Is Osteoplasty With Unilateral Osteotomy Effective in the Correction of the Crooked Nose?

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Objective: The crooked nose is frequently observed, and a significant number of correction methods have previously been described. Nevertheless, the condition remains a challenging problem for rhinoplastic surgeons. Here, the authors present a technique that the authors have used to correct a crooked nose in selected patients.
Methods: A total of 23 patients underwent surgery for a C-shaped crooked nose, and were followed up for an average of 11.4 months. Pre- and postoperative photographs were taken, and these were analyzed to evaluate the results.
Results: Osteoplasty and unilateral osteotomy were carried out in all 23 patients and a spreader graft was contralaterally placed. Unilateral osteoplasty was conducted in 17 patients, while bilateral osteoplasty was performed in 6 patients. In 19 patients, a single spreader graft was sufficient, but it was necessary to use a double spreader graft in 4 patients. In summary, 23 C-shaped crooked noses were corrected with osteoplasty plus unilateral osteotomy.
Conclusions: Osteoplasty plus unilateral osteotomy, combined with a contralateral spreader graft, is an efficient method that can be safely used in the correction of a C-shaped crooked nose.

Key Words: Crooked nose, C-shaped, osteoplasty, spreader graft, unilateral osteotomy

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The crooked nose is defined as a deviation of the nasal bone and cartilage pyramid from the facial midsagittal plane,[1] and trauma and iatrogenic and congenital issues are involved in its etiology. Three types of crooked nose have been distinguished, according to the shape of the deviation, as follows: if the nasal pyramid deviates to the right or the left in a linear manner, the condition is termed I-shaped deviation; if the nasal pyramid is concave on one side and convex on the other, it is known as a C-shaped deviation; and if there is a convexity and a concavity on the same side of the nasal pyramid, the deviation is referred to as S-shaped.

Detailed preoperative analysis and planning are crucial prior to surgical correction of a crooked nose.[2] In planning and surgery, the nasal pyramid must be separated into 3 parts, and each of these must be individually assessed. The basic purpose of the surgical intervention is to create a straight nose for the long term, by relocating the nasal septum, upper lateral cartilage, and nasal bones according to the medial line. In correcting the upper one-third osseous section, bone operations, such as asymmetric osteotomy, intermediate osteotomy, lateral osteotomy, double lateral osteotomy, or wedge resection, are required.[3,4] However, correction of the lower two-thirds section involves more cartilaginous structures (septum and upper lateral cartilage). Frequently used techniques to straighten the cartilaginous section include resection, scoring, and spreader flaps and grafts.[5,6]

Although a number of surgical techniques used for the correction of the crooked nose have been described, it still represents one of the most challenging problems in rhinoplasty.[3,6–8] In this paper, we present a surgical technique that we used in the correction of a C-shaped crooked nose.

METHODS

The study was begun after obtaining approval from the ethics committee. After a comprehensive search of patient records, 23 patients who had undergone septorhinoplasty to correct a C-shape crooked nose during 2015 and 2016 were enrolled. Those patients who had undergone previous nasal surgery, those who had an I-shaped crooked nose, and those receiving secondary rhinoplasty were excluded. For each patient, photos from 5 different angles (frontal, helicopter, lateral, and basal views) were taken and recorded preoperatively, and at 3, 6, 9, and 12 months following surgery.

Surgical Technique

In all the patients, rhinoplasty was performed under general anesthesia using an open technique. Prior to the intervention, the concave and convex sides were established, and a 1/100,000 epinephrine injection was administered via the submucosal tissues of the nose. After achieving sufficient hemostasis, an inverted-V midcolumellar incision was made. After the elevation of the bone and cartilage roof, the cartilage hump was first removed, followed by the bone hump, using a rasp, via the component method. Septoplasty was then undertaken, leaving the 15 mm dorsal and caudal septal cartilage intact. If the caudal septum deviated from the nasal spine, it was dislocated and sutured to the nasal spine. Further, an incision was made right above the inferior concha on the convex side. A subperiosteal tunnel with a width of approximately 2 cm was created along the frontal processes of the maxillary bone, with the borders posterior to the nasofacial groove, and superior to the medial canthus (Fig. 1A). This convex section (lateral to the medial canthus) was aligned with the medial canthus (osteoplasty, Fig. 1A, shaded area) using a rasp. In fact, this convex section was in accordance with the frontal process of the maxillary bone. Subsequently, transverse and lateral osteotomy was performed. After removing cartilage from the convex side of the septum in the shape of an inverted triangle, a spreader graft was placed in the concave side without conducting osteotomy; thus symmetry was achieved (Fig. 1B). The spreader graft placed on the concave side achieved both the straightening of the septal cartilage and lateralization in the upper lateral cartilage.

