

ORİJİNAL ARAŞTIRMA ORIGINAL RESEARCH

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# Retrospective Analysis of Children Undergoing Revision Adenoidectomy

## Revizyon Adenoidektomi Ameliyatı Yapılan Çocukların Retrospektif Analizi

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**ABSTRACT Objective:** The aim of this study is to assess revision adenoidectomy rates in our pediatric patient population, and to identify contributing factors. **Material and Methods:** A retrospective review was made of the medical and surgical records of patients aged 0-18 years who underwent adenoidectomy using the blind curettage method, between March 2013 and March 2019 in our department. Out of the 1.841 patients who underwent adenoidectomy (n:629), adenoidectomy and ventilation tube insertion (n:403), adenotonsillectomy (n:752), adenotonsillectomy and ventilation tube insertion (n:57), 31 required revision adenoidectomy procedure. Thirty-one patients were examined in the study. Four of 31 patients underwent second revision adenoidectomy. The outcomes were investigated, including the initial surgery, first and second revision surgery procedure types, as well as data on gender, age at the time of the procedures, and the time interval between the procedures, and medical diagnoses such as asthma, allergic rhinitis and gastroesophageal reflux. **Results:** Of the 1.841 patients who underwent initial adenoidectomy, 31 (1.68%) underwent revision adenoidectomy. Among these patients, four (0.21%) underwent a second revision adenoidectomy. Of the patients, 45.2% (n=14) were female and 54.8% (n=17) were male. The age of the children included in the study at the time of initial adenoidectomy, first and second revision adenoidectomy were 5.91±1.89, 7.36±1.82, and 8.47±1.89 years respectively. The mean interval between the initial adenoidectomy and the first revision adenoidectomy was 1.43±0.69 years. During the initial adenoidectomy procedure, children underwent adenoidectomy in 4 cases (12.9%), adenoidectomy and ventilation tube insertion in 22 cases (%71), adenotonsillectomy in 3 cases (9.6%), adenotonsillectomy and ventilation tube insertion in 2 cases (6.5%). During the first revision surgery, children underwent adenoidectomy in 3 cases (9.7%), adenoidectomy and tube insertion in 26 cases (83.9%), adenotonsillectomy and tube insertion in 2 cases (6.5%). All of the children who underwent second revision surgery underwent an adenoidectomy and tube procedure. Of the children, 16.1% (n=5) had allergic asthma, 80.6% (n=25) had allergic rhinitis and 3.2% (n=1) had reflux. **Conclusion:** In the present study, the incidence of revision adenoidectomy was 1.68 %. Of the patients who underwent revision adenoidectomy, 83.9% were patients with ventilation tubes due to otitis media with effusion.

