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Caudal Septal Extension Graft Sutured with Absorbable Material and Not Fixed to the Nasal Spine Region Compared with the Conventional Fixation Method: A Retrospective Study

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Abstract

Background The caudal septal extension graft (CSEG) is a predictable method for positioning the tip and columella during rhinoplasty, and it is commonly performed using permanent sutures and in some cases fixating the graft to the nasal spine region (NSR) (conventional method). Whether this predictability is preserved when using absorbable sutures has yet to be determined.

Methods We performed a retrospective assessment of 1146 patients who underwent rhinoplasty performed by the same surgeon using the CSEG method from 2008 through 2017 in an academic setting. We utilized a computer-based patient record system for automatic data collection comparing outcomes of two groups: a group of patients who were operated on using the conventional fixation method (2008–2011) (group 1) with a second group in which absorbable sutures were used without fixation to the NSR (2011–2017) (group 2). The average follow-up period was 33.2 months. Patients operated on using a combination of methods and patients with less than 6 months of follow-up were excluded. All cases had the same septum-to-extension graft suturing technique with either permanent or absorbable suture material. This technique was side-to-side fixation with simple interrupted stitches.

Results Outcomes were measured in terms of reoperation rates and complication rates grouped in 10 categories. There were no statistical differences in complication or reoperation rates between group 1 and group 2 except for suture extrusion and/or foreign body reaction (3.9% and 0.2%, respectively, $P < 0.0001$). Tip deprojection was of rare and similar occurrence in both groups (0.9% and 0.8%, respectively, P 0.88).

Conclusion Suturing CSEG with absorbable material and not fixing it to the NSR is a reliable variation in the conventional technique.

Level of Evidence IV This journal requires that authors assign a level of evidence to each article. For a full description of these Evidence-Based Medicine ratings, please refer to the Table of Contents or the online Instructions to Authors www.springer.com/00266.

Keywords Septal extension graft Rhinoplasty Tip Projection Absorbable sutures Permanent · Sutures Nasal spine region Septal deviation Nasal spine fixation · Nasal spine · Removal Sutures in rhinoplasty

Introduction

The caudal septal extension graft (CSEG) is a predictable method for positioning the tip and columella during rhinoplasty [1–3]. The conventional suture type and fixation method are permanent sutures and fixation of the graft to the nasal spine region in some cases (NSR) [1, 4, 5]. We aimed to compare the results of CSEG carried out using this conventional approach versus CSEG using absorbable sutures and not performing any fixation to the NSR.

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Methods

All patients enrolled in the present study had open-approach rhinoplasty with CSEG, performed by the senior author (GB) in a teaching institution from 2008 through 2017. After years of using other techniques, the senior author began performing CSEG in 2008 because of its reported predictability and versatility [1, 2, 5]. It soon became frequently used in our service. Criteria for performing CSEG were, and continue to be, patients we judged to need an especially strong tip support (short nose, marked underprojection, revision surgery and thick skin) or columellar retraction repair.

There was a variation in the fixation method over time: All patients operated on during the first years (March 2008 through February 2011) had the conventional method; they form group 1.

The extrusion of permanent sutures in our patients in the early years and the perception that fixation to the NSR was nonobligatory in most cases explains the gradual evolution toward CSEG sutured with absorbable material and not fixed to the NSR. This evolution was based on empirical observations that led us to change our technique from fixing a deviated caudal septum with permanent sutures to fixing it with absorbable sutures then to not fixing it at all as our definitive technique. All patients in whom this novel method was used (November 2011 through January 2017) form group 2.

We excluded CSEG patients with less than 6 months of follow-up and patients operated on using a combination of methods (2011–2012), including septal fixation with absorbable sutures, because the number of patients with this procedure was significantly lower than that of the other groups and because we intended to compare only the two most representative groups in our experience.

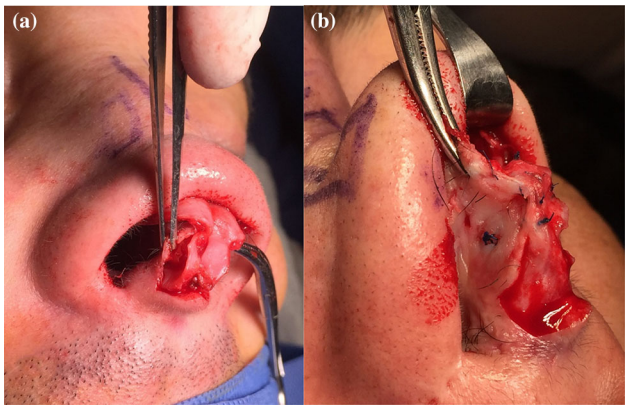

Fig. 1 **a** Skin is undermined before suturing to assure complete coverage and prevent extrusion and foreign body reactions. **b** Revision case: extrusion of nonabsorbable sutures through the vestibular skin years after being operated on elsewhere

