

Problems In Cleft Lip Nose Patients Undergoing Augmentation Rhinoplasty With Rib Graft : A Case Report

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Background: Correction of a cleft lip nasal deformity remains a challenging procedure in reconstructive surgery. Many different procedures have been suggested to address the problem, but few techniques have worked well and consistently.

Method: We present a case of secondary cleft nasal deformity after repair of unilateral complete cleft lip and palate on the left side. The corrective procedures carried out included closed method rhinoplasty and dorsal nasal augmentation with rib graft which was fixed to the nasal septum with needle.

Result: The patient showed satisfactory immediate post-operative result, with correction of depressed alar base and satisfying dorsal and tip projection. However, 5 months post operative result showed deviation of nasal tip to the cleft side, which we suspected was due to: warping of the rib graft, soft tissue deficiency in the cleft side which exerts pulling forces to the warping graft, and lack of rigid fixation of the graft.

Summary: After appraising pitfalls encountered in augmenting nasal dorsum of cleft patients with rib graft, we concluded that some preventive measures need to be done to avoid those problems, namely: balanced cross sectional carving of rib graft, cantilever graft with plate and screw to the nasal bone, and addressing pulling force from lack of soft tissue in the cleft side by adding columellar strut graft or alar contour graft.

Keywords: *cleft lip nasal deformity, rib graft augmentation rhinoplasty, warping, rigid fixation.*

Latar Belakang: Sampai saat ini rekonstruksi hidung pada pasien dengan sumbing bibir dan hidung masih merupakan suatu tantangan. Meskipun berbagai teknik telah diterapkan, hanya sebagian yang memberikan hasil memuaskan secara konsisten.

Metodologi: Kami menyajikan suatu kasus kelainan sumbing hidung sekunder pada pasien sumbing bibir dan langit – langit komplis sisi kiri yang telah menjalani operasi. Rekonstruksi yang dilakukan berupa rhinoplasty dengan teknik tertutup, dan augmentasi pada sisi dorsum hidung menggunakan graft dari tulang rusuk yang difiksasi ke septum hidung menggunakan jarum.

Hasil: Dengan mengkoreksi dasar alar yang rendah dan proyeksi letak dorsum serta ujung hidung yang sesuai, pasien merasa puas dengan hasilnya segera setelah operasi. Akan tetapi, 5 bulan setelah operasi tampak deviasi ujung hidung kearah sisi sumbing, yang menurut kami disebabkan oleh : perubahan bentuk graft tulang rusuk, kurangnya soft tissue pada sisi sumbing yang menyebabkan gaya tarikan dari sisi sehat lebih dominan, sehingga graft berubah bentuk, serta kurang rigidnya fiksasi pada graft.

Ringkasan: Setelah menelaah kemungkinan yang mungkin terjadi pada augmentasi dorsum hidung bagi pasien dengan sumbing, kami menyimpulkan beberapa langkah pencegahan perlu dilakukan untuk menghindari masalah yang mungkin timbul. Yaitu dengan memahat tulang rusuk dengan potongan seimbang, memfiksasi graft dengan plate and screw ke tulang hidung, dan mengatasi gaya tarikan dari arah sisi sehat dengan menambah columellar strut graft atau alar contour graft.

Kata Kunci: *cleft lip nasal deformity, rib graft augmentation rhinoplasty, warping, rigid fixation.*

Correction of a cleft lip nasal deformity continues to be a challenging task for every reconstructive surgeon. Despite the array of procedures developed in the last four decades, results are extremely varied, and greatly depend on the severity of the deformity, the

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age at the time of surgery, the technical approach, the surgeon's skill and aesthetic appreciation, the availability of orthodontic management, and each patient's expectations¹.

