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Original Research Article

Correlation between throat-related symptoms and histological examination in adults with chronic tonsillitis

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ABSTRACT

Objective: The aim of the study was to evaluate correlations between throat-related symptoms and histological findings in adults with chronic tonsillitis.

Materials and methods: A prospective cohort study was carried out. Throat-related symptoms (complaints, tonsillitis rate, and pharyngeal findings) of 81 adults with histologically proven chronic tonsillitis followed by tonsillectomy were analyzed. Four types of histological changes in removed tonsils were determined: (1) pure hyperplasia, (2) chronic inflammation, (3) chronic inflammation with hyperplasia, (4) chronic inflammation with scarring/fibrosis. The power of correlation was tested using the Pearson contingency coefficient (CC).

Results: Recurrent throat infections were the most common complaint (74.1%). The mean tonsillitis rate was 3.6 (SD 1.9) episodes per year. Tonsillar cryptic debris (61.7%) and hyperemia of the anterior pillars (59.3%) were the most common pharyngeal findings. Chronic inflammation with hyperplasia was predominant (38.3%) histological type of chronic tonsillitis. The statistically significant correlations between histological type and combination of tonsillitis rate ≥ 3 times per year with cryptic debris (CC = 0.346; $P = 0.010$) and cryptic debris alone (CC = 0.294; $P = 0.051$) were detected.

Conclusions: Assessment of throat-related symptoms is complementary to histological examination in adults with chronic tonsillitis.

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1. Introduction

Diagnosis of chronic tonsillitis in adults is usually based on the rate of acute tonsillitis episodes. At least three or more episodes in each of the three preceding years, despite adequate medical therapy, can be accepted both as clinical criterion of the chronic tonsillitis and as an indication for the tonsillectomy (TE) [1,2]. However, adults suffering from chronic tonsillitis often have less severe episodes of acute throat infection. The tonsillitis symptoms (cryptic debris, halitosis, persistent sore throat) and systemic effects of chronic disease (poor general health, tiredness, tendency to catch colds, unexplained fever affecting quality of life) are common complaints [3,4]. Furthermore, the benefit of TE should be greater than morbidity gained during postoperative time and possible complications risk, especially of comorbidity rate increasing with age. Therefore, unnecessary surgery should be avoided.

Although an accurate number of acute tonsillitis episodes are often difficult to determine, the diagnosis of chronic tonsillitis in adults is usually based on clinical history, other throat-related symptoms or even tonsillar biopsy [3–6]. However, histological criteria of chronic tonsillitis have not been well studied. Various degrees of lymphoid hyperplasia, intra-epithelial and sub-epithelial lymphocyte infiltration, chronic cryptitis, and fibrosis of the parenchyma of the palatal tonsils were the most typical histological findings found in patients with chronic tonsillitis [1,6–8]. According to some studies, histological findings like lymphocyte infiltration, status of lymphoid tissue follicles, and intra-epithelial lymphocytic micro abscess represent chronic tonsillitis in more than 93% of cases [6,9]. Ripplinger et al. systemized these histological findings into 4 types, depending on severity of histological signs of chronic tonsillar inflammation [10]. However, the literature data regarding correlation between histological findings of chronic tonsillitis and throat-related symptoms are rather sparse and controversial [3,10,11].

The aim of this study was to evaluate the correlation between throat-related symptoms and tonsillar histological findings in adults with chronic tonsillitis.

2. Materials and methods

The study was conducted at the Department of Otorhinolaryngology, Lithuanian University of Health Sciences, Kaunas, Lithuania in 2013. Approval from the Regional Ethics Committee was obtained prior to the study.

A total of 81 consecutive patients with chronic tonsillitis followed conventional cold-steel capsular TE and histological examination of the removed palatal tonsils, were included in the study. There were 39 men and 42 women aged from 18 to 61 years (mean 27.2 years; SD 9.7) in the study group. Patients with obstructive sleep apnea, gastroesophageal reflux disease, peritonsillar abscess or recent acute tonsillitis were excluded from this study.

