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ORIGINAL ARTICLE

# Pediatric septoplasty in a tertiary care center: A study on surgical outcomes

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***ABSTRACT***

**Objectives:** In this study, the results of pediatric septoplasty performed at a tertiary care center are presented, and the safety, effectiveness, and complications of the surgery are discussed in comparison with the existing literature.

**Patients and Methods:** A retrospective analysis of medical records was performed for pediatric patients (under 18 years of age) who underwent septoplasty between October 2022 and January 2025. Patients with a history of prior nasal surgery, nasal mass, septal abscess, or cosmetic rhinoplasty were excluded. Data collected included age, sex, comorbidities, surgical indications, operative findings, complications, and follow-up outcomes.

**Results:** In total, 37 cases (24 males, 13 females; mean age: 11.4 ± 3.2 years; range, 0 to 18 years) with nasal obstruction were included in the analysis. Patients were categorized into two groups according to their age: Group 1 (13 males, 3 females; mean age: 8.06 ± 1.39 years; range, 0 to 10 years) and Group 2 (16 males, 5 females; mean age: 14.4 ± 1.67 years; range, 11 to 18 years). Postoperative complications were observed in 13.5% of cases (n = 5), consisting of septal hematoma (n = 1), synechiae (n = 2), and epistaxis (n = 2). Two patients required revision surgery. Comparison of the two age groups revealed no significant differences in complication rates, reported complaints, or follow-up periods ($p > 0.05$). The mean follow-up was 15.1 ± 2.6 months.

**Conclusion:** Pediatric septoplasty can be considered a safe and effective procedure for nasal obstruction when performed with a conservative approach that preserves growth zones. While early surgical intervention does not appear to significantly impact complication rates, long-term studies with larger cohorts are necessary to evaluate potential effects on facial development and quality of life.

***Keywords:*** Nasal obstruction, nasal septum deviation, pediatric, septoplasty.

Septoplasty is a commonly performed surgical intervention aimed at correcting nasal obstruction resulting from a deviated nasal septum. Septal deviation is among the leading pathologies causing nasal obstruction in pediatric patients. Although its prevalence is approximately 55% in the general population, studies have reported an increase in this rate after adolescence.[1] Trauma is the most common cause of septal deviation. Intrauterine and birth-related traumas are generally considered minor and tend to cause mild deviations in the nasal septum, whereas school-age traumas and advancing age are associated with increased severity of the deviation. Additionally, it has been suggested that the likelihood of intrauterine obstruction may increase and symptoms may become more pronounced.[2]

There are still some debates regarding the indications for septoplasty in the pediatric population.

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Clinical indications for pediatric septoplasty are generally classified into absolute and relative categories. Septoplasty is absolutely indicated in cases of septal hematoma or abscess, significant trauma-induced nasoseptal deformities, congenital malformations such as cleft lip and/or palate, and intranasal tumors. Progressive nasal airway obstruction secondary to growth-related deformities is regarded as a relative indication.[3] Damage to the cartilages vital to nasal structural development during septoplasty raises concerns about its impact on normal facial development. Additionally, the rapid growth phase of the nose following early adolescence and the completion of nasal growth around the age of 15-16 have sparked discussions regarding the timing of the procedure.[4]

There remains no consensus within the literature regarding the ideal timing of pediatric septoplasty; many authors advocate for correcting septal deviation when the deformity leads to nasal obstructions, mouth breathing, or other respiratory issues in pediatric patients as young as six years of age.[3,5-7] These authors highlight the importance of preserving the connection between the nasal cartilage and the perpendicular plate, given its critical role in the development of the nasal septum and dorsal structure. In addition, performing septoplasty surgery in early childhood may contribute to the prevention of progressive facial growth disorders.[7] Although studies on pediatric septoplasty have primarily centered on the objective analysis of its effects on facial and nasal growth centers postoperatively, many studies conducted on adult patients using quality of life (QoL) scales have shown improvements in QoL during the postoperative period. In the literature, there are also studies focusing on disease-specific QoL outcomes following septoplasty in pediatric patients, with the Nose Obstruction Symptom Evaluation (NOSE) scale being commonly used in these studies. Recent studies have reported disease-specific improvements following pediatric septoplasty, supporting its clinical benefit in the pediatric patient.[8,9]

Septal surgery in pediatric patients is not among the most commonly performed procedures today, and due to the limited number of case series in the literature, there is insufficient research on the complications that may arise postoperatively. This study aims to present our clinical experience regarding the demographic characteristics, age range, management based on intraoperative findings, long-term follow-up, and complication management of pediatric patients diagnosed with septal deviation and undergoing pediatric septoplasty at a tertiary care center.

