



# The role of tonsillar actinomycosis in adult patients

Kapila R. Hari<sup>1</sup>, Shivesh Maharaj<sup>2</sup>, Shahpar Motakef<sup>2</sup>, Ridwaan Essa<sup>2</sup>

<sup>1</sup>Department of Medicine, University of the Witwatersrand, Johannesburg, South Africa; <sup>2</sup>Department of Otorhinolaryngology, University of the Witwatersrand, Johannesburg, South Africa

**Contributions:** (I) Conception and design: KR Hari, S Motakef, R Essa; (II) Administrative support: KR Hari, S Maharaj; (III) Provision of study materials or patients: All authors; (IV) Collection and assembly of data: R Essa; (V) Data analysis and interpretation: All authors; (VI) Manuscript writing: All authors; (VII) Final approval of manuscript: All authors.

**Correspondence to:** Shivesh Maharaj. Charlotte Maxeke Johannesburg Academic Hospital, University of the Witwatersrand, Johannesburg, South Africa. Email: Shivesh.maharaj@wits.ac.za.

**Background:** Tonsillectomy is one of the most commonly performed surgical procedures. There are many indications for the surgery, and these vary for children and adults. A common finding on tonsillectomy histology is the presence of the bacteria actinomycosis. The objective of the study was to establish the incidence of actinomycosis in the tonsils of adults undergoing tonsillectomy and to evaluate its role in tonsillar disease.

**Methods:** This study is a retrospective record review, for the period 1 July 2005 to 30 June 2015. It was conducted in the clinical units of the University of the Witwatersrand's Department of Otorhinolaryngology (ENT). The study population included all patients older than 18 years of age, who had a tonsillectomy performed with subsequent histological analysis. There were 638 specimen reports reviewed, comprising 319 patients.

**Results:** In the study sample the patient ages ranged from 18 to 77 years old, with a mean age of 35 years and a standard deviation of 12 years. The frequency of actinomycosis was 11.6% (74 specimens) in our study population. Ninety-eight percent of patients with actinomycosis had reactive tonsillar hypertrophy as compared to the control group (No Actinomycoses) in whom 77% of patients had tonsillar hypertrophy. This difference was significant ( $P=0.002$ ).

**Conclusions:** Based on our study it can be said that when actinomycosis is present, there is almost always lymphoid hyperplasia as well.

**Keywords:** Tonsil; actinomycosis; hyperplasia

Received: 20 May 2020; Accepted: 25 August 2020; Published: 04 September 2020.

doi: 10.21037/ajo-19-38

**View this article at:** <http://dx.doi.org/10.21037/ajo-19-38>

## Introduction

Tonsillectomy is one of the most commonly performed surgical procedures. There are many indications for the surgery, and these vary for children and adults. Routine histological testing is done in adult tonsillectomy specimens in certain centres, however this may not be a viable option in resource limited centres (1). A common finding on the tonsillectomy histology is the presence of the bacteria actinomycosis.

The objective of the study was to establish the incidence

of actinomycosis in the tonsils of adults undergoing tonsillectomy and to evaluate its role in clinical tonsillar disease.

We present the following article in accordance with the STROBE reporting checklist (available at <http://dx.doi.org/10.21037/ajo-19-38>).

## Background

Actinomycosis is caused by gram-positive, non-acid fast, anaerobic, branching, filamentous bacteria which result in

chronic suppurative inflammation of the organs involved. The organism is a commensal in the human oral cavity (2). *Actinomyces* colonization of tonsillar crypts has been described in 7–35% of tonsillectomy specimens (3,4). Aydin *et al.* and Toh *et al.* found actinomycosis more common in adults than in children (5,6).

It has been suggested that tonsillar actinomycosis may be an aetiological factor in the development of tonsillar hypertrophy (5,6). This finding has not been consistent. A paediatric study by van Lierop *et al.* examined 344 tonsils and found no tissue reaction due to *Actinomyces* colonies and hence reported that there was no correlation between tonsillar actinomycosis and recurrent tonsillitis in their population (1). Melgarejo *et al.* found no statistical association between *Actinomyces* and recurrent adenotonsillitis or adenotonsillar hypertrophy (7).

