Published in final edited form as:

Acta Otolaryngol. 2017 March ; 137(3): 293–296. doi:10.1080/00016489.2016.1229023.

Short-term quality of life outcomes following pediatric septoplasty

Victoria S. Lee, MD^{a,*}, Rebecca M. Gold^a, and Sanjay R. Parikh, MD, FACS^a

^aDepartment of Otolaryngology – Head and Neck Surgery, Division of Pediatric Otolaryngology, University of Washington and Seattle Children's, Seattle, Washington, United States

Abstract

Conclusions—Pediatric septoplasty may be associated with short-term symptomatic benefit. This benefit may be greater in female patients and equally achievable in young patients and using less invasive surgical approaches.

Objective—To determine the short-term effect of pediatric septoplasty, which is not routinely performed, on sinus and nasal-specific quality of life.

Methods—This study is a retrospective case series of 28 pediatric patients that underwent septoplasty. Pre- and post-septoplasty SN-5 overall (mean of all 5 items, range 1–7) and visual analog scale (VAS; range 0–10) scores were obtained and compared using a Wilcoxon signed-rank test. Comparisons of pre- to post-septoplasty changes by sex (female vs. male), age (<13 vs. 13 years), and surgical approach (open vs. closed) were performed using a Mann Whitney U test. Median and interquartile range are reported.

Results—Overall and VAS scores significantly improved from pre- to post-septoplasty (3.5 [2.8, 4.3] to 2.0 [1.4, 2.8], $p < 0.001$; 5.0 [4.0, 6.3] to 8.0 [8.0, 10.0], $p < 0.001$). Females reported significantly greater overall and VAS score improvements compared to males (–1.8 [–2.6, –1.6] compared to –1.0 [–1.6, –0.2], $p = 0.01$; 5.0 [4.0, 5.0] compared to 3.0 [1.5, 4.0], $p = 0.007$). Comparisons of changes by age and surgical approach were not significantly different.

Keywords

SN-5; visual analog scale; quality of life; pediatric; septoplasty

Introduction

Although septoplasty is commonly performed in adults, it is not routinely performed in the pediatric population. The reticence to perform septoplasty in pediatric patients is related to concerns over adverse effects on nasal and facial growth [1]. Anthropometric studies, however, have shown that nasal and facial growth measurements in pediatric patients

Corresponding author: Victoria S. Lee, MD, Resident Physician, Department of Otolaryngology – Head and Neck Surgery, University of Washington, Box 356515, Seattle, WA, United States, 98195. Tel: +1 206 314 2169. Fax: +1 206 543 5152. leevict@uw.edu.

This paper was presented as a Podium Presentation at the 2015 Triological Society Combined Sections Meeting, in San Diego, California.

The authors have no funding, financial relationships, or conflicts of interest to disclose.

receiving septoplasty and more extensive nasal reconstructive surgery remain consistent with normative data even after long-term follow-up [2–5]. Furthermore, failure to perform septoplasty in pediatric patients with nasal obstruction may adversely affect nasal and facial growth [6].

Clinical indications for pediatric septoplasty are generally divided into absolute and relative categories. Septal abscess, septal hematoma, severe deformity secondary to acute nasal fracture, dermoid cyst, and cleft lip nose are considered absolute indications; deviated septum causing significant nasal obstruction is considered a relative indication [7, 8]. The timing of pediatric septoplasty is controversial, particularly given that completion of nasal growth is not until approximately 16 years of age in males and 14 years of age in females. Absolute or relative indications may prompt earlier intervention [1].

Objective outcome measures, such as acoustic rhinometry, have been shown to improve following pediatric septoplasty [9]. Subjective quality of life outcome measures, however, are important to assess independently because they focus on symptoms, which patients are most interested in, and may not correlate with objective outcome measures [10]. The few studies that have evaluated the effect of pediatric septoplasty on subjective quality of life outcome measures generally have not used validated assessment tools or have assessed younger adults as a proxy for pediatric patients [11, 12]. Only one study has assessed subjective quality of life outcome measures using a validated tool, the Nasal Obstruction Symptom Evaluation (NOSE) scale [13]. The NOSE scale, however, is only validated in adults, and as a result, is not generally used in the pediatric population [14]. In contrast, the Sinus and Nasal Quality of Life Survey (SN-5) is designed for and validated in the pediatric population [15, 16].

The aims of this study are to determine if sinus and nasal-specific quality of life, measured using the SN-5, significantly improves following pediatric septoplasty, and to evaluate for improvement differences by sex, age, and surgical approach.