## PATIENTS AND METHODS

This study was conducted retrospectively at Ankara Etlik City Hospital, Department of Otorhinolaryngology, between October 2022 and January 2025. Patient files were retrospectively reviewed to collect data on age, sex, body mass index, comorbidities, surgical indications, intraoperative findings, surgical techniques used, surgeon experience, length of hospital stay, and postoperative findings, including complications. All patients under the age of 18 who underwent septoplasty at our clinic were included in the study. Patients with a history of nasal surgery, those who underwent aesthetic septorhinoplasty, patients with septal abscess or nasal masses who underwent concomitant septoplasty, patients over the age of 18, and those who did not attend regular follow-up visits after surgery were excluded. All participants and their parents provided both verbal and written informed consent to participate in the study. The study protocol was approved by the Clinical Research Ethics Committee (Date: 28.05.2025, No.: BADEK1-2025-199). The study was conducted in accordance with the Helsinki Declaration.

### Preoperative evaluation

The primary complaint of the patients upon initial presentation was nasal obstruction. All patients underwent comprehensive clinical evaluation, including detailed medical history and endoscopic nasal examination Additional causes of nasal obstruction such as adenoid hypertrophy, turbinate hypertrophy related to allergic rhinitis, nasal polyps, and sinonasal masses were excluded based on clinical and endoscopic findings. Imaging studies were not routinely performed unless clinically indicated.

### Operative procedure

All patients underwent septoplasty, which was carried out by the same two surgeons under general anesthesia, employing the same surgical technique. For local hemostasis and hydrodissection, 40 mg of lidocaine hydrochloride (20 mg/mL) combined with epinephrine (0.0125 mg/mL) was diluted at a 1:5 ratio and administered into the subperichondrial space. A hemitransfixion incision was preferred for correcting the septal deviations. Subperichondrial dissection was carried out bilaterally, reaching the area of the septal curvature. Excision was performed on the deviated portion of bone or cartilage. These procedures were specifically conducted in pediatric septoplasty,

ensuring that the sphenoethmoidal junction was not damaged, with particular attention paid to not separating the septal cartilage from the perpendicular plate. In cases of caudal septal deviation, excessive cartilage resection was avoided. The excised cartilage was repaired and returned to the mucosal planes. Hemostasis was achieved, and the transfixion incision was closed with a 4.0 absorbable suture (Vicryl Rapid; Ethicon Inc., Somerville, NJ, USA). Silicone splints (Doyle splint, Xomed, Jacksonville, FL, USA) were placed in both nasal cavities, secured to the septum and to each other with a 3.0 absorbable suture (Vicryl; Ethicon Inc., Somerville, NJ, USA) and removed on the second postoperative day.

All procedures were performed under general anesthesia by two otolaryngologists, each with over five years of experience in septal surgery. Postoperative follow-ups were conducted at one week, one month, and six months, and any complications or cases requiring revision surgery were identified. In addition to the overall patient results, the entire group was divided into two age groups: those under 10 years and those over 10 years. This age range was selected to compare the early age group (Group 1) and the older age group (Group 2) during the second rapid growth phase and pre-puberty.

**Statistical analysis**

Statistical analyses were performed using IBM SPSS Statistics for Windows, version 21.0 (IBM, Armonk, NY, USA). Normally distributed continuous variables were expressed as mean ± standard deviation (SD), while non-normally distributed variables were summarized as median (min-max). Comparisons between the two age groups (≤ 10 years and > 10 years) were conducted using the Student's t-test for normally distributed continuous variables and the Mann-Whitney U test for non-normally distributed continuous variables. Categorical variables were compared using Fisher's exact test, given the small cell counts in several comparisons.

All statistical tests were two-tailed, and exact p-values were reported. A $p$-value of < 0.05 was considered statistically significant. Due to the retrospective design and limited sample size, a priori power analysis and effect size estimation were not performed, and the results should be interpreted with caution regarding small between-group differences.

