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Intraoperative Evaluation of Nasal Valve Repair Interventions: A Prospective Analysis

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Abstract

Objectives: To allow for early identification and treatment of inadequate nasal valve repair interventions in the intraoperative setting, based on degree of nasal valve collapse quantified by suction-assisted pressure readings. Patient outcomes were measured by comparison of pre- and post-operative Nasal Obstruction Symptom Evaluation (NOSE) surveys.

Study Design: Prospective study.

Methods: All enrolled patients undergo suction-assisted evaluation of nasal valve collapse before surgical intervention. Patients randomized into the experimental group underwent repeat assessment after various nasal valve interventions, compared to a control group where adequacy of interventions was assessed by palpation of the nasal ala.

Results: 20 patients who underwent nasal valve repair were first randomized into control (10) or experimental (10) groups. Two patients in the control group did not receive nasal valve work due to pre-operative readings and were excluded from further analysis. Nasal valve interventions included alar rim grafts (5), spreader grafts (10), batten grafts (2), and nasal valve suture suspension (8). After nasal valve interventions, average suction reading at first sign of collapse increased by 92% ($p < 0.0001$) and average suction reading at maximal collapse increased by 16% ($p < 0.0001$). Pre-operative NOSE scores decreased by 55% ($p < 0.0001$) at the first follow-up visit at 9.3±3.5 days. No patients in the experimental group required additional nasal valve interventions after repeat suction-assisted evaluations intraoperatively.

Conclusion: Intraoperative suction-assisted evaluation of nasal valve collapse can help assess adequacy of nasal valve interventions and determine whether additional interventions are necessary to improve nasal valve integrity.

Introduction

- Nasal valve repair is a common procedure performed for nasal obstruction symptoms
- Currently, there is no method to quantify the adequacy of nasal valve repair intraoperatively
- Patients occasionally require revision surgery, which can range from 4-9%[1]
- Suction-assisted assessment of nasal valve patency has been previously introduced in the literature[2]

Methods

- All enrolled patients between July 2020 and November 2020 underwent suction-assisted evaluation of nasal valve collapse before surgical intervention
- Patients randomized into the experimental group underwent repeat assessment after various nasal valve interventions, compared to a control group where adequacy of interventions was assessed by palpation of the nasal ala

Results

Demographics	
Age in Years [mean ± SD]	45 ± 15
Gender	
Male	13 (72%)
Female	5 (28%)
Race	
Caucasian	16 (89%)
African American	1 (6%)
Other	1 (6%)
Comorbid Conditions	
BMI [mean ± SD]	28 ± 5
Diabetes	2 (11%)
Obstructive Sleep Apnea	6 (33%)
Chronic Sinusitis	5 (28%)
Prior nasal surgery	7 (39%)
Functional Endoscopic Sinus Surgery	4 (22%)
Septoplasty	2 (11%)
Rhinoplasty	1 (6%)
Turbinate Reduction	1 (6%)

Table I. Demographics

Intervention	
Spreader Grafts	10 (56%)
Nasal Valve Stitch	8 (44%)
Alar Rim Grafts	5 (28%)
Open Reduction and Internal Fixation Nasal Bone	4 (22%)
Revision Septoplasty	2 (11%)
Batten Grafts	2 (11%)
Inferior Turbinate Reduction	18 (100%)
Pyriform Aperture Reduction	11 (61%)
Septoplasty	10 (56%)

Table II. Surgical Interventions

NOSE Score	
POD 0	64.9 ± 28.3
POD 1 (at 9.3 ± 3.5 days)	29.3 ± 28.0
POD 2 (at 33.3 ± 6.1 days)	18.6 ± 17.8
POD 3 (92.6 ± 4.1)	15.0 ± 22.6
POD = post-operative day	

Table III. Nasal Obstruction Symptom Evaluation (NOSE) Survey at POD 0, 1, 2, and 3

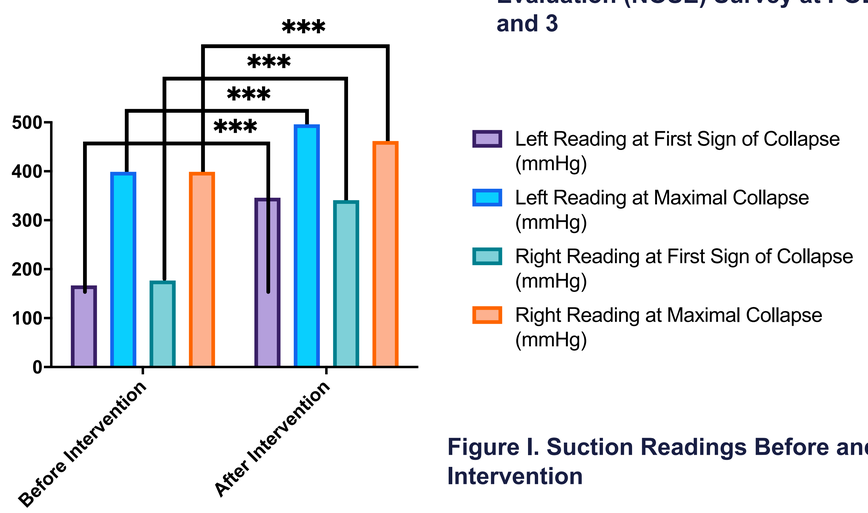

Figure I. Suction Readings Before and After Intervention

Figure II. Video Demonstrating Intraoperative Catheter Placement (patient consent was obtained: https://drive.google.com/file/d/17rYJzABGAZ_fz0PKk98dvV7HBgDyoyka/view?usp=sharing)

Discussion

- Determining nasal valve integrity intraoperatively by palpation alone can be challenging and is subjective
- Using suction-assisted devices in the OR, nasal valve competency can be quantified with suction readings in mmHg at various points of collapse
- This real-time objective assessment can allow for optimal intraoperative decision-making for choosing which nasal valve repair interventions to employ
- Alternatively, the decision to defer nasal valve interventions can be made if no collapse is observed at the highest levels of suctioning, which was the case with 2 patients in this study
- Suction-assisted intraoperative assessment of nasal valve integrity is a feasible method to determine the adequacy of various interventions and can assist with real-time decision-making for the surgeon

Conclusion

- Evaluation of nasal valve collapse via a suction-assisted device can help assess adequacy of nasal valve interventions and assist in determining whether additional interventions are required to improve nasal valve integrity

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