



Transmaxillary Sinus Approach for Le Fort II Osteotomy

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Summary: The Le Fort II osteotomy is a relatively rare operation. The posterior wall osteotomy of the maxillary sinus (MS) is often difficult for Le Fort III. We developed the transmaxillary sinus approach (TSA) for the Le Fort II osteotomy that cuts the posterior wall of the MS directly. This report illustrates this easy-to-use procedure for the Le Fort II osteotomy in syndromic craniosynostosis. This procedure was performed in an 18-year-old patient with Apert syndrome and a 15-year-old patient with Pfeiffer syndrome. The thin anterior walls of the MS were removed through an intraoral approach to look inside the MS. Then, the posterior walls were cut by chisel under direct vision using light. The other osteotomy was performed as usual. Distraction osteogenesis with internal and external devices was used in combination. The advantages of TSA are the direct posterior wall osteotomy of the MS with no down fracture and minimal invasiveness to the mucosa of the MS under direct vision. However, the disadvantage is that TSA becomes a blind procedure in a case with no MS or hypoplasia. We developed the TSA for the Le Fort II osteotomy, which could provide direct observation and perform the posterior wall osteotomy of the MS without down fracture. We believe that TSA is an effective surgical procedure for the Le Fort II osteotomy. (*Plast Reconstr Surg Glob Open* 2016;4:e619; doi: 10.1097/GOX.0000000000000591; Published online 10 February 2016.)

The Le Fort II osteotomy is a relatively rare operation. The indications are severe midfacial-nose hypoplasia with a skeletal class III malocclusion, which occurs due to trauma with nasomaxillary hypoplasia,^{1,2} syndromic midfacial anomalies like Apert and Pfeiffer,³⁻⁵ cleft lip and palate,⁶ Treacher Collins syndrome,⁷ and so on. The Le Fort II osteotomy is generally performed by an

approach with a combined bicoronal incision of the scalp and an oral vestibular incision or by a periglabbellar approach instead of a bicoronal incision.⁸ In either case, the posterior wall osteotomy of the maxillary sinus (MS) may often be difficult. We developed a transmaxillary sinus approach (TSA) for the Le Fort II osteotomy that could cut the posterior wall of the MS directly. This report aims to illustrate this easy-to-use procedure for Le Fort II osteotomy in syndromic craniosynostosis.

SURGICAL METHODS

TSA is a procedure that provides direct observation and cuts the posterior walls of the MS without

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Received for publication October 2, 2015; accepted November 11, 2015.

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DOI: 10.1097/GOX.0000000000000591

Disclosure: This work was supported by grant from Grant-in-aid for Developmental Scientific Research, The Ministry of Education, Science and Culture (No. 20592101), and Health and Labour Sciences Research Grants Research on intractable disease (No. 2011-164). The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. The Article Processing Charge was paid for by the authors.

down fracture after removing the thin anterior walls of the MS.

First, the alveolar mucosa and the periosteum between the maxillary molar regions on both sides are gently removed from the pyriform aperture to the malar area horizontally and from the infraorbital region to the process frontalis maxillae vertically. Then, the thin anterior walls of the MS are removed to look inside the MS. Next, after only the mucosa of the osteotomy area in the MS has been gently removed on both sides, the posterior walls are cut by chisel under direct vision using light (Fig. 1). Then, rigid endoscopes may be useful in a supplementary role. The posterior osteotomy lines of the MS are joined to the medial osteotomy lines of the MS, which go through the nasal bone, and are also joined to the lateral osteotomy lines of the MS. The osteotomy of the pterygomaxillary junction is cut by a swan-neck or curved chisel. Therefore, this procedure does not need a complete down fracture with a Rowe forceps. However, the osteotomy of the nasal bone to the orbital region is cut in the frontonasal suture via a bicoronal or transglabellar approach. The lacrimal sac is protected, and a chisel is then used along the lacri-

mal fossa behind the posterior lacrimal crest. The subconjunctival incision is used to expose the infraorbital rim, when subperiosteal dissection of the infraorbital rim cannot be performed directly. The osteotomy lines of the lateral maxillary wall are extended posteriorly to the tuberosity and join the infraorbital cut at the anterosuperior region of the medial infraorbital rim. A nasal septal osteotomy is passed through the frontonasal horizontal cut and gently tapped obliquely toward the posterior palatal region.

CASES

Patient 1: An 18-year-old woman with Apert syndrome (Fig. 2).

