

Endonasal Triangular Technique for nasal valve rhinoplasty: a ten-year review

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ABSTRACT:

Introduction: The nasal valve is the main regulator of airflow in the nose. Consequently, the collapse of the nasal valve has a significant impact on nasal obstruction and hence quality-of-life of patients. Several nasal valve rhinoplasty techniques are being used, from cartilage grafts to endonasal resection of the upper lateral cartilage. We describe a new endonasal approach to nasal valve rhinoplasty, the Triangular Technique, and assess its efficacy and complication rate over ten years.

Materials and Methods: A retrospective study of patients who underwent nasal valve rhinoplasty at three regional hospitals from Jan 2004 to May 2014 was conducted. Subjective reports were used to assess the improvement of nasal obstruction. A total of 24 patients were included.

Results: Three months postoperatively, 19 patients reported improvement in nasal obstruction. Four patients required revision surgery. Two of these 4 patients had substantial symptom resolution post revision surgery. Ten patients were followed up for more than 5 years (range: 5.8 to 10.3 years), 9 of who reported continued satisfaction and none or minimal nasal obstruction after nasal valve rhinoplasty compared to before surgery. There were no reported complications.

Discussion: The Triangular Technique is a straightforward endonasal technique to address collapsed nasal valves with minimal associated co-morbidities.

KEYWORDS:

nasal, valve, rhinoplasty, alar, endonasal, triangular, technique, surgery, nose, obstruction

INTRODUCTION

Mink first coined the term nasal valve in 1920¹. It is the narrowest portion of the human airway and accounts for nearly two thirds of total nasal airway resistance². Until recently, little attention has been given to such a crucial part of the nasal airway. However, in less than forty years, a wide array of techniques and even more variations of these techniques have been described to address nasal valve collapse.

The spreader graft was first introduced by Sheen in 1984³. It involves the placement of strips of cartilage between the septum and the upper lateral cartilage (ULC) to widen the internal nasal valve. Since then, several variants have been described including use of sutures to further bolster the ULC⁴⁻⁶ as well as an endonasal approach⁷. Paniello described nasal valve suspensions as an alternative technique in 1996⁸. Sutures are

used to anchor the nasal mucosa cephalic to the area of collapse to the orbital rim. In 1997, we saw the advent of alar batten grafts⁹. These are auricular or septal cartilage grafts inserted into a precise subcutaneous pocket to provide support to the lateral wall of the nose. The ULC splay graft, described by Guyuron in 1998, uses conchal cartilage to reconstruct the middle nasal vault by placing the cartilage implant over the septum but below the ULC¹⁰. A variation, the "butterfly" technique, involves placing the cartilage graft over both the ULC and the septum¹¹. The M-plasty¹² and Z-plasty¹³ are relatively novel techniques that involve resection of the ULC through an intercartilaginous incision.

We aim to describe the Triangular Technique, a more straightforward endonasal approach to nasal valve rhinoplasty, and perform a ten-year audit to evaluate the efficacy and complications of this new technique.

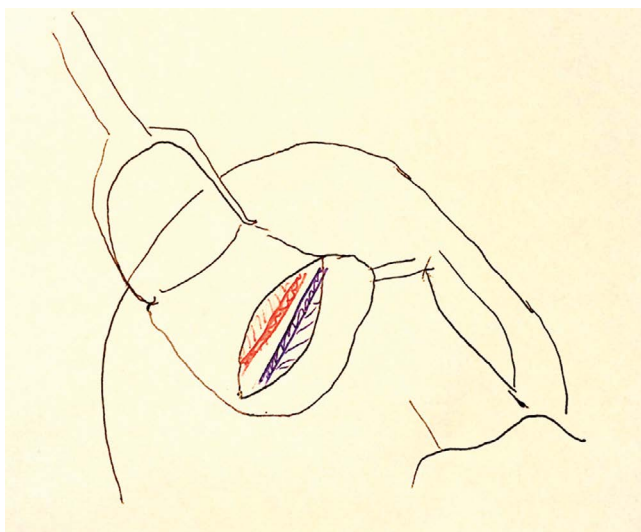


Fig. 1. Lower lateral cartilage (red), upper lateral cartilage (blue). Incision along the ICJ.