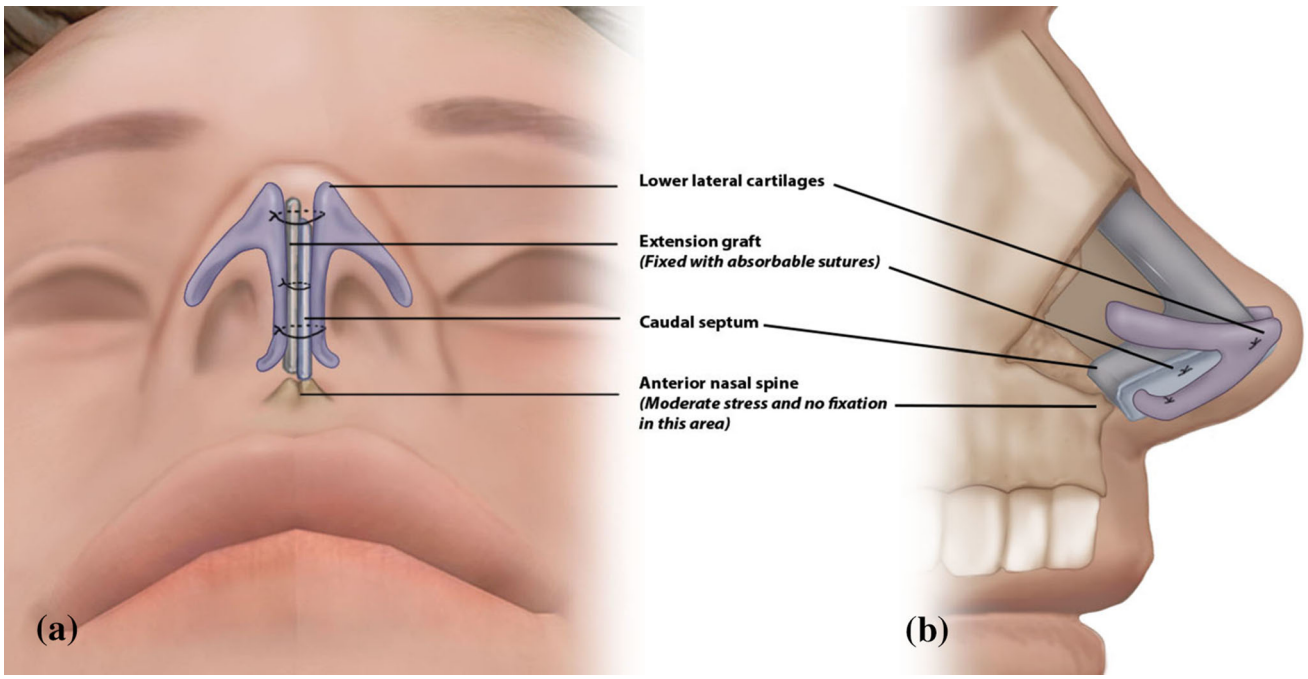

Fig. 2 Technique for caudal septal extension graft that we use now relies on two principles: **a** using long-lasting absorbable sutures produces long-term results as good as those produced by permanent ones with less risk of foreign body reaction. **b** The creation of a balanced tension system between the lateral crura and the septum-to-extension graft unit without it becoming overcompressed generates a symmetric structure without the need for fixation to the nasal spine region

