Use of hypertonic saline in the management of parotid fistulae and sialoceles: a report of 2 cases

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Received: 13 August 2008 / Accepted: 26 January 2009

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Abstract Parotid fistula is a well known complication of parotidectomy or penetrating injury of the parotid gland. Fistulae may be internal or external, but simple internal fistulae are of no surgical interest. In cases of external fistulae, the principles of management aim at the return of normal parotid function in both acute and chronic parotid injury, but sometimes the alternative is to depress parotid secretions to allow natural healing process to seal the injury.

The paper highlights the indications, techniques, advantages and disadvantages of using osmotic sclerosant for the management of parotid fistulae. We used warm hypertonic saline injections within the glandular substance to cause rapid fibrosis of the gland in 2 patients of chronic parotid fistulae.

This technique is a simple and effective method of dealing with salivary leak. Its ease of performance, effectiveness; minimal surgical risk and minor cost are the advantages over other available options.

Keywords Salivary fistula · Sialocele · Hypertonic saline · Osmotic sclerosants

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Introduction

Salivary fistula and sialocele are uncommon complications following surgery in the maxillofacial region. Parotid fistulae have been reported following surgery in the Temporomandibular Joint (TMJ) region, parotidectomy [11] or secondary to drainage of facial/parotid abscess and the incidence reported is as high as 14%.

Although there is consensus in literature that acute parotid injury must be explored primarily and all injured structures repaired accurately, the treatment of chronic injury is controversial.

Various conservative as well as aggressive treatment modalities have been described with varying success and morbidity. In this paper, we describe the successful management of post-surgical parotid fistula in two cases, with the aid of hypertonic saline injections into the parotid substance which is a simple yet effective method of treating this malformation.

Case report 1

A 42-year-old man injured in a road traffic accident reported to the Department of Oral and Maxillofacial Surgery. He was diagnosed with a high subcondylar fracture on the left side and a left parasymphysal fracture. The patient was thoroughly investigated and open reduction and internal fixation was carried out for the mandibular fractures under general anaesthesia.

A transparotid approach was taken for the fixation of fracture in the subcondylar fracture on the left side with great care to prevent injury to the facial nerve and its branches. The fracture at the parasymphysis was opened and reduced intraorally. On the fifth postoperative day, a diffuse swelling was observed in the left parotid region and on compressing the swelling; a watery, odourless fluid was seen discharging from the sutured surgical wound.

On the basis of history, location of the swelling and clinical inspection of the discharge, a diagnosis of salivary fistula was made. The patient underwent starch-

iodine test followed by salivary amylase estimation (40U/L) which confirmed the presence of salivary fistula. The swelling was repeatedly aspirated, pressure dressings were applied and the patient was put on anticholinergic drugs. The quantity of discharge reduced subsequently but did not completely resolve.

On the 10th postoperative day, after obtaining the patient's consent, it was decided to inject warm hypertonic saline into the glandular parenchyma to cause fibrosis of the gland with gradual atrophy and resolution of the fistula. Subsequently, warm hypertonic saline injections (3%) at 60°C 5 ml each were injected into the glandular substance every other day followed by pressure dressings and antisialogogues for a period of one week. After one week, the patient did not show any signs of salivary leak and the fistula closed spontaneously. Pressure dressings and antisialogogues have been reported to cause fibrosis of the gland after a period of a few weeks [9], hence closure of the fistula within a weeks time was attributed to the warm hypertonic saline injections. Patient

was on regular follow up for 3 months with no morbidity seen. The facial nerve and its branches were evaluated and were found to be normal.

Case Report 2

A 55-year-old man reported to our department with the chief complaint of discharging wound on the left cheek region for the past 15 days. The patient had undergone incision and drainage extraorally for the treatment of left buccal and parotid abscess from a local practitioner, which had developed in relation to carious left lower second and third molars.

On inspection, the wound measured 1.5×1.5 cm in greatest dimension and was discharging purulent secretions. The secretion was sent for culture and sensitivity testing. The offending teeth was extracted, and the patient was put on appropriate antibiotics. The wound was irrigated and antibiotic dressings were given after which the size of the wound decreased.

On the 8th postoperative day, the patient complained of watery discharge from the wound. The discharge was odourless, colourless and did not show any purulence. A diagnosis of parotid fistula was made and after obtaining the patient's consent, excision of the fistulous tract was done under local anaesthesia. Primary closure was achieved by layered suturing. This was followed by pressure dressings in that area along with a course of antibiotics. Five days later still confirmed the presence of salivary leak. After obtaining patient consent, a regimen of hypertonic saline injections into the parotid substance was started. 3–4 ml of warm hypertonic saline (3%) at 60°C was injected into the parotid substance surrounding the fistulous tract followed by pressure dressings in that area. The injections were repeated every other day for a period of 5 days. After 5

Case 1

Fig. 1 Surgical wound showing salivary leak

Fig. 3 Injection of hypertonic saline into gland parenchyma

days, the fistula closed spontaneously which was the result of the rapid sclerosing property of warm hypertonic saline. The patient was followed up for a period of 6 weeks and showed complete resolution of the salivary leak. Facial nerve functions were found to be intact.

Discussion

Parotid fistula can be a major complication following blunt or penetrating trauma to the face or following surgical techniques in the maxillofacial region including mastoidectomy, mandibular osteotomy, temporomandibular joint surgery and rhytidectomy, drainage of facial abscess or even dental extractions. Both surgical and non surgical approaches are accepted as

Fig. 2 Aspirate showing saliva

Fig. 4 Wound healed

modalities of treatment for PGDS (Parotid Gland and Duct System injuries) (Table 1).