Materials and Methods

Study Design and Procedures

This study was a retrospective case series of pediatric patients that underwent septoplasty from 2011 to 2014 at Seattle Children's Hospital and was approved by the Seattle Children's Institutional Review Board. Open or closed septoplasty was performed depending on the severity of the deviation and the presence of other contributing factors, such as poor nasal tip support or nasal valve collapse. Adjunctive techniques, such as columellar strut or spreader graft placement and inferior turbinate reduction, were performed as indicated. Cartilage-sparing techniques were always considered to maximally maintain native cartilage.

For patients that underwent a closed approach, a septal quilting stitch was placed but no additional packing. For patients that underwent an open approach, silastic septal and external nasal splints were also typically placed, which were removed 7 days after surgery. These patients received prophylactic anti-staphylococcal antibiotics while the silastic septal splints were in place. All procedures were performed by the same attending surgeon (SRP).

Descriptive Data

Demographics (sex and age), physical exam findings (body-mass index), indications for surgery, and relevant history (chronic rhinosinusitis, allergic rhinitis, and obstructive sleep apnea), were recorded. Details of the surgery (open or closed approach, columellar strut or spreader graft placement, and inferior turbinate reduction) and time to follow-up were also recorded.

Outcome Data

The SN-5 is a sinus and nasal-specific quality of life survey. Figure 1 shows the SN-5 form. Patients score five items on a scale from 1 (none of the time) to 7 (all of the time). An overall score is calculated as the mean of all 5 items, ranging from 1 to 7; higher scores indicate more severe symptoms. Patients also indicate global quality of life on a 10-point visual analog scale (VAS). The VAS score ranges from 0 (worst possible) to 10 (best possible); lower scores indicate more severe symptoms. Overall and VAS scores were recorded at the preoperative visit and at the 30-day postoperative visit or the postoperative visit closest to this time point.

Statistical Analysis

Statistical analyses were performed using commercial software (Stata/IC 13.1, StataCorp LP, College Station, TX). Distribution and summary statistics were evaluated for descriptive characteristics. Outcome data were examined for normality prior to hypothesis testing. A Wilcoxon signed-rank test was used to compare pre- and post-septoplasty overall and VAS scores. A Mann Whitney U test was used to compare pre- to post-septoplasty change in overall and VAS scores by sex (female vs. male), age (<13 vs. ≥13 years), and surgical approach (open vs. closed). Median and interquartile range are reported unless otherwise indicated. A p-value <0.05 is considered significant.

Results

Descriptive Data

Of the 28 patients who underwent pediatric septoplasty from 2011 to 2014 at Seattle Children's Hospital, 68% (19/28) were male, and 71% (20/28) were 13 years of age or older. Median body-mass index was 20 kilograms per meters² (18, 24). Indications for pediatric septoplasty were either nasal fracture secondary to trauma (64%, 18/28) or nasal obstruction with a deviated nasal septum (36%, 10/28). A minority of patients also had a history of chronic rhinosinusitis (11%, 3/28), allergic rhinitis (11%, 3/28), or obstructive sleep apnea (11%, 3/28). An open approach was employed in 71% (20/28) of patients, a columellar strut was placed in 7% (2/28) of patients, a spreader graft was placed in 54% (15/28) of patients, and inferior turbinate reduction was performed in 18% (5/28) of patients. Median time to follow-up and obtaining of outcome data was 44 days (31, 60).

Outcome Data

The overall score significantly improved from pre- to post-septoplasty (3.5 [2.8, 4.3] to 2.0 [1.4, 2.8], $p<0.001$). Similarly, the VAS score significantly improved from pre- to post-

septoplasty (5.0 [4.0, 6.3] to 8.0 [8.0, 10.0], $p<0.001$). Because both pre- and post-operative outcome data were taken at the same postoperative visit, the “sinus infection” item score was used as an internal control to assess for recall bias. In contrast to the overall score, this “sinus infection” item score was not significantly different between pre- and post-septoplasty, as expected in the absence of significant recall bias.

Table 1 shows subgroup comparisons of pre- and post-septoplasty overall and VAS score changes. The pre- to post-septoplasty overall score improvement was greater in females than males (-1.8 [$-2.6, -1.6$] vs. -1.0 [$-1.6, -0.2$], $p=0.01$). Similarly, the pre- to post-septoplasty VAS score improvement was greater in females than males (5.0 [4.0, 5.0] vs. 3.0 [1.5, 4.0], $p=0.007$). The pre- to post-septoplasty overall and VAS score changes were not significantly different by age (<13 vs. ≥ 13 years) or surgical approach (open vs. closed).