## RESULTS

A total of 37 patients (24 males, 13 females; mean age: 11.4 ± 3.2 years; range, 0 to 18 years) with nasal obstruction were included in the study. Participants were categorized into two groups according to their age: Group 1 (13 males, 3 females; mean age: 8.06 ± 1.39 years; range, 0 to 10 years) and Group 2 (16 males, 5 females; mean age: 14.4 ± 1.67 years; range, 11 to 18 years). Two patients had additional complaints of epistaxis, and one patient complained of headaches. A history of previous trauma was found in 22 (59%) of the patients, and 10 (27%) had a history of allergic rhinitis. Postoperative follow-up was conducted for all patients for a minimum of six months, with an average follow-up period of 15.1 ± 2.6 months, as shown in Table 1.

During the follow-up, complications were detected in a total of five patients (13.5%). One patient had a septal hematoma, two patients developed synechiae, and two patients experienced epistaxis. Two patients were reoperated due to hematoma and synechiae, while one patient with epistaxis was hospitalized after tampon placement. No further complications were observed in the reoperated patients during follow-up. The patient hospitalized for epistaxis was discharged after two days of hospitalization. When comparing the general characteristics of the patients between the age groups, it was found that the sex, complaint symptoms, and follow-up durations were homogeneous between Group 1 and Group 2. However, a significantly higher history of trauma was observed in Group 2 patients. Additionally, no statistically significant difference in

**Table 1.** Patient demographics (n = 37)

| Variables | n | % | Mean ± SD |
|---|---|---|---|
| Age (year) | | | 11.4 ± 3.2 |
| Sex | | | |
| Male | 24 | 64.8 | |
| Female | 13 | 35.2 | |
| Primary complaint | | | |
| Nasal obstruction | 37 | 100 | |
| Epistaxis | 2 | 5.4 | |
| Headache | 1 | 2.7 | |
| History of nasal trauma | 22 | 59.5 | |
| History of allergic rhinitis | 10 | 27.0 | |
| Postoperative complications | | | |
| Septal hematoma | 1 | 2.7 | |
| Synechiae | 2 | 5.4 | |
| Epistaxis | 2 | 5.4 | |
| Revision surgery required | 2 | 5.4 | |
| Follow-up duration (months) | | | 15.1 ± 2.6 |

SD, standard deviation.

**Table 2.** Comparison of clinical characteristics and outcomes between age groups

| | Group 1 ≤ 10 years (n = 16) | | | Group 2 > 10 years (n = 21) | | | |
|---|---|---|---|---|---|---|---|
| Variables | n | % | Mean ± SD | n | % | Mean ± SD | *p* |
| Age (year) | | | 8.06 ± 1.39 | | | 14.4 ± 1.67 | - |
| Sex | | | | | | | 0.74* |
| Male | 13 | 81.3 | | 16 | 76.2 | | |
| Female | 3 | 18.7 | | 5 | 23.8 | | |
| History of nasal trauma | 8 | 50.0 | | 20 | 95.2 | | **0.006*** |
| History of allergic rhinitis | 6 | 37.5 | | 9 | 42.9 | | 0.74* |
| Postoperative complications (overall) | 3 | 18.7 | | 2 | 9.5 | | 0.39* |
| Septal hematoma | 1 | 6.3 | | 0 | 0 | | |
| Synechiae | 1 | 6.3 | | 1 | 4.8 | | |
| Epistaxis | 1 | 6.3 | | 1 | 4.8 | | |
| Revision surgery | 1 | 6.3 | | 1 | 4.8 | | 1.00* |
| Follow-up duration (months) | | | 14.8 ± 2.5 | | | 15.3 ± 2.7 | 0.56† |

SD, standard deviation; Statistical significance was defined as $p < 0.05$.

complications was noted between the two groups, as shown in Table 2.

## DISCUSSION

In pediatric patients, conservative management for septal deviation causing chronic nasal obstruction is often limited in its effectiveness, and septoplasty stands out as an effective treatment option. In this study, the demographic characteristics, intraoperative findings, and postoperative outcomes of pediatric patients undergoing septoplasty were examined, and differences in complications and follow-up findings between the younger age groups were investigated.

Pediatric septoplasty is typically performed to correct septal deviation causing nasal obstruction. However, there are some debates in the literature regarding the timing, indications, type of anesthesia, surgical techniques, and potential complications of pediatric septoplasty. The classic indications for pediatric septoplasty include nasal tumors, septal abscess, and congenital cleft lip and palate anomalies, which often require combined approaches. While there is no definitive indication for nasal obstruction in the literature, it is the most frequent reason for surgery.[7] In our study, all of our patients presented with complaints of nasal obstruction, and in line with the literature, nasal obstruction was found to be the primary indication for surgery. Regarding anesthesia, in compliant patients, septoplasty can be safely performed under sedation with local anesthesia. However, although some studies suggest local anesthesia may be administered in a few compliant pediatric patients, general anesthesia is most often preferred.[10] In our study, all patients were operated on under general anesthesia.

