Extended L-shaped Spreader Graft for Correction of Combined Dorsal and Caudal Nasal Septal Deviations

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Summary: Although a wide range of surgical techniques have been proposed to straighten the deviated cartilaginous nasal dorsum and maximize nasal function, recurrence is common because of cartilage memory and scar contractures. An extended L-shaped spreader graft, a permanent support, was developed to correct functional and aesthetic problems, to prevent recurrence, and to maintain the correction of the septum stable and strong. This technique was utilized in 16 cases of deviated cartilaginous dorsum. All patients were subjected to a detailed history, physical examination, CT scan of the nose, and photographic documentation preoperatively. The patients were followed up during a period of 3 months to 4 years. According to physical examination, postoperative photography, and patients’ satisfaction, the final results were categorized as excellent, good, or poor. The results were as follows: 14 patients (87.5%) were classified as excellent, as their noses were completely straight, and this was consistent with physical examination and postoperative photographs. Two patients (12.5%) were classified as good because there was a minimal residual deviation according to either photographs or clinical examinations. This minimal deformity was not experienced by the patients. In conclusion, consistent, reproducible results were achieved with using the autologous extended L-shaped spreader graft for controlling and maintenance of the dorsal and caudal septal deviation after correction. It is one piece of L-shaped graft of autogenous cartilage fixed to the original septal L-strut. It is regarded as an anatomical graft that provides sustained cephalocaudal support, preserves pliability of the lobule, and maintains stability as an independent stabilizer for the native strut. (Plast Reconstr Surg Glob Open 2021;9:e3716; doi: 10.1097/GOX.0000000000003716; Published online 23 July 2021.)

INTRODUCTION

The main problem of the deviated nasal pyramid lies in the cartilaginous portion, especially the cephalocaudal strut of the septum. Preservation of the structural integrity of this cephalocaudal L-strut is crucial for successful correction, otherwise the deformity will remain.1,2

A number of techniques have been described to straighten and stabilize the C or S-shaped deformities involving this L-strut, including spreader grafts, caudal septal repositioning, scoring incisions, suture fixation to the nasal spine, partial or complete replacement by autogenous septal or rib cartilage, and even autologous septal bone grafts.3–10

Even with these various approaches, correction of twisted dorsal and caudal septum without weakening or compromising the middle vault and nasal tip support is still quite challenging.

This study introduces a new procedure for the reconstruction of deviated cephalocaudal strut using an extended L-shaped spreader graft. This technique addresses both dorsal and caudal septal deviations simultaneously. It preserves the keystone area and the mobility of the nasal lobule and provides support to a weakened dorsal and caudal septum without narrowing the airway. Additionally, this type of reconstruction will add an extra-strength and support to the native L-strut as the L-spreader graft rests on the maxillary crest and the anterior nasal spine.

PATIENTS AND METHODS

Over a 4-year period, 16 patients were operated upon for cartilaginous dorsal deviation with or without lower
third deformity and nasal obstruction. Patients with isolated dorsal bony deformity, a deviated nose due to a missing septum, or who had previous septorhinoplasty were excluded.

A detailed history and physical examination was done, including history of trauma, previous septorhinoplasty and septal surgery, type of deviation, and associated nasal obstruction. A CT scan of the nose was performed to document the deviation and to rule out other causes of nasal obstruction.

Standardized preoperative and postoperative photography for documentation and analysis by three plastic surgeons in my university who were not involved in any of the operations was carried out.

According to this and patient’s satisfaction, the outcomes were categorized into excellent, good, and fair. Postoperatively, all patients were reviewed at regular follow-up to assess aesthetic and functional outcomes and complications. Informed consent was obtained from all patients before surgery.

**SURGICAL TECHNIQUE**

Through open approach and after injecting local anesthetic (2% xylocaine and 1:100,000 epinephrine), the osteocartilaginous skeleton was exposed. If indicated, component dorsal hump reduction described by Rohrich was accomplished. Then the septum was freed from the deformed nasal bones and the upper and lower lateral cartilages beginning at the anterior septal angle.

