

CASE REPORT



Use of Mini-anchors and Rehabilitation with 0° Cusp Angle Teeth Complete Denture in Recurrent Condylar Dislocation: Technical Adequacy and Procedure

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ABSTRACT

Aim: To report a case of association between the surgical treatment of temporomandibular dysfunction and rehabilitation with denture total prosthesis (TP) using nonanatomic teeth (cusp 0°) in patients with anterior recurrent dislocation of the temporomandibular joint (TMJ) and persistent uncontrolled mandibular movement, showing a technical adaptation and conduct.

Introduction: There are several treatment approaches available for dislocation of the TMJ. The use of condylar mini-anchors for recurrent TMJ dislocation is a valid option and should be considered since it does not alter the joint anatomy. In edentulous patients undergoing TMJ surgical procedures, prosthetic rehabilitation can be seen as a means of treatment preservation.

Case report: A 73-year-old female patient attended the oral and maxillofacial surgery clinic presenting with joint instability, ligament laxity, and chronic recurrent TMJ dislocations. She had already been through three previous unsuccessful surgical procedures. A treatment plan was done based on the installation of a mini-anchor in the patient's TMJ through the preauricular surgical access. Dislocations were then resolved, but the lack of mandibular control even to a lesser extent after surgery precluded the use of prosthetics even at rest. Thus, it was planned

to manufacture two conventional TPs with 0° cusp angle teeth, a clinical protocol shortened to three sessions in an attempt to improve the stability of the prosthesis.

Conclusion: The use of an individual mini-anchor is simple and effective, and the use of artificial teeth is well suited to the case.

Clinical significance: A multidisciplinary intervention (surgery/prosthesis) is of utmost importance for the resolution and preservation of the treatment of these complex cases.

Keywords: Case reports, Complete denture, Dislocations, Suture anchors, Temporomandibular joint disorders, Tooth artificial.

How to cite this article: de S Leão R, da S Júnior EZ, de Alencar MGM, Catunda RQ, de Moraes SLD, do E Vasconcelos BC. Use of Mini-anchors and Rehabilitation with 0° Cusp Angle Teeth Complete Denture in Recurrent Condylar Dislocation: Technical Adequacy and Procedure. *J Contemp Dent Pract* 2017;18(4):337-341.

Source of support: Nil

Conflict of interest: None

INTRODUCTION

For proper temporomandibular joint (TMJ) functioning, the mandibular condyle, the articular disc, and the glenoid cavity must be adequately positioned, both at rest and during function.¹

Dislocation of the TMJ occurs when the mandibular condyle moves out of the joint cavity, surpasses the neighboring joint surfaces, and remains locked.¹

When conservative procedures to solve this condition fail, surgical treatment should be considered. Wolford et al² divided the surgical procedure into five categories:

- (1) Procedures on soft tissue only
- (2) obstacle removal
- (3) the use of obstacles to prevent translational movement
- (4) movement reduction through the use of ligatures
- (5) jaw osteotomy.

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Wolford et al² developed a mini-anchor called "Mitek" for the purpose of promoting mandibular translation control and, at the same time, preventing anterior condylar dislocation. This device has been since then considered to be a reference for TMJ anchor use in the case of both recurrent dislocation and disk repositioning.

On considering the connection between TMJ disorders and tooth absence,^{3,4} TMJ surgical treatment of edentulous patients needs to be complemented by satisfactory prosthetic rehabilitation. This should establish proper maxillomandibular relations, especially the occlusal vertical dimension and centric relation (CR).

Hagag et al⁵ mention that prosthetic recovery to stabilize occlusion is suitable for patients with temporomandibular disorders. Another occlusion-related factor is the kind of artificial teeth used, which may influence treatment outcome.⁶⁻⁸

For instance, there are anatomical teeth at 30° cusp angle on average. In contrast, nonanatomic ones do not have a straight occlusal plane with cusp inclination at 0°.⁹

Sutton et al⁶ and Shetty¹⁰ reported that nonanatomic teeth reduce lateral stress, minimize the masticatory load, and allow freer lateral movement without treatment, thus promoting better prosthesis stability, which would imply smaller TMJ effort.