It is common for cleft lip nose patients presenting in their teen years to require or request for dorsal nasal augmentation procedure. Due to their age, complicated anatomic features, and

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scars from previous surgeries, cleft lip nose patients need more tailored nasal augmentation procedure that is sometimes different from aesthetic rhinoplasty. Autologous materials remain the preferred graft material for use in cleft lip nose rhinoplasty because of their high biocompatibility and low risk of infection and extrusion. However, these advantages should be counterbalanced with the concerns of donor-site morbidity, graft availability, graft resorption and warping². Furthermore, specific surgical techniques and approach must be implemented to ensure satisfactory result.

We present a case of secondary unilateral cleft lip nasal deformity treated with augmentation rhinoplasty using rib graft; a procedure many plastic surgeons perceive as common or are familiar with. Despite the satisfactory immediate post operative result, pitfalls from the procedure jeopardize the long term aesthetic result. The aim of this study is to convince us that satisfactory long term aesthetic result will be achieved if specific technical measures are carried out during rib graft augmentation rhinoplasty in cleft lip nose patients.

PATIENT AND METHODS

An 11-year-old girl who had previously under-gone surgeries in her infancy to repair unilateral complete cleft of left lip, alveolus and palate; presented to our division to correct nasal deformity. The patient had also under-gone primary nasal repair in conjunction with palate repair, yet there were no records of previous pre-surgical orthodontic management or alveolar bone grafting. The patient had expectation that her nose could be corrected to more

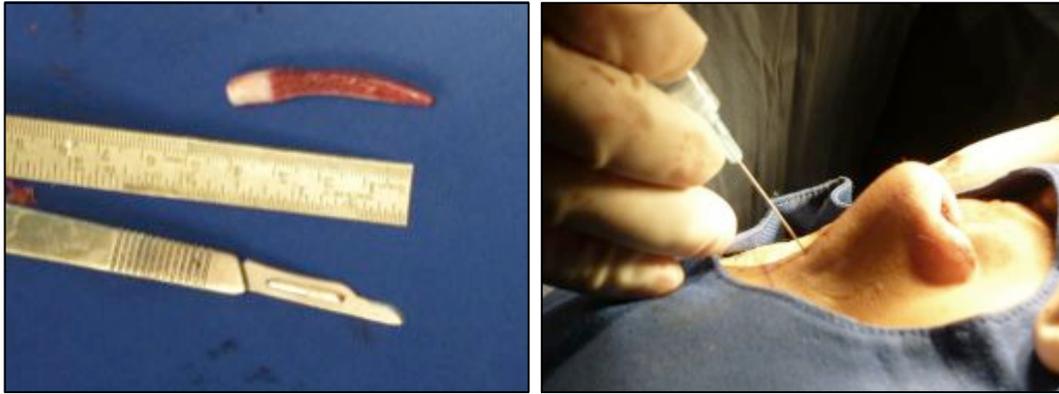
resemble her mother's nose, and was the one who requested for surgery due to lack of confidence. On examination, we found that the patient had a broad and inadequately projected nasal tip; lack of dorsal nasal support (flat nasal bridge), depressed alar base in the cleft side, asymmetry in height and width of nostrils (see Figure 1).

There was also quite prominent hypoplasia involving premaxilla region but the occlusion was normal. There was not a significant lateral displacement of the cleft side ala, probably because the patient had undergone previous primary nasal repair.