## Methods

### Study design

This study is a retrospective record review, for period 1 July 2005 to 30 June 2015.

### Study location

The study was conducted in the clinical units of the University of the Witwatersrand's Department of Otorhinolaryngology (ENT). The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics approval was obtained in March 2016 from the Human research ethics committee University of the Witwatersrand (registration number M151140) and individual consent for this retrospective analysis was waived.

### Study population

The study population included all patients older than 18 years of age, who had a tonsillectomy performed. All patients undergoing tonsillectomies had histological analysis.

**Inclusion criteria:** all adult patients who had a tonsillectomy performed and for whom histopathological results were available on the National Health Laboratory Services (NHLS) database.

**Exclusion criteria:** inadequate data.

### Data collection

Patients were identified from the ENT Operating Theatre Register. The patient information was used to obtain the histopathology reports from the NHLS database.

### Data recorded included

- ❖ Hospital registration number;
- ❖ Age;
- ❖ Date of surgery;
- ❖ Histology report;
- ❖ Patients were divided into two groups:
  - ◆ The sample group consisted of those with actinomycosis identified on histology;
  - ◆ The control group were patients without actinomycoses;
- ❖ The histology reports were reviewed by the authors and a histopathologist.

The following details were recorded:

- ❖ The presence of actinomycosis in the tonsillectomy specimens
  - ◆ The site of the bacteria was also reviewed and deemed to be either in the tonsillar:
    - Stroma;
    - Crypts;
    - Both tonsillar stroma and crypts.
  - ◆ The association between the presence of actinomycosis and tonsillar hyperplasia in the specimens was evaluated using a two by two contingency table.

Fischer's exact test was performed using GraphPad.

- ❖ Ethics approval was obtained in March 2016 from the Ethics Committee, University of the Witwatersrand. Certificate number M151140.

Limitation: small number of patients with actinomycosis.

## Results

There were 638 specimen reports reviewed, comprising 319 patients. Actinomycosis was documented in 74 specimens.

The frequency of actinomycosis in the tonsils of adults undergoing tonsillectomy was 11.6 % in our study population.

Ninety-eight percent of patients with actinomycosis had reactive tonsillar hypertrophy as compared to the control group (No Actinomycoses) in whom 77% of patients

**Table 1** Comparison of tonsil histology results

Variables	Actinomycoses group	Control group
Number of patients	37	282
Gender		
Female	23	198
Male	14	84
F:M ratio	1.6:1	2.4:1
Reactive tonsil hyperplasia	36/37 (97%)	218/282 (77%)

Actinomycoses infection was significant in the development of reactive tonsil hyperplasia ( $P=0.002$ ).

had tonsillar hypertrophy. This difference was significant ( $P=0.002$ ).

### Patient demographics

In the study sample the patient ages ranged from 18 to 77 years old, with a mean age of 35 years and a standard deviation of 12 years. In the cohort with actinomycosis the average age was 35 years with a standard deviation of 11 years. There were 23 females and 14 males.

### Histopathology

The reports revealed that reactive lymphoid hyperplasia was the most common (77%) condition encountered amongst our patients. The next most commonly described condition was actinomycosis which was documented in 74 (14%) specimens.

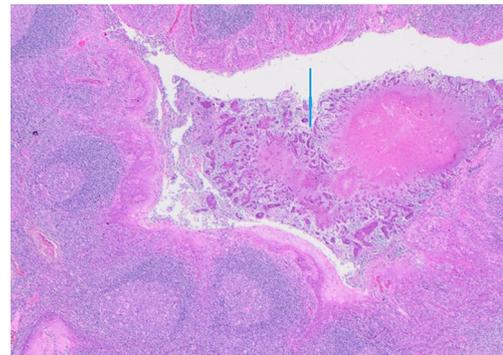
The majority of specimens with actinomycoses identified on histopathology, demonstrated reactive tonsillar hyperplasia 36/37 (97%). In the control group only 77% had reactive tonsil hyperplasia.

