ for an efficient

stomatognathic function while TMJ diseases affect the system as a whole [8].

This joint consists of skeletal and soft tissue structures, as in any other body joint but the nature, position, and function of its disc make the TMJ a very unique articular structure [9].

Its pathophysiology may involve various aspects such as systemic disorders, hereditary conditions, micro and macro stresses, direct and indirect trauma, previous interventions, malocclusions, psychological, behavioral and environmental factors [10,11].

A well conducted study by Tallents, *et al.* (1996) [12] showed TMJ disc displacement in 84% of their patients with symptomatic joint versus 33% of asymptomatic subjects. Because of these displacement associated with pain, several patients in any particular time in their life might require some kind of TMJ intervention, closed or opened.

The TMJ is one of the body parts that offer greater difficulty for clear visualization during an open surgical procedure due to its position/location, size, neuro and vascular important surrounding structures, unique bone shapes (condyle and fossa), and biaxial nature [9].

Although it is well known that small incisions, less tissue dissections and gentle anatomy manipulation for TMJ access greatly reduces the chances for more scarring and fibrosis inside and outside the TMJ structures, unambiguous visualization inside the joint during a surgical procedure is very difficult, mostly with bleeding coming from the bilaminar tissue after its removal [13].

Until now neither studies nor auxiliary technique descriptions have been presented to solve this problem.

Purpose

So, the aim of this work is to demonstrate a simple procedure that can be performed along with opened TMJ surgeries which helps perceiving the internal joint structures.

This article presents an auxiliary, simple but very effective procedure which helps moving the condyle in various directions, mainly anterior-inferiorly, to broaden the articular space during any type of opened TMJ arthroplasty. It allows larger access to the joint and better visualization of its compartments and structures such as: 1) disc, 2) ligaments, and 3) capsule. Also, this procedure opens more space for entering the superior and inferior joint spaces, facilitates cutting any damaged posterior bilaminar tissue, gives better access for releasing the disc, provides adequate space for rotation of a needle holder tip inside the joint when suturing the Mitek Anchor 2-0 non-resorbable sutures on the medial and lateral aspects of the disc, and offer perfect tridimensional space

for final suturing of the remaining portion of the most posterior aspect of the bilaminar tissue to the posterior aspect of the disc.

The authors propose this technique as a small contribution for the study of TMJ surgery.

Technique description

The technique developed and conceptualized by the senior consultant is step-by-step described below to facilitate technique reproducibility by other surgeons and illustrative pictures were added to assist it.

After the normal cervicofacial preparation of patient's face, mouth and nose are isolated with Tegaderm. The very angle of the mandible in which the TMJ will be surgically addressed is localized and 2 cc of local anaesthetic with vasoconstrictor is injected in the area until bone is reached at the needle's tip (Figure 1A). A very small incision measuring the exact size of a # 15C scalpel blade, not bigger or larger than the size of the screw head which will be used for the angle of the mandible (gonial angle) fixation, is performed (Figure 1B).

Then, the mandible angle is perforated with the bur provided



Figure 1A: The angle of the mandible is localized and delineated with skin pen, and local anaesthesia is infiltrated in the area.



Figure 1B: Tiny skin incision made with a # 15C scalpel blade.

on the 2.0 rigid fixation system (Figure 2A). The longest 2.0 screw available on the rigid fixation system kit (at least 15 mm long) is used and fixated at the mandible angle (Figure 2B). The stop of the screw is exactly at the skin level.



Figure 2A: Mandible angle is perforated with the bur provided on the rigid fixation kit.



Figure 2B: The screw is fixated at the mandible angle.

A fifteen cm number 1 stainless steel wire is tightly twisted around the screw head (Figure 3A). The other tip of the wire is cut in order to avoid skin lesion. A strong needle holder is maintained in position holding the stainless steel wire throughout the entire TMJ surgical procedure in order to: 1) maintain control of the mandible angle; 2) Avoid surrounding skin damage inadvertently provoked by a loose wire; 3) Gain time with no need for wire capture with the needle holder. This three-component apparatus is called screw-wire-holder system (SWH technique/system) (Figure 3B).



Figure 3A: A number 1 stainless steel wire is tightly twisted around the screw.



Figure 3B: The screw-wire-holder system (SWH technique/system) is composed of a strong needle holder fixed to the stainless steel wire which is hold in position against the screw.

TMJ space available during any open joint access is very limited and the condyle still seats inside the articular fossa reducing the joint space available for completing the procedure with a good vi-

sion even if the patient is under skeletal muscle relaxation caused by neuromuscular blocking agents (Figure 4A).



Figure 4A: TMJ space available during joint access. Joint space is reduced because condyle seats passively inside the articular fossa.

Before TMJ capsule incision is performed for entering the superior joint space, mandible is pulled down by the screw-wire-holder system (SWH technique) opening space for a better vision of the joint space as the condyle is pulled outside the articular fossa (Figure 4B).



Figure 4B: Mandible pulled down by the SWH system, opening space for a better vision of the joint space as the condyle is pulled outside the articular fossa.

The final skin suture of the gonial angle incision can be done with a single vertical mattress stitch using # 6-0 mononylon.



Figure 5: Final skin suture of the gonial angle incision with # 6-0 mononylon.

Advantages of the SWH technique/system

These are the advantages for this technique but certainly they are not limited to: 1) A form of more precise mandible-condyle control/grip during an opened TMJ surgery; 2) Opening more room in the superior and inferior compartments of the joint; 3) Avoid possible damage (incision) to the disc when it is posterior and/or laterally displaced; 4) Easier to visualize and investigate the fossa and mostly the articular eminence; 5) Easier to visualize the superior (upper) face of the disc; 6) Easier to visualize and make any plasty to the inferior (lower) face of the disc in those cases where the disc is deformed and needs some trimming; 7) Easier to resect the capsule, disc, and condyle when total joint replacement is the delivered treatment; 8) When the SWH technique is applied bilaterally, forward traction of the mandible can be performed in those cases of bilateral TMJ total joint replacement, if mandible needs to be concomitantly anteriorly repositioned.

Disadvantages of the SWH technique/system

For application of the SWH technique is fair to mention that: 1) There is a possibility for a tiny skin scar to be formed in patients with melanin pigmentation; 2) There is a need for two extra # 6-0 mononylon skin sutures placed at the angle of the mandible incision sites; 3) Minimal to moderate oedema at the angle of the mandible due to masseter muscle trauma while using bur for mandible perforation.

Conclusion

Repeated surgical procedures which will improve surgeon's performance aided by auxiliary techniques may minimize trauma to the surgical site with obvious reduction of surgical time.

The SWH technique/system is a very simple, efficient and reproducible technique for enlarging/amplifying the space inside the TMJ, during any type of opened surgical approach for this joint. The authors have applied this technique now for every and any single opened TMJ procedure since the beginning of 2019 and have not come across to any difficulties or undesired effects of this minor surgical auxiliary concomitant intervention.

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