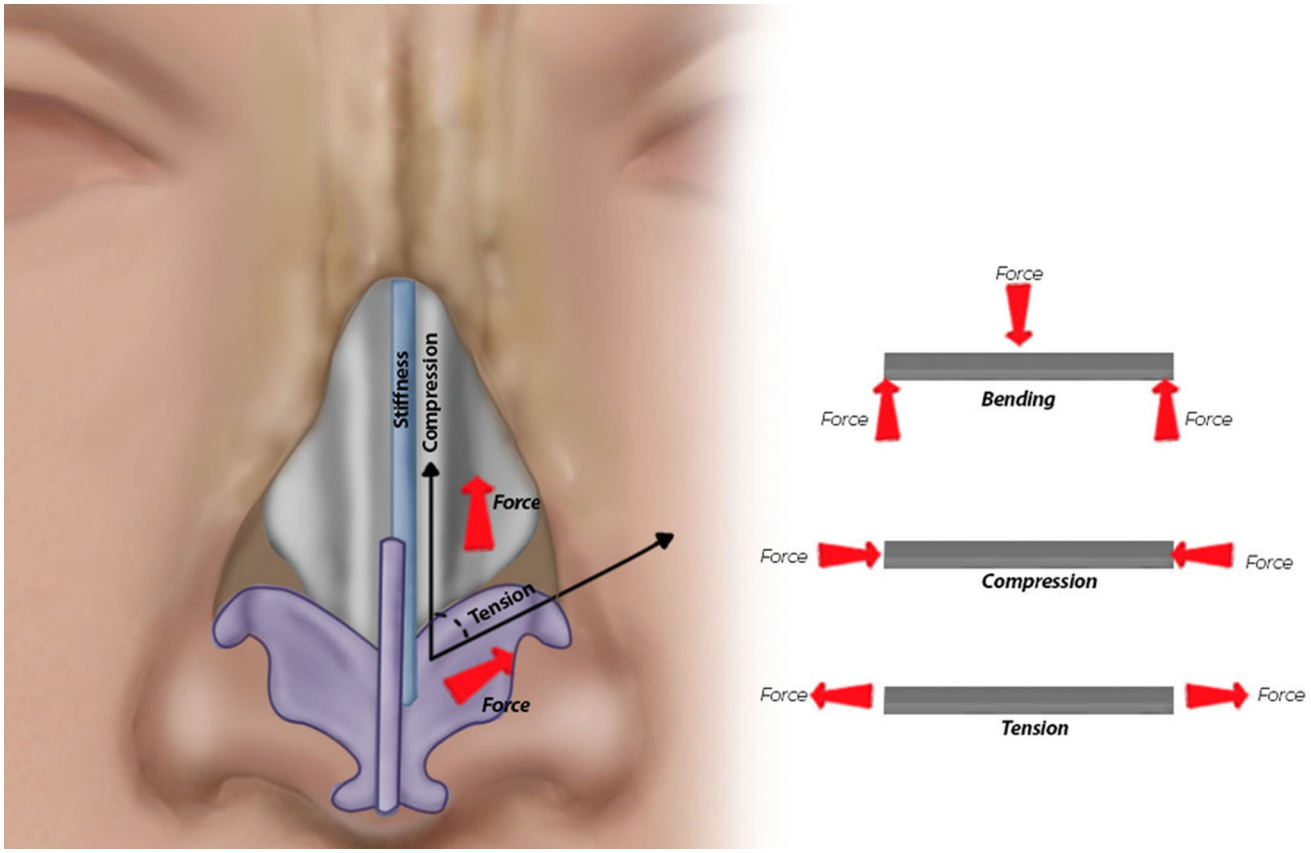

Fig. 3 In the caudal septal extension graft assembly, a component of the lateral crural tension is transmitted to the septal graft unit as a compression force. Stiffness of this unit must withstand this force

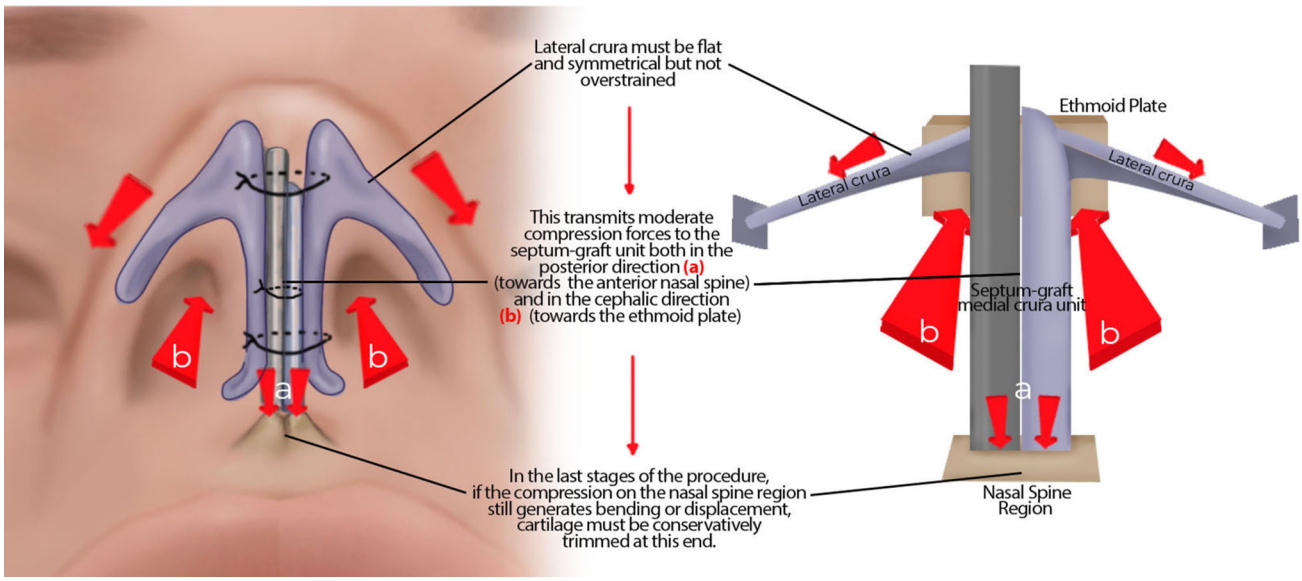

Fig. 4 Integration of a septal extension graft into the existing nasal structures. Steps to create a balanced moderate tension system

In both groups, we had primary and revision cases, all types of skin and nose lengths, and any degree of septo-columellar deviation. Grafting material was either septum or autologous rib cartilage. No ear cartilage was used in any case.