This study aims to report a case of an association between surgical treatment of temporomandibular dysfunction and total prosthesis (TP) rehabilitation using nonanatomic teeth in patients with recurrent anterior dislocation of the TMJ and persistent involuntary mandibular movement.

CASE REPORT

A 73-year-old female pheodermic patient came over to the maxillofacial trauma and surgery clinic complaining that her jaw often dropped and that she had difficulty using her prosthesis to feed properly.

During anamnesis, the patient reported having undergone three previous surgical procedures elsewhere. The first was an eminectomy in 2007 to treat a chronic recurrent dislocation disorder. She reported an improvement of this condition after the procedure, but the treatment was not satisfactory, since there were still a considerable number of dislocation episodes of dislocations every year, directly interfering with her quality of life. A new surgical procedure was performed in 2010, when 2.0 system L-shaped mini-plates were bilaterally inserted into her zygomatic arches. After a year, the patient presented right-side mini-plate fracture and infection, and a new surgical procedure was necessary to remove the plates.

Three years after the last surgery, she sought the clinic presenting joint instability, ligament laxity, and chronic recurrent TMJ dislocations (eight dislocations per year on average).

Maxillofacial physical examination revealed severe difficulty in keeping a static jaw, which was probably caused by ligament laxity.

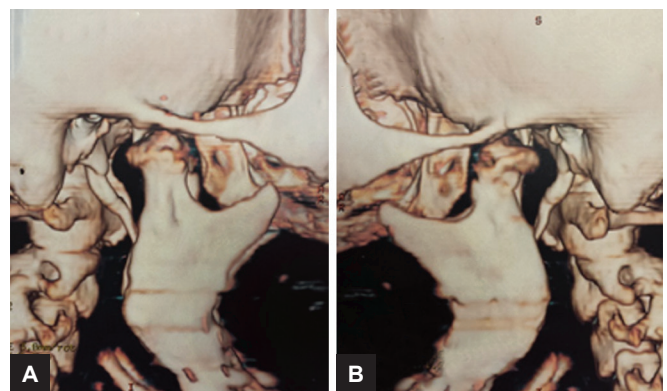
Preoperative computed tomography scan revealed an image suggestive of a degenerative condylar process and bilateral articular eminence absence. Due to mandibular instability, there was image distortion (Figs 1A and B).

All procedures were performed after signing of the free and informed consent form by the patient. The surgical procedure for mini-anchor placement was conducted at a hospital under general anesthesia, with tracheal intubation. Choice access was preauricular. The initial incision was made on the scar from previous surgical procedures, which corresponded to the preauricular skin fold. After accessing the area at this stage, the TMJ capsule and the zygomatic arch were exposed. As there was no need for joint disk plication, the upper and lower joint spaces were not accessed. A minimal incision on the lateral condylar pole, breaking the capsule only in this area, was enough for mini-anchor placement. The less the trauma to the soft tissue and periosteum region, the greater the vascularization preservation, decreasing the risk of condylar resorption.

A simple 2.0 mm titanium alloy self-drilling mini-anchor with two-needled polyester sutures was threaded into the lateral condylar pole parallel to the longitudinal medial-lateral axis (Fig. 2).

The root of the zygomatic arch was drilled upward and downward with a truncated surgical cone 702 drill 702. One of the mini-anchors suture threads was passed through this hole and fixed by a simple knot on the wire itself (Fig. 3). The knot was tightened according to mandibular movements so as to promote mandible translation control as well as to avoid anterior condylar dislocation. With the other needled wire, a continuous suture was made suspending the joint capsule to the zygomatic arch in its entire length.

