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Molina distractor를 이용한 상/ 하악 동시 신장술 증례의 보고

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ABSTRACT

Case Report of Maxilla/Mandible Simultaneous Distraction with Molina® Distractor

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1980년 일리자로프가 하지에서의 골 신장술을 발표한 이래 수많은 외과 의사들이 임상연구와 발표를 거듭해 현재의 골 신장술을 이루었다. 악골에서 골 신장술의 적용은 1992년 8명의 악골 기형 환아에게 하악지 신장술을 적용한 맥카시의 발표를 기점으로 시작되었다. 골 신장술의 장점은 부족한 골조직과 함께 주변 연조직을 신장시키는 것으로 복합적 조직 결손을 보이는 선천성 악골 기형 환자들에게 특히 유리하게 적용시킬 수 있다. 반안모 왜소증은 안면 반측의 상/하악골 및 악관절, 연조직의 저성장 및 결손을 보이는 비교적 흔한 악골 기형이다. 하악지 신장술의 활발한 연구로 이를 이용한 악관절 증상과 안면 비대칭의 해소가 일차적 치료기법으로 선택되고 있다.

연구자들은 악관절 증상과 안면 비대칭을 주소로 내원한 성인 반안모 왜소증 환자에게 상악 및 하악의 동시 골 신장술을 적용하여 만족할 만한 결과를 얻었기에 이를 발표한다. 상악골의 Le Fort 제1형 골 절단술과 이환측의 하악지 시상분할 골절단술 후에 Molina distractor를 하악지에 적용하고 악간 고정을 통해 동시 신장을 꾀하였다. 수술 기법 및 평가 기법에 대하여 논의하였다.

Key Words: 상하악 동시 골신장술, 반안모왜소증, Molina distractor

I. Introduction

Since Ilizarov demonstrated his accomplishment of limb lengthening in 1980, many surgeons have developed this technique to what we call the 'Distraction Osteogenesis' now. McCarthy and colleagues published, in 1992, the first report of mandibular lengthening in 8 children with congenital facial bone deformities. Distraction osteogenesis also distracts adjacent structures, so this technique is especially useful

그림 1. Pre-op cephalography

그림 2. Pre-op facial photo

for congenital deformities which usually accompany overlying soft tissue deformities. Hemifacial microsomia is congenital hypogenesis of hemimandible and maxilla with various degree of TMJ involvement. Facial asymmetry and TMJ malfunction are chief problems of this disease, and distraction osteogenesis can be the treatment of choice.

Here we are to report our case of adult hemifacial microsomia we treated with simultaneous distraction of maxilla and mandible. After Le Fort I osteotomy and sagittal split ramus osteotomy of affected side, we applied Molina® distractor to lengthen maxilla and mandible simultaneously.

II. Material and Methods

Patient data

A 21 year old female patient visited the Department of Oral and Maxillofacial Surgery in Seoul National University Dental Hospital complaining of left TMJ intermittent pain. The patient showed shortening of right ramal height, prominent right antegonial notch and hypoplasia of right condyle. Mandible of unaffected side was normal in configuration but relatively small in size, resulted in Class II malocclusion. Authors diagnosed the patient as hemifacial microsomia with Pruzansky classification IIa (그림 1, 2).

TMJ stabilizing splint was applied and NSAID was prescribed, all failed to alleviate patient's symptom. Authors decided to apply surgical treatment, the distraction osteogenesis of right maxilla and mandible.

Staged surgery for correction of severe hemifacial microsomia was planned. Distraction osteogenesis would lengthen maxilla and mandible first to improve facial asymmetry and TMJ pain. To consider reported 25~30% of relapse, it would make the patient status to Pruzansky classification I. Afterward orthodontic treatment would be planned for preparing final orthognathic surgery, which involves mandible advancement and definite correction of facial asymmetry.

