Spreader flaps do not change early functional outcomes in reduction rhinoplasty: A randomized control trial

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ABSTRACT

Background: Internal nasal valve collapse is a preventable complication of rhinoplasty, for which the spreader graft is the gold standard. More recently, the spreader flap technique has been espoused as an alternative to spreader grafting. Here, we evaluated the efficacy of this technique in a randomized trial setting.

Methods: The autospreader was used in 32 patients who were candidates for primary rhinoplasty; 34 who did not undergo a spreader flap procedure were recruited as a control group. Acoustic rhinometry was used in every patient preoperatively and 1 year postoperatively. Average volume and minimal cross-sectional area (MCA) of the nose and findings were collected. Also, the pre- and postoperative patients’ subjective assessment about their satisfaction from their appearance and nasal obstruction were evaluated according to visual analog scale (VAS).

Results: Among the study group patients, 46 (69.7%) were female and 20 (30.3%) were male subjects. Their mean age was 50.2 ± 6.24 years. The difference in MCA in the control group was −0.1 and +0.6 (on right and left sides, respectively), and in the spreader flap group it was −0.03 and +0.05, which showed an increase in MCA in the left side and a decrease in the opposite side of both groups. However, their difference was not statistically significant (p = 0.50). Also, the differences between preoperative and postoperative VAS were not significant in either nasal obstruction (p = 0.68) and cosmetic satisfaction (p = 0.38).

Conclusion: Spreader flap is an attractive technique in preserving the middle vault in nasal plastic surgery. However, its effect needs more evaluation.

SUBJECTS AND METHODS

Study Subjects

Sixty-seven patients underwent rhinoplasty between May 2011 and June 2012 in the Otolaryngology Department of a tertiary referral center (Imam Khomeini Hospital, Tehran University affiliated hospital) and were randomly divided into two groups. In the first group the spreader flap was used to reconstruct the midvault after dorsal reduction, as described later. In the second group (control) the ULC was repaired without a spreader flap. The study population was selected from consecutive patients who were candidates for rhinoplasty or septorhinoplasty with reduction of a dorsal hump. Exclusion criteria were patients presenting with need for revision rhinoplasty, congenital malformations, severe allergic rhinitis, severe septal deviation, nasal polyposis, sinusitis, deviated nose, or others who required use of standard spreader grafting. All patients but one (control group) completed the study follow-up.

Ethical Approval

The protocol of this study was approved by the Institutional Review Board of the Tehran University of Medical Science. Detailed information about the study was given to the participants and a written informed consent was obtained from each one. All aspects of the study were conducted according to the Declaration of Helsinki.

Technical Details

The primary surgeon used the external rhinoplasty approach in all cases. All procedures were performed by one surgeon under general anesthesia with the same technique. All patients in this trial underwent dorsal reduction and varying degrees of tip plasty.

After complete skeletonization of the dorsal area, a mucoperichondrial flap was elevated from the septum. Subsequently, the ULC was detached from the dorsal septum by sharp incision (Fig. 1). Next, the ULC was separated from the bony dorsum by using of Cottle elevator. Then, the mucosa of the ULC was dissected free and
moved downward to create a flap for downward rotation of the ULC. Afterward, the cartilaginous hump was removed sharply and the bony hump was removed by rasping or osteotomy depending on the size of the hump. Finally, the ULC was folded over and fixed with two or three 5-0 polydioxanone mattress sutures (Ethicon, Inc., Somerville, NJ; Figs. 2 and 3).

In the control group, a similar dissection was used. However, instead of creation of the spreader flap, the excess ULC was removed. The ULC edge was then repaired and sutured to the septum similarly. Additionally, bilateral internal lateral osteotomies were performed in all patients. No packing was used. Antibiotic prophylaxis (cephalexin, 500 mg q.i.d. for 5 days) was given to all patients and the only prescribed analgesic was acetaminophen. Subsequently, their nasal splints were removed after 7 days but tapings were continued for 4 weeks thereafter.

Variables and Outcome Measurements
Pre- and postoperative nasal obstruction and patient satisfaction (with appearance) were measured with VAS. Accordingly, acoustic rhinometry was used in every patient before and 1 year after the operation by using GM (ARI model; Kilwinning, U.K.) with an ultrasound system 0/8. (US-100; Nagoya, Japan).

All tests were performed while the patients were sitting while holding the device in front of the nose, completely sealing the nose, without excessive pressure, causing a change in the nasal shape.

Reducing the possible mucosal effect on acoustic rhinomanometry results, all tests were performed 10 minutes after the decongestant (oxymetazoline spray) usage.