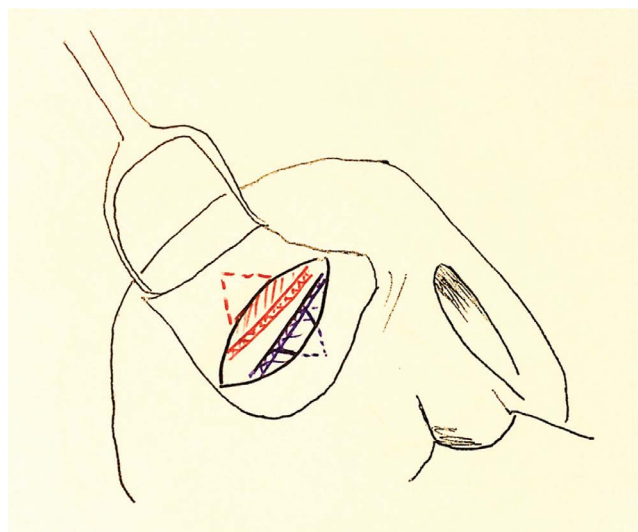


Fig. 2. Superficial mucosa excised from LLC. ULC exposed.

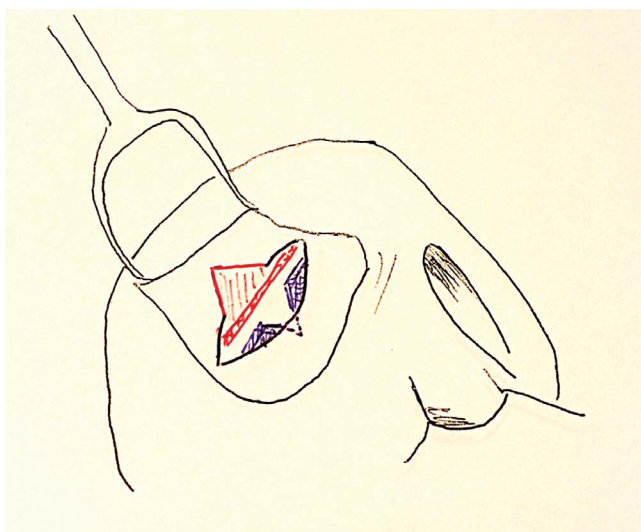


Fig. 3. Triangular piece of ULC excised.

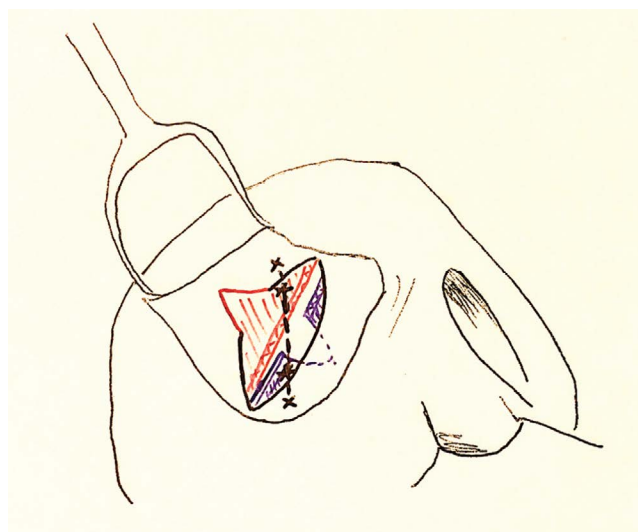


Fig. 4. Suture medial LLC to lateral ULC.

METHODS

Clinical records of patients who had undergone nasal valve surgery privately at St John of God Bendigo Hospital, Castlemaine Hospital and Bendigo Health since 2004 were retrospectively investigated for the effects and complications of the triangular technique.

Exclusion criteria included concurrent septoplasty, inferior turbinectomies or any other surgeries that may affect airflow in the nasal cavity.

New nasal valve rhinoplasty technique (the triangular technique):

The 2% xylocaine with 1:80,000 adrenaline solution was injected along the intercartilaginous junction (ICJ) starting 2-3 mm from the apex of the nasal valve. The incision was then made along the ICJ, starting 2-3 mm from the apex of the nasal valve to spare the axilla (Figure 1). The length of the incision was approximately 4-6 mm depending on the nasal dimension of the patient.

