



# Does Actinomyces Have Any Role in Tonsillar Diseases in Children?

## Aktinomycesin Çocuklardaki Tonsil Hastalıklarında Herhangi Bir Rolü Var Mıdır?

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**Objective:** The aim of our study was to investigate the presence of Actinomyces colonization in the tonsillar tissue of children undergoing tonsillectomy and to determine the possible role of Actinomyces in obstructive tonsillar hypertrophy (OTH) and recurrent tonsillitis (RT).

**Methods:** Our study was designed retrospectively. A total of 206 tonsils were analyzed histopathologically from 103 children (66 males, 37 females; mean age 7, 14) who underwent tonsillectomy. The tonsil specimens were divided into two groups according to the indications for the operation. These two groups were OTH (Group A) and RT (Group B). Each group was investigated histopathologically for the presence of Actinomyces in their specimens.

**Results:** Actinomyces was found in 7 of the patients in Group A (12%) and 2 of the patients in Group B (4.44%). The mean age of patients with Actinomyces was 8.44 (range 4-14 years), and the mean age of patients without Actinomyces was 6.97 years (range 2-17). The average size of Actinomyces-positive tonsils was 3.76 mL, whereas the average size of specimens without Actinomyces was 2.68 mL. The tonsils with Actinomyces were found to be significantly larger than the ones without Actinomyces ( $p<0.01$ ).

**Conclusion:** We found no a significant correlation between the presence of tonsillar Actinomycosis and OTH and RT.

**Keywords:** Actinomyces, obstructive tonsillar hypertrophy, recurrent tonsillitis, tonsillectomy

**Amaç:** Çalışmamızın amacı, tonsillektomi yapılan çocuklarda tonsil dokusunda Aktinomycesin varlığını araştırmak ve Aktinomycesin obstruktif tonsil hipertrofisi (OTH) ve rekürrent tonsillitteki (RT) olası rolünü saptamaktır.

**Yöntemler:** Çalışmamız retrospektif olarak tasarlandı. Bademcik ameliyatı yapılmış 103 tane çocuğun toplam 206 tane bademciği histopatolojik olarak incelendi (66 erkek, 37 kadın, ortalama yaş 7, 14). Bademcik preparatları tonsillektomi endikasyonuna göre iki gruba ayrıldı. Grup A; tonsiller hipertrofili ve Grup B; rekürrent tonsillit li preparatlardan oluşmaktaydı. Her bir gruptaki bademcik preparatları Aktinomyces varlığını saptamak için histopatolojik olarak incelendi.

**Bulgular:** Aktinomyces Grup A' da 7 hastada (%12) ve Grup B'de 2 hastada (%4,44) saptandı. Aktinomycesli hastaların yaş ortalaması 8,44 (yaş aralığı 4-14) ve Aktinomyces saptanmayan hastaların yaş ortalaması 6,97 (yaş aralığı 2-17) idi. Aktinomyces saptanan tonsil spesmenlerinin ortalama boyutu 3,76 mL ve Aktinomyces saptanmayanların boyutu ortalama 2,68 mL idi. Aktinomyces saptanan bademciklerin boyutu saptanmayanlara kıyasla daha büyük bulundu ( $p<0.01$ ).

**Sonuç:** Aktinomycesin varlığı ile OTH ve RT arasında anlamlı bir ilişki bulunamadı.

**Anahtar Kelimeler:** Aktinomyces, obstruktif tonsiller hipertrofi, rekürrent tonsillit, tonsillektomi

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## Introduction

Obstructive tonsillar hypertrophy (OTH) and recurrent tonsillitis (RT) affect most people during childhood, and therefore, tonsillectomy is one of the most common operations in otorhinolaryngology. Tonsillar diseases are important because of their potential complications and the high cost of treatment. There are numerous studies related to the etiology of tonsillar disease. One of these possible etiologies is Actinomyces infection. Actinomyces is an anaerobic, gram-positive, nonacid fast, branched, basophilic, filamentous bacterium (1). They colonize on gingival crypts, dental calculi, and tonsillar crypts, especially in periodontal pockets and dental plaques. In the presence of pyogenic aerobic and anaerobic infection of tonsil, Actinomyces, which is normally present within the tonsillar crypts, may colonize, proliferate, or directly invade tonsillar tissue. f are the most frequently isolated pathologic Actinomyces species in humans. The presence of Actinomyces in tonsillar specimens has been identified since 1896 (2, 3), and its incidence varies between 1.3%-57% in the literature. Actinomyces is usually seen between the ages of 10 to 60, peaking in middle ages. It is uncommon in children younger than 3 years of age and 3 times more common in males than females.

