JPRAS Open 30 (2021) 53–60

Contents lists available at ScienceDirect

JPRAS Open

journal homepage: www.elsevier.com/locate/jpra

Original Article

Reduction Rhinoplasty Re-Endorsed: When Conservative and Measured ☆,☆☆,★

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ARTICLE INFO

Article history:
Received 14 June 2021
Accepted 11 July 2021
Available online 21 July 2021

Keywords:
Reduction rhinoplasty
cosmetic rhinoplasty
rhinoplasty complications

ABSTRACT

Reduction rhinoplasty has been widely criticised and dismissed due to the current preference for structural rhinoplasty. The criticism is related to airway compromise and secondary structural deformities, both early and late, due to overzealous resection. This two-year study attempted to prospectively assess the risk of airway and structural problems following reduction rhinoplasty in 30 consecutive patients. The findings showed no statistically significant difference either in the NOSE score (subjective sense of breathing) or in nasal valving (objective observations), at the 3-month follow-up. Subsequent 12-month telephone reviews revealed no change in the patients' functional or aesthetic outcomes. There was a 3% structural complication rate (requiring secondary surgery) and a 20% rate for further refining reduction surgery.

The findings confirmed the author's impression that conservative, measured reduction rhinoplasty, performed with due consideration to preserving the nasal supportive framework, is a technique well worth endorsing with confidence to reduce the disproportionately large nose. Contemporary surgeons need

☆ Financial Disclosure Statement:
☆☆ Dr. Sylaidis has no financial interests relating to this study.
★ Presented: Not presented at any meeting, neither wholly nor in part.

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https://doi.org/10.1016/j.jpra.2021.07.004

not feel obliged to only use the more complex later-developed structural rhinoplasty techniques.

Introduction

Reduction rhinoplasty has fallen out of favour over the recent decades due to its high complication rates arising from the over-zealous resection of supportive structures and the subsequent secondary constriction of airways and deformity.[1] On attending a number of national and international meetings on rhinoplasty, the author was surprised to hear how reduction rhinoplasty (endonasal or open) was generally dismissed by experts in favour of structural rhinoplasty (with cartilage graft reinforcement and augmentation of the osseo-cartilaginous framework). No appropriate comparative studies were presented to verify these attitudes or to put the issue in perspective. In contrast, it was generally admitted that structural rhinoplasty did have a very steep early learning curve. This generally indicates an increased complication rate.

The author has been performing both reduction and structural rhinoplasties for over 25 years, conducting up to 50 primary surgeries per year. Although he is highly aware of the high risks of rhinoplasty in general and ablative rhinoplasty in particular,[2] his experience did not align with the general dismissive attitude that prevailed at these rhinoplasty meetings. Because a large proportion of his cosmetic rhinoplasty patients (predominantly Caucasian) requested reduction and refinement of their noses, reduction rhinoplasty seemed to have been a very useful technique worth pursuing. In an effort to properly evaluate the validity of the author's view, this study was performed to prospectively assess the effect of reduction rhinoplasty on the airway (subjective and objective criteria) and the structural integrity of the nose (observed rate of postop deformity requiring revisions).

Methods

This prospective study included all consecutive primary reduction rhinoplasty cases performed by the author between October 2018 to July 2020, with the last review three months later in October 2020. The STROBE criteria for cohort studies were followed (www.strobe-statement.org).

Reduction rhinoplasty refers to those procedures that result in the reduction of the dimensions of the nose to make the nose smaller and simultaneously look more balanced. This includes caudal septal trim, tip debulking, hump reduction by rasping or osteotomy of the nasal dorsal complex, mobilization of the lateral nasal walls, and alar medialization. Both endonasal and open approaches were used.

