



## *Analysis of mineral composition & bacterial flora in 4 tonsillolith stones.*

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**Keyword 2: tonsillectomy.**

**Keyword 3: unilateral tonsil enlargement.**

### **Abstract :**

**Background/ objectives; Large tonsillolith is a rare entity although small calcifications in the tonsillar tissue are a common clinical finding in adults. These**

*patients usually present with bad breath odor, pain during swallowing or foreign body sensation in the throat.*

**Design:** *K V G Medical College, Department of ENT, Head & Neck Surgery.*

**Intervention:** *Tonsillectomy was done in all the cases & tonsillar specimen sent for histopathological analysis & tonsillolith for mineral & bacterial flora analysis.*

**Result:** *Normal tonsillar lymphoid tissue was seen on histopathology in all the 4 cases. Calcium carbonate & phosphate was seen in all with magnesium phosphate in one. Fusobacterium an oral anaerobic commensal were isolated from 2 stones.*

**Conclusion:** *Tonsilloliths are sometimes incidental findings in X-ray neck & nasopharynx. Treatment includes surgical removal for superficial stones & tonsillectomy for larger & deeper stones.*

**Introduction:**

*Tonsillolith are calcifications that form in the crypts of the palatine tonsils.<sup>1</sup> These calculi are usually small but larger stones are also reported.<sup>1</sup>*

*Gross examination & sectioning of tonsillectomy specimens during histopathological study reveals that small calcifications are not uncommon, but larger stones are rare.<sup>1</sup> Lang in 1560 was the earliest to describe the tonsillolith<sup>2</sup>. Most of the calculi are composed primarily of calcium carbonate and calcium phosphate but other mineral such as magnesium, sodium, silica, potassium, copper, aluminium, iron, ammonia radicals have also been reported.<sup>3,4,5</sup>*

*The mechanism of tonsillolith formation in the tonsillar crypts is still debated.<sup>6</sup> The hypothesis widely accepted is that tonsilloliths are formed from retained caseous secretions in the tonsillar crypts in conjunction with filaments of leptothrix buccalis – a common oral saprophyte, some times in association with chronic purulent tonsillitis.<sup>6</sup>*

*Tonsillolithiasis can occur at any age but is more frequent in 10-77 year age group with a mean age of about 50 years with equal sex distribution.<sup>7</sup>*

*The symptoms are usually nonspecific such are sore throat, referred otalgia or pain in the throat.<sup>6</sup> A foreign body sensation and halitosis may also be presenting symptoms.<sup>6</sup> It is not unusual for tonsilloliths to be diagnosed on routine radiological studies.<sup>6</sup>*

*Large calculi are clinically seen as a hard mass in the tonsil.<sup>6</sup> Treatment consists of surgical removal of the stone if it is protruding on the surface.<sup>6</sup> Tonsillectomy is indicated if the calculi are embedded in the tonsillar tissue or when associated with chronic tonsillitis.<sup>6</sup>*

#### **Materials & methods :**

*This is a retrospective of study conducted in KVG Medical College Sullia between April 2007 to September 2010. 4 cases of tonsillolith clinically palpable were confirmed on post tonsillectomy specimens. The incidence was 4 in 427 tonsillectomies done in our department under local as well as general anaesthesia.*

*All the patients were in the age group 38- 52 years. The youngest patient was 38 year old female & oldest 52 year old female. 3 were females & 1 male. All the 3 females presented with features of chronic tonsillitis & the male patient presented*

*with h/o mild right sided discomfort in the throat with occasional mild pain in the right ear while swallowing.*

*All the 3 females had a significant past history with recurrent throat infections. Oral examination revealed unilateral tonsillar enlargement & signs of chronic tonsillitis in all the 3 cases. Also cheesy material was seen over the tonsillolith prominence and appeared like a large grayish white mass with a pitted rough surface embedded in the tonsillar tissue. A clinical diagnosis of a tonsillolith was made. X-ray lateral view of the neck in the 3 cases revealed a radiolucent to radio-opaque shadow in the tonsillar region.*

*In the male patient the left tonsil was found to be normal but the right tonsil was enlarged & the tonsillar surface was congested & normal. Residual congestion of the right anterior pillar was present. On palpation of the right tonsil stony hard mass was felt which was not tender. Provisional diagnosis of elongated styloid process was made, but x-ray lateral view of the neck showed normal styloid process. A small radio-opaque shadow seen in the right tonsillar region. X-ray submento-vertical view confirmed the right tonsillolith.(fig 1)*