Preliminary diagnosis of chronic tonsillitis was based on history of recurrence of acute tonsillitis, other throat-related complaints and pharyngeal findings. The acute tonsillitis was

defined if the episode of acute throat infection satisfied the following two or more criteria (fever $> 38.5^{\circ}\text{C}$, tonsillar exudates, cervical adenopathy, positive group A β -hemolytic streptococcus culture). The tonsillitis rate (TR) per year was calculated. At least three or more episodes in each of the three preceding years were defined as pathological TR [2].

Nine of the most common throat-related complaints (recurrent throat infections, weakness/chronic fatigue, unexplained subfebrile condition, halitosis, snoring, swallowing difficulties, loss of appetite, heart “beating,” joint pain) were analyzed. The presence of hyperemia of the anterior pillars, cryptic debris, tonsillar hypertrophy (grade 024, according to M. Friedman), tonsillar asymmetry and cervical adenopathy > 1.0 cm were evaluated on physical examination [3,12,13].

The removed palatine tonsils were fixed in 10% neutral-buffered formalin for 24 h. After dehydration with alcohol and xylene, a histological procedure was done in paraffin. Four tissue pieces ($1.0\text{ cm} \times 1.0\text{ cm} \times 0.5\text{ cm}$ in diameter) including surface epithelium were obtained from each palatine tonsil. Three-micrometer-thick serial sections were cut (semi-automatic microtome LEICA RM 2145, Leica Instruments GmbH, Germany) and stained with hematoxylin and eosin (H+E) [14]. Histological slides were investigated with fluorescence microscope OLYMPUS BX40 (Olympus, Japan), using magnification 40–400 \times . Histological sections were analyzed and interpreted in a blind manner without using any additional information from the data of subject's history and of physical examination. Pictures of histological specimens were made using a NIKON Digital Sight DS-5M camera (Nikon Corp., Japan). Histological examination of removed tonsils was performed at the Department of Pathology, Lithuanian University of Health Sciences.

The following histological criteria of chronic tonsillitis were assessed: (a) presence of slight-to-severe lymphocyte infiltration in the surface epithelium, (b) status of lymphoid tissue follicles and germinal centers, and (c) presence of scarring and fibrosis. Depending on severity of inflammation four histological types of chronic tonsillitis were established: (1) pure hyperplasia (Fig. 1); (2) chronic inflammation (Fig. 2); (3)

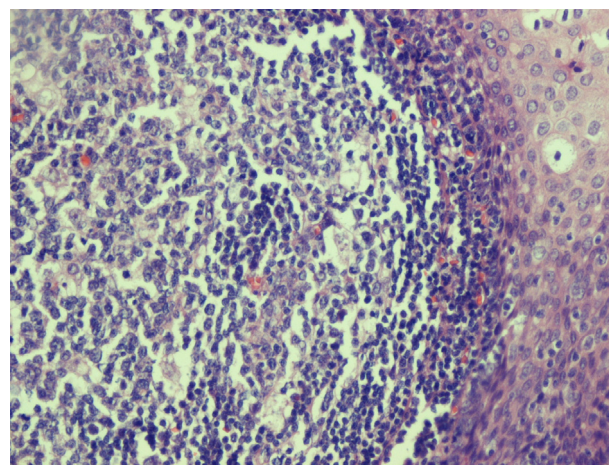


Fig. 1 – Pure hyperplasia: multiple secondary reactive lymphoid tissue follicles with distinct germinal centers, and several intraepithelial and subepithelial lymphocytes (H+E, 100 \times).

