

Research article - Human anatomy case report

Unilateral duplication of parotid duct – a rare cadaveric case report

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Abstract

The parotid gland is drained by the parotid duct which normally measures 50 mm in length and 3 mm in width. The parotid duct emerges at the anterior border of the gland and runs horizontally across the masseter muscle to pierce the buccinator and open into the vestibule of the mouth. The occurrence of double parotid duct is 7% and there are only very few literature references. The parotid gland develops as an epithelial bud arising from the oral ectoderm and invaginating into the underlying mesenchyme. The proximal part canalises to form the duct and the distal end differentiates to form the acini. An early division of the parotid duct with acini from both ducts intermingling with each other results in the formation of double parotid duct. The cytodifferentiation and morphogenesis of parotid gland are influenced by cell specific gene expression and cell-matrix interactions that produce collagen responsible for branching and hyaluronidase responsible for acini formation. The awareness of presence of a double parotid duct is significant in ductal endoscopic procedures and in performing surgery in the parotid region.

Key words

Parotid gland, parotid duct, duplication, autopsy

Introduction

The parotid gland is the largest of the salivary glands. The secretion of this gland reaches the oral cavity through the parotid duct (Stensen's duct). The normal parotid duct measures about 50 mm in length and 3 mm in width. It runs horizontally forwards across the masseter and turns medially at its anterior border to pierce the buccinator. The duct opens into the vestibule of the mouth by piercing the mucous membrane of the cheek opposite the upper second molar tooth (Williams et al., 1995). The occurrence of double parotid duct is seen in 7% of population (Bailey, 1971). On the contrary there are few reports in the literature about the parotid duct variations.

The awareness of the normal topographic anatomy and variations of parotid duct is highly relevant to analysis of radiographic images and computerised tomography scans used in sialography as well as for duct endoscopy, lithotripsy and transductal facial nerve stimulation in early stages of facial nerve palsy (Zenk et al., 1998; Moore et al., 2005). We report here a case of double parotid duct on one side, a very rare presentation.

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Case report

During routine cadaver dissection in the department of Anatomy, we found a double parotid duct on the left side of the face of a 78 year old male subject. Both the parotid ducts - the superior and inferior one - were carefully dissected and traced from the anterior border of parotid gland to their fusion with each other to form the main parotid duct at a distance of 7 mm from the anterior border of parotid gland. The main parotid duct was traced up to its piercing the buccal fat pad. The length of the ducts and the outer diameter of the parotid ducts were measured using digital calipers. The anterior border of parotid gland was taken as the reference to measure the length of the ducts. The lengths of the superior (D1) and inferior ducts (D2) were 8 mm and 22 mm respectively. The diameters of the superior and inferior ducts were 2.5 mm and 3 mm respectively. The length of the main parotid duct was 23 mm and



Figure 1 – Double left parotid duct (D1 and D2) in a 78 year old male. MPD: Main parotid duct.

its diameter at the anterior border of masseter was 4 mm. The distance between the superior and inferior ducts at the anterior border of parotid gland was 17 mm. On the right side, there was a single parotid duct measuring 55 mm in length and 4 mm in diameter at the anterior border of masseter.

Discussion

The parotid gland is located below the external acoustic meatus and zygomatic arch and between the ramus of mandible and sternocleidomastoid muscle. The parotid duct is formed by the confluence of two or three ducts within the anterior part of the gland at the centre of the posterior border of ramus of mandible. The main parotid duct emerges at the anterior border of the gland.

The parotid gland begins to form during the sixth to seventh week of development. On each side, a solid epithelial bud arises from the primordial oral ectodermal lining that invaginates into the underlying mesenchyme as an elongated furrow running dorsally towards the ears between the maxillary and mandibular prominences. This cord of cells later becomes canalised to form a duct by about the tenth week. The rounded posterior end of the cord branches and differentiates to form the secretory acini. The gland commences its secretions at around 18 weeks of gestation. As the size of oral fissures decreases the duct opens into the inside of the cheek (Moore et al., 2002). Sometimes an early division of the parotid duct occurs and the epithelial sprouts from both ducts invaginate individually into the surrounding mesenchyme and intermingle with each other. This may lead to development of two parotid ducts with acini from both ducts ramifying to form the parotid gland.

This case of double parotid duct on the right side of a male cadaver adds to the small list of cases in the literature. The ascending and descending intraparotid ducts should normally merge within the gland to form the main parotid duct (Aktan et al., 2001). Double parotid ducts measuring 26.49 mm and 37.25 mm in length and merging 3.35 mm proximal to the piercing of buccinator were present on the right side of a 46 year old male cadaver (Fernandes et al., 2009). Also, double parotid ducts were seen bilaterally in a 50 year old male cadaver. The length of the ducts on the right side was 29 mm and 36 mm and that of the ducts on the left side was 28 mm and 34 mm. The ducts merged with each other at the level of the anterior border of masseter on both sides (Astik and Dave, 2011). An unilateral double parotid duct with the superior duct measuring 28 mm and the inferior duct measuring 37 mm merged to form the main parotid duct within an accessory parotid gland and then emerged to run forward to pierce the buccinator; the length of the main parotid duct was 25 mm (Mohammed et al., 2014).

The branching of a tubular duct occurs as a result of interaction between the proliferating epithelium of the duct and its surrounding mesenchyme. During tubular and acinar development, hyalouranidase secreted by the underlying mesenchymal cells breaks down the basal lamina produced by the epithelial cells thus increasing the epithelial mitoses locally and resulting in the formation of an acinus. The cleft formation for branching is initiated by the collagen III fibrils produced by the mesenchyme. The collagen acts to protect the basal lamina and the overlying epithelia from the effects of hyalouranidase resulting in a series of clefts that produce a characteris-

tic branching pattern. If the collagen is removed no clefts develop whereas if excess collagen is produced then supernumary clefts appear (Strandring et al., 2005).

The development of parotid gland occurs in six stages pertaining to the growth, cytodifferentiation and morphogenesis influenced by intrinsic and extrinsic factors. The cell specific gene expression and cell-cell and cell-matrix interaction and growth factors influence the synthesis and deposition of type I and type III collagen. These are required for branching morphogenesis. The collagen synthesis stabilizes and maintains the branch points and specific growth factors regulate the branching patterns (Avery et al., 2002).

This variant anatomy of parotid duct has been reported as a very rare occurrence with only a handful of literature reports. The knowledge of such variations of parotid duct is significant in investigative procedures like diagnostic sialography, miniaturised salivary duct endoscopy and in planning surgical interventions in the parotid region. This awareness helps to avoid accidental damage to these duplicated parotid ducts.

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