The patient had already undergone a first Le Fort III operation at 8 years of age. This time, she underwent a Le Fort II osteotomy with TSA and a periglabbellar approach because she had midfacial-nose hypoplasia with a skeletal class III malocclusion. When the nasomaxillary complex was totally freed from the bone attachment, a pair of intraoral maxillary distractors (Synthes, Paoli, Pa.) was placed. Then, a halo-type external distraction device (MEDICAL U&A, Osaka, Japan) was attached, and a total of 6 surgical wires (2 fixed to an internal distraction device, 2 fixed to the piriform aperture, and 2 fixed to the nasal bone) were attached to the external devices.

When the maxillary position showed slight anticlockwise rotation at the distraction phase, it was corrected by the vertical wires. Immediately after the distraction, the external devices were removed. After an additional 3 months, the remaining internal devices were removed. At the 8-month postoperative cephalometric analysis, points N, Or, and A were advanced by 9, 0, and 12 mm, respectively, and all of their downward angles were 0 degree. Examining the facial image, midfacial depression was improved, and the repaired morphology of the external nose was also improved.

Patient 2: A 15-year-old boy with Pfeiffer syndrome (Fig. 3).

The patient had already undergone a first Le Fort III operation at 7 years of age. This time, he underwent a Le Fort II osteotomy with TSA and a periglabbellar approach because he had midfacial-nose hypoplasia with a skeletal class III malocclusion. The procedures were performed as in patient 1.

At the 6-month postoperative cephalometric analysis, points N, Or, and A were advanced by 11, 0, and 12 mm, respectively, and their downward angles were 20, 0, and 0 degrees, respectively. Examining the facial image, midfacial depression was improved, and the repaired morphology of the external nose was also improved.

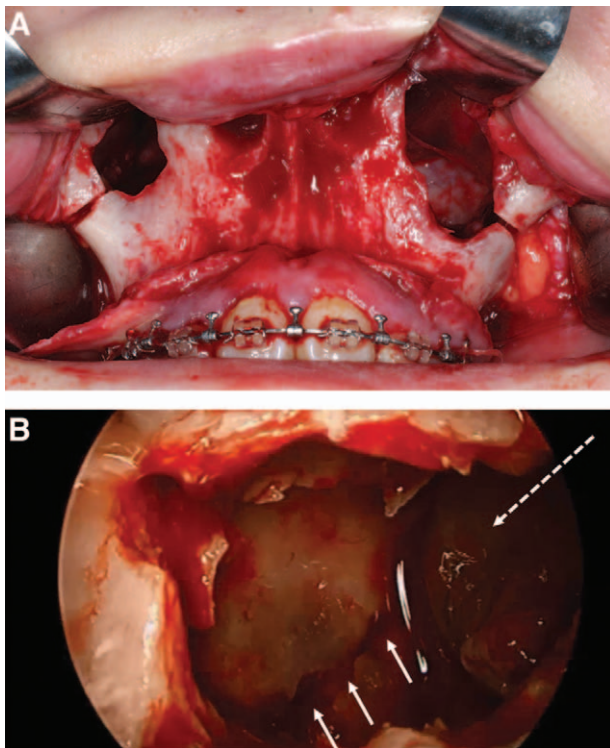


Fig. 1. Transmaxillary sinus approach for the Le Fort II osteotomy. A, Frontal view of the removal of the thin anterior walls of the MS to look inside the MS. B, Frontal view showing the right posterior wall in MS cut by chisel endoscopically. White arrow: the osteotomy line, White dotted arrow: the mucosa removed in the MS.