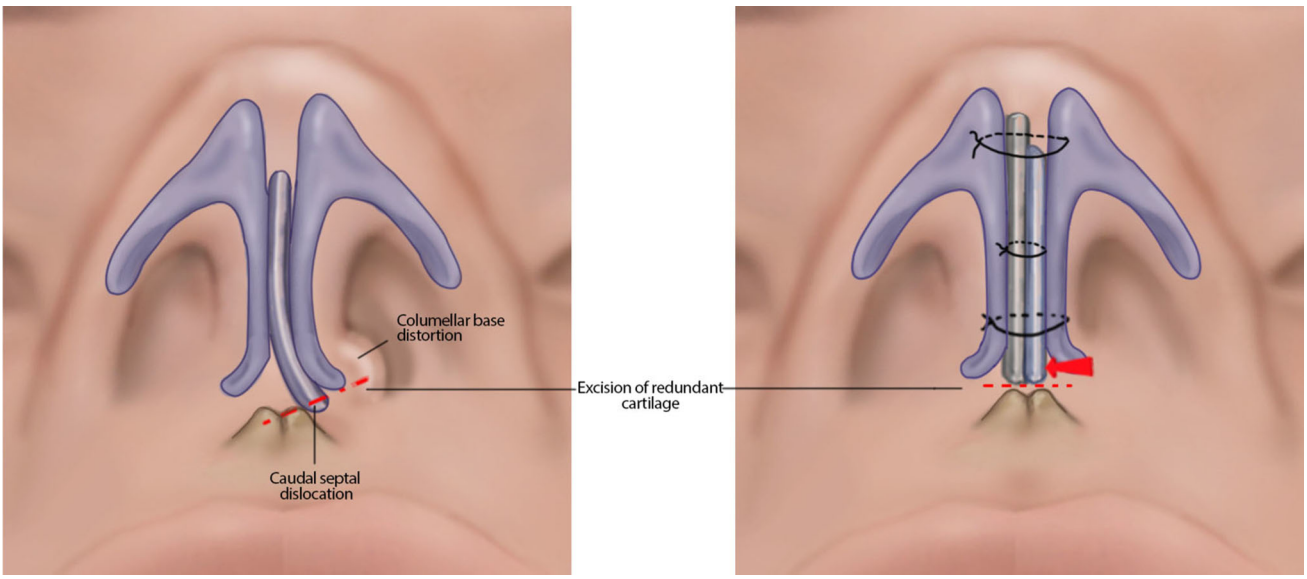

Fig. 5 Cartilage trimming to correct septal dislocation so that it goes to the midline and the end that is in contact with the nasal spine region does not experience excessive compression against the bone

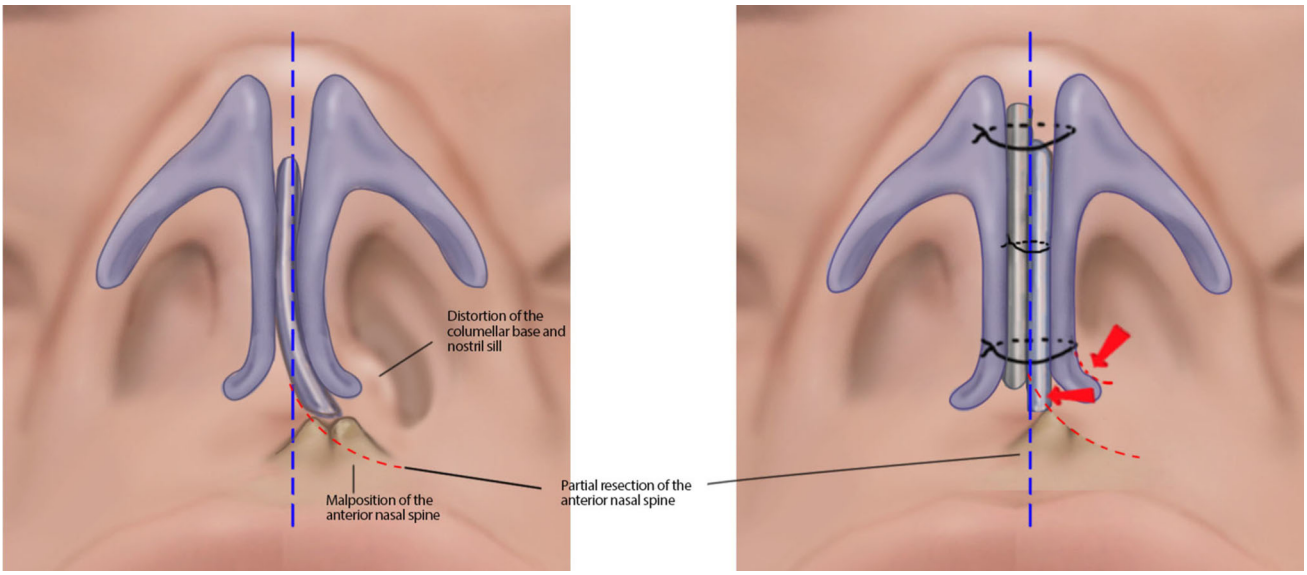

Fig. 6 Nasal spine partial removal

We utilized our computer-based patient record system for automatic data collection retrospectively. Patient perception outcome measurement was not included because this information was not available for all patients. Instead, we recorded complication and reoperation rates. Tip position alteration data were gathered from medical records containing yes/no answers and type of alteration.