Operation

On 5th March 2007, the patient was operated under general anesthesia. Le Fort I osteotomy was performed, and maxillary segment was anchored with vicry 2-0 suture on the

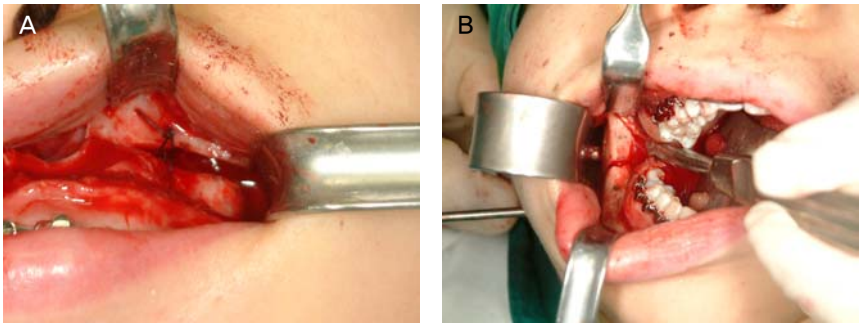

그림 3. Intra-op photo of giving the maxilla fulcrum point

left side of the piriform aperture only for the controlling the distraction vector regulation. Key technique in this operation was that we removed osteotomy line of left maxilla lateral to the vicryl suture (그림 3). This will move fulcrum of distraction medially to the piriform aperture, and reduce distraction amount and relapse tendency. Considering her facial midline deviation with the amount of occlusal cant correction, we decided 20 mm over maxillary 1st molar as a distraction fulcrum.

Along with the maxillary fulcrum, the position of the pins and the corticotomy line in the mandible determined the vector of distraction. Using the panoramic view of the mandible, we determined the degree of mandibular hypoplasia and the direction of distraction. The site for the insertion of pins and the exact position of the corticotomy are decided.

A 5 cm long incision was made in the oral mucosa along the mandibular buccal vestibule. The mucoperiosteum was elevated to expose the lateral mandibular body and the ascending ramus. A corticotomy was performed on the lateral mandible until we could see bleeding from the cancellous bone, but not deep into the cancellous bone. The corticotomy was extended inferiorly around the lower border of mandible where the bone is thick and then lingually to the retromolar triangle. The mandibular vessels and inferior alveolar nerve were not exposed, but the lingual cortical plate is partially removed to control the fracture line. The cancellous bone and neurovascular bundle in the bone remained intact. We applied occlusal wafer and intermaxillary fixation with wire.

After the stab incision on the buccal cheek skin, the pins (3.2×60 mm) were inserted percutanously after small diameter of drilling with irrigation to avoid thermal injury to the bone. The bicortical insertion and parallel position of the pins were important and confirmed with firm, tensionless distractor application. Over the corticotomy line, right mandible was fractured with chisel and gentle malleting. By this technique inferior alveolar nerve in the affected side mandible was preserved and could be distracted together with the mandibular ramus. The Molina® mandibular distractor (53 mm) is applied to the pins. Trial distraction was performed a few millimeters and correct direction of maxilla

lengthening along with mandible was confirmed. Distractor was rewinded to the original position and the mucosa was closed. There was no initial distraction gap.

Distraction

After 4 days of latency period, the activation was started on 9th March 2007, with 2 turns a day -in the morning and the evening- resulting 1 mm distraction a day. During distraction, patient was periodically recalled and checked with radiography. This activation was carried on for 23 days, as a result 23 mm was distracted on the right mandibular ramus. With intermaxillary fixation with a occlusal splint, the maxilla was lengthened to correct facial asymmetry. This patient complained unbearable pain on right temporal and cheek area after 20th day of activation. The activation was ended on 2nd April 2007, and the distractor was kept for additional 8 weeks of consolidation. On 7th June 2007, the distractor and arch bar were removed and the patient was referred for the orthodontic treatment.

III. Result

Although the Molina® distractor works on linear vector, the result of distraction is 3-directional movement and regeneration of bone. There was no single best evaluation tool demonstrated. We used cephalometic PA view to evaluate the distraction amount, the facial midline correction, and the occlusal cant correction. As we did not use standardization tool for PA view[1], the head posture of patient while taking the x-ray resulted in meaningful variables of the anatomical landmark.

So we tried various landmarks to compare the improvement of occlusal cant, and used 2 plan finally. V-ceph® 3.3 program was used to measure the cephalometric view.