Deformed central septal cartilage was resected, leaving a cartilaginous cephalocaudal L-strut at least 1-cm wide. Straightening the remaining cartilaginous septum by scoring the concave side in a plane perpendicular to the axis of the curvature was performed.

Apart from correcting dorsal deformities, any caudal L-strut deformities were corrected by dividing the connection with the anterior nasal spine, removing excess overhang cartilage, and scoring of the twisted caudal strut (caudal septoplasty).

**FABRICATION OF THE EXTENDED L-SPREADER GRAFT**

The L-spreader graft was carved from the septal cartilage. If there was not enough septal cartilage, the costal cartilage would be an alternative. It was fabricated as one piece. The dimension was as follows: 1.5–2 mm (thickness), 4 mm (width), and regarding the length, the dorsal part was usually 2–3 cm and the caudal part was around 2 cm, and the angle of connection was 90 degrees to 110 degrees (Fig. 1A).

In most cases, unilateral extended L-spreader graft would be enough, but in some cases with severe S-shaped deflection, bilateral frameworks on both sides of the septum had been used. In these cases, the septal cartilage was not enough; so the two frameworks were fabricated from the costal cartilage specifically from sixth and seventh ribs, as there is a syncytial junction between them that aids the fabrication as one piece. Carving was performed symmetrically and from the central core of the rib to minimize the effect of warping. Medial and lateral osteotomies were then done on both sides.

**INSERTION OF THE EXTENDED L-SPREADER GRAFT**

After carving, it was inserted on the concave side, extending from the keystone area proximally and rests on the maxillary crest abutting anterior nasal spine caudally to reinforce and support both the dorsal and the caudal portions of the native L-strut. Quilting mattress sutures with 5-0 absorbable monofilament sutures were used to secure the graft on the concave side of the septum after scoring in a patient with deviated cartilaginous dorsum. B, Diagram showing the fixed extended L-spreader graft, the exact site alongside the native L-strut, and its role in providing architectural support to the middle vault and tip.
secure the framework tightly to the native L-strut, and straighten and stabilize it in a midline position (Fig. 1B).

A regular spreader graft sometimes was required in cases of long-standing deviation and during exposure, the upper lateral cartilage on the convex side was found very thin with loss of its structural integrity; so a regular spreader was inserted on that side to add structural support and keep the internal nasal valve opened.

When necessary, cephalic trim of the lateral crura of the lower lateral cartilage, columellar strut, tip defining sutures and tip grafts were performed. After completion of the procedure, bilateral silicone septal splints were applied for two weeks and external nasal cast for one week.

### RESULTS

Mean follow-up period was 23 months (range 3–48 months). There were 10 women and six men. Mean patient age was 28 years (range 18–50 years). In five patients, costal cartilage was used to reconstruct the L-spreader grafts. In two of them with severe deformity, two frameworks were required on both sides of the septum.

Fourteen patients (87.5%) were classified as excellent, believing that their noses were completely straight with natural feel and appearance. Two patients (12.5%) were classified as good, as there was a minimal residual deviation according to either photographs or clinical examinations. These two patients did not notice this minimal deformity (Table 1).

Careful follow-up revealed remarkable improvement in nasal airflow and a straight nose in all cases with no major complications such as infection, graft displacement, structural weakening, relapse, or nasal airway compromise (Fig. 2). (See figure 1, Supplemental Digital Content 1, which displays a 27-year-old woman with C-shaped right-sided middle vault deviation, left-sided caudal septal deviation, and lack of tip support, as evident in frontal and basal views. [http://links.lww.com/PRSGO/B721](http://links.lww.com/PRSGO/B721).) (See figure 2, Supplemental Digital Content 2, which displays a 22-year-old woman with C-shaped left-sided septal deviation with left-sided nasal obstruction. [http://links.lww.com/PRSGO/B722](http://links.lww.com/PRSGO/B722).)