Exclusions included all cases requiring simultaneous functional nasal airway procedures such as septoplasty, inferior turbinectomies, septal spreader grafts, collumelar strut grafts and so on. This was done so as not to mask any possible airway compromise resulting from the reduction rhinoplasty procedure. In addition, all cases that needed any type of structural rhinoplasty were excluded, such as alar extension grafts, lateral wall on-lay cartilage grafts, inter-domal suturing and so on. This was done to avoid masking any structural destabilisation and subsequent deformity that might result from reduction rhinoplasty. However, on-lay dermo-fat or fascia grafts and injected fat were permitted as these were used purely for contour refinement and played no significant structural role. All revision and secondary cases were excluded. The aim of the study was to unambiguously examine the effect of reduction rhinoplasty on the primary, unmodified nose.

All patients had two preoperative consultations and a three-month postoperative review to assess outcomes. An independent party performed a final telephone interview with all patients at the end of October 2020 to see whether any delayed complications had developed. In the Covid-19 situation, this was considered prudent, rather than calling all patients back for a face-to-face review.

Table 1
NASAL Obstruction and Septoplasty Effectiveness Scale (NOSE) Questionnaire. In the last month, how much of a problem were the following conditions? 0 = not a problem, 1 = very mild, 2 = moderate, 3 = severe, 4 = extremely severe.

Situation	Degree of Problem				
Nasal congestion or stuffiness	0	1	2	3	4
Nasal blockage or obstruction	0	1	2	3	4
Trouble breathing through my nose	0	1	2	3	4
Trouble sleeping	0	1	2	3	4
Unable to get enough air through my nose during exercise or exertion	0	1	2	3	4
TOTAL					
Add the five scores together to get a Total Score - then multiply by 5 for Final Score (max100)	FINAL SCORE = ……..				

Table 2
Nasal Valving Scoring

Grade	Pre-op L side	Pre-op R Side	3m po L Side	3m po R side
0: no collapse, no symptoms				
1: slight collapse, no symptoms				
2: mod collapse, mild symptoms				
3: marked collapse, marked symptoms				
Final Score (between 0-3, recording worse score)				

This study specifically looked for any negative outcomes in the airway (assessed by the NOSE questionnaire and physical examination for nasal valving) and aesthetic outcomes reflected by the type and rate of surgical revisions required subsequently.

Airway patency was assessed using the NOSE questionnaire[3,4] and physical examination for nasal valving.[1] The NOSE questionnaire is a subjective, validated, quality-of-life instrument for assessing airway obstruction. The questionnaire was completed preoperatively and three months postoperatively (see Table 1). The final score is calculated out of 100. The higher the final score, the worse the patient's subjective sense of breathing. Objective measurements of nasal airflow and intra-nasal volumes were not performed. Reduction rhinoplasty usually makes the nose smaller and hence reduces the objective measures of airway.[5] The question examined in this paper is: does traditional reduction rhinoplasty lead to a significant risk of subsequent noticeable concerns with breathing in our patients? Hence, the NOSE method was used to assess this rather than rhinometry.

Nasal valving was assessed by testing the left and right nostril for lateral wall collapse on deep inspiration.[1] This was performed by the author by applying firm finger pressure externally to one side of the nostril. The patient was then asked to inspire deeply through the unblocked nostril and comment on whether or not they felt any restriction to airflow on the contralateral, unblocked side. If they did, they were asked to grade it as mild, moderate or severe. Simultaneously, the surgeon observed the upper lateral cartilage, whether it held its position or whether it moved medially on inspiration, and to what degree.

Both nostrils were checked; when one side was worse than the other, the worse score was recorded in the data (Table 2).

The revision rate was chosen as a means for gauging the undesirable secondary structural effects. Revisions were sub-classified as "refining" or "repair" procedures. Refining procedures were performed to address "under-corrections". Repair revision procedures were performed to correct the unexpected structural changes resulting in visible deformations, asymmetries and deviation from the midline. To assist in this assessment, photographs were taken pre- and postoperatively for comparison.

After the completion of the study, an independent investigator conducted a telephone interview of all the patients. Several questions were asked such as 'since the date of the last operation (primary or revision), has there been any significant new alterations to breathing or shape of the nose'?

Table 3
Statistical analysis of results for NOSE and nasal valving scores.