A triangular piece of vestibular mucosa superficial to the lo-

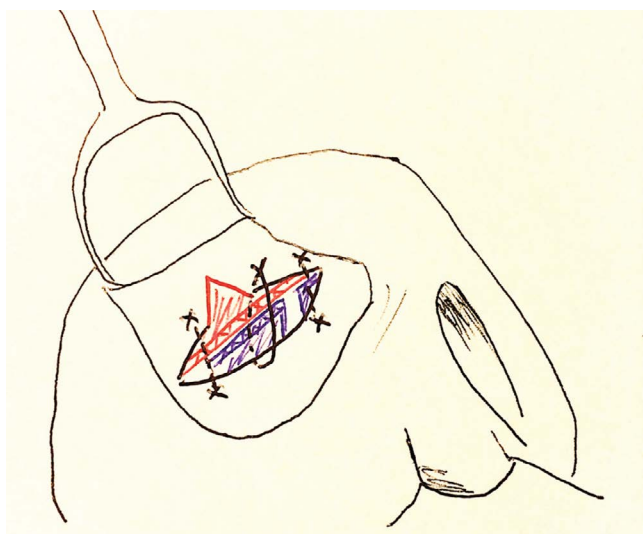


Fig. 5. Second suture medial to the first to anchor the medial aspect of the ULC to the excised triangle. Third suture lateral to the first.

wer lateral cartilage (LLC) was excised. The base of this triangle was along the incision and its apex was pointing inferiorly (Figure 2). If necessary, the border between the ULC and the LLC was divided, the intercartilaginous scroll was trimmed, and the cephalic portion of the LLC was also trimmed if collapsed. Starting from the midline of the incision, the perichondrium was then dissected to expose the dorsal and ventral aspects of the caudal edge of the ULC (Figure 2). A triangular piece of the ULC with its base along the caudal edge of the ULC and its apex pointing superiorly was removed (Figure 3).

Using 4-0 plain Cat Gut, the first suture was inserted medial to the exposed area of the LLC and then diagonally to the ULC lateral to the previously excised triangle (Figure 4). The second suture was inserted medial to the first suture to anchor the medial aspect of the ULC to the excised triangle. The third suture was lateral to and reinforced the first suture (Figure 5). Excess mucosa was trimmed along the suture line (Figure 6).

Subjective improvement in nasal obstructive symptoms was quantified by calculation of the nasal obstruction symptom evaluation (NOSE) score¹⁴ (Table III). Raw score was multiplied by 5. Final score was obtained by subtracting the post-operative score from the pre-operative score.

RESULTS

Twenty-four patients underwent nasal valve rhinoplasty from January 2004 to May 2014 (Table I). All surgeries were performed by the senior author (NH). Seventeen patients were

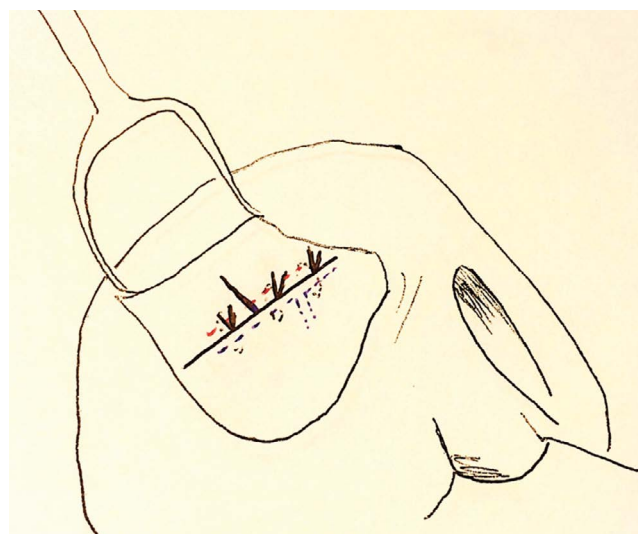


Fig. 6. Excess mucosa trimmed

Tab. I. Demographics.

DEMOGRAPHICS	
Male	7 (29%)
Female	17 (71%)
Mean age	55 ± 15 years
Bilateral NVR	18 (75%)
Unilateral NVR	6 (25%, 5R and 1L)
Concurrent surgery	9 (38%)
Mean follow-up	4.2 ± 3.9 years
Followed-up > 5 years	10 (42%)

Tab. II. Post-operative outcomes.

	NO. OF PATIENTS (%)	P-VALUE
Improvement within 1 month	22 (92%)	
Improvement within 6 months	19 (79%)	
Revision surgery	4 (17%)	
Reported improvement post revision	2 out of 4	
Patients who completed the NOSE questionnaire	12 (50%)	
Mean difference between pre- and post-op NOSE scores	54 ± 27	P<0.001
Complications	0	

female. The mean age at the time of operation was 55 ± 15 years. Eighteen patients had bilateral nasal valve rhinoplasty, five patients had right-sided nasal valve rhinoplasty and one

Tab. III. Nasal Obstruction Symptom Evaluation (NOSE) Questionnaire.

