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Case Report

Stensen's duct reconstruction associated with facial trauma: a case report

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ABSTRACT

Facial lacerations involving the parotid duct are rare injuries (0.1% to 0.3% of facial lacerations in major trauma studies) but clinically important in the field of maxillofacial and plastic surgery. Its position on the cheek and proximity to the buccal branch of the facial nerve put it at risk for penetrating injuries, lacerations, and crush damage. If not diagnosed and treated, these lesions can cause sialoceles, parotid-cutaneous fistulas, chronic infections, and functional problems, which can lower the patient's quality of life. The secret of success in repair is knowledge of regional anatomy.

Keywords: Stensen's duct, Parotid duct injury, Facial trauma, Sialocele, Plastic surgery, Facial nerve

INTRODUCTION

The face is the basis of human identity, emotion and social connection. Facial reconstruction after trauma is a technical challenge and a huge responsibility for the patient's self-image and quality of life in plastic and reconstructive surgery. The main excretory duct of the parotid gland, Stensen's duct, is rarely damaged in soft tissue trauma of the midface. It represents 0.1-0.3% of all lacerations of the face in large trauma studies.[1] The duct of Stensen opens into the oral cavity via the buccal fat pad, masseter and buccinator muscles opposite the second upper tooth. The duct can be damaged by penetrating cheek trauma with glass shards, knife wounds, dog bites, motor vehicle accidents, and iatrogenic trauma following craniofacial treatments 5-7 cm long in adults.[2] Due to its location under the superficial musculoaponeurotic system (SMAS) and adjacent to the buccal branch of the facial nerve, duct injuries are common. Many parotid duct injuries were not diagnosed until a sialocele or persistent salivary leakage from a laceration or face sinus developed.[3] Delayed diagnosis leads to chronic inflammation, scarring, psychological distress and many surgeries.

Parotid gland and Stenon duct anatomy

Knowing regional anatomy is the key to successful repair. The parotid gland lies superficial to the posterior half of the masseter muscle. The posterior part or tail of the parotid extends posteriorly and medially to the posterior border of the ascending ramus of mandible.[4]

The parotid-masseteric fascia is a continuation of the superficial layer of the deep cervical fascia surrounding the gland. The Stenson's duct (also called the parotid duct) is about 7 cm in length.[5] It arises from the anterior surface of the gland and passes superficial to the masseter muscle. In this context, it is found near the transverse facial artery and the buccal branch of the facial nerve.[6] Medially, the duct enters the buccal fat pad at the anterior border of the masseter. It crosses the buccinator muscle and oral mucosa and ends in papillae at the level of the second maxillary tooth. It runs in a straight line vertically from the tragus of the ear to the midpoint of the upper lip. Van Sickles classified parotid duct injuries as A, B, or C depending on the site of injury.[7] Site A shows damage to the the posterior border of the masseter muscle. Site B includes duct segment crossing the masseter. Site C injuries are anterior to masseter. If left untreated, saliva will ooze into the surrounding tissues, leading to a painless, progressive sialocele. If the skin cut isn't fixed or gets infected, it can lead to a long-lasting parotid-cutaneous fistula, which causes ongoing salivary drainage when eating or even just by seeing or smelling food, known as the "gustatory reflex." Facial nerve injury (usually buccal or zygomatic branches) is found in 15-25% of cases and should be carefully examined before surgery.[8]

CASE REPORT

A 38-year-old male patient with no significant medical history presented to our hospital emergency unit with facial trauma in the right middle third due to an attempted robbery with a knife. On examination there was a laceration of the middle third of the right hemiface approximately 5 cm in length with clean margins and no evidence of vascular injury. The buccal branch of the facial nerve was intact as well. However, a surgical exploration of the incision was performed which revealed a complete section of the Stenson duct at Van Sickles Zone II classification. This led to the decision to proceed with cannulation and immediate reconstruction which was successful resulting in a satisfactory full recovery without any complications.

Surgical strategies

There are several surgical approaches for treatment of Stenson's duct injuries, each of them with different indications, advantages and disadvantages. The choice of strategy depends on the location of the damage (zone I, II or III), the time elapsed since the injury, the condition of the ductal ends and the experience of the surgeon.[9] Primary repair is the preferred method for clean and precise transections in Zone II not the use of a stent within 24 to 48 hours.[10] The stent is important in maintaining luminal patency and avoiding anastomotic collapse, allowing proper placement of the sutures and postoperative drainage of saliva. The optimal timing of stenting is still under discussion. Most authors suggest that the stent be left in place for 10 to 14 days to allow complete epithelial healing and to decrease the risk of early postoperative obstruction.[11] Another method is proximal duct ligation, which blocks the duct permanently. This stops any more saliva from leaking out and leads to the gradual shrinkage of the parotid gland. This method can lead to chronic dry mouth, a sensation of fullness or pain in the face, and reduced overall gland function. Ligation is to be reserved for cases where the gland is irreparably damaged, or where the patient's medical condition precludes reconstruction and diversion procedures that preserve gland function.[12] Intraoral marsupialization is a helpful procedure when fixing a problem directly is not possible. This can happen in serious Zone III injuries where the end of the duct cannot be reached, or after a first attempt to reconnect (anastomosis) fails, making the duct open to the mouth. This method addresses the challenges of microsurgery, keeps some function of the gland, and successfully handles sialocele and skin fistulas by inserting a tube into the main duct, guiding it under the mucous layer, and stitching it to the inside of the cheek.[13]