	NOSE Score Median (IQR)	Valving Score Median (IQR)
Pre-operation	7.5 (0.0,150)	1.0 (0.0,1.75)
3-month Post-operation	2.5 (0.0,5.0)	0.0 (0.0,1.0)
Difference (post-pre)	0.0 (-10,0.0)	0.0 (0.0, 0.0)
P-value	0.003	0.13

Statistical Analysis

Median and inter-quartile ranges (IQR) for the NOSE score and the valving score were reported, along with the median difference between the postoperative and preoperative scores. The Wilcoxon signed rank-sum test was used (as an alternative to the paired t-test) to test for differences in pre- versus postop scores. Exact conditional *p*-values were reported due to the presence of ties. Statistical analysis was performed using R version 4.0.2 (R Foundation for Statistical Computing).

Results

Thirty-five primary cosmetic rhinoplasty patients were prospectively and consecutively recruited in this study.

Thirty patients presented for postoperative follow-up; hence, they formed the final study group. Five patients (14%) failed to return for review. Repeated attempts were made to contact them by phone, emails and finally by letter. As they did not respond, they had to be removed from the study. None of these five patients ever contacted the practice to lodge a complaint of dissatisfaction.

Of the 30 patients in the final study group, 3 were male and 27 were female, their ages ranging from 21 to 59 years (mean 31 years old).

One patient had a post-trauma deformity of the nasal dorsum with overgrowth of bony callus. The rest were all developmental cases.

Types of Operations

The endonasal approach was used for 25/30 (83%) patients and the open approach was used for for 5/30 (17%) patients. The latter was used to facilitate the trimming of the inferior crura or for on-lay fascia and fat grafts.

The surgical procedure comprised caudal septal trim (20/30, 66%), tip reduction (22/30, 73%), hump reduction (by rasp alone or by osteotomy) plus supra-tip shave (29/30, 97%), lateral wall fracturing (either in-fractures or out-fractures, depending on the requirements for symmetry) (20/30, 66%), alar medialization (6/30, 20%) and other refinements (such as inferior crura trimming, on-lay fascia or fat grafts and fat injection) (6/30, 20%).

"NOSE" Results

The scores ranged preoperatively from 0 to 70 (mean 11.6) and from 0 to 20 (mean 4.2) at 3 months postoperatively. Of the 30 patients in this study, three had postop results that were slightly worse (increases of 5 points each), fifteen showed no change at all and the remaining twelve patients actually showed improved results. Figure 1 illustrates the summary plots for the differences between the pre- and postop NOSE scores. Using the paired Wilcoxon rank sum test, it was observed that the difference between the scores was statistically significant, *P*-value = 0.003 (Table 3). The airways seemed to be improved postoperatively. To further verify this conclusion, a one-sided Wilcoxon signed rank sum test was performed for the Null hypothesis that the postop NOSE values were expected to