Discussion

The results of this study showed a significant improvement in subjective quality of life outcome measures, SN-5 overall and VAS scores, following pediatric septoplasty. Septoplasty is being increasingly performed in the pediatric population, as a growing amount of data has shown no adverse effects on nasal and facial growth [2–6]. In this study, the clinical indication for performing pediatric septoplasty was significant nasal obstruction primarily due to a deviated nasal septum, which is considered a relative indication [7, 8]. Recent studies have focused on objective outcome measures, but subjective quality of life outcome measures are equally important to assess independently, as they focus on symptoms and may not correlate with objective measures [9, 10]. Only one study has been done using a validated quality of life assessment tool, the NOSE scale, which specifically assesses nasal obstructive symptoms but is validated only in adults, showing significant improvement in NOSE scores following pediatric septoplasty [13]. The results of this study are consistent, further supporting the potential short-term symptomatic benefit of pediatric septoplasty.

There is a need to identify patient characteristics that may contribute to better outcomes. In this study, females experienced significantly greater short-term symptomatic benefit than males, indicating sex may potentially be one of these patient characteristics. Similar short-term improvements were observed between younger and older children, suggesting an equal benefit regardless of age, a proxy for stage of nasal and facial growth. Similar short-term improvements were also observed between open and closed surgical approaches, supporting the use of less invasive approaches when possible as the benefit achieved may be similar.

This is an exploratory study and therefore has several limitations. It is designed as a retrospective case series. Because of the lack of a control group, improvements in quality of life measures cannot be associated specifically to pediatric septoplasty. Surgical procedures were also not standardized across all patients, with graft placement and inferior turbinate reduction performed in some patients but not others. The lack of standardization, however, is a more accurate representation of surgical decision-making when performing septoplasty in the pediatric population. In addition, the sample size, although on par with other studies on pediatric septoplasty, limits the conclusions of the study and the generalizability of the results. The descriptive characteristics of this sample, specifically demographics and relevant

history, must also be considered when extrapolating results to other study populations with differing profiles. Furthermore, pre- and post-operative outcome data were also assessed at the same postoperative visit, potentially introducing recall bias. The SN-5 “sinus infection” item score was used as an internal control to assess for recall bias. Pediatric septoplasty was not expected to impact “sinus infection” symptoms specifically, thus if recall bias was present, this item score was expected to be significantly different pre- and post-septoplasty but was not. Although this does not in any way rule out the possibility of recall bias, it is reassuring and lends more integrity to the results of this study. Lastly, patients were followed only until the 30-day postoperative visit, and therefore, the symptomatic benefit found in this study can only be extrapolated to the short-term.

This retrospective case series is exploratory in nature and has its limitations. The results, however, do suggest that pediatric septoplasty is associated with a short-term symptomatic benefit. This benefit may be greater in female patients and may be achieved even at earlier stages of nasal and facial growth and with less invasive surgical approaches. More scientifically rigorous and long-term studies are needed to truly assess the effect of septoplasty on subjective quality of life outcome measures in the pediatric population.

Acknowledgments

We would like to thank Rose Jones-Goodrich, our research coordinator, for her assistance with administration for this study. Dr. Lee has received support through the National Institutes of Health National Institute on Deafness and Other Communication Disorders T32 DC000018 Research Training Grant.

References

1. Christophel JJ, Gross CW. Pediatric septoplasty. *Otolaryngol Clin North Am*. 2009; 42:287–94. [PubMed: 19328893]
2. El-Hakim H, Crysdale WS, Abdollel M, Farkas LG. A study of anthropometric measures before and after external septoplasty in children: a preliminary study. *Arch Otolaryngol Head Neck Surg*. 2001; 127:1362–6. [PubMed: 11701075]
3. Bejar I, Farkas LG, Messner AH, Crysdale WS. Nasal growth after external septoplasty in children. *Arch Otolaryngol Head Neck Surg*. 1996; 122:816–21. [PubMed: 8703382]
4. Tasca I, Compadretti GC. Nasal growth after pediatric septoplasty at long-term follow-up. *Am J Rhinol Allergy*. 2011; 25:e7–12. [PubMed: 21711962]
5. Walker PJ, Crysdale WS, Farkas LG. External septorhinoplasty in children: Outcome and effect on growth of septal excision and reimplantation. *Arch Otolaryngol Head Neck Surg*. 1993; 119:984–9. [PubMed: 8357599]
6. D’Ascanio L, Lancione C, Pompa G, Rebuffini E, Mansi N, Manzini M. Craniofacial growth in children with nasal septum deviation: a cephalometric comparative study. *Int J Pediatr Otorhinolaryngol*. 2010; 74:1180–3. [PubMed: 20696485]
7. Lawrence R. Pediatric septoplasty: a review of the literature. *Int J Pediatr Otorhinolaryngol*. 2012; 76:1078–81. [PubMed: 22595463]
8. Funamura JL, Sykes JM. Pediatric Septorhinoplasty. *Facial Plast Surg Clin North Am*. 2014; 22:503–508. [PubMed: 25444724]
9. Can IH, Ceylan K, Bayiz U, Olmez A, Samim E. Acoustic rhinometry in the objective evaluation of childhood septoplasties. *Int J Pediatr Otorhinolaryngol*. 2005; 69:445–8. [PubMed: 15763279]
10. Guyatt GH, Feeny DH, Patrick DL. Measuring health-related quality of life. *Ann Intern Med*. 1993; 118:622–9. [PubMed: 8452328]
11. Bae JS, Kim ES, Jang YJ. Treatment outcomes of pediatric rhinoplasty: the Asan Medical Center experience. *Int J Pediatr Otorhinolaryngol*. 2013; 77:1701–10. [PubMed: 23958392]

