RESEARCH

Prevalence of palatine tonsilloliths: a retrospective study on 150 consecutive CT examinations

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Objectives: To evaluate the prevalence of palatine tonsilloliths.

Methods: 150 consecutive CT examinations (75 males and 75 females) were read.

Results: Tonsilloliths were found in 37 patients (24.6%; confidence interval 17.7–31.6%), of which 18 (48%) had a bilateral location. No influence of sex or age was observed ($p = 0.37$ and $p = 0.57$, respectively). 26 patients (70%) had more than 1 concretion. The largest tonsillolith was 7 mm. None of the tonsilloliths found were involved in the reason for prescribing the CT. The radiographic density of the tonsilloliths was between 216 and 2959 HU.

Conclusions: Palatine tonsilloliths could affect approximately one-quarter of the population. This prevalence is likely to be underestimated in daily clinical practice because small concretions do not result in any functional impairment and are not visible on orthopantomographs.

Dentomaxillofacial Radiology (2013) **42**, 20120429. doi: 10.1259/dmfr.20120429

Cite this article as: Fauroux M-A, Mas C, Tramini P, Torres J-H. Prevalence of palatine tonsilloliths: a retrospective study on 150 consecutive CT examinations. *Dentomaxillofac Radiol* 2013; **42**: 20120429.

Keywords: Tonsillitis/radiography; Tomography; X-ray computed

Introduction

Tonsilloliths are calcifications located in the palatine tonsil (palatine tonsilloliths)¹ as well as in lymphoid tissues of the posterior nasopharyngeal wall (nasopharyngeal tonsilloliths).² In the absence of symptoms, tonsilloliths can be discovered incidentally during a systematic radiological examination. These calcifications must then be distinguished from other radio-opacities visible in the panoramic radiograph.³ Numerous cases have been reported in the literature, describing diverse features such as unilateral or bilateral location, associated symptoms, size, weight and chemical and bacterial composition.^{1,4} Treatment (consisting of surgical enucleation or even tonsillectomy) is far from being systematic and depends on possible associated signs such as halitosis,^{5,6} dysphagia⁷ or odynophagia.⁸

The aim of the present study was to estimate the prevalence of palatine tonsilloliths in patients referred for CT examination.

Materials and methods

This retrospective study involved 150 CT scans carried out in the Head and Neck Department of the University Hospital of Montpellier, France. The calculation of the sample size was based on the precision required to assess the prevalence. With an expected prevalence of about 16% (according to the only identified study⁹) and a precision of 10%, 75 CT scans were needed to achieve adequate power. Because this study concerned both males and females, 150 CT scans were required.

The study involved all consecutive CT scans performed from January 2011 to April 2011 in the Head and Neck Department. Among the 150 CT scans, 75 were performed in females and 75 in males. The mean

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Received 23 November 2012; revised 15 March 2013; accepted 18 March 2013

age was 44 years. The youngest patient was 6 years old and the eldest 85 years. These CT scans were carried out with a LightSpeed® VCT scanner (General Electric Healthcare, Barrington, IL) as follows: 512×512 pixel resolution, scan field of view (FOV) 320 mm, display FOV from 138 mm to 250 mm, slice thickness between 0.625 mm and 1.250 mm and slice spacing between 0.2 mm and 1.0 mm. The reference plan was orbitomeatal. The CT scans had been prescribed for nose, sinus and throat pathology or diagnosis (75), traumatic reasons (23), pain or oncological diagnosis (18), oral implant evaluation (16) or third molar (or other tooth) evaluation (7); the reason for prescription was not reported for 11 CT scans. None of the CT scans in the present study were prescribed for reasons involving the presence of tonsilloliths.

All the scans were read in a C600/W3200 HU window. A sole examiner (CM), qualified in orofacial CT reading, analysed the axial acquisition images and measured the tonsilloliths (Figure 1). The diameter of each tonsillolith was assessed by means of the linear scale tool from the visualization software (Centricity Web; General Electric Healthcare). Intraindividual reproducibility of concretion size measurements was assessed on the first ten CT scans showing tonsilloliths and yielded a kappa coefficient of 0.97.

The age and sex of the patients were recorded. When tonsilloliths were found, the number of tonsilloliths was noted as well as their unilateral or bilateral location, their size and their maximal density (expressed in HU).