The subcutaneous tissue suture was done with polyglactin 910 (Vicryl® 4.0) and the skin suture with



Figs 1A and B: The preoperative CT examination showed a suggestive image of degenerative condylar process and the absence of articular eminence bilaterally. Due to mandibular instability, there is image distortion

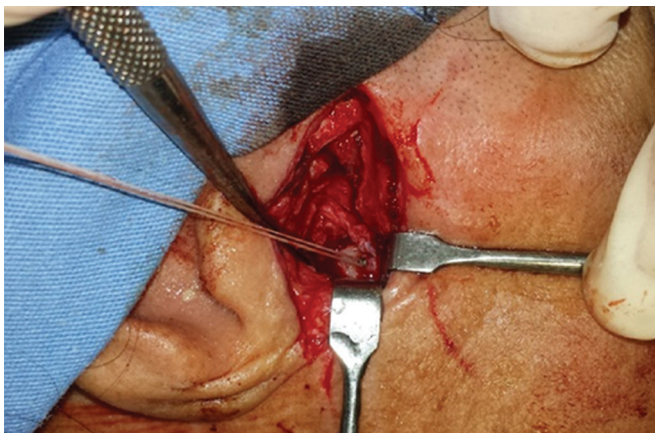


Fig. 2: A mini anchor was threaded on the side pole with a parallel condylar insertion to the long lateral-medial axis

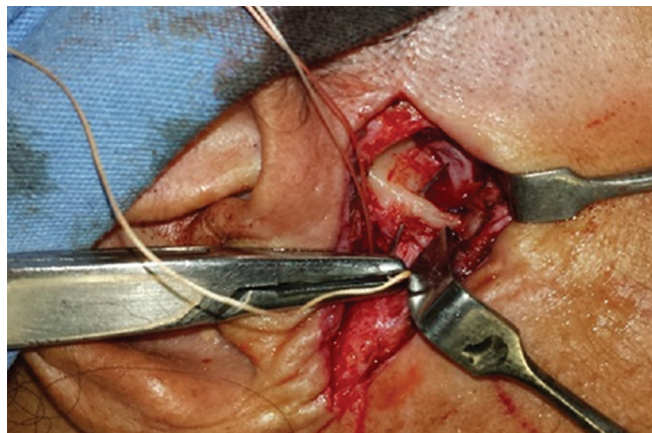


Fig. 3: A drilling was carried out on the root of the zygomatic arch in the lower-upper direction and one of the mini-anchor sutures went through this hole, being stuck through a simple knot on the cord itself

polyamide yarn (mononylon® 5.0). When the procedure was finished, a routine surgical dressing was used.

After surgery, the patient used a customized chin cup for 60 days to allow for fibrosis formation in the area so as to limit mandible movement.

In the face of the surgical procedure, the patient needed prosthetic rehabilitation, which would ensure correct establishment of maxillomandibular relations to preserve the surgical phase and which would take into account the lack of control of mandibular movements after surgery that still existed, though to a much smaller extent. This prevented the patient from using the TP – which had anatomic teeth – both at rest and during function, once the prostheses, upon touching each other, were displaced, even though the superior prosthesis alone showed satisfactory retention.

Thus, two conventional 0° cusp angle prostheses were developed to obtain better prosthesis stability, since this anatomical configuration allows greater freedom of movement without upper and lower denture lock (Fig. 4).

Moreover, because the patient was an elderly woman who lived more than 300 km from the consultation venue,



Fig. 4: Prosthesis side view focusing on the anatomy of 0° cusp angle

an abbreviated three clinical session protocol (anatomic mold, maxillomandibular relations, wax denture proof + functional modeling) was established for denture manufacturing (Figs 5A and B). After these sessions, the dentures were installed (Fig. 6).



Figs 5A and B: Abbreviated production of the prosthesis technique. Functional impression is performed at wax trial denture stage



Fig. 6: Prosthesis installed in the patient

Within a week of use, small basic adjustments were made; at month 1, the patient showed improvement of all complaints, using the TDs without displacement, both at rest and during function, and maxillomandibular relations were satisfactorily restored.

The same result was observed 16 months after prosthesis installation. After 18 months postoperatively, the patient felt no pain, improved the mandibular stability, and showed a 32 mm mouth opening. No mandibular condyle dislocation episodes were observed during this period.

DISCUSSION

Surgical Procedure

Many methods of mandibular condyle recurrent dislocation treatment can be used; however, the conservative approach, according to many scholars, should be the initially adopted. According to Shorey and Campbell,¹¹ many treatment methods can be employed aiming to resolve pain and dysfunctions resulting from recurrent dislocation of the TMJ. Surgical interventions have generally given the best results because they are considered to be a final treatment.