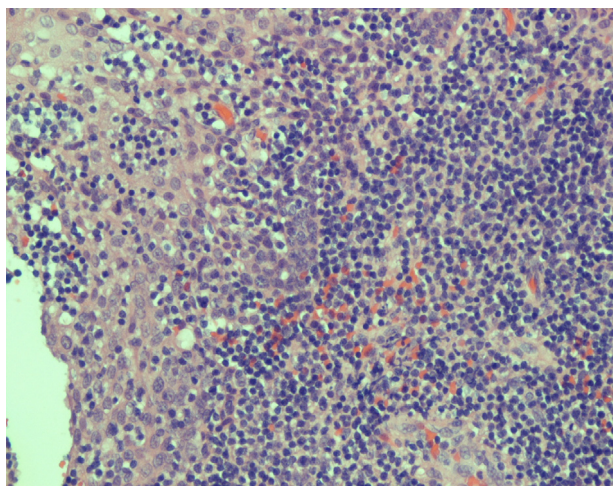


Fig. 2 – Chronic inflammation: severe intra-epithelial and sub-epithelial lymphocyte infiltration, small lymphoid tissue follicles, without distinct germinal centers (H+E, 100×).

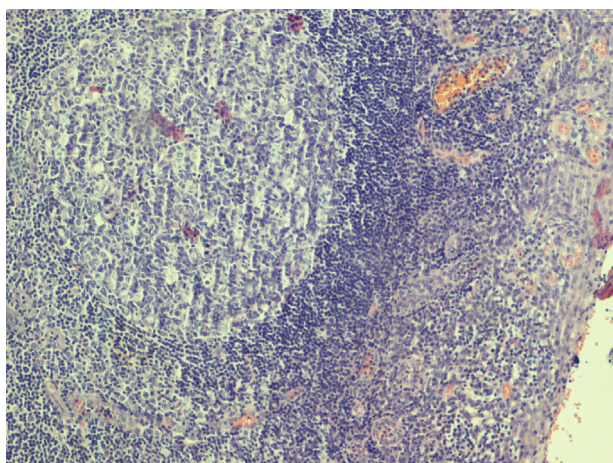


Fig. 3 – Chronic inflammation with hyperplasia: multiple secondary lymphoid tissue follicles with distinct germinal centers, severe intra-epithelial and sub-epithelial lymphocyte infiltration (H+E, 100×).

chronic inflammation with hyperplasia (Fig. 3); and (4) chronic inflammation with scarring/fibrosis (Fig. 4) [10].

2.1. Statistical analysis

Statistical analysis was performed using IBM SPSS Statistics for Windows, version 20.0 (Armonk, NY: IBM Corp.). The Student's t-test was used for testing hypotheses about the equality of means. The Kruskal-Wallis test was applied for comparing more than two samples. For testing hypotheses about independence, the chi-square test was used. The Pearson correlation coefficient (r) was applied to assess correlation between histological types and throat-related symptoms. The power of correlation was tested by using the

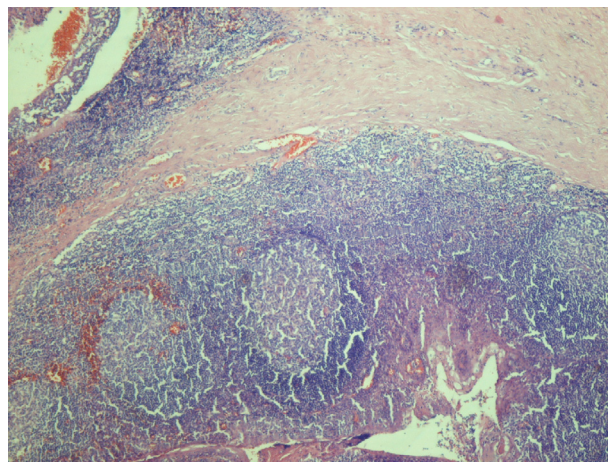


Fig. 4 – Chronic inflammation with scarring/fibrosis: multiple secondary reactive lymphoid tissue follicles with distinct germinal centers, severe intraepithelial and subepithelial lymphocyte infiltration, fibrosis (H+E, 100×).

Pearson contingency coefficient (CC). The level of statistical significance by testing statistical hypothesis was 0.05.