**ÖZET Amaç:** Bu çalışmanın amacı çocuk hasta popülasyonumuzdaki revizyon adenoidektomi oranlarını değerlendirmek ve bu duruma katkıda bulunan faktörleri tespit etmektir. **Gereç ve Yöntemler:** Kliniğimizde Mart 2013-Mart 2019 tarihleri arasında kör küretaj yöntemiyle adenoidektomi yapılan 0-18 yaşları arasındaki hastaların tıbbi ve cerrahi kayıtları geriye dönük olarak incelendi. İlk cerrahi olarak adenoidektomi (629 hasta), adenoidektomi ve ventilasyon tüpü yerleştirme (403 hasta), adenotonsillektomi (752 hasta), adenotonsillektomi ve ventilasyon tüpü yerleştirme (57 hasta) ameliyatları geçiren 1.841 hastanın 31'inde revizyon adenoidektomi prosedürünün yapıldığı görüldü. Otuz bir hasta çalışmada incelendi. Revizyon adenoidektomi yapılan 31 hastanın 4'üne ikinci revizyon adenoidektomi işlemi yapıldığı görüldü. Çalışmada ilk cerrahi, birinci ve ikinci revizyon cerrahi prosedürleri, cinsiyet, işlem sırasındaki yaş ve prosedürler arasındaki zaman aralığı, astım, alerjik rinit ve gastroözofageal reflü gibi ek tıbbi teşhisler hakkındaki veriler incelendi. **Bulgular:** Adenoidektomi yapılan 1.841 hastanın 31'ine (%1,68) revizyon adenoidektomi yapıldığı saptandı. Bu hastalardan dördü (%0,21) ikinci revizyon adenoidektomi geçirdi. Hastaların %45,2'si (n=14) kız, %54,8'i (n=17) erkekti. Çalışmaya katılan çocukların ilk adenoidektomi, birinci ve ikinci revizyon adenoidektomi esnasındaki yaşları sırasıyla 5,91±1,89, 7,36±1,82 ve 8,47±1,89 yıl idi. İlk adenoidektomi ile birinci revizyon adenoidektomi ameliyatı arasındaki ortalama zaman aralığı 1,43±0,69 yıldır. İlk adenoidektomi işlemi sırasında çocuklara 4 olguda (%12,9) adenoidektomi, 22 olguda (%71) adenoidektomi ve ventilasyon tüpü yerleştirme, 3 olguda (%9,6) adenotonsillektomi, 2 olguda (%6,5) adenotonsillektomi ve ventilasyon tüpü yerleştirme uygulandı. Birinci revizyon adenoidektomi sırasında çocuklara 3 olguda (%9,7) adenoidektomi, 26 olguda (%83,9) adenoidektomi ve tüp yerleştirme, 2 olguda (%6,5) adenotonsillektomi ve tüp yerleştirme uygulandı. İkinci revizyon ameliyatı geçiren tüm çocuklara adenoidektomi ve tüp yerleştirme işlemi uygulandı. Çocukların %16,1'inde (n=5) alerjik astım, %80,6'ında (n=25) alerjik rinit ve %3,2'sinde (n=1) reflü vardı. **Sonuç:** Bu çalışmada revizyon adenoidektomi insidansı %1,68 olarak bulundu. Revizyon adenoidektomi ameliyatı geçiren hastaların %83,9'u efüzyonlu otitis media nedeniyle ventilasyon tüpü yerleştirilen hastalardı.

**Keywords:** Adenoidectomy; child; revision; adenoids

**Anahtar Kelimeler:** Adenoidektomi; çocuk; revizyon; adenoidler

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Adenoidectomy is one of the most common surgical procedure in children.<sup>1</sup> Surgery is indicated in the presence of upper airway resistance syndrome, obstructive sleep apnea, chronic adenoiditis, recurrent rhinosinusitis, recurrent otitis media and chronic otitis media with effusion.<sup>2,3</sup> When necessary, an adenoidectomy can be performed together with a tonsillectomy and ventilation tube application.<sup>4,5</sup>

Adenoidectomy has a positive effect on symptoms and quality of life in 70-100% of patients, although adenoid regrowth or hypertrophy of the residual adenoid tissue can occur in some patients, leading to a need for revision adenoidectomy.<sup>2,3,6,7</sup> Studies have been conducted to identify the factors contributing to the need for revision surgery, in which the male gender, early age at the initial procedure, frequent use of preoperative antibiotics, indications for surgery, and conditions such as allergic rhinitis, asthma and gastroesophageal reflux (GERD) have been shown to be associated with revision adenoidectomy.<sup>1,3,7-10</sup> There is a need for further studies regarding this issue for the purpose of accurate family information and to avoid repeat surgeries.

The aim in this study is to assess revision adenoidectomy rates in our pediatric patient population, and to identify contributing factors to this situation.

