Temporomandibular Joint Surgery

Open Discopexy and "Functional Arthroplasty"

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KEYWORDS

• TMJ surgery • TMD • Functional arthroplasty • Internal derangement • Discopexy • Arthroscopy • Condylar shaving • TMJ pain

KEY POINTS

- The facial nerve runs over the superficial temporalis fascia along part of the zygomatic arch; for this reason, it is important to conduct dissection of the deep temporalis fascia.
- During the dissection the superficial temporal artery and vein are identified, carefully tied, and interrupted.
- The lateral ligament of the disk must be identified, cutted, and replaced with the anchor screw suture to allow an inferior compartment surgery.
- The association of condylar shaving and disk repositioning improves the relapse of the disk luxation.
- The authors called "Functional Arthroplasty" (FA) the procedure with upper compartment arthroscopy, access to the lower compartment with condyle condylar shaving, retrodiscal perforations repair, disk repositioning with Kirk maneuver, and its stabilization through the resorbable anchor.

Introduction

Temporomandibular disorders (TMDs) are a heterogeneous group of conditions affecting the masticatory system characterized primarily by joint and/or muscular pain, joint sounds, and limited or irregular mandibular function, otologic symptoms may be present.

The more severe TMD are associated with a lower quality of life.

The causes of TMD are complex and multifactorial. Biological, psychological, and social roles seem to be related to the observed association between TMD and female sex.

Disk repositioning surgery is an accepted and commonly performed treatment of temporomandibular joint (TMJ) internal derangement. The main goal of discopexy is to stabilize the articular disk in a functional position, restoring the normal condyle—disk relationship.[1] It has been suggested that disk repositioning surgery may lead to a reduction in disk degeneration by eliminating mechanical interferences and facilitating the range of motion[2] with fewer complications than discectomy.[3,4]

The authors called "FA" the procedure with upper compartment arthroscopy, access to the lower compartment with condyle condylar shaving, retrodiscal perforations repair, disk repositioning with Kirk maneuver,[5] and its stabilization through the resorbable anchor.

Surgical technique

Preoperative planning

All the patients that undergo "FA" are affected by TMD with chronic pain and irreversible TMJ damage resistant to conservative therapy.

All patients receive a comprehensive history and TMJ evaluation according to Diagnostic Criteria for Temporomandibular Disorders (DC/TMD) for Clinical and Research Applications Axis I.[6]

Patients are investigated for headache, local pain, cervical pain, brachial pain, tinnitus, and vertigo.[7,8]

All patients undergo a panoramic radiograph and a real-time MRI at 15 frames per second during the natural opening and closing of the mouth when a TMJ disk displacement is suspected, whereas a computed tomography (CT) scan is performed in patients suspected of TMJ degenerative joint disease.

Prep and patient positioning

The patients undergo general nasotracheal anesthesia. Antibiotic prophylaxis with a cephalosporin is administered intravenous (IV) 1 h before surgery.

The patient's dressing must leave uncovered the ipsilateral temporal area to keep under control the possible contractions of the facial nerve and partially the patient's mouth, previously sterilized, to check the occlusion. A trichotomy of the hair located in front of the corresponding ear is mandatory before the surgery.

Under general anesthesia with nasotracheal intubation, the patient is positioned over the surgical bed in an operatory room

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in a semi-seated position with the head turned to show the affected TMJ (Fig. 1).

A chlorhexidine digluconate and alcohol 70% solution is used to wash and sterilize the skin (Fig. 2).

Surgical approach

A pre-auricolar retro-tragal incision is performed with a cold N°15 blade and a 45° beveled inclination with interruption of the tragal cartilage (Fig. 3).

Surgical procedure

Deep temporal fascia exposure

The dissection will start to expose the superficial temporalis fascia. After, the deep temporalis fascia was exposed. This is a safety plan because the frontal branch of the facial nerve runs over the superficial fascia in correspondence of the zygomatic arch (Fig. 4).

Vessel's ligature

The parotid gland is detached from the perichondrium that covers the cartilage of tragus and the external auditory canal in all its depth and to detach parotid from the TMJ capsule.

Moving the mandible of the patient the motility of the mandibular condyle is appreciated. In this region, the superficial temporal artery and vein are identified, carefully tied, and interrupted (Fig. 5).