3. Results

3.1. Complaints, tonsillitis rate, and pharyngeal findings

Distribution of throat-related complaints is presented in Fig. 5. Recurrent throat infections consisted 74.1% of all complaints and was a statistically predominant ($P < 0.01$) entity. Tonsillitis rate varied from 1 to 8 (mean 3.6, SD 1.9), predominately 3–4 times per year (46.9%). Pathological TR was found in 60 (74.1%) of cases.

As shown in Table 1, tonsillar cryptic debris (61.7%) and hyperemia of the anterior pillars (59.3%) were the predominant pharyngeal findings in our series. However, there were no statistically significant differences among the rates of all the pharyngeal signs assessed ($P > 0.05$).

3.2. Histology

In Table 2, a distribution of histological type of chronic tonsillitis is shown. The histological signs of chronic tonsillitis

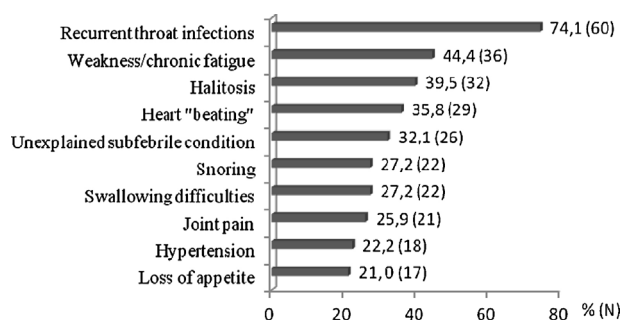


Fig. 5 – The rate of throat-related complaints.

Table 1 – Pharyngeal findings of patients with chronic tonsillitis.

Pharyngeal signs	N (%)
Tonsillar cryptic debris	50 (61.7)
Hyperemia of the anterior pillars	48 (59.3)
Tonsillar hypertrophy grade 2	43 (53.1)
Cervical adenopathy	38 (46.9)
Tonsillar hypertrophy grade 3	21 (25.9)
Tonsillar asymmetry	18 (22.2)
Tonsillar hypertrophy grade 1	15 (18.5)
Tonsillar hypertrophy grade 4	2 (2.5)

Table 2 – Distribution of histological type of chronic tonsillitis.

Histological type	No. of patients (%)
Pure hyperplasia	6 (7.4)
Chronic inflammation	26 (32.1)
Chronic inflammation with hyperplasia	31 (38.3)*
Chronic inflammation with peritonsillar scarring/fibrosis	18 (22.2)
Total	81 (100.0)

* $P < 0.05$.

(multiple secondary reactive lymphoid tissue follicles, intraepithelial and subepithelial lymphocytes infiltration, and fibrosis) were detected in all the cases of removed tonsils. However, expression of histological findings was rather different. The third histological type, i.e. chronic inflammation with hyperplasia was statistically predominant ($P < 0.05$) in our series.

3.3. Correlations between histological findings and throat-related symptoms

The statistically significant correlations ($P < 0.05$) between histological type of chronic tonsillitis and some throat-related

symptoms (cryptic debris, pathological TR or their combination) were found (Table 3). The statistically significant correlations were detected between histological type and combination of pathological TR with cryptic debris ($CC = 0.346$; $P = 0.010$) and cryptic debris alone ($CC = 0.294$; $P = 0.051$).

4. Discussion

Histological evaluation of the palatal tonsils is not a routine diagnostic method of chronic tonsillitis. The current opinion about the value of histological examinations in diagnostics of chronic tonsillitis remains controversial. The main rationale for histological examination of TE specimens is to detect possible unexpected disease, especially low-grade non-Hodgkin's lymphomas and malignancy [9,15]. However, the results of several studies highlight that the incidence of unexpected clinically relevant diseases of the tonsil is low, albeit not extremely rare [9,16]. Microscopic histological diagnoses may also be required in adult patients with uncertain diagnosis and/or risk factors [1,17]. Therefore, some authors suggest a punch biopsy before the adult TE because of (a) diagnosis may be true before surgery; (b) TE may not be performed in unnecessary and wrong diagnosis cases [6]. It may decrease the cost and consumption of manpower related to TE [9,18]. However, no consensus exists whether and/or when tonsillar biopsy specimens need to be sent for histological examination [9].