The suture anchors were initially developed for orthopedic surgical procedures as a repositioning method of tendons and ligaments to the bone. Wolford et al² reported the articular disk repositioning technique through the use of a simple mini-anchor installed in the posterior condyle region, which is attached to the disk through No. 0 composite polyester sutures.

In the same year, the above-mentioned authors also described a technique for the treatment of mandibular condyle recurrent dislocation with the use of double Mitek mini-anchors, where the first would be installed on the lateral pole of the condyle and the second at the root of the zygomatic arch; they would then be joined by two

No. 2 polyester sutures. On evaluating this technique, the author stated that it allows condylar translation control, and while preventing condylar dislocation, it can also eliminate it altogether without altering the joint anatomy and has predictable results.

In our study, a modified version of the technique was proposed using a single threaded, self-drilling anchor fixed to the lateral pole of the condyle. Instead of using a second anchor, as proposed by Wolford et al,² a hole was made upward and downward to the root of the zygomatic arch, through which the anchor suture passed. This modification allowed a reduction in the use of foreign materials to the body, without jeopardizing the expected results.

A desirable feature of all anchor types installed in the TMJ is their osseointegration ability and tensile strength. Fields and Wolford¹² evaluated Mitek mini-anchor osseointegration in 13 condyles of eight patients who underwent condylectomy by factors unrelated to mini-anchors. They concluded that these anchors showed osseointegration ability and that there had been no change in the suture material used along a 59-month period.

It is recommended that articular movements should start with isometric exercises and a liquid-only diet to avoid the exertion of excessive loads so as to reduce the possibility of periimplant mobility by implant/bone interface rupture and fibrous tissue formation, as well as to maintain the conservative treatment in the postoperative period to ensure good results.^{2,12}

In the case studied, a mouth-opening restriction through the use of a customized chin cup for a 60-day period was adopted, and the patient was advised to have a liquid/soft diet during this time; she also had to make sure that excessive jaw movements were not performed. The approach adopted was consistent with that in the literature. There were no transoperative or postoperative complications within an 18-month follow-up period.

Prosthetic Procedure

Regarding the prosthetic rehabilitation provided for the patient, short- and long-term treatment success as a whole is crucial. According to De Boever et al,¹³ the maintenance of all teeth and particularly most molars and premolars provides the advantage of maintaining proper occlusal and muscle stability, joint function, and satisfactory chewing ability. In a totally toothless individual, the absence of teeth harms the whole stomatognathic system, including the TMJ. Hence, it can be concluded that in the case of an edentulous patient submitted to a surgical procedure due to a TMJ disorder, the lack of prosthetic rehabilitation will compromise the surgical treatment longevity.

Furthermore, occlusal rehabilitation should correctly establish the DVO and CR. Although some studies^{14,15}

have stated that there is no correlation between correct DVO and DTM, other authors have advocated this connection^{16,17} relying on the fact that tooth loss causes occlusal instability, which is one of the causes of injuries to the joint.

A peculiar fact in this clinical case was the need to establish greater prosthesis stability, both during function and at rest, since the patient's mandibular involuntary movement persisted, though to a lesser degree. This was obtained using nonanatomic artificial teeth, inasmuch as they show reduced lateral effort through the freedom of lateral movements, without treatment.¹⁸⁻²⁰

Abduo²¹ conducted a systematic review, and out of 12 studies included, nearly all reported the patient's preference for anatomic teeth in relation to prostheses that were occluded at a right plane. However, the patient's profile must be considered. The patient in question in this study already made use of new prostheses, but with anatomic teeth, which caused denture lock, making correct eating and speech, and even social life, virtually impossible. Therefore, a satisfactory result was achieved through this planning, and the patient can now use her prosthesis without displacement complaints, both during function and at rest.

CONCLUSION

- The use of single mini-anchors is simple and effective
- There was no recurrence after 18 months
- Artificial teeth on a straight plane were well-suited to the case
- The prosthetic and surgical rehabilitation were key to the successful outcome of the case

Clinical Significance

A multidisciplinary intervention (surgery/prosthesis) is of utmost importance for the resolution and preservation of the treatment of these complex cases.

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