### DISCUSSION

Various techniques have been described for persistent correction of the severely twisted cephalocaudal L-strut of the septum without affection of the middle vault and nasal tip support. Foda did full mobilization of deviated cartilage, followed by straightening of the cartilage and its fixation in the corrected position by using bony splinting grafts. Also, nasal bone graft harvested mainly from the ethmoid bone and vomer have been utilized as a splint to reinforce a weakened L-strut after straightening by many authors, and they reported satisfactory result. The septal crossbar graft has been proven to be useful in the correction of severe septal deviation with the greatest degree of resistance to cartilaginous memory.

Despite all the above techniques that utilize septal bone or cartilage grafts to maintain the straightened cephalocaudal L-strut achieving satisfactory outcomes, there would be a difficulty in fixation of bone grafts, and the most important thing is that these grafts depend on the native L-strut for their support, which is usually weakened during straightening.

Caudal extension grafts as tongue in groove techniques have been utilized to secure a midline position of

| Age: | Range | Mean |
|------|-------|------|
| 18–50 years | 28 years |

| Gender: | Masculine | Feminine |
|---------|-----------|----------|
| 6 patients | 10 patients |

| Airway obstruction: | All patients complaining of obstruction with variable degrees |
|-------------------|---------------------------------------------------------------|

| Sites of graft harvest: | Septum | Costal |
|------------------------|--------|--------|
| 11 patients | 5 patients |

| Results evaluated subjectively: | Excellent | Good |
|-------------------------------|-----------|-------|
| 14 patients (87.5%) | 2 patients (12.5%) |

Fig. 2. Pre- and postoperative results. A. A 24-year-old man complained of bilateral nasal obstruction as well as external nasal deformity in the form of severe left-sided C-shaped deviation of the cartilaginous dorsum. The deviated dorsal and caudal septal cartilage were straightened and splinted using an extended L-spreader graft. B. Two-months postoperative results showing straight nose in the bird’s eye view.
the deviated septum after straightening. Although it creates a firm conjunction between the septum and the columella/Tip complex with strong tip support, it usually results in rigid tip lobule with loss of tip pliability as the caudal limb of the graft lies in the columella.

Extracorporeal septal reconstruction to correct the markedly deviated nasal septum has been described to offer a radical solution with good results. The drawback of this procedure lies in the practical difficulty of obtaining perfect alignment of the grafted septum with the surrounding structures and the risk of mobility, irregularities, and saddling over time.

The extended L-shaped spreader graft was developed for reconstructing the severely twisted cephalocaudal septal L-strut after straightening. This graft acts as an independent support, stabilizer, and also prevents recurrence of deviation over time. As it lies cranial to the membranous septum, there was free mobility of the tip lobule complex.

This technique is different from the bony or cartilaginous grafts. Being a one-piece graft that mimics the structurally essential cephalocaudal part of the septum, it has inherent structural integrity. The dorsal component extends cephalically till keystone area and the caudal part till the maxillary crest abutting the anterior nasal spine; so it provides a firm support to the weakened native cephalocaudal L-strut after scoring and straightening. The long-term outcome, free mobility of tip lobule, and improved nasal airflow were maintained due to the independent support of the extended L-spreader graft to the native cephalocaudal L-strut.

CONCLUSIONS

Remarkable improvement in nasal dorsal straightening, contour, and airflow were achieved in all patients. No complications, such as structural weakening or relapse, were encountered in any of the 16 patients. All patients were satisfied with the results. The outcome remained unchanged over time. These advantages make the extended L-shaped spreader graft an excellent choice for severe cephalocaudal cartilaginous septal deviation and can be regarded a valuable contribution for the treatment of these cases due to any cause.

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PATIENT CONSENT

The patients provided written consent for the use of their images.

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