A MODIFICATION OF THE MICHELET TECHNIQUE FOR SLIDING HORIZONTAL OSTEOTOMY : A CASE REPORT

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MICHELET 테크닉의 변형을 이용한 이부성형술의 치험례

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앞 턱 부위가 짧고 후방으로 위치해 있을 때 턱의 높이를 증가시키고 전방으로 돌출시키는 축조 이부성형술의 방법으로는, 매식체 삽입술, 골 절단술, 골 절제술 또는 이들을 동시에 시행하는 혼합술 등이 행해져 왔다. 그러나 매식체 삽입술에서는 감염 또는 매식체의 유동성 등의 합병증의 발병이 빈발하고 매식체의 밑 부위에 골이 흡수된다든지 연조직의 변화를 예측하기 어렵다든지 하는 복잡한 문제점들이 종종 보고되고 있다. 따라서 매식체를 이용하지 않는 골 절단술이나 골 절제술만을 이용한 다양한 방법의 이부성형술이 많이 시행되고 있다.

하악골이 전후방 관계로 발육부전인 환자에게 양측 하악지 시상분할술을 시행하여 전방 이동시킨 후 앞 턱의 위치를 좀더 개선하기 위하여 Michelét 테크닉의 변형법을 이용한 이부성형술을 추가로 시행하였다. 이 방법의 이부성형술은 턱의 수직적, 수평적 길이를 증가시키기 위하여 하악결합면 부위에 장부와 장붓구멍 모양을 한 골 절단술을 시행하고 광범위한 연조직경을 보존하여 골편으로의 혈류 차단을 최소화하였으며 나사를 이용한 견고한 고정을 용이하게 하였다.

이 술식은 턱을 수직적으로 증가시킬 때 두 골편 사이의 공간에 골 이식을 시행할 필요가 없으며, 금속판을 이용하지 않아도 정확한 위치에 골편을 고정하기가 용이하고, 또한 고정용 나사가 향후 골형성 부위에 위치하게 된다는 장점을 경험하게 되어 이에 한 증례를 보고하는 바이다.

I. Introduction

The sliding horizontal osteotomy (genioplasty) is a relatively simple surgical procedure to correct chin deformity. With proper planning and execution, the sliding horizontal osteotomy technique provides a means of concomitantly achieving three-dimensional chin proportions and normalization of the associated orofacial musculature in the majority of patients with dentofacial deformities[1]. Due to the position in relation to the face, anatomic form, location of the major nerve to the area and excellent

blood supply, the surgical repositioning of the chin through osteotomy and/or ostectomy is relatively easy and very versatile[2].

It has been claimed that minimal detachment of periosteum in the anterior and inferior surface of the genial segment without detaching the suprahyoid muscle can increase the blood supply to the surgical wound, and thus healing is optimal[3,4,5]. Broad soft tissue pedicle technique has been reported to minimize osseous resorption and to achieve more predictable soft tissue change[6,7].

A horizontal anterior mandibular osteotomy with segmental ostectomy involving creation of a tenon and mortise has been primarily used for the correction of anterior mandibular vertical excess[8,9,10,11]. In the following case, the technique was modified to correct the mandibular anteroposterior hypoplasia in conjunction with bilateral sagittal split ramus osteotomies.

II. Case Report

Patient Case Description

A 15-year-old Indian female was presented for preorthognathic surgery evaluation. The patient's facial profile was convexed with an average mandibular plane and mild mentalis animation. The patient's maxilla appeared to be in a normal position. Her mandible was retrusive with slight retrusion of the upper lip and mild protrusion of the lower lip(Fig. 1). The patient also had an increased facial height in the middle facial third. Interpupillary and intercanthal distance were within normal limits. the nasal evaluation revealed a moderate dorsal hump present, a slight supra tip break with normal projection and prominent columella. The patient was noted to have moderate submandibular fullness with a short throat-chin length. Her cervicomental lining was within acceptable limits as was her radial nasal angle. Evaluation of the patient's temporomandibular joint revealed no popping, clicking, or crepitus. No pain resulted from the palpation of the auricular areas. The patient's maximal incisal opening was 40mm, protrusive movement was 11mm, and excursions were 9mm bilaterally. There was no deviation upon opening or protrusion. Occlusal evaluation revealed that-centric occlusion and centric relation were coincident.

