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Histopathological Features of Tonsils & Significance of Actinomycosis in Chronic Tonsillitis

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Abstract: *Actinomycosis of the tonsillar tissue is a rare pathological condition whose clinical significance has been disputed over by authors worldwide. Specimens of chronic tonsillitis showing Actinimycoses were involved in this study. The histopathology of the tonsillectomy specimens revealed colonies of Actinomyces in tonsillar crypts, along with cryptitis and reactive lymphoid hyperplasia. The question whether the presence of colonies in tonsil is incidental or causative for tonsillar lesions is still not definitely solved.The present study was conducted to determine the histopathological features of tonsils and significance of Actinomycosis in chronic tonsillitis.*

Aim: *The aim of this study is to investigate the histopathological features of tonsils and significance of Actinomycosis in chronic tonsillitis.*

Materials &Methods*: 9 cases presenting Actinomycotic granules, ranging in age from 5 to 30 years who had undergone tonsillectomy with symptoms of chronic tonsillitis were considered in this study. Tonsil biopsy specimens stained with Haematoxylin-Eosin & Gram Stain were evaluated with light microscopy for the presence of Actinomyces, signs of significant cryptitis or active tonsillitis and reactive lymphoid hyperplasia. The data was further analysed to determine the statistical significance.*

Results:*9 cases (18 tonsillar biopsy specimens) with a mean age of 15 years (ranging from 5 to 30 years) were considered in this study. Actinomyces were seen in 11 tonsillar specimens only. Histopathological analysis of resected tonsils shows active tissue infection. There was a significant statistical relationship between the presence of actinomycosis and age, with a greater occurrence of actinomycosis in adult patients and our study showed female preponderance of tonsillar actinomycosis.*

Conclusions: *The histopathological examination of tonsils in the present study documents a definite tissue reaction to the Actinomyces colonies. The age of the patient and female preponderance of tonsillar actinomycosis in adults correlate with the findings of other authors in previous studies.*

Keywords:*Tonsil, Actinomycosis, Chronic tonsillitis, Reactive Lymphoid Hyperplasia.*

I. Introduction

The first reported case of human infection with Actinomycosis was reported by Von Langenbeck in 1845 and was attributed to a fungus. Harz, in 1877, named the infecting organism Actinomyces, which means ray fungus, reflecting the belief at the time that the organism was a fungus. Israel and Ponfick delineated the anaerobic nature of Actinomyces and isolated it from humans in 1891. In the 1960's Waksman showed that Actinomyces was actually a gram-positive bacteria. Since their proper identification in the 1960's, five species have been identified A israelli, A bovis, A naeslundii, A viscosus and A odontolyticus. These organisms are members of the family Actinomycetaceae, Streptomycetaceae and Actinoplanaceae. The presence of Actinomycosis in the tonsils has been identified in 1896[20].

Actinomycosis is caused by the Gram-positive, non- acid fast, anaerobic, branching, filamentous bacteria which results in chronic suppurative inflammation of the organs involved. Normally the organism lives as a commensal in human oral cavity[1], colon and vagina. In 55% they involve the cervicofacial region, in 20% thoracic, and in 15% abdomino-pelvic. Actinomyces colonizing tonsillar crypts has been described in 6.7-35% of tonsillectomy specimens[3,4], while some other studies proposed an even wider range[5,6,7]**.** The disease is characterized by spread to contiguous tissues because of disruption of anatomical barriers by dental caries or trauma, surgery or another infection. Once it enters the tissues, it may form an abscess that develops into a hard red to reddish purple lump. When the abscess breaks through the skin, it forms pus-discharging lesions[8]. Definitive diagnosis of Actinomycosis is important as it helps in initiating appropriate antibiotic therapy early[9].