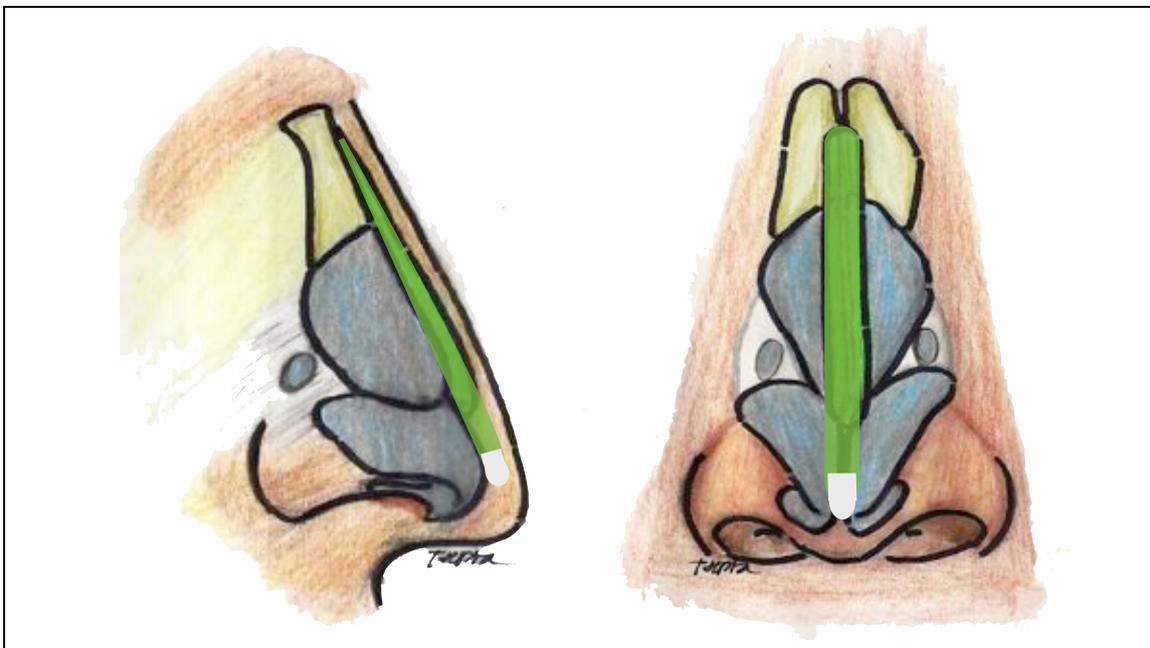
We performed dorsal nasal augmentation with osseocartilaginous graft harvested from 7th rib of the right side, leaving intact perichondrium to minimize donor-site morbidity. The rib graft was easily carved using no.15 surgical blade to the desired dimension and shape. Before we shaped the rib graft, we performed Gibsonian balanced cross-sectional carving which involved symmetrical removal from both sides and using only the central part of the cartilage for augmentation. The readily carved rib graft was then inserted over the nasal bone (as dorsal onlay graft) via closed approach involving inverted U incision in the upper rim of right nostril. The graft was then secured into place by fixating it to the nasal septum with a large needle (see Figures 2-3). The remains of rib graft which had previously been removed from both sides were diced and used to augment the pyriform margin, by inserting them over the periosteum through a lateral alar base incision. Both medial crura were joined together at an appropriate height by transfixing sutures. We



Figure 1. (Left) pre-operative view of the patient, 11-year-old girl, presented with secondary cleft nasal deformity. (Middle) Worm view showed broad tip and lack of projection of tip, depressed alar base in the cleft side and asymmetry in the height of nostrils. (Right) Lateral view showed insufficient dorsal height and retrusive maxilla.



Figures 2. Intraoperative procedures. (left) osseocartilaginous rib graft harvested and carved with no.15 blade. (Right) rib graft fixed to the nasal septal with no. 23 needle.



Figures 3. Schematic picture of dorsal onlay osseocartilaginous graft carried out in this patient.

did not apply plaster of Paris or nose splints to immobilize the nose; we used adhesive tape instead, strapped longitudinally along the lateral sides of nose, and also horizontally over the nasal bridge. The adhesive tape and the fixating needle were retained for about a week before they were removed. Stitches were removed by the seventh day.

RESULTS

Immediate post operative result was satisfactory, with symmetrical alar base and height of nostrils, defined nasal tip projection and ade-

quate height of nasal dorsum. However, in the 5-months followup examination, we found deviation of nasal tip to the cleft side (see Figures 4,5,6). We did not observe any significant resorption from the nasal dorsum or pyriform margin. The height of nasal dorsum and symmetry of alar base remained intact.