Actinomycoses infection was significant in the development of reactive tonsil hyperplasia ( $P=0.002$ ) (see Table 1).

The most common site involved was the stroma; 58 specimens had Actinomycoses in the stroma. Sixteen specimens had Actinomycoses in the tonsillar crypts (Figure 1). In our sample no patients were reported as having Actinomycoses in both the stroma and the crypts.

### Discussion

The presence of actinomycosis infection in tonsillectomy



**Figure 1** Actinomycosis within the tonsillar crypt. Blue line showing Actinomycosis within tonsillar crypt (H&E staining, magnification 100x).

specimens is well described. The incidence is variable and ranges between 0.8% and 41% (8). In this study the incidence was 11.6%. The reasons for this variation include differences in the sectioning and staining techniques employed by different laboratories; the ages of the patients studied and discrepancies in the indications for tonsillectomy.

Hematoxylin & eosin (H&E) staining is useful in the detection of *Actinomyces* colonies. There are more sophisticated techniques including polymerase chain reaction-based oligonucleotide-deoxyribonucleic acid hybridization technique and Restriction fragment length polymorphism analysis of amplified small subunit ribosomal Ribonucleic acid genes which can improve the yield (9,10). In 1991 Pransky *et al.* suggested that core tissue analysis be used to assess tonsillar infection as this may be shielded from the effect of antimicrobials, and anaerobic organisms are more likely to survive in the oxygen depleted environment of the tonsillar crypts (11). They found that microbiological investigations are only successful in determining the presence of Actinomycetes in less than half of the cases; and that histological examination of the core tissues of the tonsils will more accurately detect the presence of these organisms (11).

*Actinomyces* are commonly found in the oral cavity where they are commensals. Their role in the development of tonsillar disease has not been firmly established. Numerous series have been published to try and establish the relationship between tonsillar actinomycosis and clinical tonsillar disease (6,9-13). In 1910 Lord isolated *Actinomyces* species from the tonsillar crypts and suggested that hypertrophy of the tonsils is the result of some toxin produced by the micro-organisms (12). This has however

never been proven.

Ashraf *et al.* studied 204 patients who underwent tonsillectomies. In their study cohort indications were recurrent tonsillitis in 81% and obstructive sleep apnea (OSA) in 19%. They documented actinomycosis in 41% of their patients; with a higher incidence in their adult population. They surmised that *Actinomyces* colonization was more prevalent in patients with recurrent tonsillitis than in those with sleep disordered breathing. They concluded that the presence of *Actinomyces* does not indicate any active disease (8).

Bhargava *et al.* reviewed 302 patients. In their group the indications for surgery were similar but the proportions were different in that only 61% had recurrent tonsillitis and 39% had OSA. They found a positive correlation between actinomycosis of the tonsils and tonsillar hypertrophy with actinomycosis present in 56.8% of patients with tonsillar hypertrophy compared to 10.3% of patients with recurrent tonsillitis (14). The findings of Rebechi *et al.* were similar. They evaluated the routine histopathology of 281 patients who underwent tonsillectomy with 63% having had recurrent tonsillitis and 37% OSA. They found evidence of chronic tonsillitis with colonies of *Actinomyces* in 9.6% of their patients (15). The discrepancy between Ashraf *et al.* (8), and Bhargava *et al.* (14) and Rebechi *et al.* (15) may be due to the disproportionate numbers of recurrent tonsillitis and OSA in the respective studies.

## Conclusions

The frequency of actinomycosis in the tonsils of adults undergoing tonsillectomy was 11.6% in our study population. This is slightly higher than comparative studies.

Ninety-eight percent of patients with actinomycosis had reactive tonsillar hypertrophy as compared to the control group (No Actinomycoses) in whom 77% of patients had tonsillar hypertrophy. This difference was significant ( $P=0.002$ ).

Based on our study it can be said that when actinomycosis is present, there is almost always lymphoid hyperplasia as well, implying a commonality in the factors that underlie these conditions.

## Acknowledgments

The authors would like to thank Dr. F. Mahomed for the histology picture (Figure 1).

*Funding:* None.