The CT examinations were divided into four groups according to the patients' ages: younger than 35 years; 35–50 years; 50–65 years; older than 65 years. The presence and size of tonsilloliths were compared among these groups.

Figure 1 Example of a tonsillolith detected on a CT scan

Categorical variables (presence of calcification, sex and the indications for the CT scans) were compared using the χ^2 test, whereas age, as a quantitative variable, was tested using Student's *t*-test. The sizes of the calcifications among the four age groups were compared by ANOVA. Statistical analysis was conducted with the Statview software (v. 5.1; SAS Institute, Inc., Cary, NC). The significance level was set at $p < 0.05$.

Results

Tonsilloliths were present in 37 CT scans [24.6%, with a 95% confidence interval (CI) of 17.7–31.6%]. 18 of them (48%) had a bilateral location. The prevalence according to sex was 22.7% for females (CI 11.8–33.6%) and 26.7% for males (CI 17.1–36.3%), with a non-significant difference ($p = 0.57$). The age range for patients with tonsilloliths was 8–84 years. The age of patients with tonsilloliths did not significantly differ from those without tonsilloliths ($p = 0.37$).

The sizes of the concretions are shown in Figure 2.

Among the CT scans with tonsilloliths, 30% showed only one tonsillolith, whereas 70% showed two or more. On six CT scans, five tonsilloliths were apparent (Table 1).

The indications for the CT scans showing tonsilloliths (17 had been prescribed for nose, sinus and throat pathology or diagnosis, 3 for traumatic reasons, 6 for pain or oncological diagnosis, 5 for oral implant evaluation, 2 for third molar evaluation, and the reason was not reported in 4 cases) did not appear significantly different from the indications for the other CT scans.

The density of the tonsilloliths found was between 216 and 2959 HU.

No significant difference was noted for prevalence of tonsilloliths among the four age groups (13 in the younger than 35 years group, 5 in the 35–50 years group, 12 in the 50–65 years group and 7 in the older than

Figure 2 Histogram of tonsillolith size over the sample with a normal curve overlaid

Table 1 Number of tonsilloliths per CT scan

Number of tonsilloliths	1	2	3	4	5	Total
Number of CT scans	11	11	6	3	6	37

65 years group). There was no significant difference among these age groups in the size of calcifications.

Discussion

Because none of the CT scans in the present study were prescribed for reasons involving the presence of tonsilloliths, it is suggested that the CT scan sample considered in this study might be extrapolated to the rest of the population. Indeed, tonsilloliths found in this study were all small-sized concretions (maximum 7 mm), with no associated clinical signs, unlike the giant tonsilloliths reported in the literature,^{7,8} which led to CT scan prescription owing to functional complaint (pain, dysphagia).

The prevalence of tonsilloliths found in this study was 24.6%. This result appears slightly higher than the one in the earlier study of Aspestrand and Kolbenstvedt (16%),⁹ although this difference is not significant ($p=0.10$). In their study, both section thickness (5–10 mm) and interval between scan slices (0–3 mm) were higher than in the present study. Such differences could lead to variations in the capacity for detecting small concretions.

In both studies, no significant difference was found between males and females.

The wide range in density of the tonsilloliths (216–2959 HU) found in this study is comparable to the results of the study by Ben Salem *et al*² (101–2357 HU). It must be stressed, however, that measuring size and density in very small lesions (less than 1–2 mm) is not easy. Partial volume artefacts can cause density changes, and size can be under- or overestimated.

Recurrent infections seem to be involved in the pathogenesis of tonsilloliths.^{1,4} So, tonsilloliths would be more likely to be found in elderly people. However, in this study, the four age classes did not show a significantly different prevalence. One can assume that a larger population could have shown a significant effect of age upon the presence of tonsilloliths. It should be noted that this study was designed to evaluate the prevalence of tonsilloliths and that the sample size calculation depended on it.

Tonsilloliths are seldom diagnosed on a panoramic radiograph (a radiographic investigation much more frequent than CT scan). Yet, the data from this study emphasize the rather high prevalence of these calcifications, which might concern about one-quarter of the general population. Their prevalence could then be underestimated in daily clinical practice. This may be of little importance because in very few cases do tonsilloliths result in functional consequences and require a specific treatment. Similarly, the authors believe that these calcifications should not necessarily be reported on when a CT scan or a cone beam examination has been performed.

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