	OVER THE PAST 1 MONTH, HOW MUCH OF A PROBLEM WERE THE FOLLOWING CONDITIONS FOR YOU?				
	NOT A PROBLEM	VERY MILD PROBLEM	MODERATE PROBLEM	FAIRLY BAD PROBLEM	SEVERE 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 of exertion	0	1	2	3	4

patient had left-sided nasal valve rhinoplasty. Nine patients had one or more concurrent surgeries including but not limited to tonsillectomies, functional endoscopic sinus surgery ± double intranasal ethmoidectomies/double intranasal anrostomies and uvulopalatopharyngoplasty. The mean follow-up was 4.2 ± 3.9 years. Ten patients were followed up for more than five years.

Effect on nasal obstruction (Table II)

Twenty-two patients reported improvement in nasal obstruction within two months post nasal valve rhinoplasty. By six months after surgery, nineteen reported ongoing improvement of nasal obstruction. Four patients required revision nasal valve rhinoplasty either using conchal cartilage grafts or J-flaps. Two of these four patients reported improvement of their symptoms post revision surgery. Twelve patients completed the NOSE questionnaire (Table III), the mean difference between their pre- and post-operative NOSE scores was statistically significant with a P-value <0.001 . Ten patients had previous septoplasty ± turbinectomies. Seven of these ten patients reported improvement in their symptoms after nasal valve rhinoplasty. Ten patients were followed up for more than 5 years (range: 5.8 to 10.3 years). Nine of them reported continued satisfaction and improvement in symptoms after nasal valve rhinoplasty compared to before surgery.

COMPLICATIONS

There were no reported complications or cosmetic deformities postoperatively.

DISCUSSION

Nasal valve rhinoplasty is continually evolving. The myriad of techniques available is an eloquent illustration of how nasal valve rhinoplasty has progressed and will continue to

progress over the years. The spreader graft^{3,15}, alar batten graft^{9, 16, 17} and splay¹⁰ or “butterfly” graft¹¹ have shown excellent results. The advantage of the Triangular Technique over these techniques is the preservation of donor sites for cartilage implants. Further, the Triangular Technique is consistently done endonasally which may reduce the risk of nasal deformities and healing time secondary to an external rhinoplasty approach. On the other hand, the patients who required revision rhinoplasty had an intrinsic weakness of the alar cartilages. This suggests that in those cases a graft is preferred to the Triangular Technique and is more likely to successfully relieve symptoms.

Nasal valve suspension remains a technically delicate procedure despite modifications to the technique¹⁸⁻²¹. It was also associated with a high complication rate with patients complaining of pain, inflammation, suborbital swelling and permanent scarring post reoperation²². In comparison, the Triangular Technique is a safer technique with similar results and low complication rate.

M-plasty and Z-plasty are at first glance similar to the Triangular Technique. Our technique differs in two ways: the minimal resection of the ULC and a straightforward suture to anchor the lateral cartilages in place. The M-plasty involves the resection of the caudal end of the ULC and also a medial triangle after separating the ULC from the septum¹². Resecting cartilage next to the septum may potentially cause loss of integrity of the ULC and further collapse of the nasal valve. Z-plasty¹³, like M-plasty, also involves resection of the caudal border of the ULC. Triangular mucosa on either side of the intercartilaginous incision is then rotated inferiorly and sutured to further lateralise the scroll. The Triangular Technique demonstrates that similar results may be achieved with a smaller amount of resected ULC ensuring the long-term integrity of the ULC and a correctly-placed stitch through the ULC and LLC to widen the nasal valve.

The septum and inferior turbinate are important components

of the nasal valve. Ten patients in our cohort had ongoing nasal obstruction despite previous septoplasty ± inferior turbinectomies. Seven of these ten patients (70%) reported an improvement in nasal obstruction post nasal valve rhinoplasty. This reiterates the close relationship between the alar cartilages, septum and head of the inferior turbinate, and their role in nasal airflow. It is hence unsurprising that most patients, from our experience, will undergo surgery on at least two of these structures concurrently. This also explains why our study cohort is small despite an audit spanning over ten years.

CONCLUSION

The interest in nasal valve rhinoplasty has not waned. This is understandable considering the significant impact nasal valve collapse has on nasal obstruction and, ultimately, the quality of life of our patients. The Triangular Technique is a straightforward endonasal technique to address collapsed nasal valves with minimal associated co-morbidities. However, in patients with intrinsic weakness of their ULC, a graft to strengthen the ULC is indicated instead.

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