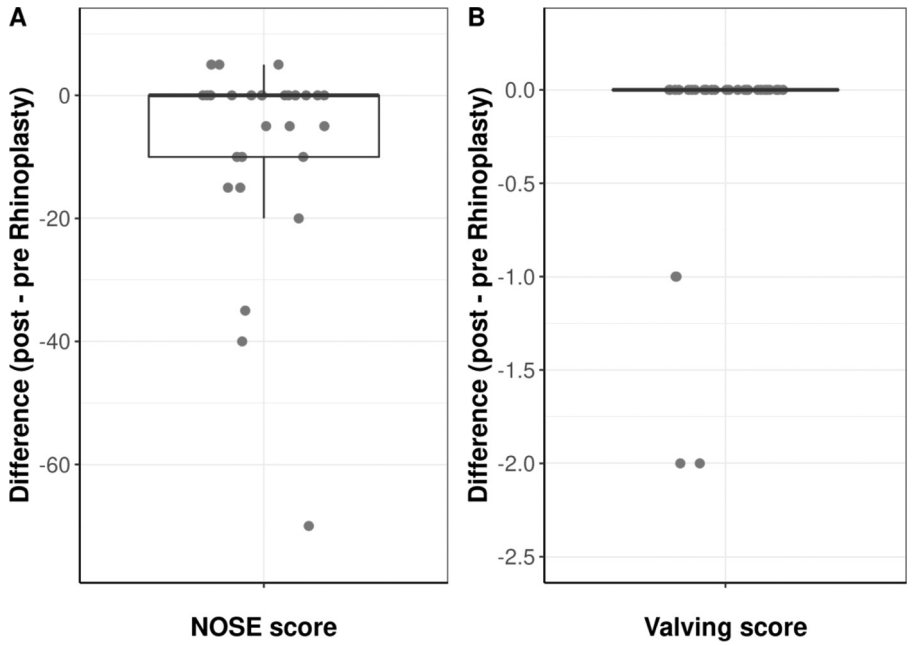

Figure 1. Graph of NOSE and Nasal Valving Results

be worse (higher) than the preop NOSE values. The alternative hypothesis was that the postop NOSE values might be lower. The *P*-value was calculated to be 0.001. This was deemed sufficient evidence to reject the Null hypothesis at 5% significance level, in favour of the alternative hypothesis that the postop NOSE scores were not significantly worse than the preop scores.

Nasal Valving Results

Preoperatively, 14 patients scored nil, 8 patients scored mild, 7 patients scored moderate and 1 patient scored severe. At 3 months postoperatively, 17 patients scored nil, 8 patients scored mild, 4 patients scored moderate and 1 patient scored severe (same patients as in preop scoring). None of the patients showed a worse postop score compared with their preop score.

Using the paired Wilcoxon rank-sum test, the *P* value was found to be 0.13. Hence, there was no statistical difference between the pre- and postop results for nasal valving (Figure 1 and Table 3).

Revision Rates

Operative revision was needed for 7 cases out of 30 (23%). One case (3%) was a structural complication. The remaining 6 cases (20%) were classified as refining revisions for under-corrections. This included combinations of further dorsal rasping, supra-tip shaves and in-fracturing. The sole secondary deformity consisted of a deviation of the nasal complex to one side that became progressively worse over the first six months postop. Preoperative septal bowing with moderate airway constriction was noted at the first consultation. However, the patient was not concerned with this and wanted to avoid the additional expense of a septoplasty. Subsequently the patient agreed for septoplasty and left-sided out-fracturing and right-sided in-fracturing to straighten the nose. The patient was discharged with a satisfactory outcome.

Telephone Reviews

All patients were contacted by telephone. There were no new problems with airway or shape since their last operation. The postop period at the time of this interview ranged from 1 to 24 months (mean 14.6 months).

Discussion

Rhinoplasty may be categorised as functional (to improve breathing), reconstructive (to repair deformities) or cosmetic. [2] Patients who consider their noses to be too large expect cosmetic reduction and refinement of their noses. Reduction rhinoplasty has been a popular choice to achieve this since the early 20th century.

However, the procedure has led to high rates of airway problems and secondary deformities, when performed with excessive removal or disruption of key structural components.[2]

Because of these problems, over the last three decades, there has been a significant shift away from reduction (ablative) rhinoplasty towards a more structural rhinoplasty approach. The latter involves conserving the native osseo-cartilage framework with cartilage sparing suture and cartilage grafting techniques. The view is that it is better to augment and reinforce the deficient areas rather than reduce the areas of excess.[1]

There is no argument that functional and reconstructive rhinoplasty is well served by "structural" cartilage grafting techniques. There have been excellent developments in that approach. However, clients with large noses want them reduced and refined, not enlarged, even if done in a balanced way. Moreover, cartilage grafting is technically more challenging and hence carries a considerable risk of secondary deformity and donor site morbidity.

There is also no argument that reduction rhinoplasty will reduce the nasal airspace volume. This has been shown repeatedly and seems an obvious expectation.[2] The author, owing to his 25 years of experience, believes that conservative, measured, cosmetic reduction rhinoplasty can be performed with low risk to breathing and secondary deformities, for a large nose.