## MATERIAL AND METHODS

The study was approved by the Clinical Research Ethics Committee, University of Health Ministry, Union General Secretariat of Public Hospitals (Approval number: 2019.03.47). A retrospective review was made of the medical and surgical records of patients aged 0-18 years who underwent an adenoidectomy between March 2013 and March 2019 in our department. A search of patient records was made, specifically for operation codes 602380 (adenoidectomy), 602390 (adenoidectomy with ventilation tube insertion), 603090 (adenoidectomy with tonsillectomy) and 603100 (adenoidectomy with tonsillectomy and ventilation tube insertion).

All patients were operated by one of six otolaryngologists, who all performed the adenoidectomy using the blind curettage approach. After the administration of anesthesia, the patient was positioned in

the supine position with the neck extended, and a Boyle-Davis mouth gag was inserted. The bulk of the adenoid tissue was felt digitally by the surgeon, and then removed blindly with several passes of the curette. Hemostasis was achieved using plain packs. All surgeons complete the surgery after checking the nasopharynx with a mirror.

Out of the 1.841 patients identified (adenoidectomy (n=629), adenoidectomy and ventilation tube insertion (n=403), adenotonsillectomy (n=752), adenotonsillectomy and ventilation tube insertion (n=57)), 31 required a revision adenoidectomy for a recurrence of the symptoms. Four of 31 patients who underwent revision adenoidectomy underwent second revision adenoidectomy. Details of these patients were obtained from the operating theatre and outpatient records were reviewed. The outcomes were investigated, including the initial surgery, first and second revision surgery types, as well as data on gender, age at the time of the procedures, and the time interval between the procedures, and medical diagnoses such as asthma, allergic rhinitis and gastroesophageal reflux. The diagnosis of allergic asthma was made by child allergy department and the diagnosis of gastroesophageal reflux was made by pediatric gastroenterology. Allergic rhinitis cases are diagnosed by ear nose and throat, some of them with child allergy department.

## STATISTICAL ANALYSIS

The statistical analysis was performed using NCSS (Number Cruncher Statistical System) 2007 (Kaysville, Utah, USA) software. Descriptive statistics (mean, standard deviation, median, frequency, percentage, minimum, maximum) were used to evaluate the study data. A Mann-Whitney U test was applied to compare the abnormally distributed quantitative variables between the two groups. A Fisher-Freeman-Halton exact test was used to compare the qualitative data. The level of statistical significance was accepted as  $p < 0.05$ .

## RESULTS

This study included 1.841 patients who underwent adenoidectomy (n: 629), adenoidectomy and ventilation tube insertion (n: 403), adenotonsillectomy (n:

752), adenotonsillectomy and ventilation tube insertion (n: 57) in the initial surgery between March 2013 and March 2019. Out of 1841 patients, 31 patients (1.68%) required revision adenoidectomy and they were examined in the study. Four (0.21%) of 31 patients underwent second revision adenoidectomy.

Of the 31 patients undergoing a revision adenoidectomy, 45.2% (n=14) were female and 54.8% (n=17) were male. The age of the children included in the study at the time of initial adenoidectomy varied between 2.5 and 10.16 years, with a mean age of  $5.91 \pm 1.89$  years. The age at the first revision adenoidectomy varied between 4 and 11.25 years, with a mean age of  $7.36 \pm 1.82$  years, and the age at the second revision adenoidectomy varied between 7.16 and 11.25 years, with a mean age of  $8.47 \pm 1.89$  years (Table 1). The mean interval between the initial adenoidectomy and the first revision adenoidectomy was  $1.43 \pm 0.69$  years.

In the initial surgery of 31 patients, children underwent adenoidectomy in 4 cases (12.9%), ade-

noidectomy and ventilation tube insertion in 22 cases (71%), adenotonsillectomy in 3 cases (9.6%), adenotonsillectomy and ventilation tube insertion in 2 cases (6.5%). In the first revision surgery, children underwent adenoidectomy in 3 cases (9.7%), adenoidectomy and tube insertion in 26 cases (83.9%), adenotonsillectomy and ventilation tube insertion in 2 cases (6.5%). All of the children (n:4) who underwent second revision surgery underwent an adenoidectomy and ventilation tube insertion procedure (Table 1).