Patients had the same septum-to-extension graft suturing technique with either permanent (group 1) or absorbable (group 2) suture material. This technique was side-to-side fixation with simple interrupted stitches, which has been reported to be the most stable suture pattern in CSEG [6, 7]. We customarily undermined the skin that would overlay the fixation sutures and judiciously closed the skin over them to lower the possibility of extrusion (Fig. 1).

Patients in group 1 had septum-to-graft sutures and some of them also NSR (spine, periosteum or soft tissue) fixation with polypropylene (Prolene 5-0) not only to set the tip position but also to correct caudal septal deviations.

Patients in group 2 had septum-to-graft sutures with polylactic acid (Vicryl 5-0) and no fixation to the NSR; instead, the septal graft was sutured between the crural footplates. The basic technique we used in the group 2 patients is the technique we use currently, which is

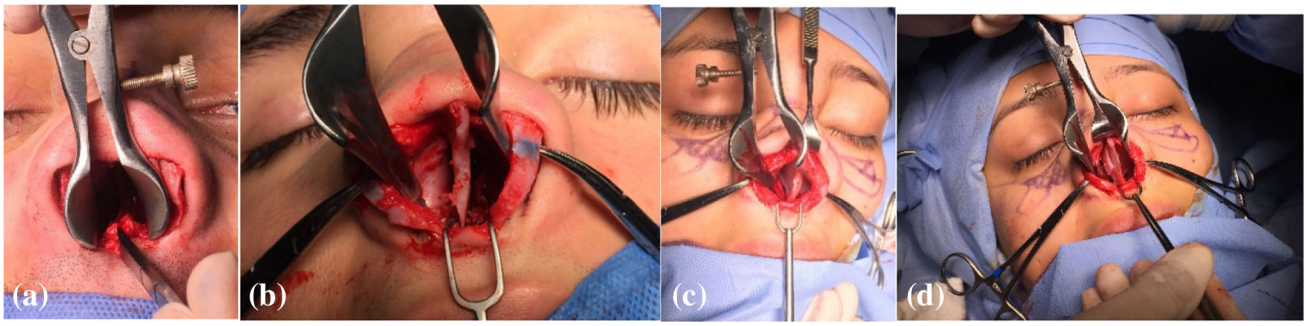

Fig. 7 Example of techniques previously described in the literature that, combined with a proper balance of forces, makes fixation to the nasal spine region nonobligatory. **a** Malposition of the anterior nasal spine treatment with partial resection with an osteotome. **b** After resecting part of the anterior nasal spine, the septum lies without tension and with low compression against the nasal spine region **c** C-shaped septal deviation. **d** Batten septal graft sutured and correcting the deviation