*The rest of the ear, nose and throat examination did not reveal any abnormality in all the 4 cases. An ultra sound examination of submandibular salivary glands, gall bladder and kidneys did not reveal any evidence of stones. No attempt to dislodge the stone from the tonsil was made. All the patients were posted for tonsillectomy under general anaesthesia. Tonsillectomy was performed & the tonsillar tissue along with the tonsillolith stone was sent for histopathological examination. (fig 2)*

*The tonsillolith was removed from the tonsil specimen. All the 4 stones were white, brownish to black in color with a pitted rough surface and measured 1x1cm,*

*1.5x1 cm, 1.5x1.2 cm & 1.6x 2cm respectively. Histopathology of all the 4 tonsil specimen showed normal tonsillar lymphoid tissue suggesting chronic tonsillitis. Calcium carbonate & calcium phosphate were seen in all 4 stones & magnesium phosphate in one stone only. The post operative period was uneventful.(fig 3,4)*

**Discussion:**

*Tonsilloliths or calculi of the tonsil are aggregates of varying size and consistency which develop in the crypts of the palatine tonsil or around it. <sup>7</sup>*

*As the etio-pathogenesis of tonsilloliths are still uncertain two postulates have been advocated. According to one postulate chronic tonsillitis associated with repeated episodes of inflammation produce fibrosis of the openings of the tonsillar crypts followed by accumulation of bacterial and epithelial debris in these crypts leading to formation of retention cysts.<sup>8</sup> This epithelial debris forms the ideal media for the growth of bacterial, actinomyces<sup>9</sup> & fungi such as *Leptothrix buccalis*<sup>6</sup>.*

*Finally dystrophic calcification occurs as a result of deposition of inorganic salts from the saliva secreted in the mouth by major and minor salivary glands.*

*<sup>10</sup>Calcification occurs subsequent to the deposition of inorganic salts following which gradual enlargement of the stone takes place. <sup>8</sup>*

*The tonsilloliths derive their phosphates and carbonates of calcium and magnesia from saliva secreted by the major salivary glands. <sup>3</sup> However, this hypothesis cannot explain the existence of calculi in the peri tonsillar zones and also in cases where prior tonsillectomy has been done<sup>3</sup>. For this, some authors have suggested that tonsilloliths results from stasis of saliva in the efferent ducts of the minor salivary glands secondary to mechanical obstruction arising from post-tonsillectomy scars or chronic inflammation. <sup>3</sup>*

*This hypothesis is supported by the histological examination of the tissue excised from around the tonsillolith which revealed salivary gland lobuli with efferent ducts surrounded by lymphoid tissue in 2 cases<sup>3</sup>. Calcification of the peritonsillar abscess and existence of ectopic tonsillar tissue are other mechanisms by which peritonsillar stones can form.<sup>3,11,12</sup> The association of tonsillolith with kidney stone, gall stones and wharton's duct stones in 3% of the cases suggest that tonsillolithiasis could be a part of the lithogenic systemic disease.<sup>3,11,12</sup>*

*Large tonsilloliths are relatively uncommon though small calcifications are a common finding in tonsillectomy specimens.<sup>7</sup> Tonsilloliths can occur at any age but are more frequent in the adults than children. They are frequently reported in the age group 10-77 yrs with a mean age of 50 yrs.<sup>7</sup>*

*69.7% of the tonsilloliths are located in the tonsillar tissue, 21.2% in the tonsillar fossa while in 9% in the soft palate.<sup>7</sup> 2 cases of large stones in the peritonsillar region associated with peritonsillar abscess known as peritonsilloliths are reported in literature.<sup>13</sup> A rare case of a calculus of the lingual tonsil has also been described in literature.<sup>14</sup> The size of a tonsillolith ranges from a few mm to several cms with largest described being 41x21x19mm.<sup>15</sup>*

*The commonest symptom is pain in throat followed by swelling in the tonsillar fossa, dysphagia, odynophagia, otalgia, peritonsillar abscess, swelling in the sub maxillary triangle and halitosis<sup>2</sup>. In some young adults tonsillar calcifications may be associated with presence of whitish expressible foul smelling and foul tasting cheesy materials from the tonsil.<sup>2</sup>*

***Tonsilloliths which are located deeply in the tonsil may present with unilateral tonsillar enlargement.<sup>16</sup> Multiple tonsilloliths have also been described.<sup>16</sup> In 9% of patients the tonsilloliths are asymptomatic with most of the asymptomatic lesions less than 21mm in the largest dimension.<sup>7</sup> Right sided lesions (60%) are more common than the left sided. They are usually single & unilateral, but 3 cases of bilateral tonsilloliths have been reported.<sup>17</sup>***