The presence of Actinomyces in tonsillar tissue and its association with tonsillar diseases have been investigated for many years. However, a definitive conclusion on this issue still has not been obtained.

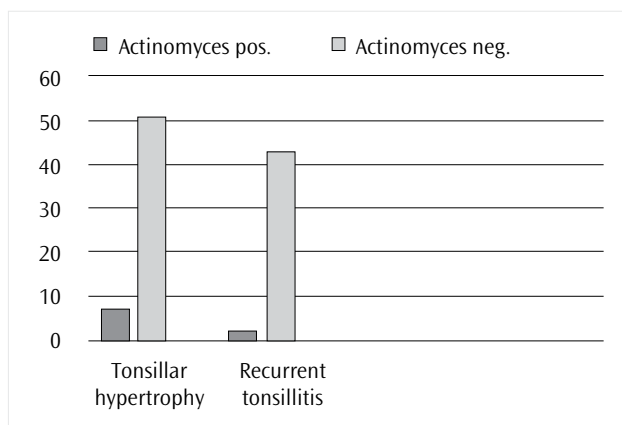
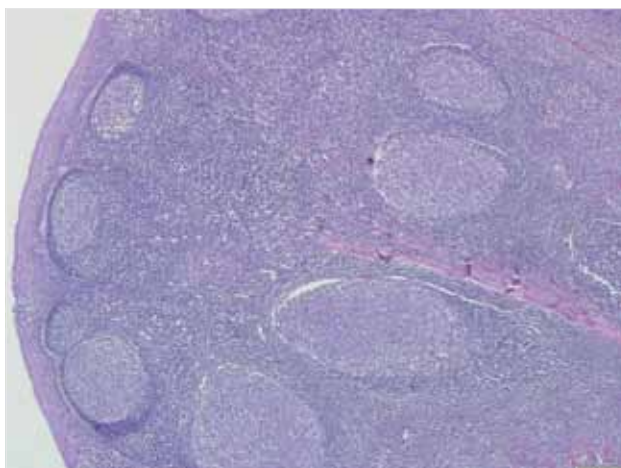
The aim of our study was to investigate the presence of Actinomyces colonization in the tonsillar tissue of children undergoing tonsillectomy and to determine the role of Actinomyces in OTH and RT.

## Methods

A total of 103 patients who had undergone tonsillectomy due to OTH and RT were retrospectively studied. Patients who had undergone tonsillectomy for suspected malignant disease

**Table 1. Distribution of patients with Actinomyces colonization in both groups**

	Tonsillar hypertrophy	Recurrent tonsillitis
Actinomyces pos	7	2
Actinomyces neg	51	43

**Figure 1.** Patients infected with Actinomyces in both groups**Figure 2.** Tonsil showing reactive hyperplasia (H&E 4x)

and who were over 18 years of age were not included in this study.

The patients were divided into two groups according to their diagnosis: OTH (Group A) and RT (Group B). The Brodsky classification was used in Group A (grade +3 and +4 tonsillar hypertrophy) and the Paradise criteria were used in Group B (at least 7 acute tonsillitis episodes in 1 year or 5 episodes per year in 2 consecutive years) for the selection of the patients.

All operations were performed with sharp dissection under general anesthesia. All specimens were investigated meticulously by the same pathologist in the pathology laboratory. Age, gender, tonsillar size, and the presence of Actinomyces were recorded.

Tonsil specimens were selected from the archives of pathology paraffin blocks and using a microtome; 3-5-micron-thick sections were obtained from these blocks. The sections were stained with hematoxylin and eosin (Leica ST 5020; Nussloch, Germany). Each

tonsil specimen was evaluated under light microscopy (Olympus BX 51; Tokyo, Japan). Tonsil specimens, including the surface epithelium, were examined histologically for the presence of an abscess in the surface epithelium, crypts, changes in lymphoid tissues, and the presence of Actinomyces. Clinicopathological findings in patients with Actinomyces were compared with those without Actinomyces.

### Statistical Analysis

The categorical variables were analyzed with chi-square test. NPAR test was used for descriptive analysis of the data. The analysis of nonparametric data was made by Mann-Whitney U-test. SPSS (Standard Package for Statistical Sciences, v. 17.0) was used for the statistical analysis of the study.