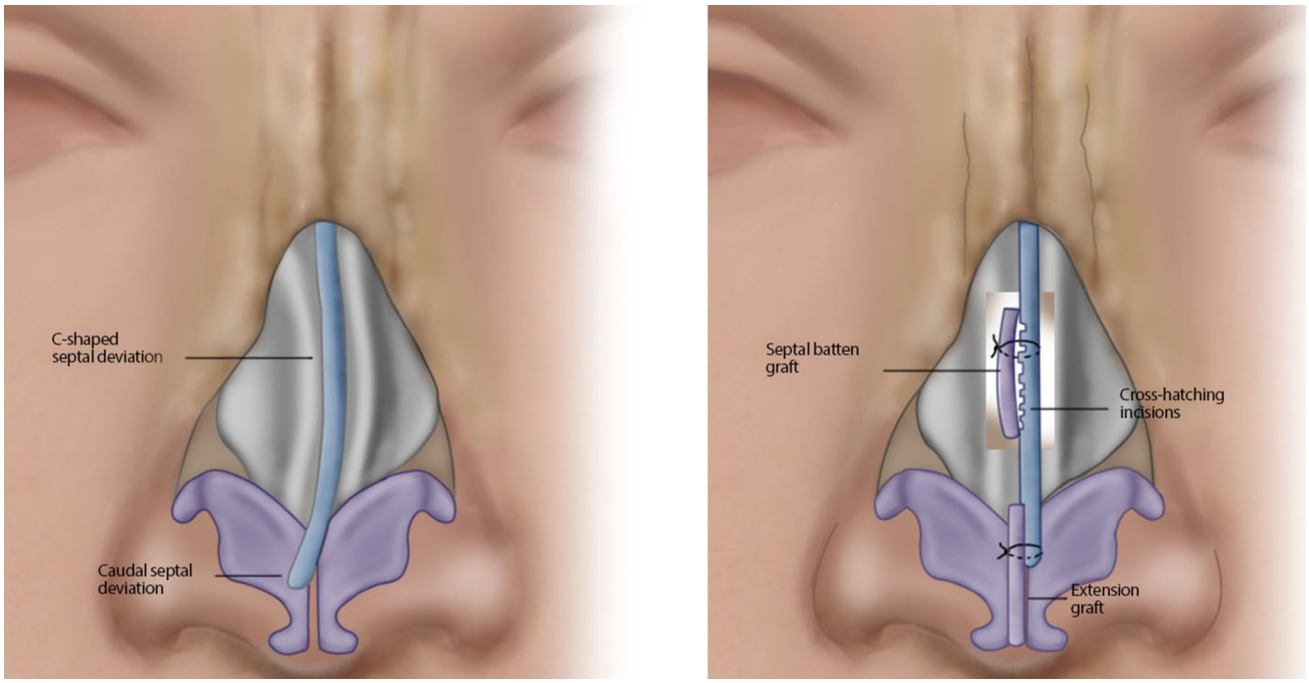

Fig. 8 C-shaped deviation corrected using a batten graft and a CSEG sutured with absorbable material without fixation to the nasal spine region

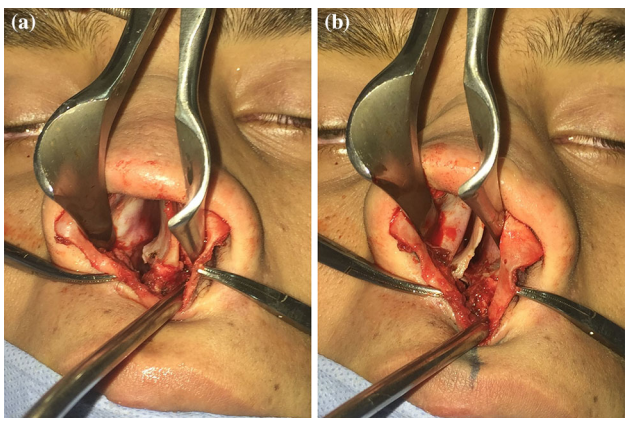

Fig. 9 **a** Septum attached to a deviated anterior nasal spine. **b** Deinsertion and partial removal of anterior nasal spine

illustrated in Fig. 2. The graft usually extends higher than the septum, and its shape is usually longer in the most anterior end, which favors tip projection and supratip break formation (Figs. 2 and 10).

In these patients, we did not use fixation to the NSR because we concluded through empirical observations that a correct balance of forces between the septum-extension graft unit, the alar cartilages and the osseous structures will produce symmetry and stability among them. The principles we followed in group 2 patients state that by fixing the alar cartilages to the graft, they are put under tension on both sides and the desirable effect of this tension is just flattening of the lateral crura. No additional tension is advisable. Furthermore, part of the force is transmitted to the septum-extension graft unit, which compresses it

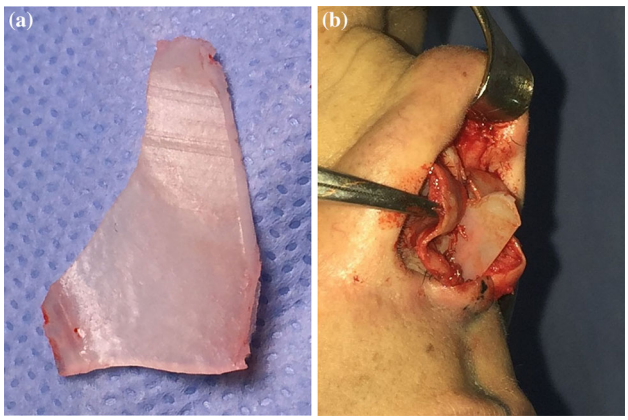

Fig. 10 **a** Usual shape of the caudal septal extension graft: longer in the most anterior end (superior end in the picture), favoring tip projection and supratip break formation. **b** Graft in the position sutured with Vicryl 5-0

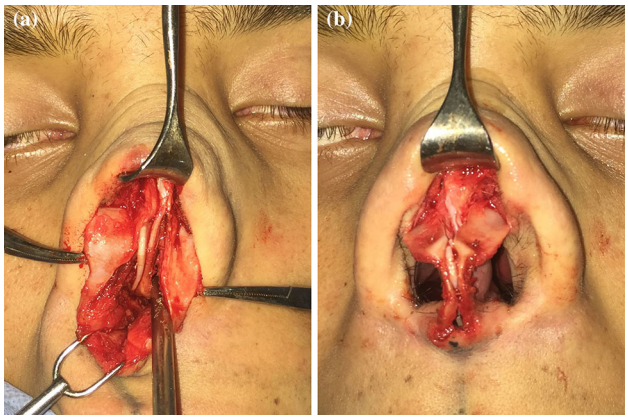

Fig. 11 Septal extension graft sutured to a caudal septum that lies in the midline without tension. Medial crura are then sutured to the extension. There is not fixation to the nasal spine region. This immediate result was achieved by only detaching the septum and partially removing the anterior nasal spine

axially (Fig. 3). If we additionally proceeded to plicate the domes, shorten the lateral crura or fix them to a more anterior position on the graft, seeking to create a longer or more projected nose, the tension along the whole system rose. If the compression load on the septal graft unit is exaggerated or this unit is not stiff enough, bending or dislocation may occur (Fig. 4).