12. Gandomi B, Bayat A, Kazemei T. Outcomes of septoplasty in young adults: the Nasal Obstruction Septoplasty Effectiveness study. *Am J Otolaryngol*. 2010; 31:189–92. [PubMed: 20015747]
13. Yilmaz MS, Guven M, Akidil O, Kayabasoglu G, Demir D, Mermer H. Does septoplasty improve the quality of life in children? *Int J Pediatr Otorhinolaryngol*. 2014; 78:1274–6. [PubMed: 24880925]
14. 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; 130:157–63. [PubMed: 14990910]
15. Kay DJ, Rosenfeld RM. Quality of life for children with persistent sinonasal symptoms. *Otolaryngol Head Neck Surg*. 2003; 128:17–26. [PubMed: 12574754]
16. Morley AD, Sharp HR. A review of sinonasal outcome scoring systems - which is best? *Clin Otolaryngol*. 2006; 31:103–9. [PubMed: 16620328]

Instructions: Please help us understand the impact of sinus and/or nasal problems on your child's quality of life by checking one box [x] for each question below. Thank you.

SINUS INFECTION: Nasal discharge, bad breath, daytime cough, post-nasal drip, headache, facial pain or head banging. How often a problem for your child during the past 4 weeks?

☐ None of the time	☐ Hardly any time at all	☐ A good part of the time
☐ A small part of the time	☐ Most of the time	
☐ Some of the time	☐ All of the time	

NASAL OBSTRUCTION: Stuffy or blocked nose, nasal congestion, reduced sense of smell, trouble breathing with mouth closed. How often a problem for your child during the past 4 weeks?

☐ None of the time	☐ Hardly any time at all	☐ A good part of the time
☐ A small part of the time	☐ Most of the time	
☐ Some of the time	☐ All of the time	

ALLERGY SYMPTOMS: Sneezing, itchy nose/eyes, need to rub nose/eyes, or watery eyes. How often a problem for your child during the past 4 weeks?

☐ None of the time	☐ Hardly any time at all	☐ A good part of the time
☐ A small part of the time	☐ Most of the time	
☐ Some of the time	☐ All of the time	

EMOTIONAL DISTRESS: Irritable, frustrated, sad, restless, or trouble sleeping. How often a problem for your child during the past 4 weeks because of nose or sinus illness?

☐ None of the time	☐ Hardly any time at all	☐ A good part of the time
☐ A small part of the time	☐ Most of the time	
☐ Some of the time	☐ All of the time	

ACTIVITY LIMITATIONS: Missed school/daycare, lost time with family/friends, unable to do projects. How often a problem for your child during the past 4 weeks because of nose or sinus illness?

☐ None of the time	☐ Hardly any time at all	☐ A good part of the time
☐ A small part of the time	☐ Most of the time	
☐ Some of the time	☐ All of the time	

OVERALL, HOW WOULD YOU RATE YOUR CHILD'S QUALITY OF LIFE AS A RESULT OF NOSE OR SINUS PROBLEMS?
(Circle one number)

Figure 1.
The Sinus and Nasal Quality of Life Survey (SN-5) [15].

Table 1

Pre- to post-septoplasty SN-5 overall and VAS score changes for (A) female vs. male, (B) <13 vs. 13 years of age, and (C) open vs. closed approach (* indicates significance).

(A)	Female (n=9)	Male (n=19)	P-value
SN-5	-1.8 [-2.6, -1.6]	-1.0 [-1.6, -0.2]	0.01*
VAS	5.0 [4.0, 5.0]	3.0 [1.5, 4.0]	0.007*

(B)	<13 years of age (n=8)	13 years of age (n=20)	P-value
SN-5	-1.6 [-2.6, -1.4]	-1.4 [-1.9, -0.4]	0.20
VAS	4.0 [1.8, 4.8]	4.0 [2.0, 5.0]	0.98

(C)	Open approach (n=20)	Closed approach (n=8)	P-value
SN-5	-1.6 [-2.2, -1.1]	-0.6 [-1.9, 0.1]	0.07
VAS	4.0 [2.5, 5.0]	2.5 [1.0, 5.0]	0.39