Table 2 shows the distribution of surgical procedures performed in cases undergoing an initial and a first revision surgery. Among the four patients who underwent second revision adenoidectomy, two of the children underwent two previous adenoidectomy and ventilation tube insertion procedures. One of these patients had an adenoidectomy and then an adenotonsillectomy, respectively, while the other underwent an adenotonsillectomy, and then an adenoidectomy and ventilation tube insertion, respectively.

TABLE 1: Distribution of descriptive statistics.		
Gender	Female	14 (45.2)
	Male	17 (54.8)
Age at initial surgery (years)	Min-Max (Median)	2.50-10.16 (6)
	Mean $\pm$ SD	$5.91 \pm 1.89$
Type of initial surgery	Adenoidectomy	4 (12.9)
	Adenoidectomy + VTI	22 (71.0)
	Adenotonsillectomy	3 (9.6)
	Adenotonsillectomy + VTI	2 (6.5)
Age at first revision surgery (years)	Min-Max (Median)	4-11.25 (7)
	Mean $\pm$ SD	$7.36 \pm 1.82$
Type of first revision surgery	Adenoidectomy	3 (9.7)
	Adenoidectomy + VTI	26 (83.9)
	Adenotonsillectomy + VTI	2 (6.5)
Age at second revision surgery (years)	Min-Max (Median)	7.16-11.25 (8)
	Mean $\pm$ SD	$8.47 \pm 1.89$
Type of second revision surgery	Adenoidectomy + VTI	4 (100.0)
Allergic asthma	No	26 (83.9)
	Yes	5 (16.1)
Allergic rhinitis	No	6 (19.4)
	Yes	25 (80.6)
Reflux	No	30 (96.8)
	Yes	1 (3.2)

VTI: Ventilation tube insertion.

**TABLE 2:** Initial and first revision surgery treatments.

		Initial surgery			
		Adenoidectomy	Adenoidectomy+ VTI	Adenotonsillectomy	Adenotonsillectomy + VTI
First revision surgery	Adenoidectomy (n=3)	1	1	1	0
	Adenoidectomy+ VTI (n=26)	2	20	2	2
	Adenotonsillectomy + VTI (n=2)	1	1	0	0
Total		4	22	3	2

VTI: Ventilation tube insertion.

**TABLE 3:** Evaluation of age (years) at initial and first revision surgery by gender.

		Gender		Test value
		Female (n=14)	Male (n=17)	p
Age at initial surgery	Min-Max (Median)	2.5-7.83 (5)	3.58-10.16 (7)	Z:-1.608
	Mean±SD	5.25±1.57	6.45±2	<sup>b</sup> 0.108
Age at first revision surgery	Min-Max (Median)	4-10.75 (6)	5.08-11.25 (7)	Z:-1.390
	Mean±SD	6.89±1.9	7.75±1.72	<sup>b</sup> 0.164
Interval between two surgeries	Min-Max (Median)	0.58-2.91 (2)	0.25-3.08 (1)	Z:-1.554
	Mean±SD	1.63±0.67	1.27±0.71	<sup>b</sup> 0.120

<sup>b</sup>Mann-Whitney U Test.**TABLE 4:** Evaluation of ages (years) at initial and first revision surgery by presence of allergic asthma.

		Allergic asthma		Test value
		None (n=26)	Yes (n=5)	p
Age at initial surgery	Min-Max (Median)	2.5-10.16 (6)	3.58-7.33 (4)	Z:-1.585
	Mean±SD	6.12±1.9	4.81±1.54	<sup>b</sup> 0.113
Age at the first revision surgery	Min-Max (Median)	4-11.25 (7)	5.66-9.5(6)	Z:-0.914
	Mean±SD	7.46±1.88	6.83±1.54	<sup>b</sup> 0.361
Interval between two surgeries	Min-Max (Median)	0.25-2.91 (1)	1.16-3.08 (2)	Z:-1.994
	Mean±SD	1.32±0.66	2.01±0.69	<sup>b</sup> 0.046*

<sup>b</sup>Mann-Whitney U Test, \*p<0.05.