## Footnote

*Reporting Checklist:* The authors have completed the STROBE reporting checklist. Available at <http://dx.doi.org/10.21037/ajo-19-38>

*Data Sharing Statement:* Available at <http://dx.doi.org/10.21037/ajo-19-38>

*Conflicts of Interest:* All authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/ajo-19-38>). The authors have no conflicts of interest to declare.

*Ethical Statement:* The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethics approval was obtained in March 2016 from the Human research ethics committee University of the Witwatersrand (registration number M151140) and individual consent for this retrospective analysis was waived.

*Open Access Statement:* This is an Open Access article distributed in accordance with the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International License (CC BY-NC-ND 4.0), which permits the non-commercial replication and distribution of the article with the strict proviso that no changes or edits are made and the original work is properly cited (including links to both the formal publication through the relevant DOI and the license). See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

## References

1. van Lierop AC, Prescott CA, Sinclair-Smith CC. An investigation of the significance of Actinomycosis in tonsil disease. *Int J Pediatr Otorhinolaryngol* 2007;71:1883-8.
2. Schwartz HC, Wilson MC. Cervicofacial actinomycosis following orthognathic surgery: report of 2 cases. *J Oral Maxillofac Surg* 2001;59:447-9.
3. Soler Sendra A, Subirana Pozo FX, Consola Maroto B, et al. Tonsillar actinomycosis manifested as expectorated debris. *Acta Otorrinolaringol Esp* 2009;60:372-4.
4. Assimakopoulos D, Vafiadis M, Askitis P, et al. The incidence of Actinomyces israeli colonization in tonsillar tissue. A histopathological study. *Rev Stomatol Chir*

- Maxillofac 1992;93:122-6.
5. Aydin A, Erkiliç S, Bayazit YA, et al. Relation between actinomycosis and histopathological and clinical features of the palatine tonsils: a comparative study between adult and pediatric patients. *Rev Laryngol Otol Rhinol (Bord)* 2005;126:95-8.
  6. Toh ST, Yuen HW, Goh YH. Actinomycetes colonization of tonsils: a comparative study between patients with and without recurrent tonsillitis. *J Laryngol Otol* 2007;121:775-8.
  7. Melgarejo Moreno P, Hellin Meseguer D, Marco Garrido A, et al. A correlation between age and Actinomyces in the adenotonsillar tissue of children. *B-ENT* 2006;2:95-7.
  8. Ashraf MJ, Azarpira N, Khademi B, et al. Relation between Actinomycosis and Histopathological and Clinical Features of the Palatine Tonsils: An Iranian Experience. *Iran Red Crescent Med J* 2011;13:499-502.
  9. Tang G, Samaranayake LP, Yip HK, et al. Direct detection of Actinomyces spp. from infected root canals in a Chinese population: a study using PCR-based, oligonucleotide-DNA hybridization technique. *J Dent* 2003;31:559-68.
  10. Stubbs SLJ, Hall V, Talbot P, et al. Identification of Bacteroides and Actinomyces by 16S rDNA PCR-restriction fragment length polymorphism. *Anaerobe* 2000;6:121-2.
  11. Pransky SM, Feldman JI, Kearns DB, et al. Actinomycosis in obstructive tonsillar hypertrophy and recurrent tonsillitis. *Arch Otolaryngol Head Neck Surg* 1991;117:883-5.
  12. 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.
  13. Valour F, Sénéchal A, Dupieux C, et al. Actinomycosis: etiology, clinical features, diagnosis, treatment, and management. *Infect Drug Resist* 2014;7:183-97.
  14. Bhargava D, Bhusnurmath B, Sundaram KR, et al. Tonsillar actinomycosis: a clinicopathological study. *Acta Trop* 2001;80:163-8.
  15. Rebechi G, Pontes TE, Braga EL, et al. Are histologic studies of adenotonsillectomy really necessary? *Int Arch Otorhinolaryngol* 2013;17:387-9.

doi: 10.21037/ajo-19-38

**Cite this article as:** Hari KR, Maharaj S, Motakef S, Essa R. The role of tonsillar actinomycosis in adult patients. *Aust J Otolaryngol* 2020;3:30.