This study has confirmed that by using this approach, there was no increased risk of airway compromise. This has also been reported in earlier studies. Although three out of the 30 patients had minimally worse NOSE score postop, the difference was not statistically significant. Indeed, twelve patients out of the 30 had better postop NOSE score and this was statistically significant (*P*-value 0.003). This improvement in the NOSE score was unexpected. No functional surgery was performed on, and no nasal decongestions prescribed for, these patients. The author offers the possible explanation that the patients felt better about their noses postoperatively and therefore felt that their breathing was also improved. The key point is that there was no significant subjective sense of worse breathing.

Furthermore, no patient scored a worse result for postop nasal valving. This test was used to check the airway on forced inspiration, such as during exercising or other exertion. Indeed, it was again surprising to find that a number of patients actually had better postop scores (4/30 patients), but this was not statistically significant (*P*-value 0.13).

With regard to secondary structural abnormalities, only one patient out of the thirty developed such a deformity. This was due to a preoperatively abnormal septum that progressively twisted the entire nasal complex after release of the lateral nasal walls by in-fracturing. The septal abnormality was recognised preoperatively but the patient did not want the additional expense of a septoplasty. This was later corrected by septoplasty and remobilisation of the nasal walls. The only other cases requiring revision surgery (6/30, 20%) were for minor refinements such as further dorsal rasping, supratip shave down and so on.

Furthermore, end-of-study telephone reviews of the patients (mean 14.6 months postop) did not reveal any new evolving problems with either airways or shape.

The question then arises, why did the author not experience worse outcomes? One would expect worse outcomes, based on the criticisms currently levelled at reduction rhinoplasty. The study has its strengths and weaknesses. There were only 30 patients in the study, but the evaluating statistician considered this as adequate. Further recruitment for the study was hampered by the extended period of the Covid-19 shutdown. The formal reviews were performed three months postop, too short to pick

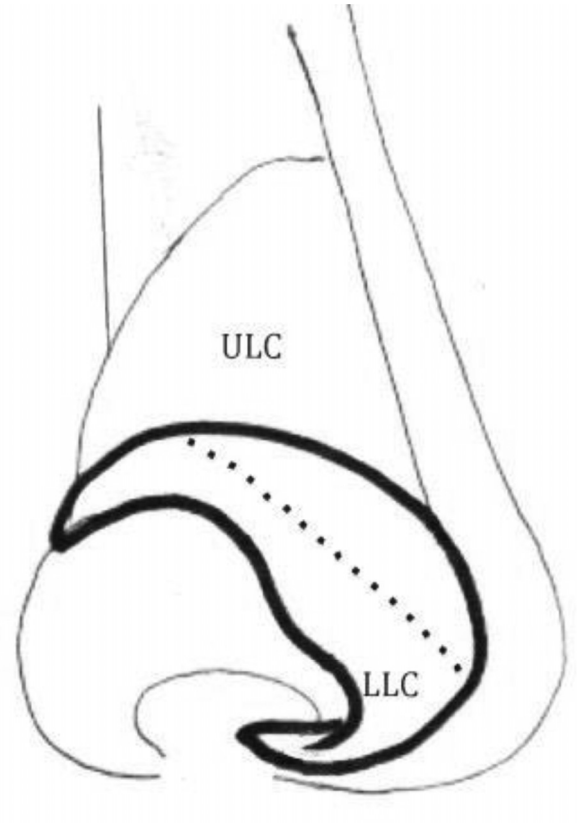

Figure 2. Tip Reduction: cephalic portion of LLC removed >4mm from caudal LLC edge. LLC may vary in distance from the skin alar edge. Intra-cartilage incision line dotted.

up long-term complications. However, all patients were interviewed by telephone at the end of this two-year study, with no new problems identified. One major strength of this study is that very strict selection criteria were applied in order to avoid bias in the results.

The author believes that the low complication rate was due to being “conservative and measured”. The author spends time educating patients to accept safely achievable outcomes. Cultivating realistic conservative expectations enables the surgeon to be more surgically conservative. The author considers this to be a key strategy for cultivating a more trouble-free practice.