### Results

In this study, a total of 206 tonsils were analyzed histopathologically from 103 patients. The mean age of patients was 7.14 years (range 2-17). There were 66 males and 37 females. As shown in Table 1, we found 9 patients with Actinomyces infection in their tonsils (8.73%). The mean age of patients with Actinomyces was 8.44 (range 4-14 years), and the mean age of patients without Actinomyces was 6.97 years (range 2-17). There were 8 male patients and 1 female patient with Actinomyces (ratio 8:1); however, the male:female ratio was 1.6:1 (56 males: 36 females) in patients without Actinomyces. These results were consistent with the literature.

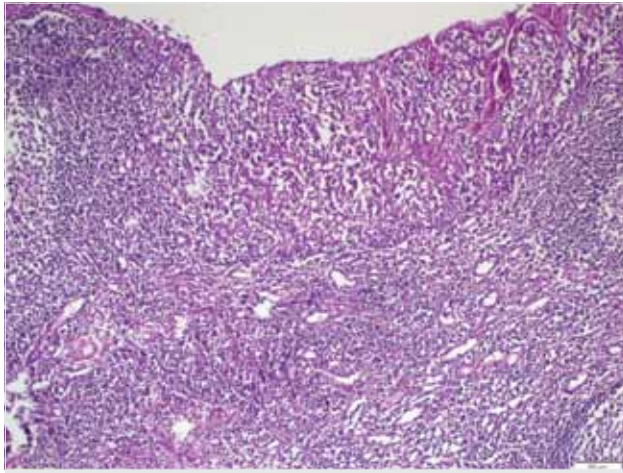
Although Actinomyces is more common in older children, there was no statistically significant relationship between the presence of Actinomyces and the age of the patient. Eventually, the presence of Actinomyces was not correlated with age.

Also, 58 patients (56.8%) had undergone surgery for OTH (group A), and 45 patients (43.2%) had undergone surgery for RT (group B). Actinomyces was found in 7 of the patients in Group A and 2 of the patients in Group B (Figure 1). There was no significant difference between Groups A and B for the presence of Actinomyces ( $p>0.05$ ). The reason for the higher Actinomyces occurrence rate in children with OTH was thought to be due to lymphoid hyperplasia.

The average size of all specimens was 3.11 mL. The average size of tonsils with Actinomyces was 3.76 mL and 2.68 mL for the ones without Actinomyces. The tonsil specimens with Actinomyces were found to be significantly larger than the specimens without Actinomyces ( $p<0.01$ ). Histological examination of each tonsil specimen revealed reactive lymphoid hyperplasia and intraepithelial abscess formation by polymorphonuclear leukocytes (Figures 2 - 3). All data obtained were statistically analyzed.

### Discussion

The presence of Actinomyces in resected tonsillar tissue has been histologically established since 1896. Actinomyces colonies can be easily detected with hematoxylin and eosin (H&E) staining (2, 4). The prevalence of Actinomyces in tonsils ranges from 1.3% to 57% in the literature. In the present study, the prevalence of Actinomyces was 8.73%. Use of varied sectioning and staining techniques, differences in indications of surgery, and differences in working groups have been shown as the reasons for the differences in incidence amongst studies (1, 4). Actinomyces is uncommon in



**Figure 3.** Polymorphonuclear leukocyte abscesses inside the epithelium (H&E 20x)

children younger than 3 years of age and 3 times more common in males than females (5, 6). Our results were similar to those in the literature. There were 8 male patients and 1 female patient with Actinomyces. The mean age of patients with Actinomyces was 8.44.

Actinomyces infection of the head and neck results in abscess formation, draining sinuses, and fistulae and fibrosis. However, the importance of Actinomyces colonization in tonsils remains unclear. There is no adequate study on Actinomyces colonization and tonsillar diseases in the literature. Whereas tonsillectomy is one of the most common operations of otorhinolaryngology and in this issue more detailed studies should be performed. At present, approximately 400,000 cases of traditional tonsillectomy are performed in the United States annually.

There are some studies about the relationship between Actinomyces and OTH and RT in the literature. The role of Actinomyces colonization in the pathogenesis of OTH and RT is still controversial. In 1910, Lord isolated Actinomyces species from the tonsillar crypts and proposed that hypertrophy of tonsils is the result of some toxin produced by the microorganisms (7). However, it has been not proven.