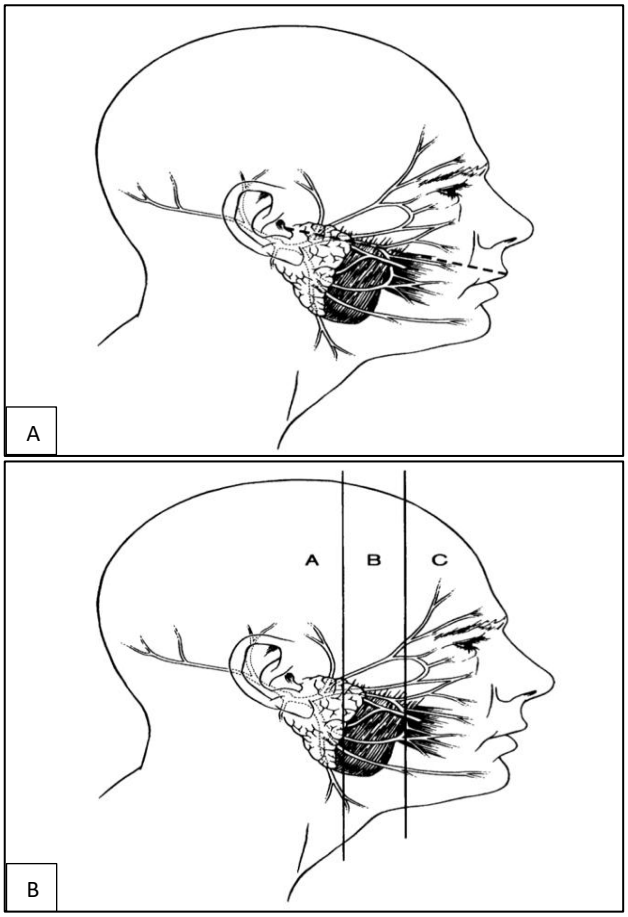


Figure 1 (A and B): Tragal-lip llane and van sickles classification.

Concomitant injuries: the facial nerve

In the discussion of single ductal injury, the concomitant injury to surrounding areas is often ignored. The buccal

branch of the facial nerve emerges from the parotid gland and courses through the superficial layer of the masseter.[14] It is close to Stensen's duct. Thus, the nerve branch is vulnerable to damage from penetrating injuries that extend into the duct. Someone who has a mixed injury may have impaired mobility and weakness of the upper lip, which may cause asymmetrical facial expressions when speaking, smiling, or expressing emotion. This is of great importance for the field of surgical management. If there is damage to a branch of the facial nerve, it is suggested to do primary neurorrhaphy or to use a nerve graft along with duct repair, ideally using magnification.[15] The initial surgical evaluation should include a careful clinical assessment of facial nerve function (by observing spontaneous and voluntary movements of the patient) and intraoperatively (by identifying the nerve branches within the incision).

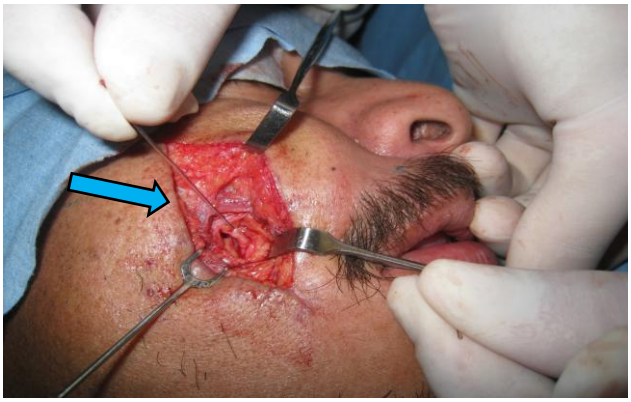


Figure 2: Surgical wound exploration.