The operative philosophy is that of preserving as much structure as possible. Caudal septum trim should be minimal (e.g., <5 mm), in order to preserve tip support. The transfixion mucosal excision should be bilateral and symmetrical, to achieve a balanced lifting of the collumela. Tip reduction by intra-cartilage incision must leave at least 4 mm of caudal cartilage intact along the entire length, to prevent secondary distortion of the alar rim. The caudal edge of the lower lateral cartilage (LLC) lies at a variable distance from the actual alar rim in different patients. In addition, the lateral crura curve cephalad, away from the rim. The endonasal intra-cartilaginous incision must strongly curve away from the rim as the incision proceeds from medial to lateral, as a “curved-strip LLC excision”. This preserves more of the lateral extension of the LLC, hence preserving more of its connection to the upper lateral cartilage (ULC) (see Figure 2). If one simply makes the incision parallel to the alar rim, one is at grave risk of removing too much of the lateral crus, increasing the risk of valving plus alar elevation and deformity. Hump reduction is the final step to approach with caution. The author strictly disciplines himself to avoid the natural tendency for the osteotome to dive too deep during dorsal

osteotomy. Alternatively, this can be avoided in most cases by using the rasp. Rasping takes longer but gives more control. The supra-tip cartilage (ULC) is shaved down by blade. For female patients, the author's aim is to only minimally lower the middle and upper thirds of the nasal vault in relation to the nasal tip, by 2–3 mm. In male patients, he tends to leave the dorsum flush with the nasal tip. By keeping the hump reduction to a predetermined minimum, closing of the "open-roof" only needs minimal in-fracturing. This is performed by percutaneous osteotomy with a 2 mm osteotome. This manoeuvre facilitates controlled green-stick fracturing. The lateral walls are then eased into position with Walsham forceps.

Conclusion

The increasing complexity of modern-day rhinoplasty is related to the endeavour to achieve excellence and the attempt to avoid the complications arising from excessive framework disruption. As commendable as such efforts are, they are inevitably accompanied by steep learning curves, exigent techniques, much longer operating times and their own specific complications and donor site morbidities. However, by tempering our approach to reduction rhinoplasty, by adopting a conservative and measured approach, both with patient education and surgical technique, we can continue to confidently use this very useful technique. Reduction rhinoplasty is a comparatively simple and direct approach to address the challenge of aesthetically reducing the disproportionately large nose. In these cases, we can avoid the more complex structural rhinoplasty approach. Therefore, the author believes that reduction rhinoplasty warrants revaluation and endorsement, with the caveats discussed.

Declaration of Competing Interest

None

Funding

None

Ethical approval

Not required

Acknowledgements

The author is very grateful to the statistical analysis performed by Dr. Shalem Leemaqz, Research Associate in Biostatistics, College of Medicine and Public Health, Flinders Medical Centre, South Australia.

Additional thanks to: Ms Marion Toy of Adelaide Plastic Surgery, for conducting the independent telephone reviews at the termination of the study.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.jpra.2021.07.004.

References

1. Rohrich RJ, Rhinoplasty Ahmad J. *Plast Reconstr Surg*. 2011;28:49e–73e.
2. Friedman O, Cekic E, Gunel C. Functional Rhinoplasty. *Facial Plast Surg Clin N Am*. 2017;25:195–199.
3. Stewart MG, Witsell DL, Smith TL, Weaver EM, Yueh B, Hannley MT. Development and validation of the Nasal Obstruction Symptom Evaluation (NOSE) scale. *Otolaryngol Head Neck Surg*. 2004;130:157–163.
4. Lipan MJ, Most SP. Development of a severity classification system for subjective nasal obstruction. *JAMA Facial Plast Surg*. 2013;15:358–361.
5. Grymer LF. *Reduction rhinoplasty and nasal patency: changes in the cross-sectional area of the nose evaluated by acoustic rhinometry Laryngoscope*. 1995;105:429–431.