Finally, a graph was drawn with two notches where the first notch was joined to the valve area and the second one was joined to the anterior part of the lower turbinate. Each examination consisted of three consecutive tests from which the minimum cross-sectional area (MCA) was calculated.

Blinding and Randomization
Enrolled patients were randomly divided into two groups. The method of randomization was block randomization. The patients and one of the authors who measured the outcome of the two groups were blinded to the usage of treatment methods.

Statistical Method
Data were analyzed using SPSS 18 for Windows (SPSS, Inc., Chicago, IL). The chi-square test was used to evaluate preoperative and
postoperative ratios in each group and also $t$-test and paired $t$-test for the rest of variables. Values were evaluated using descriptive statistical methods (mean ± SD) and results were significant at $p ≤ 0.05$.

RESULTS

Sixty-six patients were enrolled in this study; 46 (69.7%) were female and 20 (30.3%) male subjects. The mean age was 24.6 ± 5.5 year with a minimum of 17 years and maximum of 41 years.

After randomization, the two groups were comprised as follows: 32 (48.48%) patients were recruited into the spreader flap group and 35 (51.51%) patients were in the control group. Their characteristics are summarized in Table 1.

These data indicate that despite the worse preoperative esthetic VAS in the spreader flap group, the postoperative results in both groups did not have significant differences.

Furthermore, the breathing status was evaluated in preoperative and postoperative phases with acoustic rhinomanometry, in which its results are summarized in Table 2.

To better understand the preoperative and postoperative differences in both groups, we subtracted the preoperative MCA from the postoperative amount and compared it between both groups; the results are summarized in Table 3.

None of the patients in either group had any complications such as infection or septal perforation. Also, none of them required revision surgery in their 1-year follow-up period.

DISCUSSION

Spreader grafts are the gold standard technique for the reconstruction and restoration of the middle vault.2 The ULC flap, variably called the spreader flap, or autosreader, is an interesting technique that has received more attention in recent years. Over time, this technique has evolved, and several variations exist. Despite a number of articles describing the technique and one that used a validated outcome measure, none of these articles presented a clinical randomized trial to study its efficacy. Therefore, we sought to examine the efficacy of a spreader flap technique in a randomized setting.

Accordingly, the results presented in this study show that spreader flaps do indeed preserve the nasal airway and, in fact, caused a small increase in patients’ MCAs. Conversely, we observed a small decrease in control group patients’ MCAs. However, these changes were not significant. The small size of the valve area and also the subtle effect of the spreader flap could be possible explanations for this result.

Table 1 Patient characteristics in the cases and control groups (mean ±SD)

<table>
<thead>
<tr>
<th>Variables</th>
<th>Spreader Flap Group</th>
<th>Control Group</th>
<th>$p$ Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (yr)</td>
<td>25.55 ± 5.52</td>
<td>23.77 ± 5.54</td>
<td>0.29</td>
</tr>
<tr>
<td>Sex (female/male)</td>
<td>22/11</td>
<td>24/9</td>
<td>0.36</td>
</tr>
<tr>
<td>Septoplasty</td>
<td>17 (53.12%)</td>
<td>16 (47.05%)</td>
<td>0.31</td>
</tr>
<tr>
<td>Preoperative patients’ satisfaction scores (VAS)</td>
<td>4.43 ± 2.49</td>
<td>3.83 ± 1.72</td>
<td>0.005*</td>
</tr>
<tr>
<td>Post op patients’ satisfaction score (VAS)</td>
<td>8.38 ± 1.6</td>
<td>8.68 ± 0.95</td>
<td>0.38</td>
</tr>
<tr>
<td>Preoperative patients’ nasal obstruction scores (VAS)</td>
<td>5.57 ± 2.51</td>
<td>6.17 ± 3.28</td>
<td>0.32</td>
</tr>
<tr>
<td>Postoperative patients’ nasal obstruction scores (VAS)</td>
<td>2.56 ± 0.52</td>
<td>3.2 ± 1.47</td>
<td>0.67</td>
</tr>
</tbody>
</table>