DISCUSSION

It is universally acknowledged that early intervention and adjustment of the lower lateral cartilages in the cleft lip nose is beneficial, however this approach usually does not prevent



Figures 4. (Left) Pre-operative view. (Middle) Immediately post operative view. Note the adequate dorsal height, sufficiently projected tip, symmetrical nostrils and alar base after rib graft dorsal augmentation and pyriform augmentation. (Right) 5-months post-operative view. Note the deviation of tip to the cleft side. There was no significant resorption of dorsal rib graft.



Figures 5. (Left) worm view pre-operative view. (Middle) immediate post operative view. (Right) 5-months post operative. Notice the deviation of tip to the cleft side. The alar base height remained symmetrical.



Figures 6. Lateral view of the patient. (Left) preoperative view. Note the lack of dorsal height. (Right) 5-months post operative view. There was significant improvement in dorsal height and tip projection.

secondary reconstruction when the adult characteristics of the nose become apparent³. The real controversy arises when complete septo-rhinoplasty with modification of the osseo-cartilaginous vault is considered. The concern is that complete rhinoplasty with osteotomy and septal manipulation will impair facial growth.

Consequently, complete rhinoplasty has been generally deferred until the late teen years.

However, there are data demonstrating that nasal growth is complete at approximately 11 to 12 years of age in girls and 13 to 14 years of age in boys⁴. Accordingly, full rhinoplasty maybe performed at this time without fear of

affecting growth. For this reason, we believe it is quite safe to perform augmentation rhinoplasty for our patient, who was 11 years old. Moreover, the approach we used was not too aggressive, in which we did not perform external approach, osteotomy or septal framework manipulation.

Before tip reshaping is begun, the support of the alar base must first be assessed. If there was skeletal deficiency, as was found in this patient, augmentation should be considered⁵. We accomplished this by placing diced bone graft from remaining of costal graft through a lateral alar base incision of the cleft side. In the unilateral cleft lip nose, many experts frequently augment tip projection using graft material to further correct the nasal deformity, because only reshaping the lower lateral cartilage with suture techniques is usually insufficient⁵. Lower lateral cartilages in the cleft lip patients tend to be floppy; therefore, grafts are commonly used to strengthen the cartilaginous framework of the nose⁶. In this patient, the tip is projected sufficiently after only augmenting the nasal dorsum, thus we did not feel the need to do an open external approach of rhinoplasty and perform tip graft or columellar strut graft.

However, 5 months after surgery, the patient developed deviation of tip to the cleft side, which we suspected was due to warping of the graft. This is actually a well-known disadvantage from the costal cartilage graft as dorsum augmentation. Although autogenous septal cartilage is generally preferred for use in the primary correction of mild deficiencies in the projection of the nasal tip and dorsum, often there is an insufficient supply for more severe deformities, for example in Asian rhinoplasty cases. In such cases where alternatives to septal and conchal cartilage grafts are needed, autogenous rib cartilage may be the graft material of choice^{7,8}. Costal cartilage has many advantages: available in abundance, undergoes minimal postoperative resorption when not crushed excessively and is relatively easy to carve. Grafts can be harvested simultaneously during rhinoplasty by a second surgeon, thus minimizing operative time².

However, costal cartilage is often overlooked when grafting materials are sought because

of its perceived disadvantages, the foremost of which is unpredictable warping, which could jeopardize the esthetic result in a dorsal graft and necessitate revision^{9, 10}. Plastic surgeons should not be too confident after seeing the satisfactory immediate post operative results of augmentation rhinoplasty using rib graft, because the warping of rib graft can still be found as late as 9 months post operatively, as reported by Kilner et al¹¹. When using rib graft as dorsal onlay graft, we recommend to perform some preventive measures to avoid warping of the graft. In 1958, Gibson and Davis¹² demonstrated that balanced cross-sectional carving significantly reduces the incidence of cartilage warping. This involves removing symmetrical parts on the lateral sides of the graft. Gibsonian balanced carving with 15 minutes allowed for maximal warping has also been advocated⁸. In this series of 40 costal cartilage grafts for nasal reconstruction in 14 patients followed for an average of 12 months, there were no instances of postoperative graft warping.

