

TECHNICAL STRATEGY

Slice Functional Condylectomy and Piezosurgery: A Proposal in Unilateral Condylar Hyperplasia Treatment

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Abstract: Condylar hyperplasia is a temporomandibular joint progressive disease characterized by an excessive growth of the mandibular condyle. Condylar overgrowth represents one of the most common causes of facial asymmetry in early adulthood. To date, there is not a clearly established origin of the disease: genetic, traumatic, infective, vascular, and functional factors are involved hypotheses. Clinically, condylar hyperplasia presentation is characterized by an asymmetry of the lower third of the face, deviation of the chin, inclination of the labial line and malocclusion. Several treatments have been proposed over the years in the treatment of mandibular condyle hyperplasia, but to date a gold standard has not been defined. Two are the main approaches: condylectomy and orthognathic surgery, isolated or in a combination. Many condylectomy technique differentiations have been developed: high, low, and proportional, are the most performed. In this technical note, the Slice Functional Condylectomy (SFC), a modification of the proportional condylectomy is presented.

Key Words: Facial asymmetry, proportional condylectomy, TMJ surgery, unilateral condylar hyperplasia

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The surgical treatment of condylar hyperplasia (CH) represents a great challenge for the maxillofacial surgeon due to its not univocity.¹ As described in the Literature, the most adopted surgical choice is condylectomy, due to its capacity to stop the grow of the active condyle, avoiding further facial deformities.^{2–4} Condylectomy has 3 possible variations, the high, the low, and the “proportional” one.^{5,6} The main differences between this options are in the amount of bone removed: in the high one less than 5 mm of bone is removed, in the low one the removal is higher than 5 mm, while in the proportional one the bone is removed till the length of the active affected and the healthy contralateral side are equal.⁷ In the Maxillofacial Department of the University of Rome “Sapienza” patients are treated just with a modified proportional condylectomy, called Slice Functional Condylectomy (SFC). SFC consists in

cutting the bone to be removed in progressive slices (Fig. 1) until the wanted planned amount is removed and the incisors midline with the condyle in the fossa are reached. One of the goals is to preserve the correct function between disk and condyle.⁸ This goal is realized fixing the lateral ligament and the articular disk to the new lateral pole with a Mitek MicroAnchor screw (Fig. 2). This approach allows adjunctive preservation of all the anatomical structures and the total respect of joint functionality. The aim of this technical note was to describe the SFC technique.

TECHNICAL NOTE

The discrepancy between the two condyles was measured on the CT cone beam with Dolphin software.⁹ Model surgery was performed on a stereolithographic 3D model printed from the DICOM file. The patients undergo general nasotracheal anesthesia. During the patient’s preparation, it is helpful to leave uncovered the ipsilateral temporal area to keep under control possible contractions of the facial nerve and partially the patient’s mouth, previously sterilized, in order to check the occlusion and the midline shift. A pretragic preauricular incision is performed with a cold blade, extended by 1 to 2 cm in the temporal region with an arched course of 30° from back to front and from bottom to top, in order to increase surgical exposure of this region. The dissection starts to expose the superficial temporalis fascia. Then the deep temporalis fascia and the zygomatic arch are exposed. Yellow fat is an important landmark to understand when the deep temporalis fascia is quite reached during the dissection. Once reached the deep fascia of the temporal muscle, a dissection of the tissue downwards to expose the zygomatic arch is performed. This is a safety plan, while the frontal branch of the facial nerve runs over the superficial fascia, right in correspondence of the zygomatic arch. Keeping the tissues retracted with hooks represents a safer option than other retractors to avoid facial nerve injuries. The next step is to detach the parotid gland both from the



FIGURE 1. Slice Functional Condylectomy – bone removed in progressive slices.