*, significant. VAS = visual analog scale.
Variables | Spreader Flap Group | Control Group | p Value
--- | --- | --- | ---
Left I-notch area (cm²) Preoperative | 0.71 ± 0.19 | 0.83 ± 0.53 | 0.35
Postoperative | 0.70 ± 0.17 | 0.60 ± 0.15 | 0.23
Right I-notch area (cm²) Preoperative | 0.75 ± 0.2 | 0.84 ± 0.81 | 0.85
Postoperative | 0.73 ± 0.026 | 0.55 ± 0.19 | 0.11
Left C-notch area (cm²) Preoperative | 0.76 ± 0.48 | 0.92 ± 0.64 | 0.38
Postoperative | 0.69 ± 0.17 | 0.6 ± 0.15 | 0.23
Right C-notch area (cm²) Preoperative | 1.13 ± 1.07 | 1.34 ± 1.45 | 0.33
Postoperative | 2.3 ± 1.99 | 0.79 ± 0.28 | 0.11
Left MCA (cm²) Preoperative | 0.71 ± 0.2 | 0.68 ± 0.19 | 0.18
Postoperative | 1.20 ± 0.46 | 1.17 ± 0.48 | 0.83
Right MCA (cm²) Preoperative | 0.76 ± 0.21 | 0.67 ± 0.19 | 0.18
Postoperative | 0.73 ± 0.26 | 0.55 ± 0.20 | 0.11
Left volume (0–4) area (cm²) Preoperative | 6.9 ± 11.7 | 7.28 ± 8.41 | 0.9
Postoperative | 11.26 ± 16.28 | 5.67 ± 4.66 | 0.30
Right volume (0–4) area (cm²) Preoperative | 4.60 ± 2.24 | 7.00 ± 11.88 | 0.37
Postoperative | 8.07 ± 7.33 | 4.00 ± 0.96 | 0.09

**MCA = minimum cross-sectional area.**

Table 3 Measured difference between pre- and postoperative MCA in case and control group

| Groups | Spreader Flap Group | Control Group | p Value
--- | --- | --- | ---
Left side (MCA) | 0.05 ± 0.26 | −0.018 ± 0.23 | 0.52
Right side (MCA) | 0.036 ± 0.13 | −0.06 ± 0.37 | 0.53

**MCA = minimum cross-sectional area.**

However, a relatively small sample size and the limitations of the acoustic rhinomanometry method could be the other reasons. Furthermore, the stability of the reconstruction of each group was only measured at 1 year. It is feasible that contracture and nasal obstruction could occur at later time points not studied here.

Berkowitz et al. were among the first authors who reported the spreader flap. Later, Rohrich and Gruber presented their own modifications in this technique that they each found more effective. However, none of these authors presented validated outcomes data with regard to nasal obstruction.

Most et al. evaluated the effect of autospreader grafts on rhinoplasty patients’ nasal patency by using disease-specific quality-of-life instruments and VAS. They concluded that this technique can prevent postrhinoplasty nasal obstruction due to midvault collapse. Gruber et al. and Manavbasi et al. paid attention to modification of the spreader flap technique, because the effect of this technique was so dependent on the quality and thickness of the ULC. Dissection of a mucosal flap from the lower surface of the ULC and securing the folded over ULC using a suture instead of scoring or incising the cartilage were the important characteristics of this modification. In the current study Gruber’s method was used.

Also, to more completely assess nasal obstruction, objective data (acoustic rhinomanometry) were used in addition to subjective data (VAS) in this series. The usual change observed after septoplasty is a postoperative increase in MCA, whereas the typical change after rhinoplasty is a decrease in MCA. Because patients with severe septal deviation were excluded from this study, small decreases in MCA were detected in the control group. Interestingly, this change was positive in the spreader flap group but did not vary significantly from the control group.

In this series, control group patients gave a better subjective report about their appearance preoperatively, which may have been caused by sample size. The patients in both groups seemed similar in dorsal hump, deviation, and other possible esthetic indexes, so the control group was not comprised of patients with different physical characteristics that may have influenced results. Postoperative satisfaction with esthetic results did not vary among the two groups.

However, reconstruction of the middle vault with a spreader flap takes time and needs additional dissection, which has its own surgical risks. It is possible that a better esthetic and functional outcome would be realized in these patients, in comparison with the control group, in longer-term follow-up. For example, several authors have confirmed that the inverted-V deformity, dorsal irregularities and narrowing of the middle vault occur in rhinoplasties performed without any reconstruction in the midvault area but are noted beyond 1 year postoperatively.

The current study does have some limitations. First, the effect of spreader flaps in the valve area could be related to cartilage quality, thickness, or length, all of which can vary in different noses and are difficult variables to control. Furthermore, nasal obstruction is not merely related to structural deformity; mucosal problems can play a key role in this matter. In our objective measures, we tried to decrease this effect by performing acoustic rhinomanometry after pharmacologic decongestion. In the future, a larger sample size may help delineate some of these issues. Also, comparison of spreader flaps with spreader grafts would be an interesting study, because spreader grafts (and not the absence of a repair) are the gold standard for middle vault reconstruction.
CONCLUSIONS

The spreader flap is an attractive technique in preserving the middle vault in nasal plastic surgery. However, its effect needs more evaluation.

REFERENCES