Complications that may develop after septoplasty include pain, synechiae, bleeding, cerebrospinal fluid leakage, septal perforation, saddle nose deformity, and orbital or maxillary sinus wall fractures.[11] A complication specific to the pediatric population that may develop in the long term is midface growth deformities. In a study that included 93 pediatric patients, the complication rate was found to be 4.5%, with three patients requiring revision septoplasty due to persistent residual deviation.[12] In another study, the revision rate for pediatric septoplasty was 2.9%, which was higher than the 1.1% observed in the adult population. In addition, it has been reported in the literature that pediatric septoplasty revision cases are more frequently associated with the need for open septorhinoplasty.[13] In line with the literature, our study observed similar complication rates after pediatric septoplasty, with a septal hematoma rate of 2.7%, synechiae in 5.4%, and epistaxis in 5.4%. Two patients were reoperated due to complications.

In our study, patients were divided into two groups: under 10 years (Group 1) and over 10 years (Group 2). There were no significant differences between the groups in terms of age, sex, complaints, and follow-up

periods. This result is consistent with some studies in the literature, suggesting that the effect of age on pediatric septoplasty outcomes is limited. Although trauma history was significantly more common in older children, this did not translate into higher postoperative complication rates, suggesting that trauma-related deviations can be managed safely with appropriate surgical technique. However, with increasing age, developmental and growth changes in the nasal structure can affect the severity of septal deviation and may guide the timing of surgery. There are limited studies in the literature that separately evaluate age groups in pediatric septoplasty. For example, in a study by Bishop et al.[14] that evaluated patients under and over the age of 14, no significant differences in complications were found between the two groups. Similarly, in our study, no statistically significant difference in complications was observed between the two groups.

The impact of pediatric septoplasty on QoL has been addressed in many studies in recent years. Numerous studies in the literature have examined QoL after septoplasty using objective surveys.[9,15,16] Recent studies in the literature emphasize that improvements in QoL measures following septum surgery in children persist for at least one year after the operation.[16] For instance, in parallel with the findings of Manteghi et al.,[9] a significant improvement in patients' respiratory problems and overall QoL was noted after septoplasty. Additionally, there are many studies in the literature that have investigated long-term follow-up with anthropometric measurements.[5,17] A review published on this topic divided follow-up periods into groups of > 10 years, 5-10 years, and < 5 years. These studies on long-term facial development measurements concluded that septoplasty did not adversely affect the development of the nose and face.[18] In our study, the average follow-up period was 15.1 months, and anthropometric measurements were not used. Further studies with much longer follow-up periods and including quantitative anthropometric measurements are needed to determine the long-term adverse effects of pediatric septoplasty on midline development.

The main limitations of this study include the retrospective design and potential differences between age groups. Pubertal status was not assessed, which may introduce residual confounding in age-based comparisons. In addition, subclassification to indicate the severity and location of septal deviation was not used. All surgeries were performed by the same two experienced surgeons using the same technique, which minimized inter-operator variability; however, due to the limited sample size, advanced mixed-effects modeling was not possible, which is one of the statistical limitations of our study. Furthermore, long-term QoL outcomes were not evaluated. Although age groups were based on the pubertal transition, anatomical and developmental differences may still exist, particularly in the younger group. Future studies could consider more detailed age-based subgroups. Moreover, analyzing long-term outcomes based on septoplasty type, surgical indication, or severity of septal deviation, with a larger sample size, could provide valuable insights.

In conclusion, the results obtained in this study suggest that, contrary to concerns, pediatric septoplasty can be considered a safe surgical procedure when performed with a protective approach. Specifically, when septoplasty is done on areas of the septum with growth activity, such as the bony septum and cartilage-bone junction, it is crucial to avoid removing bone tissue whenever possible. If bone correction is necessary, the excised tissue should be replaced after correction. However, to better understand complication rates and long-term effects, prospective studies with larger sample sizes are needed. Additionally, long-term studies examining the impact of surgical techniques and timing on children's growth and development could help fill the knowledge gaps in pediatric septoplasty.

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