Causes, Natural History, and Incidence of Salivary Stones and Obstructions

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KEYWORDS

• Salivary gland disease • Sialolithiasis • Calculi
• Sialadenitis • Küttner's tumor • Calcification

HISTORICAL REVIEW

A brief historical review, which begins with Küttner in the late nineteenth century and finishes with research in progress, is necessary to appreciate current understanding. A detailed historical review has been presented elsewhere.[1]

Clinical Investigations

Küttner[2] in 1896 published the results of his microscopic examinations of two patients' chronically swollen submandibular glands that attracted a clinical diagnosis of malignancy. He realized that the swelling was caused by chronic inflammation that, together with fibrosis, led to a clinical appearance of malignancy. He found a sialolith the size of a cherrystone associated with the gland in one of the patients, who had complained of a submandibular swelling for 10 years. He considered the sialolith secondary to the inflammation because the sialolith was far too small for a concretion of 10 years' accumulation and because of the absence of a sialolith in the other case, in which the duration was only 1.5 months. Küttner was of the opinion that chronic sialadenitis is primary and arises by inflammation that ascends Wharton's duct from the mouth. He considered three ways in which a sialolith could form: inflammation may roughen the lining of ducts and precipation occurs on this; inflammation may compress the intraglandular collecting ducts of lobules and precipitation occurs in the obstructed lobules; and precipitation may occur in bacterial deposits.

Küttner's seminal publication in 1896 established chronic obstructive sialadenitis as an entity, which became known in continental Europe as Küttner's tumor. Küttner's subsequent practice and research confirmed his opinion that sialoliths are secondary to sialadenitis (see his *Handbuch der Praktischen Chirurgie*, 1926)[3,4]

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(**Fig. 1**). Rauch, in his monograph, *Die Speicheldrüsen des Menschen*, in 1959, considered Küttner's tumor a mycosis and did not mention Küttner's opinion about sialoliths. Instead, he described various other theories to explain the production of sialoliths.[5,6]

Küttner's work, however, was developed by Seifert and Donath in their 1977 clinicopathologic investigation of chronic submandibular sialadenitis.[7] They divided it into progressive stages that ranged from focal sialadenitis to severe chronic sialadenitis with fibrosis. The first stage occurs when sialomicroliths cause obstruction of small intraglandular ducts, followed by an inflammatory reaction. In the subsequent stages, there is increasing atrophy, fibrosis, and inflammation. The decreased secretory activity of glandular atrophy facilitates ascending invasion by microbes that sustain the inflammation, thus creating a vicious circle.

A major problem of the classification into histologic stages is that the overall microscopic appearance is graded, although there can be great variation between the different features that make up this appearance, even within different parts of the same gland. Harrison and colleagues analyzed this problem by investigating 154 cases of chronic submandibular sialadenitis and statistically reviewing 18 different clinical and histologic features.[8]

This investigation found that sialoliths, atrophy, fibrosis, and other histologic features are all related to inflammation. Inflammation is of the greatest importance in the progression of sialadenitis and the development of sialoliths. Inflammation, atrophy, fibrosis, and sialoliths are all related to the duration of symptoms, which supports Seifert and Donath's concept of a chronologic progression through increasingly severe histologic stages with secondary production of sialoliths.

Previous investigations of chronic submandibular sialadenitis, however, did not reveal the etiologic factors that could transform a normal gland into a diseased gland.

Fig. 1. Submandibular gland with a large sialolith to the right that fits into the cavity in the gland. (*From* Küttner H. Speichelsteine. In: Garrè C, Küttner H, Lexer E, editors. Handbuch der Praktischen Chirurgie. Vol. 1. Chirurgie des Kopfes. 6th edition. Stuttgart: Ferdinand Enke; 1926:929–35 [Fig. 357])