Bhargava et al. (1) and Pransky et al. (2) reported that Actinomyces is seen more commonly in subjects with OTH when compared to those with RT. Also, Bhargava supposed that the pathogenesis of actinomycosis of the tonsils was related to mucosal trauma, which allowed these organisms to invade these areas. Actinomyces is found in the normal flora of the tonsils, but when the integrity of the mucosal barrier is broken in the tonsillar crypts, Actinomyces proliferates and leads to the clinical disease (1). In addition to this, they recommended tonsillectomy for the treatment of tonsillar Actinomyces.

Pransky et al. (2) suggested that initial treatment with oral penicillin for 3 months in all patients with obstructive symptoms may eradicate Actinomyces from the tonsils and reduce tonsillar enlargement.

Riffat and Walker (8) published a study of 1213 subjects who underwent tonsillectomy in 2009 and showed that Actinomyces is more marked in subjects with sleep breathing disorder due to OTH

rather than subjects with RT episodes. Our study also showed a higher prevalence of Actinomyces colonization in subjects with OTH compared to subjects with RT episodes. In our study, Actinomyces was found in 7 of the patients in Group A and 2 of the patients in Group B (12% and 4.44%, respectively). But, previously used antibiotics may have reduced the prevalence of Actinomyces in the tonsillar crypts. On the other hand, considering that Actinomyces is an anaerobic bacterium, perhaps the relatively hypoxic conditions in children with sleep-disordered breathing may stimulate the colonization of Actinomyces. Further studies are needed to prove this opinion.

One possible cause of the higher prevalence of Actinomyces in obstructive tonsillar hypertrophy could be that the presence of Actinomyces stimulates lymphoid hyperplasia, resulting in tonsillar hyperplasia (2, 5, 9-12). Ozgursoy et al. (11) considered that actinomycotic infection or subclinical colonization of Actinomyces may be an etiologic or histopathological trigger mechanism for tonsillar hypertrophy.

Takasaki et al. (13) reported a case of unilateral tonsillar hypertrophy caused by Actinomyces. According to them, Actinomyces is one of the possible reasons for unilateral tonsil hypertrophy. On the contrary, Toh et al. (3) analyzed the relation between Actinomyces and tonsil size, and they demonstrated that Actinomyces does not affect the size of tonsils. Ashraf et al. (14) recently published a retrospective study of 204 subjects who underwent tonsillectomy, and they found that Actinomyces colonization was more prevalent in patients with RT than sleep-disordered breathing subjects. Aydin et al. (15), in a larger series of 1820 tonsillectomy specimens, found the incidence of Actinomyces to be 6.7%, and they found no correlation between the clinical diagnosis of tonsillar disease and the presence of actinomycosis.

It has become a controversial subject recently over whether it is necessary to perform a histopathological examination of tonsillectomy specimens.

One of the most interesting studies about this controversial subject was published by Koç and al. (16) in 2012. In their study, including 1021 patients who underwent tonsillectomy and/or adenoidectomy, they investigated in terms of malignancy, and they found a diagnosis of malignancy in only 11 adult patients. They concluded that a histopathologic diagnosis may not be required for patients without preoperative risk factors, particularly pediatric patients. Haholu and et al. (17) suggested that in both pediatric- and adult-age groups, histopathologic examination of tonsillectomy specimens is required in routine medical practice.

The main limitation of our study was the number of tonsillectomy specimens. Previous studies were performed with numerous tonsillectomy specimens. In our study, the number of specimens was lower.

## Conclusion

In our study, we found no correlation between the presence of tonsillar Actinomycosis and recurrent tonsillitis and obstructive tonsillar hypertrophy. But, the tonsil specimens with Actinomyces were found to be significantly larger than those without it. Nevertheless, to define the role of Actinomyces in tonsillar disease, larger series with detailed research are required.

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**Informed Consent:** Written informed consent was not obtained due to retrospective nature of the study.

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**Hasta Onamı:** Çalışmanın retrospektif tasarımı nedeniyle hasta onamı alınmamıştır.