Actinomycosis of the tonsils has been reported in a variable percentage of tonsil specimens by other authors[6,7,10-12]**.** It has been suggested that Actinomycosis infection of the tonsils may indicate an etiological factor for tonsillar hypertrophy[6,11]**.** Other authors have implicated this organism as merely a saprophyte of the normal tonsil[7]. Its role in disease of the tonsils is therefore not clearly understood. Actinomycetes are anaerobes that release proteolytic enzymes which diminish oxidation-reduction potential and leads to proliferation of the

organisms that invades the surrounding tissues[11]**.** This may lead to the colonisation of Actinomycotic organisms normally present within the tonsillar crypts[6,11]. Hematoxylin-eosin (H&E) staining has been shown to be highly effective in detecting Actinomyces colonies[7,11]. The presence of Actinomycosis can be recognized as aggregates of filamentous basophilic microorganisms arranged in a radial spoke-like fashion; the so-called **"ray-fungus"** appearance of an Actinomyces colony[6,7,11]. Incidental findings such as bacterial colony, foreign body or other artifacts may have some input for a better understanding of tonsillar disease.

The objective of this study is to investigate the histopathological features of palatine tonsils and significance of Actinomycosis in chronic tonsillitis.

II. Materials & Methods

One hundred and thirty palatine tonsils surgically removed by ENT Dept of Shri Sathya Sai Medical College, Ammapettai from 65 cases sent to the department of pathology which were reported as chronic tonsillitis were utilized for the study. Of them 9 cases showed Actinomycosis infection on both sides or on one side making a total of 11 specimens which were studied in detail.

Surgically removed bilateral tonsillar tissues were fixed in formalin, embedded in paraffin and prepared slides stained with H&E were studied. Serial sections were taken for those specimens showing Actinomycosis infection and the slides were stained with Gram Stain.

The presence of cryptitis, reactive lymphoid follicular hyperplasia, and tonsillar fibrosis were observed. The data was further analysed to determine the statistical significance of Actinomycosis in association with chronic tonsillitis.

III. Observations

Eighteen tonsillar specimens from 9 patients who underwent tonsillectomy after diagnosing chronic tonsillitis. The most frequent indication for tonsillectomy was infection. The mean age of patients was 15 years (range 5-30 years). There were 3 male and 6 female with Actinomycosis (Table no.1) showing bilateral or one side infection with Actinomycosis was making a total of 11 specimens.

Microscopic examination of the excised bilateral tonsillar tissue showed the following observations:

1. Most of the specimen showed Acanthotic squamous epithelium with basal cell hyperplasia (Fig:1)
2. Focal ulceration with scattered neutrophils (Fig:2a) and cryptitis (Fig:2b)
3. Underlying lymphoid tissue had evidence of reactive follicular hyperplasia with prominent germinal centers (Fig:3).
4. Two specimens showed hypertrophic tonsil with dense neutrophilic infiltration and bacterial colonieswith an outer zone of granulation tissue and a central zone of necrosis containing many sulphur granules that represent multiple colonies of Actinomyces (Fig 4).
5. Sub epithelial fibrosis characteristic of chronic tonsillitis was also observed (Fig 5)
6. The colonies were Gram positive (Fig 6a & 6b)

The present study reports a positive tissue reaction to Actinomyces colonies on both the sides or on one side in all the 9 cases.

Table 1: Showing bilateral or one side infection with Actinomycosis of tonsils of patients suffering from chronic tonsillitis

S.NO	AGE	SEX	Slides showing Actinomycosis colonies on	
			one side	Both sides
1.	17	F	+	
2.	12	F	+	
3.	8	F	+	
4.	26	F		+
5.	30	F	+	
6.	11	F	+	
7.	5	M	+	
8.	15	M	+	
9.	21	M		+
Total			**7**	**2**

IV. Discussion

The presence of Actinomyces in normal and diseased tonsils and its clinical significance in tonsillar crypts are controversial in the available literature sources.Actinomycotic infection has been reported in a small percentage of people presenting with chronic tonsillitis[6].The principal cause of human Actinomycosis is A.israelii. The Actinomyces are common saprophytic microorganisms which are found in the oral cavity and palatine tonsils[4] and are found in 2% -30% of subjects[4,6,7,10,11]**.** Precipitating factors are diseases in the cervico-facial region include dental caries, dental manipulations and maxillofacial trauma[14]. Mucosal disruption of the

tonsil is required for the bacteria to become infective in the tonsil.