For the patients in group 2 who had caudal septal deviation, we used time-tested techniques that we chose and adapted to each patient [8–10], which also followed the principles of interaction of forces previously described; we most frequently performed deinsertion from the nasal spine, caudal septal replacement grafts, septal batten grafts, cartilaginous crosshatching incisions, partial and in selected cases total removal of the nasal spine or a combination of the former to repair this condition (Figs. 5, 6, 7, 8). An example of surgical correction with CSEG in a patient with caudal septal deviation is shown in Figs. 9, 10, 11.

Results

A total of 1146 patients were included: 67% females and 33% males. A total of 836 were primary cases and 310 were revision cases (73% and 27%, respectively). Autologous rib cartilage was used in 145 (12.6%) patients. Although CSEG was the primary method for tip positioning, 722 (63%) had adjuvant shield tip grafts, 252 (22%) had lateral crural grafts, 158 (13.8%) had rim grafts and 869 (75.9%) had camouflaging on the tip.

Group 1 included 235 patients. (100% had permanent sutures fixing the caudal septum to the extension graft, and 73% had additional fixation to the NSR with permanent sutures.) Group 2 included 911 patients who had surgery with the novel method. The average follow-up period was 33.2 months (7 to 73 months). We measured rates of complications, negative perceptions and reoperations.

The most common resultant condition in both the conventional and novel method groups was irregular dorsum (8.0% and 7.4%, respectively) followed by nostril asymmetry not caused by columella deviation (6.6% and 7%, respectively). Complications that have been reported previously as associated with CSEG [11, 12] were rare in both group 1 and group 2: tip deprojection, 0.9% and 0.8%, respectively; tip overprojection, 1.7% and 1.3%, respectively; septocolumellar deviation, 5.1% and 3.8%, respectively; tip deviation and/or deformities 2.1% and 2.0%, respectively. There were no cases of excessive perceived stiffness or tip numbness in neither group. No significant differences in outcomes were found except for suture extrusion and/or foreign body reactions that were found in 10 and two patients from group 1 and group 2 (3.9% and 0.2%, respectively) (Table 1). The results of three patients operated on using CSEG with absorbable sutures without fixation to the NSR are shown (Figs. 12, 13, 14).

Discussion

Caudal septal extension graft is considered more predictable than other methods of tip positioning in regular rhinoplasties [3, 13]. Furthermore, it is a more versatile and stable technique for treating special cases in which considerable columella lengthening or tip projection and/or counter rotation is the main objective [4].

The conventional suture type and fixation method are permanent sutures in all cases and fixation of the graft or the caudal septum to the nasal spine region frequently if a deviation is present or additional stability is

Table 1 Open rhinoplasty with caudal septal extension graft: complications of two fixation methods

Complication	Conventional method[a] (n = 235) No. (%)	Novel method[b] (n = 911) No. (%)	P value No.
Tip deprojection	2 (0.9)	7 (0.8)	0.88
Tip overprojection	4 (1.7)	12 (1.3)	0.64
Septocolumellar deviation	12 (5.1)	35 (3.8)	0.37
Tip deformity and/or deviation	5 (2.1)	19 (2.0)	0.92
Suture extrusion and/or foreign body reaction	10 (3.9)	2 (0.2)	< 0.0001
Irregular dorsum	19 (8.0)	67 (7.4)	0.76
Breathing impairment	6 (2.6)	23 (2.5)	0.93
Nostril asymmetry not caused by columella deviation	16 (6.6)	64 (7)	0.83
Upper and/or middle deviation	8 (3.4)	29 (3.2)	0.88
Unsightly columellar scar	5 (2.1)	25 (2.7)	0.60
Reoperation	22 (9.4)	79 (8.7)	0.74

[a]Group 1, Conventional method: use of permanent sutures (Prolene 5-0) to secure the graft to the septum and to the nasal spine region

[b]Group 2, Novel method: use of absorbable sutures (Vicryl 5-0) and no fixation to the nasal spine region

Fig. 12 Revision case. Preoperative (left) and postoperative (right) photographs. Septal deviation was corrected by septal disarticulation from its base and partial resection of anterior nasal spine. Tip ptosis was corrected by excising extensive fibrous tissue and the performance of caudal septal extension grafting with absorbable sutures

needed. Nevertheless, CSEG fixation to the NSR can be time-consuming, and it often involves stabilizing spine grafts and the use of power tools [1, 4, 5]. We believe that correcting a deviated caudal septum by fixating it with sutures is a useful technique, but currently, we prefer to treat this condition with the previously described nonfixating maneuvers to successfully bring the septum to the midline such that it remains corrected without tension.

Understanding the dynamic aspects of the CSEG is crucial. These interactions must be evaluated qualitatively during surgery (Fig. 4). Adjustments to create a balanced tension system include strengthening the septum-extension graft unit, cutting excess cartilage at the nasal spine region (Fig. 5) and changing the points of attachment of the medial and intermediate crura.

