Chapter 8
Calculi of the Parotid Gland

ABSTRACT

Sialolithiasis is the most common disorder of major salivary glands with approximately 80% to 95% occurring in the submandibular gland and 5% to 20% in the parotid gland. Parotid stones are composed of organic substances such as cellular debris, muco-polysaccharides and glycoproteins, and inorganic substances, mainly phosphates and calcium carbonates. Conventional x-ray sialography combined with US is the method of choice for visualization of salivary gland calculi. Sialography and US are also inevitable in patient's qualification for diagnostic and therapeutic sialoendoscopy, thus avoiding sialadenectomy. An alternative, non-invasive diagnostic method is magnetic resonance imaging (MRI), MR sialography (MRS), or unenhanced computed tomography (CT). Therapeutic options include parotidectomy, external lithtripsy, and interventional sialoendoscopy.

INCIDENCE

Sialolithiasis is the most common disorder of major salivary glands (Madani & Beale, 2006). The majority of salivary calculi (80% to 95%) occur in the submandibular gland, whereas 5% to 20% are found in the parotid gland (Madani, 2006; Drage, 2000; Rabinov, 2000; Yousem, 2000; Jager, 2000; Koischwitz, 2000; Alyas, 2005; Bialek, 2006; Erdem, 2018). The difference in incidence is attributed to a number of factors such as the difference in the composition of the saliva produced by each gland and the dependence of the submandibular (Wharton's) duct, which hinders easy drainage of its viscid

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secretions. Sialothiasis rarely affects the sublingual gland and the minor salivary glands are rarely (1% to 2%) (Rabinov & Weber, 1985).

The majority of stones are single. In 25% of cases, the stones are multiple (Madani, 2006; Rabinov, 2000; Yousem, 2000; Alyas, 2005). The mean number of stones per one patient is 1.67 (range from 1 to 5), and the most symptomatic sialolithiasis can be observed in patients between 30 and 60 years old (Drage, Brown, Escudler, & McGurk, 2000).

COMPOSITION

Parotid stones are composed of *organic* substances such as cellular debris, muco-polysaccharides and glycoproteins, and *inorganic* substances, mainly phosphates and calcium carbonates (Langlais, 1995).

The organic substances are mainly found as the core of the stone, while the inorganic substances are in its periphery. *Hydroxyapatite* (calcium phosphate) is the most frequent component present throughout the calculus.

The annual growth rate of an established stone is about 1 mm per year and the average size is about 3.4 mm (range from 1.5 to 9 mm) (Drage, Brown, Escudler, & McGurk, 2000). Calculi within a major duct tend to be smooth and rounded, whereas those within the gland tend to be irregular in shape.

ETIOLOGY / PATHOGENESIS

According to one of the etiopathogenetic theories, the formation of the salivary gland calculi results from a deposition of calcium salts around a core made of desquamated epithelial cells, foreign bodies, bacteria, or mucus. Salivary gland calculi are of laminal structure.

Submandibular gland is the most common place for calculi formation because it produces a particularly viscous, mucous and more alkaline saliva, with a relatively high concentration of hydroxyapatites and phosphates. This predisposes to the precipitation of salts (Madani, 2006; Yousem, 2000). Moreover, the opening of the main salivary duct of the submandibular gland (Wharton's duct) is narrower than the diameter of the whole duct. What is more, the duct ascends towards its opening, which is also conducive to saliva retention (Yousem, 2000; Alyas, 2005; Langlais, 1995; Wong, 2003).