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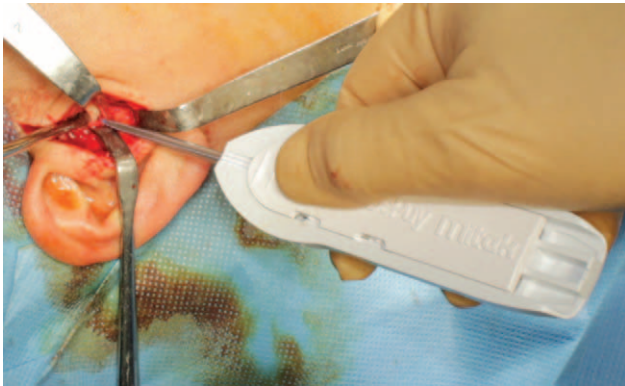


FIGURE 2. The lateral ligament and the articular disk is fixed to the new lateral pole with a Mitek MicroAnchor screw.

perichondrium that covers the cartilage of tragus and the external auditory canal in all its depth, then it is necessary to detach the parotid also from the temporomandibular joint capsule. During the dissection is important to not damage the perichondrium that covers the tragal cartilage. Motility of the mandibular condyle is appreciated moving the patient's mandible. In this region the superficial temporal artery and vein are identified, carefully tied and interrupted. The vascular structures are protected and preserved in the posterior part of the parotid region. Once the vascular structures have been interrupted the dissection continues by delving deeper to detach the parotid gland. The auriculotemporal nerve, which frequently runs parallel and contiguously to the superficial temporal vein, is preferable to be preserved. By blunt way, using dissection smooth tools, the surgeon goes in search of the temporomandibular joint capsule previously identified palpatory to expose it. The lateral ligament's insertion is identified on the lateral pole of the condylar head. With a cold blade the insertion is cut, and the disk is softly moved upward, with this procedure the inferior compartment of the temporomandibular joint is exposed. The superior compartment of the temporomandibular joint must never be incised in this surgical procedure. The lateral ligament must be preserved to allow the discopexy with an anchor screw. Dunn-Dautrey temporomandibular joint condyle retractors are now inserted to careful protect the disk and the structures medially to the condyle. To minimize the exposition and to carefully preserve all the functional temporomandibular joint structures, the condylectomy is performed in slices with piezosurgery. During the surgery the lateral ligament attached to the disc is moved antero-medially: it is necessary to identify it and to firmly hold it to complete the surgery with the anchor screw discopexy. An invitation hole for the screw is made on the posterolateral face of the condyle. Then the discopexy of the articular disc is performed suturing the lateral ligament by means of a resorbable anchor screw. In this way, a large part of the contiguity of the joint capsule will be reconstituted. At the end of these procedures, an arthrocentesis of the upper compartment of the temporomandibular joint is performed. A washing of the upper chamber of the joint is performed with isotonic liquids such as lactate ringer 20 ml. This is done by inserting two 18 to 20 gauge needles. One needle will be inserted in the posterior part of the upper compartment, the second needle will be inserted in the anterior part of the upper compartment. The deeper sutures are performed with absorbable thread stitches (monofilament or interlaced 3/0 multi-filament). Subsequently, the skin is sutured using a 5/0 nylon thread stitches.

DISCUSSION

In this study, some modifications of the original proportional condylectomy were performed. Cutting the condyle in slices represents a mechanical benefit in the bone removal: it reduces the stress of the capsule removing the bone slices and avoiding possible damages. This passage also allows to check continuously if the removed amount is enough to achieve the wanted occlusion and facial symmetry. The integrity of the joint capsule is necessary to have an early restore of the articular biomechanical balance. Secondly, the adjective "functional" takes into account the necessity to respect the anatomy and functionality of the joint, restoring the correct relationship between disk and articular surface of the condyle. Once the inferior compartment of the joint is exposed and the disk is detached, all these structures must be repositioned. The repositioning of the disk represents an important element in many TMJ surgery procedure, and it is directly involved in the full articular functionality recovery. The reassembling procedure is completed with a discopexy, as suggested by Spallaccia et al in 2013. The repositioning of the disk with a bioabsorbable anchor screw represents the best option because it allows a lasting stability of the involved structures and in the long term it is totally compatible with magnetic resonance imaging.¹⁰

Restoring the correct functionality also represents a key point in the successive 3D remodeling observed in the condyle.¹¹ This remodeling phenomenon is influenced by age, systemic pathologies and mechanical forces of the system: once the condylectomy is performed a quick reduction in the intraarticular pressure on both joints occurs, normalizing the system.¹¹

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