

## Anatomic variations

# Submandibular gland with multiple ducts

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**Summary.** A morphological peculiarity was observed in the form of a submandibular gland having three ducts. These ducts opened separately into the oral cavity. Only the upper and the largest of these three ducts was in the usual position and had the expected relation to the lingual nerve. Such a condition is to be kept in mind by a surgeon or a radiologist performing sialography. Unless each of the duct is instilled he may miss pathological findings.

### Glande submandibulaire avec des conduits multiples

**Résumé.** Une variation anatomique d'une glande submandibulaire présentant trois conduits excréteurs est rapportée. Les conduits débouchaient séparément dans la cavité orale. Seul le conduit supérieur, le plus important, était en situation

normale et avait des rapports anatomiques habituels avec le nerf lingual. Une telle variation doit être connue du chirurgien ou du radiologue qui effectue une sialographie. L'absence d'infection de l'un des conduits multiples peut être à l'origine de la méconnaissance d'un état pathologique.

**Key words:** Multiple salivary ducts — Submandibular duct — Anomaly duct anomaly

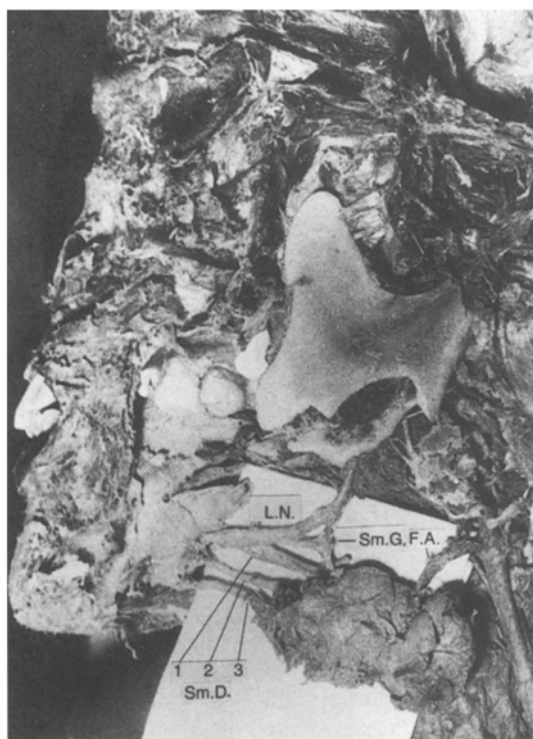
The submandibular gland is one of the three pairs of major salivary glands. It was described as long back as 1661 by a Danish scientist Neils Steensen (Nicolaus Steno), in his book *Glandulis Oris, nuper et observatis inde prodeuntibus vasis* [2]. Duplicate or multiple structures such as organs and ducts are rare but known anomalies. It is however interesting to note that multiple ducts of submandibular gland are very rarely reported in the literature [6], though in 7% of the cases the presence of two parotid ducts has been claimed [1].

### Case description

During routine dissection of a cadaver of an adult male of Indian origin, it was found that the left submandibular gland had an anatomical variation in the form of three ducts (Fig. 1). There were no other obvious congenital abnormalities found in this subject. The relations of the submandibular glands of both sides were studied and the ducts traced to their opening in the floor of the mouth. Of these ducts the upper most one was of a larger diameter than the other two. This duct had approximately the same diameter as the single duct of the right submandibular gland. The other two ducts, though of fairly large diameter, were slightly narrower than the main upper duct. These were almost parallel to each other, passing between the mylohyoid and hyoglossus muscles. Only the upper or the main duct had normal anatomical relation to the lingual nerve and the submandibular ganglion.

Each duct arose independently from this gland. They had separate openings in the mouth. The main duct opened at the summit of a papilla and the other two lateral and adjacent to it producing slight mucosal elevations. Each duct was slit open along its long

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**Fig. 1**

The left submandibular salivary gland with three ducts (SM.D., 1, 2, 3) issuing from it. Also seen is the lingual nerve (L.N.) and submandibular ganglion (Sm.G.) related to the upper duct. Facial artery (F.A.) can be seen supplying the gland

La glande submandibulaire gauche présente trois conduits (SM.D., 1, 2, 3). Remarquez les rapports du conduit supérieur avec le n. lingual (L.N.) et le ganglion submandibulaire (Sm.G.). L'a. faciale (F.A.) paraissait vasculariser cette glande

axis and its lumen found to be patent. The middle third of each duct was cut, sectioned and stained with haematoxylin and eosin. Under the light microscopy they were seen to have normal histological structure. The submandibular glands of both sides were located in the digastric triangles and were of normal size. They were firmly enclosed in their fibrous capsule with strands of trabeculae passing into its core. An attempt to separate each lobe from which the ducts arose was not successful.

### Discussion

The submandibular gland develops as an invagination of the endoderm from the floor of the developing pharynx during the sixth week of fetal life. The duct branches in an arboreal fashion, increasing in number and decreasing in caliber. If multiple primordia develop it would lead to the formation of as many number of ducts and glands. The glandular tissue of these primordia, if closely placed and compactly covered by connective tissue should

form a single submandibular gland having multiple ducts, each opening separately in the mouth as seen in this case.

The large single submandibular duct is apparently quite constant (except of course, in agenesis of the gland) but very rarely a marked anomaly of this duct may occur. Waller [7] described a case (in an embryo) in which a submandibular duct opened into the pharynx near the faucial isthmus. Rose [6] described a case in which the chief duct seemed to bifurcate, one part emptying as usual at the sublingual papilla while the second limb, of equal size, appeared to empty in the floor of the mouth opposite the second molar tooth; the anterior limb in this case was blocked by a calculus, and he was not sure that the posterior limb might not have been a fistulous tract. In the present case all three ducts had normal histological structure and opened in the floor of the mouth just lateral to the frenulum of the tongue.

The pathological conditions of the salivary glands such as calculi (which

account for 80-90% of all salivary stones), inflammatory disorders, mass lesions and penetrating trauma can be assessed by sialography [3]. The duct is cannulated through the ostium and retrograde instillation of water or oil soluble contrast media helps in location and evaluation of these diseases by observing the disturbance of the ductal architecture. About 90% of all salivary calculi occur in the submandibular gland and approximately 20% of these are radiolucent [5]. Though majority of salivary calculi are radioopaque, it is commonly recognised that because of technical problems, only 50% of such calculi are seen on plain X-ray film. This highlights the importance of sialography as a diagnostic procedure.

Radiolucent stones or any other pathology present in the accessory ducts may inadvertently be overlooked if sialography is not performed by injecting the contrast media into each of these ducts. Awareness of the possibility of multiple ducts opening separately is important to a surgeon and to a radiologist performing this investigative procedure.

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