***Clinically the tonsillolith appears as a white or yellowish hard mass within the tonsillar crypt.<sup>7</sup> Tonsilloliths may be single or multiple and of variable shapes like round, oval, cylindrical, pyramidal or lobular.<sup>7</sup> The color also varies from the commonest grayish yellow to dark gray, black or red brown.<sup>7</sup> Tonsilloliths simulating peritonsillar abscess<sup>15</sup> or malignancy<sup>18</sup> have been described.***

***The diagnosis can usually be easily made on clinical examination including palpation of the tonsil and for confirmation a lateral x-ray of the upper neck will show the radio-opaque shadow.<sup>19</sup> Tonsilloliths have been diagnosed on routine x-rays of the mandible.<sup>1,19</sup>***

***But in the absence of clinical signs & symptoms, these x-rays may be misleading and give a false impression of an interosseous radio-opaque lesion such as a foreign body, odontoma, sclerosing osteitis, garre's osteomyelitis, fibrous dysplasia, idiopathic osteosclerosis, osteoma or a displaced tooth because of the super imposition of the tonsillolith on the mandibular ramus.<sup>19</sup>***

***Tonsilloliths should also be differentiated from radio-opaque structures and lesions that occur in the soft tissues close to the jaws such a sialolith, a phlebolith, cysticercosis, calcified lymph node , carotid artery arteriosclerosis, Eagle's syndrome and dystrophic calcifications in an acne scar, ectopic bone or cartilage, a large maxillary tuberosity or prominent hamulus of pterygoid.<sup>1,19</sup>***

*Cases of pseudo-bilateral tonsilloliths has also been described in which a unilateral tonsillolith gave a false impression of a bilateral tonsillolith on lateral radiograph of the neck because of super imposition of a lesion involving one side of the jaw which created a ghost or a pseudo image on the contra lateral side.<sup>20</sup> CT scans may reveal non specific calcified image in the tonsillar zone and is not helpful in reaching a differential diagnosis.<sup>6</sup>*

*A mineralogical analysis of the tonsillolith reveals primarily carbonates and/ or phosphates of calcium but, other minerals like magnesium, sodium, silica, potassium, ammonium radicals, copper, aluminium, iron have also been reported.<sup>7</sup> The composition of the bacterial flora in tonsilloliths using culture dependent molecular method and scanning electron microscopy have been described.<sup>21</sup> Anaerobic bacteria detected in tonsilloliths belong to the genera eubacterium, fusobacterium meghasphaera, porphyromonas, prevotella, selenomonas and tannerella.<sup>21</sup> All these anaerobes are associated with production of volatile sulphur compounds and this supports the tonsillolith as a cause of halitosis.<sup>21</sup>*

*Superficial & smaller tonsilloliths can be removed by enucleation or curettage under local anaesthesia. Tonsillectomy is indicated in larger stones & smaller stones with chronic tonsillitis.<sup>7</sup> We did tonsillectomy in all the 4 cases as the 3 patients were having associated chronic tonsillitis & in the other patient the stone was embedded deep in the tonsillar tissue. Tonsilloliths more than 2cms in largest dimension were usually associated with significant symptoms & lesser than 2 cm lesser were the symptoms.<sup>7</sup>*

*In our patients all 4 had stones were lesser than 2cm in greatest dimension. 2 had tonsilloliths superficially situated & 2 deep in the tonsillar tissue. Stones deeper*

*resulted in more symptoms than superficially situated stones. So the symptoms of tonsilloliths depend on the size as well as location of the stones in the tonsillar tissue.*

**Conclusion:**

*Tonsilloliths are sometimes incidental findings in X-ray neck & nasopharynx. Treatment includes surgical removal for superficial stones & tonsillectomy for larger & deeper stones. No recurrence are reported in literature after enucleation. Calcium carbonate & calcium phosphate was seen in all the 4 stones & magnesium phosphate was seen in one stone only. Anaerobic bacterial culture yielded fusobacterium in two cases.*

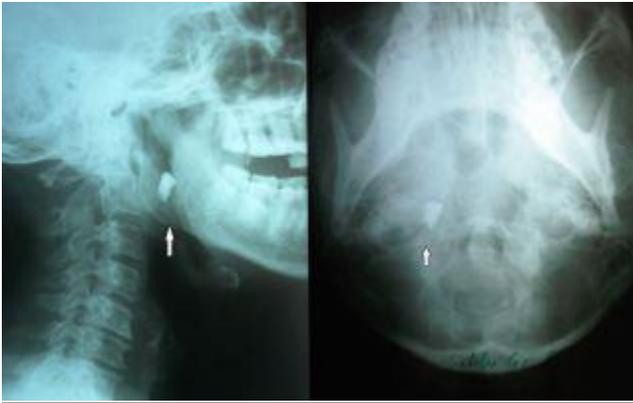


Fig 1: X-ray lateral view of neck and submento-vertical view showing tonsillolith in patient 3.