Patient had a Class II molar relationship and a Class II canine relationship(Fig. 2). At rest, the patient showed 3mm of maxillary central incisor. Animated, the patient showed 10mm of maxillary incisor. There was no occlusal cant present. The patient's lower dental midline was 1mm to the left of the maxillary dental midline and the skeletal midline, which was coincident with the maxillary

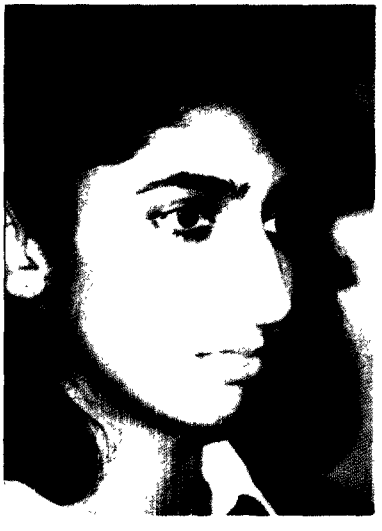

Fig. 1. Pre-operative facial photo

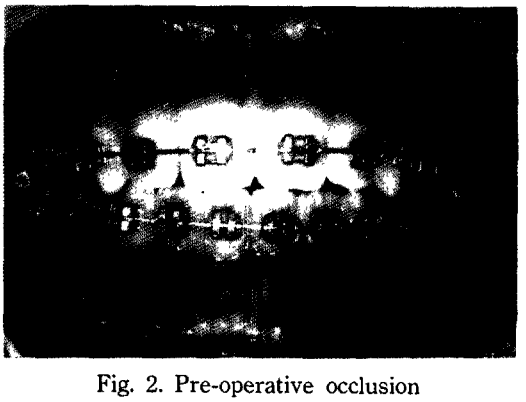

Fig. 2. Pre-operative occlusion

dental midline. There was no cross bite present, and the patient had normal arch forms. The patient had an anterior open bite of approximately 1mm. The patient had -1mm of open bite and 6mm of over jet. The patient also contacted prematurely on the premolars bilaterally. The patient's periodontal status was excellent. From the clinical and radiographic studies of the patient, it was revealed that the proposed treatment would be a bilateral sagittal split ramus osteotomy with advancement of approximately 6mm and a horizontal sliding osteotomy to improve the patient's facial profile(Table 1.). The patient had her maxillary third molars present, which would also be removed at the time of surgery.

Table 1. Cephalometric analysis and prediction

Planes, Angles & Landmarks	Pre Surgical	Pre-diction	Post Surgical
SNA	80	80	80
SNB	76	78	78
ANB	4	2	2
SN-MP	38	38	40
Naso-labial Angle	86	86	86
L_1-MPA(°)	100	102	104
L_1-Menton(mm)	39	45	43
E-Line(mm)	+2	−1	0

Surgical Techinique

The patient was taken to the main operating room and placed on the operating room table in a supine position. A plane of general anesthesia was induced utilizing intravenous and inhalation agents, an atraumatic nasotrachointubation was performed. After the breath sounds were verified and the tube was secured, the patient was prepped and draped in the usual sterile fashion. A bilateral sagittal split ramus osteotomy was performed in the standard fashion utilizing Smith osteotomes and spreaders. The ramus segments were fixed bilaterally with three superiorly positioned bicortical screws in the ramus of the mandible. The wound was closed with 3−0 chromic gut in a standard one-layer fashion.

In the anterior region of the mandible, a vestibular incision was made approximately 5mm inferior to the junction of the attached gingiva. Sharp dissection was carried through the mentalis muscle to the mandible. Posterior dissection was used to identify the mental foramen and nerve bilaterally. the incision and dissection were carred out in a similar way as Bell and McBride described[3]. A broad soft tissue pedicle remained attached to the lingual, buccal, and inferior surfaces of the anterior mandible.

A modification of the Michelét technique for a sliding horzontal osteotomy was initiated by scoring the outline of the tenon with a small round bur. The horizontal and vertical arms were scored on the superior aspect of the genial segment. The horizontal osteotomy was made using a reciprocating saw with a banana blade. The osteotomy was begun in the posterior region, approximately 4mm beneath the mental foramen, at the inferior border of the mandible in the region of the first molar and continued anteriorly until it joined the vertical arm of the tenon on the corresponding side(Fig. 3). The cut was made through both the buccal and lingual cortices until it joined the vertical arm of the tenon. The osteotomy cut was completed only through the lingual cortices posterior to the tenon by directing the blade to overlap the midline of the lingual corti-