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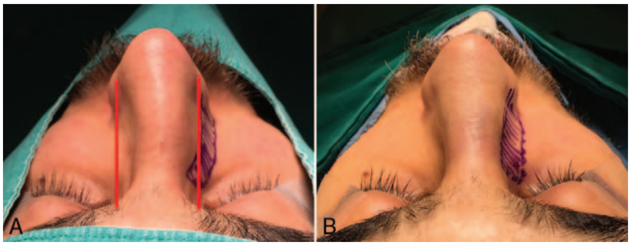

FIGURE 1. (A) A preoperative view of a C-shaped crooked nose. The red line shows the line of the medial canthus. As the widest point of the nasal bone on the concave side at the maxillary level remains medial to the canthus line, an osteotomy on the concave side is not necessary. Contralaterally, there is an excessive convexity. Shaded area: the area requiring rasping corresponds to the excessively expanded frontal processes of the maxillary bone. (B) A view of the same patient shown in Figure 1, following the insertion of a spreader graft on the concave side, rasping of the shaded area on the convex side, and unilateral transverse and lateral osteotomy.

In some patients, where the widest point of the nasal bone on the concave side at the level of the maxilla remained lateral to the medial canthus, a subperiosteal tunnel was created along the frontal processes of the ipsilateral maxillary bone. This expanded section was brought to the level of the medial canthus by rasping.

Finally, a tip plasty was made. The operation was concluded by placing an intranasal silicone tampon and an external thermal splint. The intranasal silicone tampons were removed on postoperative day 4, the external splint was removed on postoperative day 7. All the patients received antibiotics and pain killers for 7 days postoperatively, as per routine. A schematic illustration of the surgical technique is shown in Figure 2.

RESULTS

A total of 23 patients (15 females, 8 males) with a C-shaped crooked nose participated in this study, and their mean age was 26.4 years (range: 19–35). The patients were followed up for an average of 11.4 months (range: 9–12 months). Osteoplasty, as well as transverse and lateral osteotomy on the convex side, was carried out in all the patients, and a spreader graft was placed in the concave side. A single spreader graft was sufficient for the purpose in 19 patients, while 2 spreader grafts were inserted into the concave side to achieve symmetry in 4 patients. In 6 patients, the frontal processes of the maxillary bone on the concave side extended laterally to the medial canthus; this expanded section was rasped to make it symmetrical to the opposite side. A total of 23 C-shaped crooked noses were corrected using osteoplasty plus unilateral osteotomy and contralateral spreader graft.

There were no postoperative complications. During the follow-up, an average of 1 year, there was no recurrence of the deformity in any of the patients. There was a minimal undercorrection of the nasal dorsum in only 2 patients, which was corrected by filler injection on the concave side. The examples of the cases are shown in Figures 3 and 4.

DISCUSSION

The crooked nose is a condition that includes septal, as well as osseous, deformities, presenting a challenge to rhinoplasty. In general, the lateral wall of the nasal pyramid is medially repositioned following a trauma, due to a compression of the cartilaginous septum and the upper lateral cartilage, becoming depressed and concave. In contrast, the contralateral wall is laterally repositioned under the pressure of the nasal bone, the cartilaginous septum, and the upper lateral cartilage, as a result of the trauma. The result is a deformity affecting the nasal bone, the cartilaginous septum, and