There was no statistically significant difference between the ages of initial and first revision adenoidectomy in terms of gender ( $p>0.05$ ). By gender, no statistically significant difference was identified in terms of the time interval between the initial and first revision adenoidectomy ( $p>0.05$ ) (Table 3).

Of the children, 16.1% (n=5) had allergic asthma, 80.6% (n=25) had allergic rhinitis and 3.2% (n=1) had reflux (Table 1). There was no statistically significant difference in the age of initial and first revision adenoidectomy between children with and without allergic rhinitis and asthma ( $p>0.05$ ). Ac-

cording to the presence of allergic rhinitis, there was no statistically significant difference in the time interval between the initial and the first revision adenoidectomy ( $p>0.05$ ). The time interval between the initial and the first revision adenoidectomy of the children with allergic asthma was found to be statistically significantly higher than in those without allergic asthma ( $p=0.046$ ;  $p<0.05$ ) (Table 4).

## DISCUSSION

A symptomatic re-growth of the adenoid may occur following an adenoidectomy and revision surgery

may arise. There are investigations in literature about revision adenoidectomy and the etiological factors contributing to the condition.<sup>7</sup> The literature revealed incidences of revision adenoidectomy of 0.55%, 1.3%, 1.6, 1.95, 1.98, 2.5 and 2.9.<sup>1-3,7-10</sup> The revision adenoidectomy rate in the present study was established as 1.68%, which is consistent with literature. The study by Thomas et al. established a revision adenoidectomy incidence of 9%, which is higher than that reported in literature.<sup>11</sup>

The present study examined the average ages at the time of the initial, the first revision and the second revision adenoidectomy surgeries, and found them to be 5.9 years, 7.4 years and 8.5 years, respectively. The average time interval between the initial and the first revision adenoidectomy was 1.6 years in the female patients and 1.3 years in male patients, indicating no statistical difference between genders. The average age at the time of the initial adenoidectomy has been reported at 3.6, 5.2, 5.7 and 6.7 in literature, and concurs with the findings of the present study.<sup>3,7-9</sup> Monroy et al. observed the symptoms of adenoid re-growth on average at 7.8 years of age.<sup>3</sup> Lee et al. established that the age of initial adenoidectomy was performed mostly between the ages of 4 and 6, in addition they detected the highest incidence of revision surgery was in children under 3 years. The authors observed a decreasing incidence of revision surgery with increasing age at the time of the primary adenoidectomy.<sup>10</sup> Duval et al. found that being under 5 years of age during the initial surgery was an important risk factor.<sup>12</sup> Dearing et al. found that the age at the time of the initial procedure being earlier than 4 years old was a risk factor for revision adenoidectomy. The authors attributed this to the fact that the surgeons had to perform more conservative surgery in order not to damage the surrounding tissues due to the small size of the nasopharynx in small children, and also to the high activity of the immune system at such ages and the predisposition to recurrent otitis media in such period.<sup>7</sup> In contrast to these studies, Monroy et al. identified no significant association between the age at the time of the initial adenoidectomy and the need for revision adenoidectomy.<sup>3</sup> The time interval between the initial adenoidectomy and the revision adenoidectomy was detected 3.5 years by

Johston et al. and 4.2 years by Monroy et al., while in our study, revision surgery was performed in a shorter period (1.4 years).<sup>3,8</sup> In the present study, the ratio of female to male patients undergoing revision adenoidectomy were very similar, and no difference was noted in the initial and the first revision surgery treatments by gender. Lee et al. found that in addition to early age, male sex was also associated with revision surgery.<sup>10</sup>