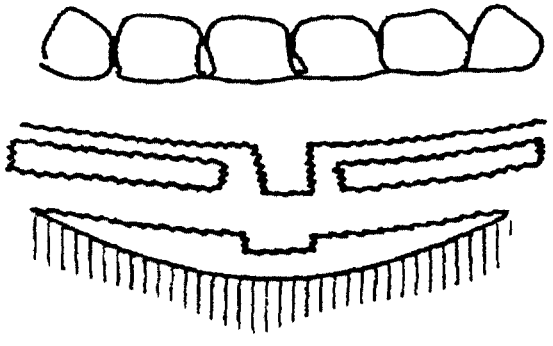

Fig. 3. Schematic drawing of Michelét technique

ces. The same procedure was performed on the contralateral side. A fissure bur was used to cut through the labial cortices following the outlined form of the tenon. After the osteotomy was completed through the labial cortices, a small lambotte osteotome was used to complete the osteotomy through the cancellous bone. The superior and inferior genial segments were separated. The inferior genial segment was mobilized and advanced anteriorly and inferiorly. The mortise was formed in the inferior genial segment by removing cancellous and cortical bones as needed so that the tenon would fit passively against the lingual cortces. The suprahyoid musculature was not detached from the lingual surfaces of either segments. The labial surface of the tenon and the lingual surface of the mortise were recontoured with a fissure and a large acrylic bur until they could be passively placed into pre-planned position both vertically and transversely. Two bicortical screws were then inserted through the tenon and mortise(Fig. 4), engaging both cortices in a lag fashion and providing stable fixation. A two layer closure was used to reapproximate the mentalis muscle and labial mucosa. A pressure dressing, using micropore tape, was applied and left in place for five days to assure reattachment of the mentalis muscle and decrease chances of a 'witch's chin' deformity.

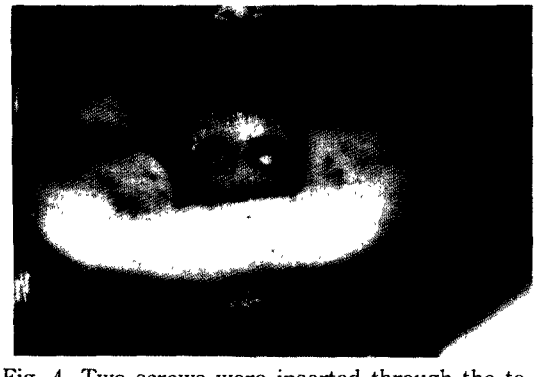

Fig. 4. Two screws were inserted through the tenon and mortise

III. Discussion

The genioplasty can be used to lengthen, reduce, straighten or augment the appearance of the soft tissue chin and should be considered when planning and performing orthognathic surgery. Alloplastic implants, osteotomies, ostectomies, or combinations of these have been used for the correction of chin deformities. Unfortunately, various complications, including infection, mobility of the implants, bone erosion beneath the implants, undesirable and unpredictable soft tissue change have been reported associated with alloplatic implants[12,13]. Many methods for surgical repositioning of the chin through osteotomy and/or ostectomy have been reported, showing the versatility of the procedure[4,9,10,14-20]. Moreover, it was reported that the soft tissue response was more predictable for the osteoplastic genioplasty than for the alloplastic augmentation genioplasty[21].

One of the major refinements in genioplasty may be the development of the broad softe tissue pedicle technique[4,5,22]. The broadest soft tissue pedicle, from meticulous mucosal incision, minimal dissection and exposure of bone surface allowing for the osteotomy and mental nerve preservation can maximize the blood supply to the bony segment and the soft tissue wound. Excessive stripping or degloving of the labial soft tissue may induce hematoma, necrosis of the osteotomized segment and unnatural appearance of the soft tissue chin[3,23].

With the evolution of rigid internal fixation technique, wire osteosynthesis may gradually be replaced in jaw surgery. Advantages of rigid interal fixation with either metal plates and screws or screws alone would be ease of procedure, decrease in operation time, minimal segment displacement and bone healing promotion[24,25]. Precious, et al. found a specific pattern of bone resorption and deposition through adaptive bone modeling after genioplasty, and recommended to place the fixation device in areas of future bone deposition[11].

Fig. 5. 6-month post-operative radiograph

Fig. 6. Post-operative facial photo

Fig. 7. Post-operative occlusion

For the advancement genioplasty a dilemma may be produced whether to reserve the soft tissue attachment for a good blood supply or to detach or cut the suprahyoid musculature to reduce the tension from stretching. One possible way to solve this problem may be to divide the anterior bellies of the digastric about 1cm from their attachment to the back of the segment without detaching the soft tissues[26]. But even after large chin advancement without the suprahyoid myotomy, relative stability was observed[6]. Moreover, the stability of rigid fixation may withstand the tension until the suprahoid musculature adapts.

A tenon and mortise created from the modified Michelét technique will provide for ideal placement of screws and an excellent guide to measure the planned location of genial segment. Additionally, 6-month post-operative radiograph showed bone deposition on that area(Fig. 5). Overlapping the tenon and mortise can exclude the need for bone grafting the space between the segments after vertical advancement.

The importance of the mentalis muscle in normal lower lip and soft tissue pogonion has been reported[27](Fig 6, 7), and undesirable transposition of mentalis muscle from improper wound closure and excessive degloving should be avoided[3,27]. The shape of the labiomental fold is to be corrected if necessary for esthetic refinement in genioplasty [28].

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