The plane connecting bilateral zygomatic-frontal suture, and bilateral uppermost point of zygomatic arch are selected and compared (Table 1, 2)[2]. Four time points was selected and compared : pre-operation, immediate post-operation, post-activation, post-consolidation (just before removal of the distractor)(그림 4).

Table 1. Maxillary occlusal plan angle to the skull base

	Pre-op	Imm. post-op	Post-activation	Post-consolidation
To ZFS line	10.5°	9.8°	3.5°	5°
To ZA line	10°	9.5°	3°	4.8°

Table 2. Amount of distracted ramus measured on cephalometric view

	Pre-op	Imm. post-op	Post-activation	Post-consolidation
Ceph PA	0mm	1mm	19mm	21mm
Ceph Lat	0mm	1mm	21.5mm	21mm

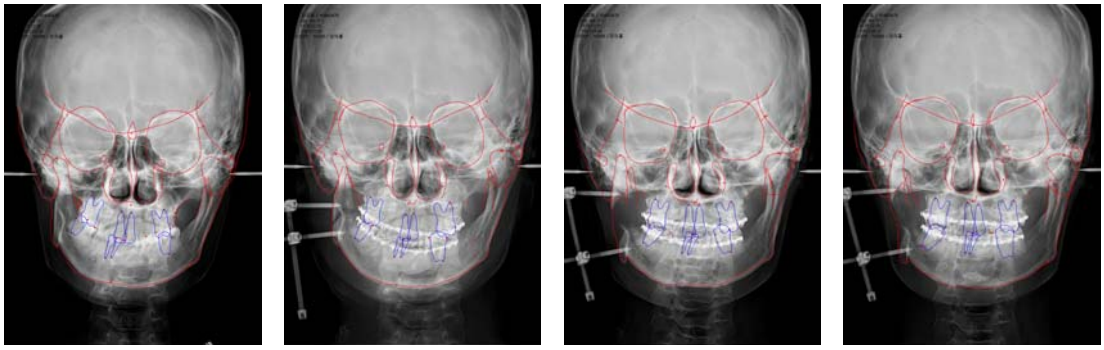

그림 4. Cephalography PA analysis of 4 time-points

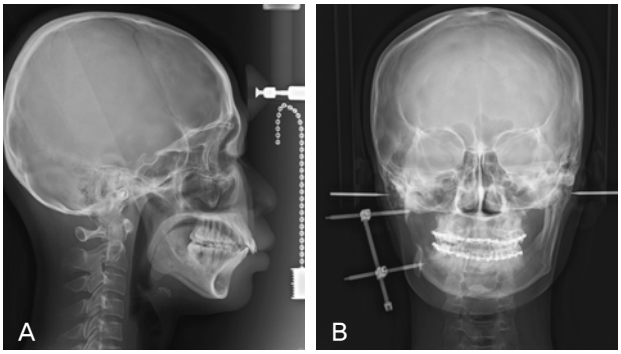

그림 5. Post-consolidation cephalography

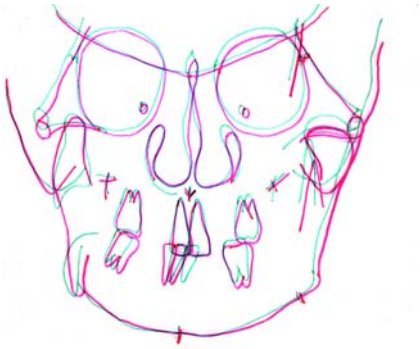

그림 6. Superimposition of pre-op and post-consolidation cephalography

Distraction amount is 23 mm but the linear lengthening of ramus is 19 mm in cephalometric PA view, and 21 mm in lateral view. (Table 2) As linear distraction is converted to 3 dimensional bone lengthening, to calculate the actual lengthening is not simple with plain film. The improvement of maxillary occlusal cant on cephalometric PA view was 5 degree at the end of activation (그림 6). There seems to be the increase of occlusal cant during consolidation period, but considering the distortion according to the patient head posture, a simple comparison is not considered as valid. As mentioned above, there should be standardization of PA view and accurate evaluation tool of occlusal cant[3,4].