Another proposed cause of tip deviation is displacement of the rib graft. The deficient soft tissue (probably hypoplastic) of the cleft side lateral sidewall exerts some pulling forces to the tip¹³. Because the graft was not rigidly fixed and the soft tissue shortage which results in force imbalance was not addressed, the graft was displaced to the cleft side. In this case, fixating the graft with needle to the nasal septum for a week proved to be not strong enough to resist the forces of muscular pull from the cleft side lateral ala. We believe it is more efficient to use rib graft as cantilever bone graft with screw fixation on nasal bone to ensure that the graft is perfectly immobilized¹⁴. However, doing this procedure is not without downfall, in this case the patient has to be able to accept a conspicuous scar in the nasal bridge skin, between her eyes. This is why it is not very common to do a cantilever graft procedure in our population because scar in that region, for Asian skin, is difficult to obscure. Addressing the deficiency in soft tissue of cleft side lateral sidewall should also be performed to prevent displacement of graft; this can be achieved by augmenting the ala with alar contour graft, and

strengthening the tip support with columellar strut¹³.

SUMMARY

In summary, rib graft can be considered the material of choice for augmentation rhinoplasty in unilateral cleft lip nose patient. However, specific measures should be taken to ensure longevity of aesthetic result, namely : preventing warping of the graft, fixating the graft with plate and screw, and addressing shortage of soft tissue in the cleft side lateral sidewalls.

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REFERENCES

- de la Torre, J. I., Gallagher, P. M., Douglas, B. K., and Tenenhaus, M. Repairing the cleft lip nasal deformity *Cleft Palate Craniofac. J.* 2000;37: 234, 2000.
- Sajjadian A, Rubinstein R, Naghshineh N. Current status of grafts and implants in rhinoplasty: part 1. Autologous graft. *Plast.Reconstr. Surg.* 125: 40e, 2010.
- Kane, A. A., Pilgram, T. K., Moshiri, M., and Marsh, J. L. Long-term outcome of cleft lip nasal reconstruction in childhood. *Plast. Reconstr. Surg.* 2000;105: 1600.
- Akguner, M., Barutcu, A., and Karaca, C. Adolescent growth patterns of the bony and cartilaginous framework of the nose: A cephalometric study. *Ann. Plast.Surg.* 1998;41: 66.
- Stal S, Hollier L. Correction of secondary deformities of the cleft lip nose. *Plast. Reconstr. Surg.* 2002;109: 1386.
- Flores RL, Sailon A, Cutting CB. A novel cleft rhinoplasty procedure combining an open rhinoplasty with the Dibbell and Tajima techniques: a 10-year review. *Plast. Reconstr. Surg.* 2009;124: 2041
- Daniel RK. Rhinoplasty and rib grafts: Evolving a flexible operative technique. *Plast Reconstr Surg.* 1994;94:597-609;discussion 610-611.
- Sherris DA, Kern EB. The versatile autogenous rib graft in septorhinoplasty. *Am J Rhinol.* 1998;12:221-227.
- Maas CS, Monhian N, Shah SB. Implants in rhinoplasty. *Facial Plast Surg.* 1997;13:279-290.
- Agaoglu G, Erol OO. In situ split costal cartilage graft harvesting through a small incision using a gouge. *Plast Reconstr Surg.* 2000;106:932-935; discussion 936-937.
- Gunter JP, Rohrich RJ. External approach for secondary rhinoplasty. *Plast Reconstr Surg.* 1987;80:161-174
- Gibson T, Davis WB. The distortion of autogenous cartilage grafts: Its cause and prevention. *Br J Plast Surg.* 1958;10:257-274.
- Byrd SH, El-Musa KA, Yazdani A. Definitive repair of the unilateral cleft lip nasal deformity. *Plast. Reconstr. Surg.* 2007;120: 1348.
- Gunter JP, Clark CP, Friedman RM. Internal stabilization of autogenous rib cartilage grafts in rhinoplasty: A barrier to cartilage warping. *Plast Reconstr Surg.* 1997;100:161-169.