A 29 year old man presented with a history of pain and swelling in the right submandibular region for the past 4 months, worsening over the past week. The clinical differential diagnosis included submandibular sialadenitis, submandibular sialolithiasis, submandibular abscess formation and submandibular lymphadenopathy.

Imaging Findings:

Plain CT images revealed a calcification in the anterior aspect of the floor of the mouth on the right side and another calcification where the main submandibular duct curves over the posterior edge of the mylohyoid muscle. The right submandibular salivary gland appeared significantly enlarged in size in comparison to the left side.

Post contrast images revealed a fluid attenuation tubular structure along the inner margin of the right mylohyoid muscle suggestive of a dilated right submandibular (Wharton's) duct. The previously visualized calcifications were noted in line with the dilated submandibular duct confirming them as proximal and distal intraductal calculi. Dilated intraglandular ducts were also well seen as linear or rounded fluid attenuation areas within the submandibular gland depending on their orientation to the axial section. These dilated intraglandular ducts could be traced to converge on the intraductal calculus within the proximal right submandibular duct (not shown).

Discussion:

Sialolithiasis is considered the second most common disease process affecting the salivary glands after mumps infection. About 80 to 82% of calculi occur in the submandibular salivary gland/duct. Factors implicated in the submandibular predominance of sialolithiasis include thicker, viscous saliva, dependent position of gland, antigravity course/wider dimension of the duct and a narrow orifice. Calculi may form in the intraglandular ducts or major ducts. About 25% of the cases of sialolithiasis show multiple calculi [1].

Conventional radiography, ultrasound and CT can detect submandibular duct calculi. Conventional sialography performed by cannulating the salivary duct, although largely replaced by newer modalities, may still be used to assess post traumatic/infective ductal abnormality, stricture or fistula formation and autoimmune disease [2]. Ultrasound and CT are more sensitive at detecting calculi in comparison to conventional radiography. Ultrasound is however operator dependent. CT with its intrinsically high sensitivity for calcification and ability to acquire thin slices is considered the ideal imaging modality in sialolithiasis. A preliminary non contrast acquisition is considered essential as small vascular structures in post contrast images may mimic calculi. CT is also useful in assessing features of sialadenitis secondary to sialolithiasis. CT may demonstrate enlargement of the gland, mild increase in
enhancement or intraglandular ductal dilatation in the acute setting [1]. Chronic cases may show fatty infiltration and atrophy of the involved gland [3]. CT was directly ordered in our case in view of its ability to better evaluate possible multiple calculi, abscess formation and lymphadenopathy in other areas of the neck. MR sialography uses thin 0.5-1.5 mm heavily T2W images to assess the ductal system. Source images are usually obtained using a single shot fast spin echo sequence in the axial and oblique sagittal planes with maximum intensity projection reconstruction. The ductal system appears T2W hyperintense, while calculi appear as focal hypointense areas [2]. Small calculi within the salivary gland and sometimes even larger ductal calculi may however be missed on MRI [1]. A combination of MRI and CT is considered ideal by some authors [3]. Treatment for sialolithiasis depends on the position of the calculus. Calculi in the distal duct may be removed via a transoral approach. Calculi closer to the gland are however not amenable to this approach. Removal of the salivary gland may be necessary in cases with a history of recurrent sialadenitis [1]. Our case underwent resection of the right submandibular salivary gland after a trial of symptomatic treatment.

**Differential Diagnosis List:** Submandibular sialadenitis due to submandibular sialolithiasis, Infective sialadenitis, Calcified submandibular lymph nodes

**Final Diagnosis:** Submandibular sialadenitis due to submandibular sialolithiasis.

**References:**


Description: Calcification is noted in the anterior aspect of the floor of the mouth on the right side, immediately lateral to the genioglossus muscle. Origin: Ramnad MRI and CT Scans, Ramnad, India.

Description: Another calcification is noted where the main submandibular duct curves over the posterior edge of the mylohyoid muscle. Origin: Ramnad MRI and CT Scans, Ramnad, India.
Description: The right submandibular gland (open arrow) appears significantly enlarged in size in comparison to the left side (solid arrow). Origin: Ramnad MRI and CT Scans, Ramnad, India.
**Figure 2**

**a**

*Description:* The calcification previously visualized in the plain images is noted in the anterior aspect of floor of mouth on the right side in the region of termination of the right submandibular (Wharton\'s) duct (arrow). *Origin:* Ramnad MRI and CT Scans, Ramnad, India.

**b**

*Description:* A tubular fluid attenuation structure is seen along the inner margin of the right mylohyoid muscle in keeping with a dilated right submandibular duct (arrow). *Origin:* Ramnad MRI and CT Scans, Ramnad, India.
**Description:** The other previously visualized calcification (arrow) is noted at the proximal end of the right submandibular duct confirming an intraductal calculus. **Origin:** Ramnad MRI and CT Scans, Ramnad, India.

**Description:** The enlarged right submandibular gland shows a couple of small round fluid attenuation areas in keeping with dilated intraglandular ducts (arrows). **Origin:** Ramnad MRI and CT Scans, Ramnad, India.
Description: The dilated intraglandular ducts appear as linear fluid attenuation areas converging onto larger rounded ducts (arrows). Origin: Ramnad MRI and CT Scans, Ramnad, India.