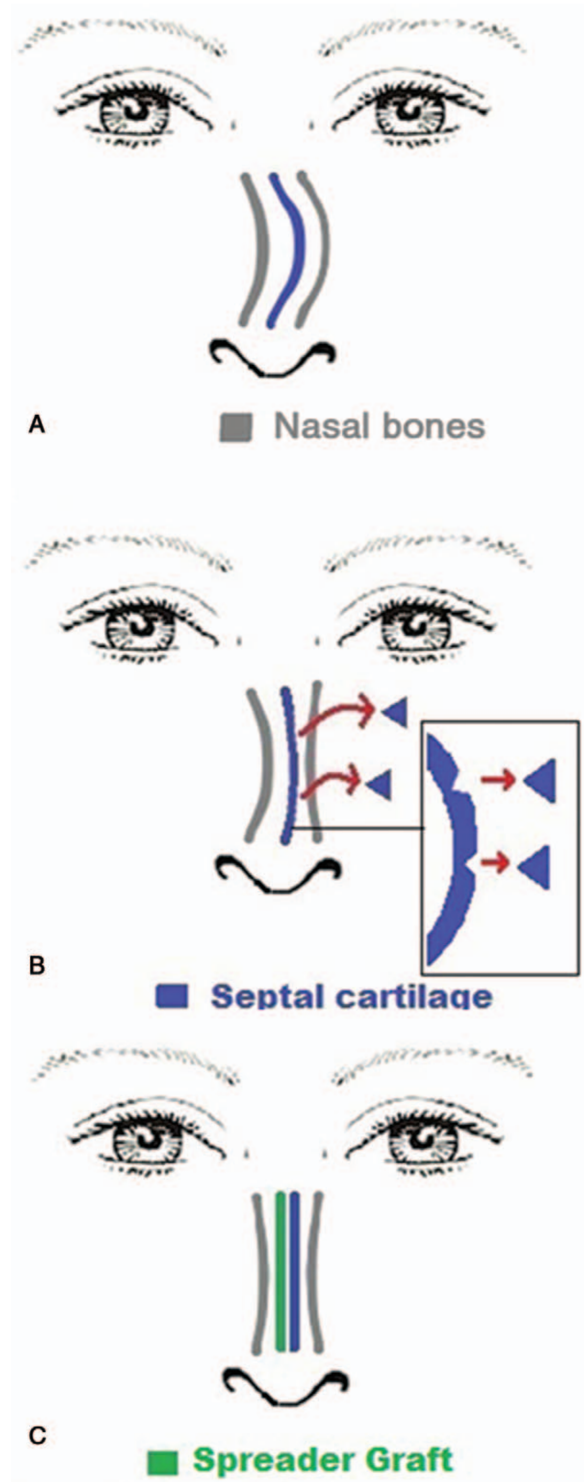

FIGURE 2. A schematic illustration of the surgical technique. (A) Preoperative view, the nasal pyramid is concave on one side and convex on the other. (B) After osteoplasty on the convex nasal bone, transverse, and lateral osteotomy are being performed. By removing inverted triangles from the convex side of the septum, its length is equalized with that of the concave side. (C) Without osteotomy, a spreader graft has been placed in the concave side of the nasal pyramid, achieving straightening of the septum and lateralization of the depressed upper lateral cartilage.

FIGURE 3. Preoperative and postoperative photographs of patients with C-shape crooked nose deformity.

FIGURE 4. Preoperative and postoperative photographs of patients with C-shape crooked nose deformity.

the upper lateral cartilage. The affected structures must be individually assessed and appropriately corrected; if they are not relocated to the median line, effective correction of the crooked nose cannot be achieved.[9]

Lateral osteotomy is an indispensable step in the correction of the crooked nose; however, it must be remembered that every osteotomy can result in complications. Bracaglia et al[10] reported correction of a deviated nose using double lateral osteotomy on the side of the long nasal bone and single lateral osteotomy on the side of the short bone. Bloom et al[4] found that, in patients of a crooked nose with a convex lateral osseous wall, medialization of the lateral wall was feasible by double lateral osteotomy. Ellis and Gilbert[11] described how they performed a total of 5 osteotomies to correct a crooked nose. Double or multiple osteotomies are more traumatic interventions than unilateral osteotomies.

Fragmentation after multiple osteotomy can make it difficult to hold the nasal bones in a stable condition. In addition, any osteotomy can lead to complications, such as hemorrhage, ecchymosis, overnarrowing and collapse, staircase and rocker deformities, canalicular trauma, bone irregularities, insufficient mobilization and related repositioning, or callus formation.