Temporomandibular joint capsule exposure

Once the vascular structures have been interrupted, the dissection was carried deeper to detach the parotid gland.

Now, by blunt dissection, the surgeon will expose the joint capsule previously identified palpatory (Fig. 6).

Upper compartment arthroscopy and arthrocentesis

The OnPoint 1.2 mm Scope System (Biomet Microfixation, Jacksonville, FL, USA) was used for the diagnostic. The OnPoint System consists of a console, monitor, and disposable kit. The system also includes a disposable arthroscope, cannulas, trocars, and a 22-gauge lavage needle, along with other disposable items, which eliminates the need for sterilization[9] (Fig. 7).

Following TMJ capsule exposure, the superior joint space was entered.

Entry is similar to the traditional technique by entering the superior joint space at the maximum concavity of the glenoid fossa, followed by the insertion of the outflow lavage needle to establish lavage track. After the outflow port is made with the 18- to 20-gauge needle, arthroscopic arthrocentesis was initiated with continuous irrigation and lavage using 160-mL lactated Ringer's solution for lysis and lavage.

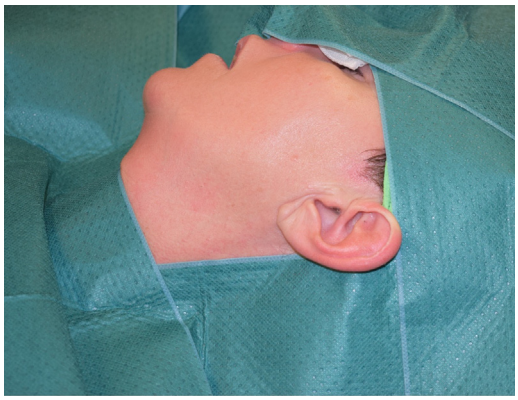

Fig. 2 Chlorhexidine digluconate and alcohol 70% solution is used to wash and sterilize the skin.

A diagnostic sweep of the arthroscope is done to tackle and visualize and examine the seven points of interest of the superior joint space: medial synovial drape, pterygoid shadow, retrodiscal tissue, posterior slope of the glenoid fossa, articular disk position and dynamics, intermediate zone, and anterior recess.

During this procedure, any small adhesions are lyzed with the pressure of the irrigating fluid.

Lateral ligament incision

The lateral ligament's insertion is identified on the lateral pole of the condylar head and with a cold N°15 blade the insertion is cut, the disk is softly moved upward, and the inferior compartment of the TMJ is exposed (Fig. 8).

Retractor placement

Dunn-Dautrey TMJ condyle retractors are now inserted to carefully protect the disk, the retrodiscal tissues, the superior compartment, and all the structures around the head condyle (Fig. 9).

Condylar shaving

Condylar shaving (a high condylectomy of 1—2 mm) is then performed to reshape the upper part of the condylar head, using PIEZOSURGERY Plus (Mectron S.p.A., Carasco, Italy) to

Fig. 1 Patient is positioned over the surgical bed in the operatory room in a semi-seated position with the head turned to show the affected TMJ.

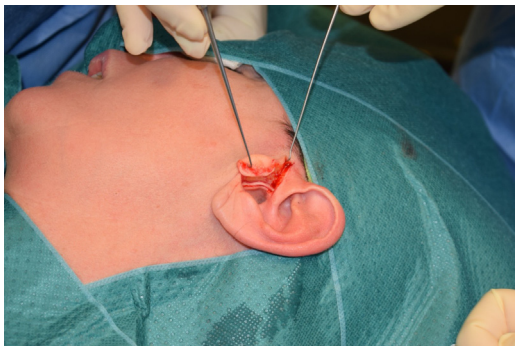

Fig. 3 Pre-auricolar retro-tragal incision is performed with a cold N°15 blade and a 45° beveled inclination with interruption of the tragal cartilage.

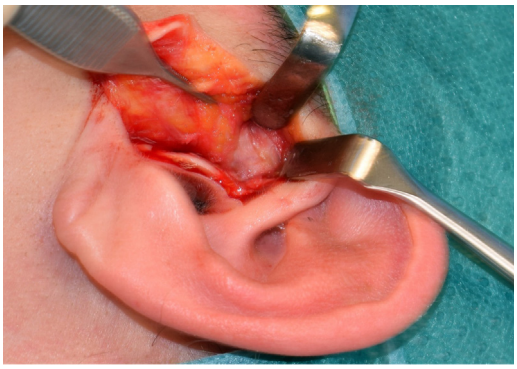

Fig. 4 Deep temporalis fascia exposed. This is a safety plan because the frontal branch of the facial nerve runs over the superficial fascia in correspondence of the zygomatic arch.

remove the damaged condylar head and improving disk stability on the condyle (Figs. 10 and 11).