Pransky et al [11] found that histological examination of the core tissues of the tonsils will accurately detect the presence of these organisms. Gaffney et al[7] reviewed 42 tonsils with Actinomycosis and found no correlation between the presence of Actinomycosis and tonsillar fibrosis or micro-abscesses, and concluded that Actinomycosis was present only as a saprophyte. In the present study all the 11 cases showed tonsillar fibrosis and micro-abscess was observed in two of them.

Van Lierop et al[15]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. Toh et al[16] examined 834 specimens and found no correlation between tonsillar hypertrophy and Actinomycosis. Both these reports showed no tissue reaction in spite of Actinomyces colonisation of tonsils. Contrary to the above reports, Aydin et al[10]analysed 1820 tonsillectomy specimens found the incidence of Actinomycosis to be 6.7% and reported that cryptitis was a common histopathologic indicator of tonsillar Actinomycosis. In the present study of 130 tonsillectomy specimens showed the incidence of Actinomycosis in 11 specimens (8.4%) with cryptitis.Assimakopoulos et al[4]studied the histopathological sections of 238 tonsils and concluded that Actinomyces colonisation of the tonsillar crypts was significant in causing chronic tonsillitis. Ozgursoy et al[17] suggested that Actinomyces colonisation could cause lymphoid hyperplasia and obstructive tonsillar hypertrophy. Several other authors[11] have also studied histopathological sections from tonsillectomy specimens and have arrived at similar conclusions. Present study showed the presence of lymphoid hyperplasia with well defined germinal centres. All these studies report a positive tissue reaction to Actinomyces colonies in the tonsils. Actinomyces naeslundi is an integral part of dental plaque biofilms[18]and effective elimination of the species with aggressive antibiotics and strict oral hygiene is essential for prevention of tonsillar hypertrophy and subsequent chronic tonsillitis due to Actinomyces colonization of the tonsils.

The present study showed significant relationship between the Actinomycosis & Chronic tonsillitis. The histological examination of the tonsils from 9 patients (11 specimens) with Actinomycosis showed positive tissue reaction to Actinomyces colonies in the tonsils. Malgerejo et al[12] reported that the incidence of actinomycosis was more prevalent in patients aged 5- 16 years. Aydin et al. and Toh et al., also found actinomycosis more common in adults than in children[10,16].Women are infected much less frequently than are men[19]. On the other hand, Gaffney et al[7]., have found no gender preponderance of the tonsillar Actinomycosis in patients with recurrent acute tonsillitis. The present study of 11 cases of chronic tonsillitis showed female preponderance (81.8%) and in the age group ranging from 12-30 years.

V. Conclusion

The histopathological examination of tonsils in our case report also documents a definite tissue reaction to the Actinomyces colonies. To conclude that Actinomyces colonisation of the tonsillar crypts was significant in causing chronic tonsillitis. The age of the patient and clinical signs and symptoms all correlate with the findings of other authors in previous studies. There was a female preponderance of tonsillar Actinomycosis in our study and also more common in adults than in young children. Though a known commensal, Actinomycosis may have an etiological role in long standing symptomatic tonsillar lesions refractory to antibiotic treatment. Increased awareness regarding actinomycosis and high degree of suspicion are required so that an early diagnosis is possible.