Fig 2: post tonsillectomy fossa after tonsillolith removal.



Fig 3: post-tonsillectomy specimen with tonsillolith in patient 1.



Fig 4 showing specimen of tonsil and tonsillolith after removal

## References:

1. **Rodrigo CM, Marcus V, Andrea M: Bilateral tonsilloliths in a 77-year old white man with edentulous jaws: a case report.**
2. **Pruet CHW, Duplan DA: Tonsil concretions and tonsilloliths. *Otolaryngol Clin North Am* 1987, 20(2):305-9.**
3. **Cooper MM, Steinberg JJ, Lastra M & Antopol S (1993) Tonsillar calculi. Report of a case & review of the literature. *Oral Surg Oral Med Oral pathol* 55:239-245.**
4. **Heppt W, Schmidt ST, Amstutz GC, Maier H(1989) Tonsillolith : clinical picture & mineralogic analysis. *HNO* 37:438-439.**
5. **Castellano M, Marcolli G(1996) Giant calculi of the tonsil, simulating a neoplasm. *Minerva Med* 57:1686-1688.**
6. **Silvestre-Donat FJ, Pla-Mocholi A, Estelles-Ferriol E, Martinez-Mihi V: Giant tonsillolith: Report of a case. *Med Oral Patol Oral Cir Bucal* 2005, 10(3):239-42.**
7. **Mesolella M, Cimmino M, Martino DM et al (2004) Tonsillolith- Case report & review of literature *Acta Otorhinolaryngol Ital* 24:302-307.**
8. **Paparella MM, Schumrick DA, (1991) *Otolaryngology (Vol 3 head & neck), 3<sup>rd</sup> edition , Philadelphia. W>B.Saunders p. 2141.***
9. **Cogolludo Perez FJ, Martin del Guayo G, Olalla Tabar A, Poch Broto J: Report of a case: large tonsillolith in palatine tonsil. *Acta Otorrinolaringol Esp* 2002, 53(3):207-10.**
10. **Jagdeep ST, Ravinder SM, Anamika T, Dev RS& Narinder KM : Giant tonsillolith causing odynophagia in a child: a rare case report: *Cases Journal* 2008, 1:50 doi:10.1186/1757-1626-1-50.**
11. **Neshat K, Penna KJ, Shah DH (2001) Tonsillolith : a case report . *J Oral Maxillofac Surg* 59:692-693.**
12. **Swain HI(1920) Recurrent Calculus of the Tonsil- Report of a case. *Ann Otol Rhinol Laryngol* 29:73-78**

13. Kimura H, Ohashi N, Nakagawa H, Asai M, Koizumi F: Large tonsillolith mimicking peritonsillar abscess: a case report. *Auris Nasus Larynx* 1993, 20(1):73-8.
14. Bando H, Uno T, Niimi F, Tei K, Shinomiya T & Hase Y (2003) A Case of calculus of the Lingual Tonsil. *Practica oto-rhino-laryngologica* 97(7).
15. Modrzyński M, Wróbel B, Zawisza E(2001) Giant tonsillolith simulating peritonsillar abscess. *Pol Merkuriusz Lek* H (65):432-433.
16. Dogru H, Tuz M, Aycicek A (2001) Unusual multiple Giant tonsillolith. *Oto-Rhino-Laryngologia Nova* H: 319-321.
17. Mosca RC, Cabral MVG, Mantesso A(2006) Bilateral tonsilloliths in a 77 year old white man with edentulous jaws. A case report. *Oral Radiology* 22: 34-36.
18. Padmanabhan TK, Chandra Dutt GS, Vasudevan DM, Vijaykumar(1984) Giant tonsillolith, simulating tumor of the tonsil- a case report. *Indian J Cancer*21:90-91.
19. Sezer B, Tugsel Z, Bilgen C(2003) An unusual tonsillolith. *Oral surg Oral med Oral Pathol. Oral radiol Endol* 95(4): 471-473.
20. Ram S, Siar CH, Ismail SM & Prepageran N (2004) Pseudo- bilateral tonsilloliths: a case report & review of literature. *Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology & Endodontics* 98(1): 110-114.
21. Tusuneishi M, Yamamoto T, Koikeguchi S, Tamaki N, Fukui K, Watanabe T(2006) Composition of bacterial flora in tonsillolithiasis. *Microbes Infect* 8(9-10): 2384-2389.