After removal of this piece and smoothing off the edges, the disk and retrodiscal tissues were evaluated from the inferior compartment for perforations (Fig. 12), adhesions, or anomalies.

Lateral ligament identification and retrodiscal perforation suture

During the surgery the lateral ligament attached to the disk is moved anteromedially; now it is necessary to identify it and to firmly hold it and repositioned it with the Kirk maneuver.[5]

If retrodiscal perforations are visualized, they should be repaired with a 4/0 Ethibond PS-4c needle.

Anchor screw discopexy

The disk is repositioned from its pathologic position to a more correct position over the condylar head. It is then fixed to the condylar head using a 1.3 drill, supplied with Mitek Microfix QuickAnchor Plus 1.3 (Figs. 13—15), and a reabsorbable microanchor positioned inside the condylar head. The anchor is linked to a 3/0 Ethibond permanent suture, which is used to fix the posterolateral side of the disk above the condyle.[10,11] A functional test of joint mobility is then performed by opening

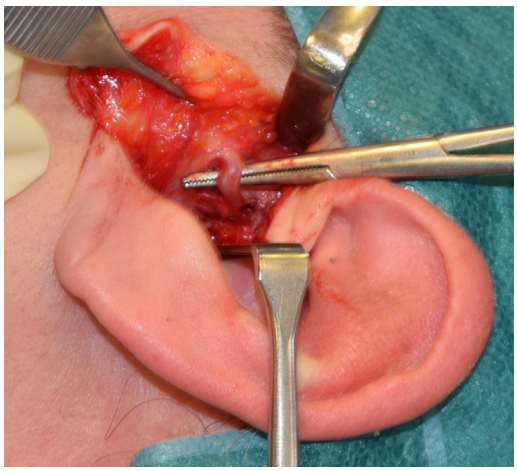

Fig. 5 Superficial temporal artery and vein identified.

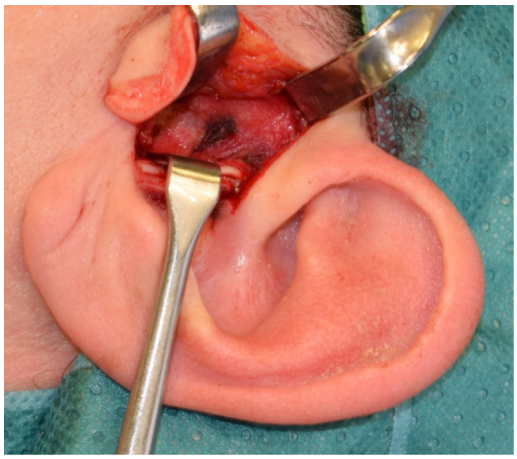

Fig. 6 Joint capsule exposed by blunt dissection.

and closing the jaw and moving it from side to side, checking the correct position of the disk.

Final sutures

The deeper sutures are performed with absorbable thread stitches (monofilament or interlaced 4/0 multi-filament). They are not real subcutaneous stitches.

Subsequently, the skin will be sutured by a 5/0 Nylon continuous suture (Fig. 16).

Potential complications

The facial nerve could be considered the most important structure at risk during FA of the TMJ.[3]

Understanding the anatomy of the facial nerve as it passes over the TMJ is key to all TMJ surgeries. Classical literature has described a safe zone approximately 0.8 to 1.8 mm in front of the tragus and approximately 10 mm inferior to the root of the glenoid fossa. A weakness of the frontal branch of the facial nerve can occur due to traction of the retractors and regresses within a few weeks. Neuropraxia around the joint and temporal region usually is related to temporary edema and is usually short lived.

Postoperative bleedings are described and are because of the superficial temporal artery. It may need to be religated.