Furthermore, if the double osteotomy in the frontal process of the maxillary bone, carried out to shorten the long nasal bone or to straighten the convex nasal bone, does not achieve complete fracture or sufficient mobilization, the crooked nose deformity will persist.[12] Thus, to avoid these risks, instead of a double osteotomy of the nasal bone on the convex side, we reduced the frontal processes of the maxillary bone with a rasp (osteoplasty) and achieved straightness of the nasal bone.

To reduce osteotomy-related complications as much as possible and avoid destabilization of the osseous roof, unilateral osteotomy approaches have been used in the correction of crooked noses. Unilateral osteotomy in the deviated nose was first described by Fanous,[8] while Burm [9] described a unilateral osteotomy technique in a crooked nose without hump; however, this is not applicable in a deviated nose with hump. Akbas et al[13] also reported that unilateral osteotomy could be used in deviated noses, without specifying the type of crooked nose for which the technique was effective. In particular, unilateral osteotomy may not be sufficient in the correction of deviated noses, such as the I-shaped crooked nose. In our study, to reduce osteotomy-related complications as far as possible, we applied osteoplasty (rasping of the frontal process of the maxilla), together with unilateral osteotomy to remove the convexity of the nasal bone and achieve symmetry.

The septum is another deviated structure in the crooked noses, and it is imperative to also correct this deviation; otherwise, crooked nose deformities cannot be effectively corrected with osteotomy alone.[8] A number of septal correction techniques are available, including scoring, resection, thinning, suturing, and the use of cartilage grafts.[5,6,9,14,15] Extracorporeal septal reconstruction can also be used for septal correction,[16] but, in our view, this is a very aggressive technique that may increase the risk of destabilization after osteotomy; a noninvasive technique that produces successful results must be applied for septal correction. In that context, spreader grafts are of great use to surgeons; it is possible to reposition the septum on the median line by inserting an appropriate spreader graft on the concave side of the septal cartilage.[3,17] Correction of the deviated dorsal septal cartilage in a crooked nose using a spreader graft provides long-term support to the dorsal septum.[8]

The upper lateral cartilages form another structure that requires correction in a crooked nose. In the C-shaped crooked nose in particular, the upper lateral cartilages are usually asymmetric, being generally depressed and medialized on the concave side.[5] Supporting the depressed upper lateral cartilage and creating symmetry between the 2 sides are crucial steps in correcting a crooked nose. In the correction of the concavity in the upper lateral cartilage and its depression, spreader grafts and flaps are frequently used techniques.[3,5]

In our approach, we inserted a spreader graft in the concave side to correct the deviation of the septal and upper lateral cartilage in the roof, which corrected the septal deviation, as well as supporting the depressed upper lateral cartilage, and achieved its lateralization. In patients in whom the upper lateral cartilage could not be sufficiently supported, we used 2 spreader grafts and lateralized the upper lateral cartilage. A double spreader graft is effective in supporting the upper lateral cartilage, but it must be ensured that the medial roof is not being broadened. If the medial roof is too wide following the insertion of a double spreader graft, it may be more useful to suture the spreader graft around 1 mm under the dorsal septum or to thin it somewhat.

In this study, we discussed osteoplasty plus unilateral osteotomy combined with the insertion of a contralateral spreader graft in the correction of a C-shaped crooked nose. This technique has the advantages of simple application, providing satisfactory results with less destabilization of the nasal bone roof, and of reducing osteotomy complications.

A major drawback is that this technique may only be applicable to selected crooked nose deformities (C-shaped), while for the correction of I-shaped and S-shaped deformities, unilateral osteotomy might not be sufficient. In addition, in some patients it may be necessary to rasp the frontal processes of the maxillary bone on the concave side, or sometimes a double spreader graft on the concave side may be required.

The limitations of our study are its low number of cases and a short follow-up period, although the latter was sufficient for the assessment of the results of rhinoplasty. Finally, it must be stated that there was no control group.

CONCLUSION

In conclusion, while unilateral osteotomy is not a new technique, it has not yet received sufficient attention. The C-shaped crooked nose can be successfully, and less traumatically, corrected using osteoplasty plus unilateral osteotomy and a contralateral spreader graft. However, further studies are required to assess long-term results.

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