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Fig: 1 – H&E x 40 - Tonsil showing acanthotic stratified squamous non-keratinized Epithelium with basal cell hyperplasia

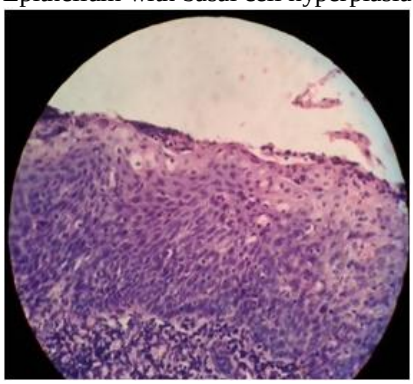

Fig: 2 (a)– H&E x 40 - Mucosal lining of the tonsilShowing focal ulceration with scattered neutrophils infiltrates in the crypt epithelium

Fig: 2 (b)– H&E x 10 - Tonsil showing Showing focal ulceration with scattered neutrophils Actinomycotic colony within the tonsillar infiltrates in the crypt epithelium crypt and cryptitis

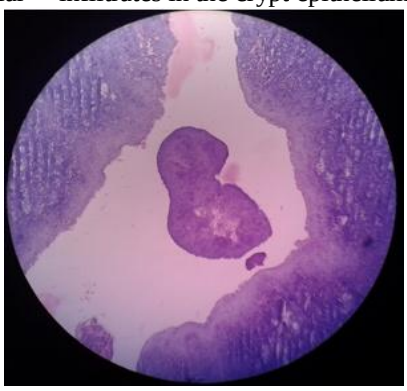

Fig: - 3 H&E x 10 - Tonsil showing reactive follicular hyperplasia with prominent germinal centers &Actinomycotic colony within the tonsillar crypt

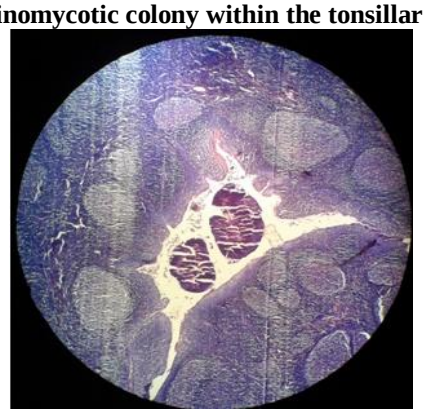

Fig: 4 – H&Ex40 Tonsil showing Actinomycotic bacterial colony with branching filaments with outer zone of granulation tissue surrounded by neutrophilic infiltration and central zone of necrosis

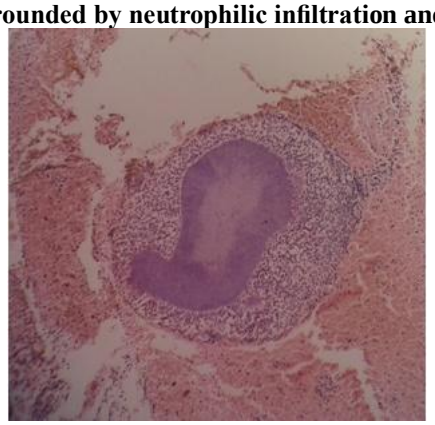

Fig: 5 H&E x 10 - Tonsil showing Sub epithelial fibrosis with congested blood vessels

Fig: 6(a) – 40 x

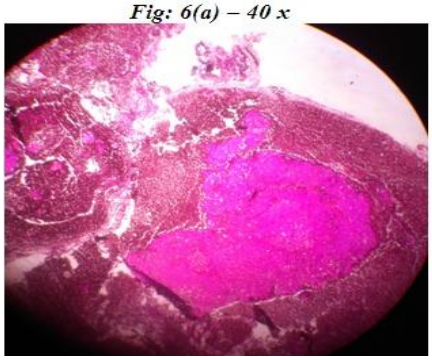

Fig: 6(b) – 100x

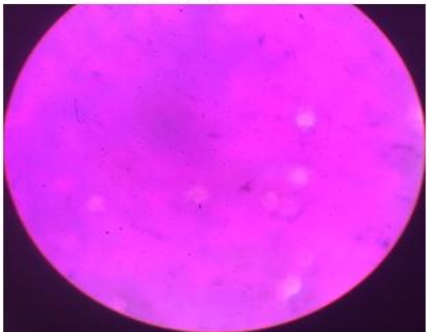

Fig: 6 (a) & 6(b) showing gram positive bacterial colonies in the crypt of tonsil in Gram stain