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## References

1. Bhargava D, Bhusnurmath B, Sundaram KR, Raman R, Al Okbi HM, Al Abri R, et al. Tonsillar actinomycosis: a clinicopathological study. *Acta Trop* 2001; 80: 163-8. [\[CrossRef\]](#)
2. Pransky SM, Feldman JI, Kearns DB, Seid AB, Billman GF. Actinomycosis in obstructive tonsillar hypertrophy and recurrent tonsillitis. *Arch Otolaryngol Head and Neck Surg* 1991; 117: 883-5. [\[CrossRef\]](#)
3. Toh ST, Yuen HW, Goh YH. Actinomycosis colonization of tonsils: a comparative study between patients with and without recurrent tonsillitis. *J Laryngol Otol* 2007; 121: 775-8. [\[CrossRef\]](#)
4. Gaffney R, Harrison M, Walsh M, Sweeney E, Cafferkey M. The incidence and role of actinomycosis in recurrent acute tonsillitis. *Clin Otolaryngol Allied Sci* 1993; 18: 268-71. [\[CrossRef\]](#)
5. Acevedo F, Baudrand R, Letelier LM, Gaete P. Actinomycosis: a great pretender. Case reports of unusual presentations and a review of the literature. *Int J Infect Dis* 2008; 12: 358-62. [\[CrossRef\]](#)
6. Molto JE. Differential diagnosis of rib lesions: a case study from Middle Woodland Southern Ontario circa 230 A.D. *Am J Phy Antropol* 1990; 83: 439-47. [\[CrossRef\]](#)
7. Lord FT. The etiology of actinomycetes. The presence of actinomycetes in the contents of carious teeth and tonsillar crypts of patients with actinomycosis. *JAMA* 1910; 55: 1261-3. [\[CrossRef\]](#)
8. Riffat F, Walker P. Prevalence of tonsillar Actinomycosis in children undergoing tonsillectomy for sleep disordered breathing compared with recurrent tonsillitis. *Int J Pediatr Otorhinolaryngol* 2009; 73: 1111-3. [\[CrossRef\]](#)
9. Van Lierop AC, Prescott CA, Sinclair-Smith CC. Investigation of significance of Actinomycosis in tonsil disease. *Int J Pediatr Otorhinolaryngol* 2007; 71: 1883-8. [\[CrossRef\]](#)
10. Sosroseno W, Bird PS, Gemmel E, Seymour GJ. The role of CD4+ and CD8+ T cells on antibody production by murine Peyer's patch cells following mucosal presentation of Actinomycosis viscosus. *Oral Microbiol Immunol* 2006; 21: 411-4. [\[CrossRef\]](#)
11. Ozgursoy OB, Kemal O, Saatçi MR, Tulunay O. Actinomycosis in the etiology of recurrent tonsillitis and obstructive tonsillar hypertrophy: answer from a histopathologic point of view. *J Otolaryngol Head Neck Surg* 2008; 37: 865-9.
12. Kutluhan A, Salvi M, Yalçın G, Kandemir O, Yeşil C. The role of actinomycosis in obstructive tonsillar hypertrophy and recurrent tonsillitis in pediatric population. *Int J Pediatr Otolaryngol* 2011; 75: 391-4. [\[CrossRef\]](#)
13. Takasaki K, Kitaoka K, Kaieda S, Hayashi T, Abe K, Takahashi H. A case of Actinomycosis causing unilateral tonsillar hypertrophy. *Acta Otolaryngol* 2006; 126: 1001-4. [\[CrossRef\]](#)
14. Ashraf MJ, Azarpira N, Khademi B, Hashemi B, Shishegar M. Relation between Actinomycosis and Histopathological and Clinical Features of the Palatine Tonsils. An Iranian Experience. *Iran Red Crescent Med J* 2011; 13: 499-502.
15. Aydın A, Erkiş S, Beyazıt YA, Koçer NE, Ozer E, Kanlıkama M. Relation between actinomycosis and histopathological and clinical features of the palatine tonsils: a comparative study between adult and pediatric patients. *Rev Laryngol Otol Rhinol* 2005; 126: 95-8.
16. Koç S, Uysal IO, Yaman H, Eyibilen A. Histopathologic examination of routine tonsil and adenoid specimens: is it a necessary approach? *Kulak Burun Bogaz İhtis Derg* 2012; 22: 87-90. [\[CrossRef\]](#)
17. Haholu A, Salihoğlu M, Turhan V. Letter to the editor. Histopathologic examination of tonsillectomy materials is required in routine medical practice. *Kulak Burun Bogaz İhtis Derg* 2013; 23: 65-6. [\[CrossRef\]](#)