In the present study when we examined the indications of the initial and the first revision surgery, we found that the most common indication was otitis media with effusion and therefore ventilation tube insertion was the most common additional surgery. The four patients who underwent second revision adenoidectomy were all diagnosed with otitis media with effusion, and underwent an adenoidectomy along with ventilation tube insertion. The 2016 American Academy of Otolaryngology-Head and Neck Surgery Foundation (AAO-HNSF) guidelines recommended tympanostomy tubes, adenoidectomy or both for the treatment of children aged 4 and above who have otitis media with effusion.<sup>13</sup> In a review of literature investigating indications of patients undergoing revision adenoidectomy, it was ascertained that the incidence of revision adenoidectomy was higher in patients with ear-related indications, which is in line with the present study.<sup>7-10</sup> In a study by Dohs et al., revision surgery was performed on 48 out of 53 revision adenoidectomy patients due to recurrent glue ear.<sup>9</sup>

Literature research indicated the presence of gastroesophageal reflux, allergic rhinitis and asthma as the risk factors for patients who underwent revision adenoidectomy.<sup>7,8,14</sup> The study by Monroy et al. found a high rate of extraesophageal reflux in patients who underwent a revision adenoidectomy.<sup>3</sup> Carr et al. identified gastroesophageal reflux in 88% of the children aged  $\leq 1$ , and in 32% of the children aged  $> 1$ , and suggested that gastroesophageal reflux should be considered in symptomatic adenoid re-growth in patients aged  $\leq 1$ .<sup>14</sup> Likewise, the present study examined the presence of GERD, allergic rhinitis and asthma in study patients, and found GERD in only one (3%) patient, while 81% had allergic rhinitis and 16% had asthma. It was established that allergic



rhinitis and asthma had no effect on the distribution of indications for surgery or the age of the procedure. However, it was found that the time interval between two procedures was significantly longer in children diagnosed with asthma than in those without asthma. Although the procedures were performed at a hospital with tertiary pediatric clinics, this may be due to the fact that the study surgeons wanted to delay revision surgery as much as possible by prioritizing medical treatments, as children with asthma are considered a high-risk group for operations.

Several adenoidectomy approaches have been described including electrocautery, coblator, microdebrider and curettage with adenotomes.<sup>7</sup> In the present study, all cases underwent a blind curettage with adenotomes procedure and controlling by mirror. The blind curettage technique has been said to result in the re-growth of the adenoid.<sup>15</sup> A study by Dearking et al. comparing curettage with other techniques could find no significant difference in revision rates.<sup>7</sup> The revision rates reported in our study are similar to those reported in literature.

Our study is limited by its retrospective investigation of the patients' clinic admissions and the records of surgical procedures. The study included only patients who applied to our clinics for revision surgery, although some patients may have been operated on outside our hospital. However, our hospital is usually the first choice for children in the region due to its tertiary pediatric clinic, and so it would be unlikely that families would choose to refer to other centers. In addition, the lack of information about adenoid

dimensions in the first and revision surgeries of the patients was another limiting feature of our study.

## CONCLUSION

In the present study, adenoidectomies were performed on all patients using the blind curettage method, and the incidence of revision adenoidectomy was found to be 1.68%. Of the patients who underwent revision adenoidectomy, 83.9% were patients with ventilation tubes due to otitis media with effusion.

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### Conflict of Interest

*No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.*

### Authorship Contributions

**Idea/Concept:** Selin Üstün Bezgin; **Design:** Selin Üstün Bezgin; **Control/Supervision:** Selin Üstün Bezgin, Taliye Çakabay; **Data Collection and/or Processing:** Selin Üstün Bezgin, Taliye Çakabay, Murat Koçyiğit, Havva Duru İpek, Safiye Giran Örtekin; **Analysis and/or Interpretation:** Selin Üstün Bezgin; **Literature Review:** Selin Üstün Bezgin; **Writing the Article:** Selin Üstün Bezgin; **Critical Review:** Selin Üstün Bezgin, Taliye Çakabay.

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