Bleeding and nerve damage often run hand in hand. In the attempt to stop bleeding with a cautery, the burn can

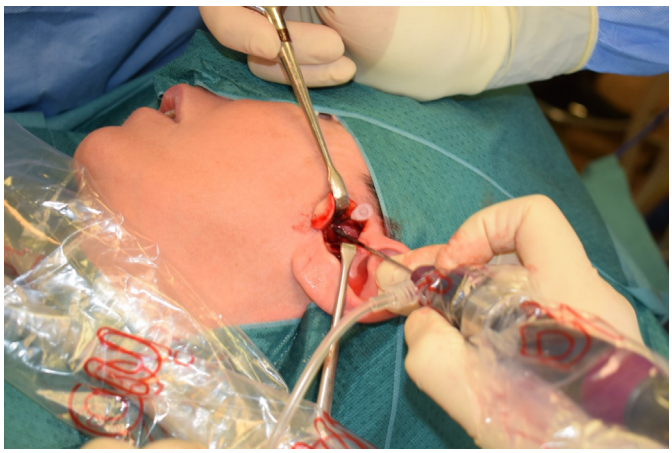

Fig. 7 OnPoint 1.2 mm scope system (Biomet Microfixation, Jacksonville, FL, USA).

Fig. 8 Drawing showing the lateral ligament's insertion identified on the lateral pole of the condylar head and cut, and the disk is softly moved upward, and the inferior compartment of the temporomandibular joint is exposed. (*Courtesy of* Claudio Starace.)

propagate to a nearby nerve. Most bleeding in TMJ surgery occurs during the dissection and can be controlled with the surgical technique.

Infections from arthroplasty of the joint are reported in the 1% to 2% range and are easily controlled with antibiotic therapy.

Pearls

The success of this surgery is related to the preservation of the superior compartment and to the disk stabilization.

Fig. 9 Dunn-Dautrey temporomandibular joint condyle retractors inserted to careful protect the disk, the retrodiscal tissues, the superior compartment, and all the structures around the head condyle.

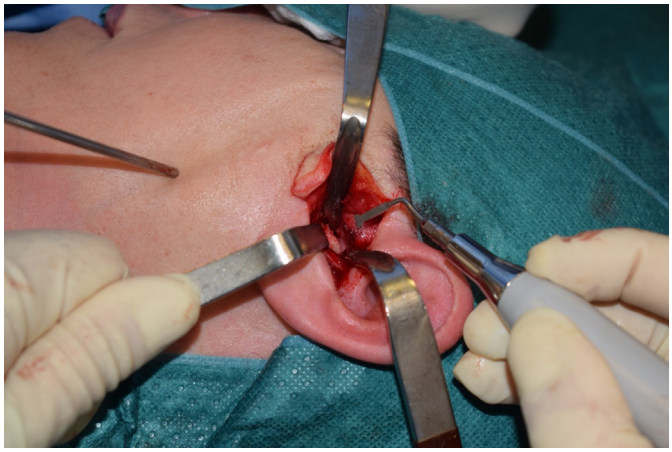

Fig. 10 Condylar shaving (a high condylectomy of 1—2 mm) is then performed to reshape the upper part of the condylar head, using PIEZOSURGERY Plus (Mectron S.p.A., Carasco, Italy) to remove the damaged condylar head and improving disk stability on the condyle.

Fig. 11 Drawing showing condylar shaving. (*Courtesy of* Claudio Starace.)

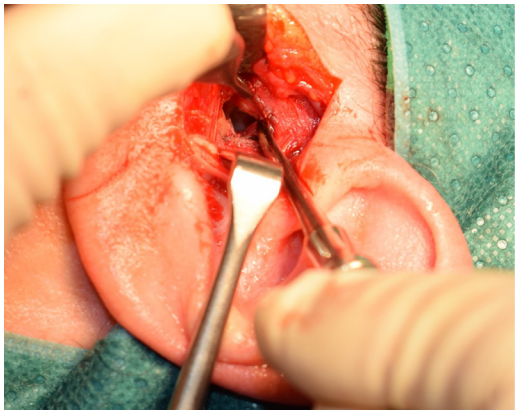

Fig. 12 Huge perforation in the retrodiscal tissue.