The diagnosis of chronic tonsillitis is usually based on clinical history and throat-related symptoms. However, there are very few studies which analyzed correlations between throat-related symptoms and histological findings of chronic tonsillitis. Ripplinger et al. in 2007 did not find a statistically significant correlation between tonsillitis rate and histological type of chronic tonsillitis; although chronic inflammation with tonsillar hyperplasia was the most common histological finding (42.0%) in the group of investigated preschool children [10]. In general, these data are in concordance with the results of the present study, showing chronic inflammation with tonsillar hyperplasia in 38.3% of cases in adults with chronic tonsillitis that diagnosis was based on throat-related symptoms. Moreover, statistically significant correlations between histological type of chronic tonsillitis, tonsillitis rate and cryptic debris were revealed in our study. The significant correlations between the third histological type (chronic inflammation with hyperplasia) and combination of pathological tonsillitis rate (≥ 3 times per year) with cryptic debris ($CC = 0.346$; $P = 0.010$) and between the 3rd histological type (chronic inflammation with hyperplasia) and cryptic debris alone ($CC = 0.294$; $P = 0.051$) were found. These results suggest that tonsillitis rate and cryptic debris significantly correlate with severity of histological expression of chronic inflammation in removed tonsils. Moreover, in the present study, the mean tonsillitis rate in patients with histologically proven chronic tonsillitis was 3.6 times (predominantly 3–4 times) per year. Consequently, these findings correspond to the statement of the current guidelines (AAO-HNS) those patients with at least three tonsillitis episodes per year despite an adequate medical therapy may be considered as candidates for TE [2].

Cryptic debris is considered as one of the most important signs of chronic tonsillitis and has been indicated in its

Table 3 – The correlations among throat-related symptoms and histological type of chronic tonsillitis.

Throat-related symptoms	r
Recurrent throat infections	0.24
Weakness/chronic fatigue	–0.13
Unexplained subfebrile condition	0.12
Halitosis	0.12
Snoring	0.14
Swallowing difficulties	0.03
Loss of appetite	–0.12
Heart “beating”	–0.02
Joint pain	0.14
Hyperemia of the anterior pillars	0.01
Tonsillar cryptic debris	0.33*
Tonsillar hypertrophy	–0.13
Tonsillar asymmetry	–0.11
Cervical adenopathy	–0.13
Pathological tonsillitis rate	0.32*
Pathological tonsillitis rate + cryptic debris	0.34*

* $P < 0.05$.

definition [2]. Despite the fact that an oropharyngeal examination is often blamed for the lack of scientific evidence and has fallen out of favor in the past decades, some authors indicate the significance of tonsillar cryptic debris in substantiating indications for TE [3,4,19]. Cryptic debris detected in 80% of cases was also considered to be the most valuable oropharyngeal sign of chronic tonsillitis in the study conducted by Kasenomm [3]. The author recommends paying attention to cryptic debris, tonsillar tenderness (sclerotic signs) that may be the only indicator of chronic tonsillitis in adults with a low rate of tonsillitis episodes [3]. Results of the present study show that tonsillar cryptic debris was detected in 61.7% of cases in chronic tonsillitis patients in our series and, therefore, served as a predominant pharyngeal sign of chronic tonsillitis.

5. Conclusions

The results of the present study suggest the assessment of throat-related symptoms as a valuable complementary examination confirming relations between the clinical signs of chronic tonsillitis and histological findings, and reveal both tonsillitis rate and cryptic debris as the most valuable throat-related symptoms indicating chronic tonsillitis in adults.

Conflict of interest

We certify that there is no conflict of interest with any financial organization regarding the material discussed in the manuscript.

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