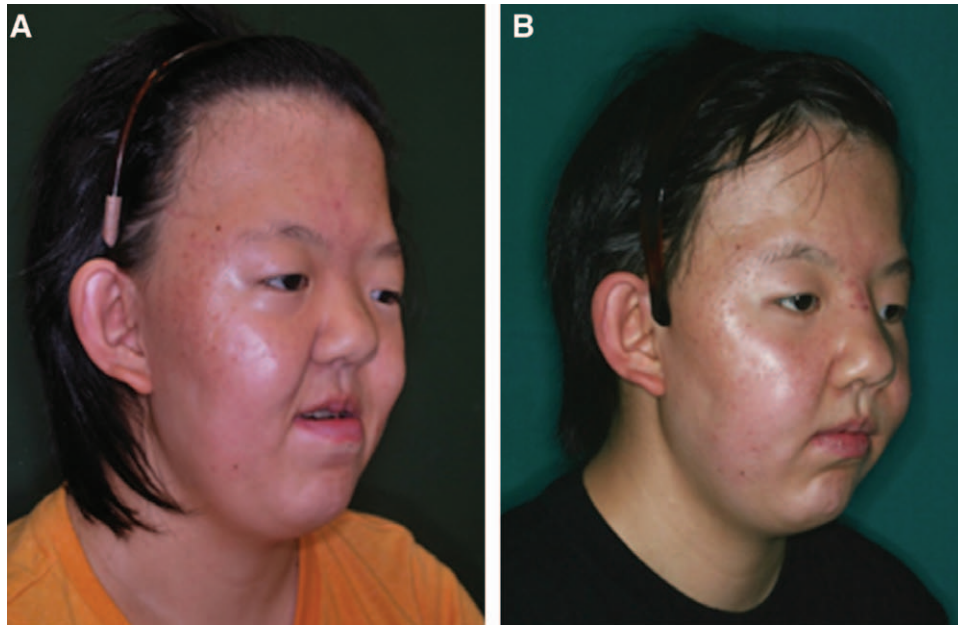


Fig. 2. An 18-year-old woman with Apert syndrome. A, Preoperative view. Class III malocclusion with dental compensation; B, 8 months postoperatively.

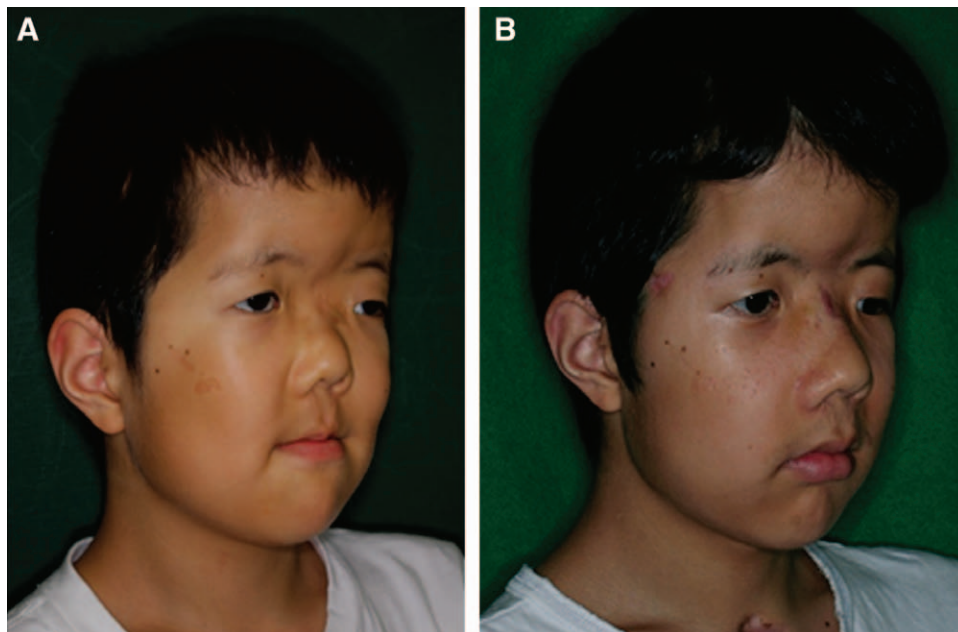


Fig. 3. A 15-year-old boy with Pfeiffer syndrome. A, Preoperative view. Class III malocclusion with dental compensation. B, 6 months postoperatively.

DISCUSSION

The Le Fort II osteotomy is a relatively rare operation. One of the difficult procedures is to cut the posterior wall of the MS for a Le Fort III osteotomy. It has been pointed out that unfavorable fractures through the pterygoid plates sometimes occur with this technique.^{9,10} TSA allows an easy procedure without down fracture by removing the thin anterior bones of the MS and cutting the posterior wall of

the MS directly for the Le Fort II osteotomy. Removing the thin anterior bones of the MS is comparatively easy because the procedure is used for repair of blowout fracture.^{11,12} The advantages of TSA are

1. the direct posterior wall osteotomy of the MS allows steady osteotomy;
2. no down fracture;
3. minimally invasive for the mucosa of the MS under direct vision.

The disadvantage is that TSA becomes a blind procedure in the case of no MS or hypoplasia.

However, distraction osteogenesis is an effective procedure for Le Fort II osteotomy.^{3-5,13,14} At this time, we use commercial intraoral distractors¹⁴ and a halo-type external distraction device with our novel wiring to control the vertical vector.¹⁵ The method that combines TSA and distraction osteogenesis is easy and has short operative time and less bleeding. We believe that TSA is an effective surgical procedure for the Le Fort II osteotomy.

CONCLUSIONS

We developed the TSA for the Le Fort II osteotomy, which provides direct observation and allows the posterior wall osteotomy of the MS to be performed without down fracture. We believe that TSA is an effective surgical procedure for the Le Fort II osteotomy.

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PATIENT CONSENT

Parents or guardians provided written consent for the use of the patients' image.

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