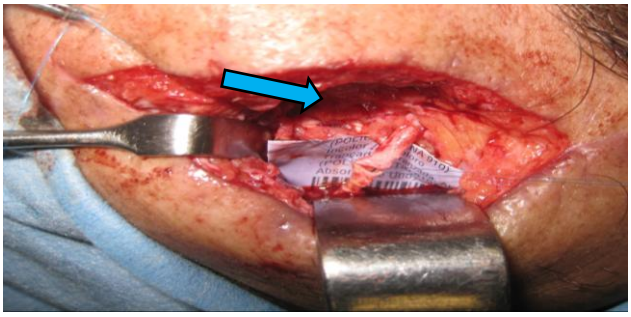


Figure 3: Intraluminal stent.

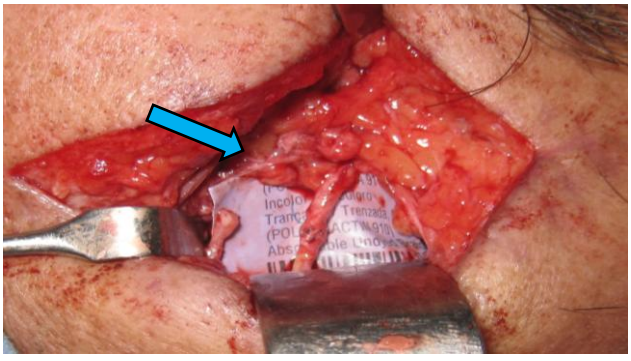


Figure 4: Complete reconstruction of stensen duct.



Figure 5: Final surgical wound across tragal-lip line.

DISCUSSION

The management of facial injuries involving Stensen's duct is a particularly intriguing intersection in facial trauma surgery. Over seven percent of all emergency room visits are due to face trauma. The majority of injuries affect surface soft tissues; nonetheless, some lesions, especially those that pierce the cheek, provide a risk of severe structural damage. Injuries to the parotid duct, however rare, have been documented in surgical literature for over a century.[16] Despite the prolonged duration of this issue, the prevalence of missing or delayed diagnoses remains intolerable. Moreover, the functional and psychological consequences for the patient are disproportionately severe relative to the size of the affected structure. All cheek lacerations necessitate comprehensive evaluation to ascertain the involvement of Stensen's duct, the parotid gland, the buccal branch of the facial nerve, and the transverse facial artery, a topic consistently addressed in both historical and contemporary literature. The tragal-lip line is a reliable clinical indicator, described as an imaginary line extending from the tragus of the ear to the mouth commissure.[17] Ductal injury should be presumed in any laceration that intersects this line from the outset. This concise anatomical guidance, easily recalled in emergencies, has the capacity to significantly reduce the incidence of missed diagnoses. A clinical suspicion alone is inadequate. There is a potential that no evidence of salivary leakage may be present during the initial examination of a damaged duct. This is particularly applicable in instances of modest incisions or when the proximal duct has retreated. Consequently, we highly recommend that deep cheek lacerations be routinely assessed during the procedure. Parotid duct injuries should be repaired promptly, ideally within the first twenty-four hours, as indicated by the research. Both clinical and anatomical factors substantiate the overarching notion.[18] The ductal termini are observable, well vascularized, and somewhat intact during the initial

post-injury phase of the healing process. No evidence of significant edema or inflammatory response is present in the tissues surrounding the afflicted location. In principle, it is feasible to execute an initial end-to-end anastomosis utilizing a stent, and duct cannulation is an uncomplicated procedure. As time progresses, numerous dreadful events occur. Progressive edema, blurred tissue planes, and difficulty in identifying ductal stumps are all manifestations of this illness. The distal segment of the duct collapses and may develop fibrosis, while the proximal portion retracts posteriorly towards the parotid gland. The development of a sialocele results in persistent saliva extravasation, accompanied by a reaction from foreign big cells. This further diminishes the quality of the tissue. The timeframe for initial repair is notably limited, spanning 72 to 96 hours post-injury.[19] Primary anastomosis is often unfeasible after one week due to considerable tension on the duct. This increases the likelihood of postoperative dehiscence and subsequent stricture formation for the repair. Consequently, we assert that the initial twenty-four hours post-accident represent not only the optimal period to address the problem but also a critical opportunity to prevent a cascade of secondary morbidity.

CONCLUSION

Reconstruction of parotid duct (Stensen's duct) injuries of the face requires knowledge of regional anatomy and accurate decision making. The results of the analysis suggest that the success of the treatment is based on three pillars: early diagnosis of ductal injury, selection of the appropriate reconstructive technique according to the extent of substance loss and preservation of the glandular function. End to end microanastomosis with or without intraluminal stent is preferred for clean early sections. Prompt and adequate treatment of patients with complex facial trauma improves functional and esthetic prognoses, reducing morbidity and allowing an optimal quality of life.

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