Along with the wide application of distraction osteogenesis in hemifacial microsomia, longitudinal studies are demonstrated and treatment protocols advanced[5,6]. All of the papers emphasize importance of the proper evaluation tool, and many of them say clinical judgment still has the significant role in distraction osteogenesis[7]. A 3 dimensional CT and other variable trials are demonstrated but still not accepted as standard methods[8].

There still remains maxillary occlusal cant but facial asymmetry is distinctly corrected, almost symmetric to the eye view. The patient is very content with the result of treatment

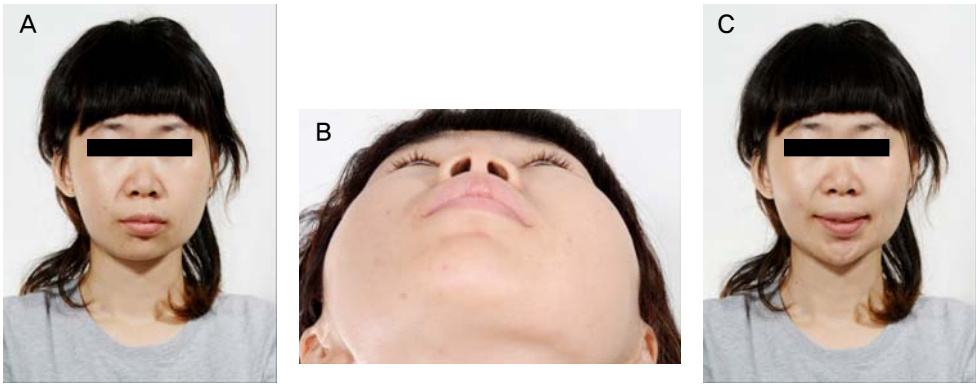

그림. Post-consolidation facial photo

and TMJ pain is relived for now. Compared to non-affected side, there is soft tissue depression on distracted cheek, which makes facial contour rather concave. Distraction osteogenesis results in lengthening of soft tissue overlying bone defect but volume expansion cannot be enough, there remains asymmetric soft tissue contour. Injection of botulinum toxin on non-affected side can be considered or soft tissue augmentation on affected side (그림 7).

The orthodontist is now preparing for orthodontic diagnosis. He is considering the relapse of distracted mandible and planning to wait and observe for another month.

IV. Discussion

Hemifacial microsomia is representative facial bone deformity that involves undergrowth of ear, maxilla and mandible. There are various degrees in this disease, from which affects only mandible to entire hemiface below the canthal line. Pruzansky developed a classification system that divides hemifacial microsomia into three classes in 1969. Kaban subdivided Pruzansky grade II according to the difference in treatment and surgery in 1988. Recently Huisinga-Fischer presented another classification of this disease according to the CT finding and name it as CFDS - CranioFacial Deformity Scoring[9]. Our case is scored MDS (Mandibular Deformity Scoring) 9, CDS (Cranial Deformity Scoring) 3, and CFDS 12 which implies moderate to severe involvement of disease. Hemifacial microsomia is the second most common facial birth defect after clefts.

Since it is common deformity, many cases and treatments have been reported. Treatment varies according to the severity of disease and traditional treatment is orthognathic surgery with bone graft - usually rib bone for condylar reconstruction. Overgrowth or resorption of the rib bone becomes common complication along with donor site morbidity. And even though skeletal results get better with development of surgical technique, soft tissue defect still needs additional correction. After the accomplishment of Ilizarov, hemifacial microsomia was one of the first diseases of clinical application of distraction osteogenesis in oral

and maxillofacial surgery. And now distraction osteogenesis becomes a treatment of choice for the hemifacial microsomia. Along with clinical advantages of distraction osteogenesis mentioned above, a simulataneous application of maxilla and mandible in the hemifacial microsomia can shorten the treatment time, minimize the need for the additional surgery and conserve the occlusion of patient. In this case we could reduce the occlusal cant of maxilla with alleviation of facial asymmetry and TMJ symptoms, which we report here.

V. Conclusion

Authors present a case of the treatment of hemifacial microsomia with distraction osteogenesis using Molina® distractor simultaneously applied on the maxilla and the mandible. There should be more study about standardized evaluation protocol of distraction osteogenesis in jaw bone.

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