We found that those methods make part of a reliable approach to CSEG technique as was suggested by the low and similar occurrence rate of septocolumellar deviation in both groups studied. Then the main conditions to guarantee septal symmetry, in our opinion, are avoiding excessive tension between previously symmetrized crura and the extension graft, as well as providing sufficient stability in the remaining septal cartilage, mainly in its dorsal region. We prefer alternative methods to correct caudal septal deviation because we believe that if a deviated caudal septum needs to be fixated to counteract a remaining tension, there will be a potential risk of the suture to eventually tear cartilage or soft tissues. On the other hand, our findings and those of others show that there is a risk of extrusion and/or foreign body reaction related to leaving permanent sutures in rhinoplasty [13–15] (Fig. 1b). Differently, absorbable sutures, if properly placed under the vestibular skin or mucosa, are less likely to produce infection and extrusion. Using only nonpermanent sutures

Fig. 13 Patient with a deviated nose affecting all nasal thirds. Preoperative (left) and postoperative (right) photographs. CSEG with absorbable sutures was used to set the tip position. Caudal deviation was corrected by cartilaginous crosshatching incisions, septal batten grafting, septal disarticulation from the anterior nasal spine and crest and spine partial resection and reshaping with an osteotome. No fixation to the nasal spine region was performed

Fig. 14 Patient with underprojected nasal tip. Thick skin on the lower third of her nose, short columella and very poor tip support mechanisms as judged by preoperative finger palpation. She underwent caudal septal extension grafting with absorbable sutures to set the tip position in a more projected position with a slight increase in rotation

would be desirable if the stability and symmetry of the structure over time are not put at risk.

Conclusion

The present study suggests that suturing CSEG with absorbable material and not fixing it to the NSR is a reliable method because it does not lead to an increase in complications or reoperation rates, including tip deprojection. It also supports the notion that a deviated caudal septum that is corrected by judiciously using nonfixating techniques and then suturing it to symmetric crura will remain in the midline as part of a balanced tension structure and will not require fixation to the NSR. Nevertheless, biomechanical studies are advisable to substantiate our conclusions. Furthermore, our study compared patients in two different periods of time and at different points in a learning curve of this specific technique; therefore, reports comparing more equivalent cases are also desirable to further support our findings.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest to disclose.

Human and Animal Rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed Consent Patients provided written consent for the use of their images.

References

1. Byrd HS, Andochick S, Copit S et al (1997) Septal extension grafts: a method of controlling tip projection shape. Plast Reconstr Surg 100:999–1010
2. Guyuron B, Varghai A (2003) Lengthening the nose with a tongue-and-groove technique. Plast Reconstr Surg 111:1533–1539
3. Akkus AM, Erylmaz E, Guneren E (2013) Comparison of the effects of columellar strut and septal extension grafts for tip support in rhinoplasty. Aesthetic Plast Surg 37(4):666–673
4. Toriumi DM (2006) New concepts in nasal tip contouring. Arch Facial Plast Surg 8(3):156–158
5. Ha RY, Byrd HS (2003) Septal extension grafts revisited: 6 year experience in controlling nasal tip projection and shape. Plast Reconstr Surg 112(7):1929–1935
6. Hwang SH, Hwang K (2011) Supporting strength of septal extension grafts. J Craniofac Surg 22(6):2323–2326
7. Jeon JY (2014) Obtaining maximal stability with a septal extension technique in East Asian rhinoplasty. Arch Plast Surg 41(1):19–28
8. Guyuron B, Uzzo CD, Scull H (1999) A practical classification of septonasal deviation and an effective guide to septal surgery. Plast Reconstr Surg 104(7):2202–2209
9. André RF, Vuyk HD (2006) Reconstruction of dorsal and/or caudal nasal septum deformities with septal battens or by septal replacement: an overview and comparison of techniques. Laryngoscope 116(9):1668–1673
10. Marianetti TM et al (2016) Reshaping of the anterior nasal spine: an important step in rhinoplasty. Plastic Reconstr Surg Global Open 4(9):e1026
11. Choi JY, Kang IG, Javidnia H et al (2014) Complications of septal extension grafts in asian patients. JAMA Facial Plast Surg 16(3):169–175
12. Seyhan A, Ozden S, Ozaslan U et al (2007) A simplified use of septal extension graft to control nasal tip location. Aesth Plast Surg 31:506
13. Dobratz EJ, Tran V, Hilger PA (2010) Comparison of techniques used to support the nasal tip and their long-term effects on tip position. Arch Facial Plast Surg 12(3):172–179
14. Gruber RP, Weintraub J, Pomerantz J (2008) Suture techniques for the nasal tip. Aesthet Surg J 28(1):92–100
15. Cagici CA, Cakmak O, Bal N, Yavuz H, Tuncer I (2008) Effects of different suture materials on cartilage reshaping. Arch Facial Plast Surg 10(2):124–129