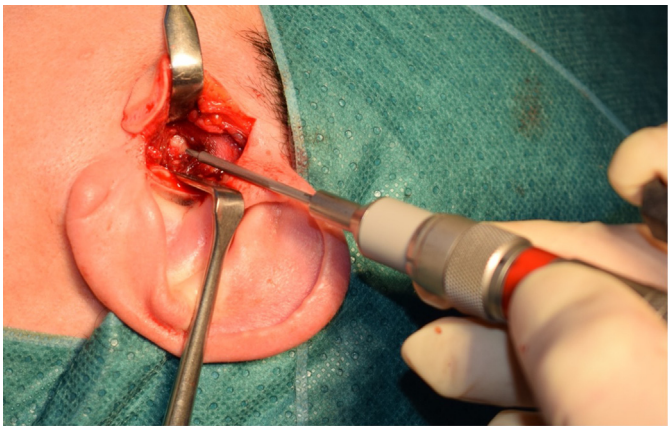

Fig. 13 1.3 drill, supplied with Mitek Microfix QuickAnchor Plus 1.3.

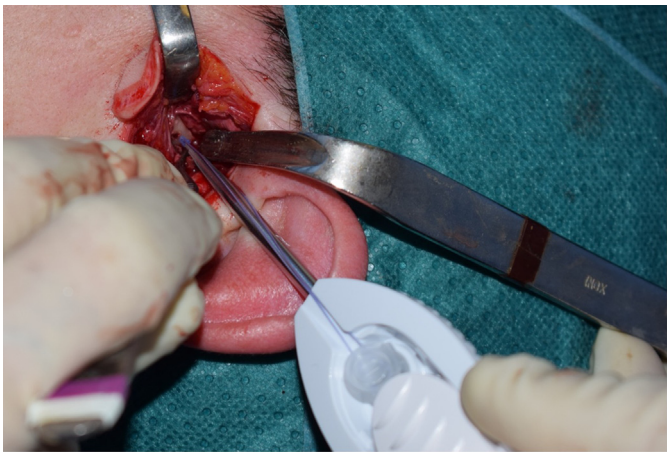

Fig. 14 Reabsorbable microanchor positioned inside the condylar head.

Condylar shaving strengthens the disk stabilization obtained with the stitches and resorbable anchor because of adhesion phenomena between the disk and the new surface of the condyle.

The scar remains hidden in the external ear canal and is minimally visible.

Pitfalls

Authors recommend gentle traction with soft tissues and condyle retractors to avoid facial nerve weakness.

After the surgery, depending on the condylar shaving, some patients complain of premature contact on the affected side. This disappears in a few days.

The auriculotemporal nerve paresthesia because of auriculo-temporal nerve stretching can last several weeks with paresthesia phenomena that subside in a few weeks.

Immediate postoperative care

The dressing is made with adhesive strips and changed after 10 postoperative days with stitches removal.

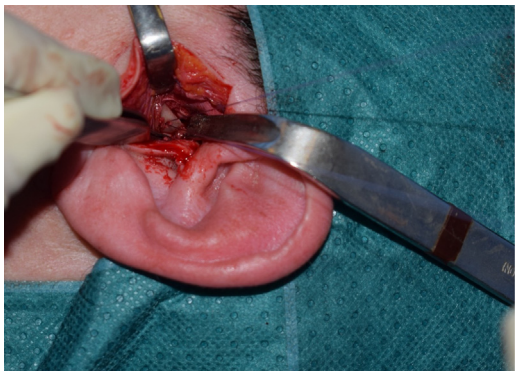

Fig. 15 Anchor is linked to a 3/0 Ethibond permanent suture, which is used to fix the posterolateral side of the disk above the condyle.

Fig. 16 Skin sutured by a 5/0 Nylon continuous suture.

The patient is discharged the day after the operation with painkiller therapy (non-steroidal anti-inflammatory drugs) and the prescription of a semi-liquid diet.

Rehabilitation and recovery

During the first 7 days after surgery, the patient is instructed not to force the mouth to open.

From the seventh day after surgery, the contralateral lateral movements can begin at least 30 days.

After 1 month, the patient can start physiotherapy for mouth movement and posture rebalance.

Biobehavioral therapy is started immediately with a brief training program that included postural relaxation, training in breathing, and proprioceptive reeducation for the management of masticatory muscle pain disorders.

Clinics care points

- Functional Arthroplasty" preserves the anatomical structures
- Functional Arthroplasty" aims to restore the functional unit of the joint

- It's a lower compartment surgery and may be associated with arthroscopy of the upper compartment - Sometimes a omolateral molar precontact due to condylar shaving may be present

Disclosure

The authors have nothing to disclose. All the figures are original works.

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