Techniques that attempt to divert secretions into the mouth by reconstructive surgery have the major problem with identifying the proximal duct in the extensive scarring around the fistula or sialocele with its associated risk of damage to facial nerve (Ananthakrishnan N, Prakash S, 1982) [1].

Those that involve creation of an internal fistula have been documented to result in progressive parotid atrophy as the proximal duct probably does not remain patent with these procedures (Demetriades D, Rabinowitz B, 1987) [4].

Parotidectomy has been discouraged as a treatment modality as earlier reports document postoperative facial palsy in 75% of the patients as morbidity increases in the

Case 2

Fig. 1 Salivary leak from the fistula

Fig. 2 Injection of hypertonic saline around the fistulous tract

Fig. 3 Spontaneous closure of the fistula following warm hypertonic saline injections

Table 1 Management of parotid sialoceles and fistulae: A classification of reported methods in literature (Parekh et al. 1989)

1. Diversion of parotid secretions into the mouth
 - A. Reconstructive methods
 - Delayed primary repair of duct
 - Reconstruction of duct with a vein graft Mucosal flaps
 - Suture of proximal duct to buccal mucosa
 - B. Formation of controlled internal fistula
 - T-tube catheter drainage into the mouth. Drainage of proximal duct by a catheter
2. Depression of parotid secretions
 - A. Surgical approaches
 - Duct ligation
 - Sectioning of Jacobsen's / auriculotemporal nerve
 - B. Conservative approaches
 - Patient kept NPO till fistula closes
 - Anticholinergic drugs
 - Radiotherapy
 - Repeated aspiration and pressure dressing
 - C. Local therapy
 - Excision
 - Cauterization
 - D. Parotidectomy
 - E. Injections of botulinum toxin-A [6] and fibrin glue [13]

presence of granulation tissue and fibrosis. (Ananthakrishnan N, Prakash S, 1982) [1].

Duct ligation leads to progressive parenchymal atrophy, however it is not indicated in chronic parotid injury owing to scarring in that region.

Sectioning of auriculotemporal nerve (Haller 1999, Vasama 2000) [8,12] has been preferred to parotidectomy but the procedure has been experimentally shown to produce glandular atrophy over a period of several months. The procedure is not predictable and is discouraged by several authors (Wallenborn 1964) [13].

Low dose radiotherapy as a mode of treatment is validated by the fact that parotid secretions are reduced after irradiation in head and neck region. Approximately 1800 rads are required to produce glandular atrophy. Since it is not useful in ductal injuries and has inherent risks involved, it is not the preferred treatment modality.

Pressure dressings are believed to lead to atrophy of the gland as the lobules of the gland are contained in a relatively inelastic capsule. The sustained rise in ductal pressure leads to compression of capillaries and veins in the lobules, resulting in diminution of secretions and gradual atrophy of the gland (Parekh et al, 1989) [9].

Pressure dressings are quoted in literature but like repeated aspirations, there is not adequate proof of their efficacy.

It has been experimentally proved that absence of reflex stimulation from

mastication and chemical stimuli in patients administered nothing orally minimizes parotid secretions and this probably allows the injured gland or duct to heal (Hall, Schneyer, 1973) [7]. This method requires maximal patient compliance which is very difficult to obtain over a prolonged period of time.

Anticholinergic drugs used are unlikely to be effective when used alone in major ductal or glandular injury and are associated with several side effects such as urinary retention, xerostomia, nausea, vomiting, constipation, vision disturbances and insomnia which are unacceptable for long term use.

Recently use of botulinum toxin A (BTX-A) has been encouraged for persistent fistulae (Guntinas, Lichius, 2002) [6]. BTX-A has a latency period and requires repeated injections for the desired effect. Moreover the effect may not last long enough to bring about complete remission which makes the treatment less cost effective.

Fibrin glue has been used in recent years to seal the fistula (Zwaveling, Steenvoorde, 2006) [14]. It has been advocated that fibrin glue is rendered inactive by saliva leading to recurrence of the fistulous tract (Ellis, Pelausa, 1988) [5].

Hypertonic saline or isotonic saline are referred to as osmotic sclerosants. Hypertonic saline has been used in various concentrations and is approved by the US Food and Drug Administration but its use in sclerotherapy is off label.

It has also been used for the treatment of varicose veins as an alternative to surgery or in combination with surgery and in the management of telengectasias (Parsons, 2004) [10].

In the head and neck region, hypertonic saline has been used for the treatment of venous malformations with good results (Cabrera J, Cabrera J Jr, Olmedo AG, Redondo P, 2003) [2]. Although it is true that osmotic dehydration at the point of injection produces the effect seen, they are effective even after dilution has reduced the osmotic gradient far too low as in cases of isotonic saline. Thermodynamic and physicochemical calculations suggest that these solutions work by causing conformational denaturation of cell membrane proteins in situ and saline can be diluted to a point where there will be no cellular toxicity. The temperature of saline can be raised above body temperature (60° C) to enhance the fibrosing property of physiologic saline (Craig FF, 2002) [3].

Conclusion

In our patients, keeping their economic status in mind, we chose warm hypertonic saline injections for the purpose of fistula closure as it does not contain any chemical substance that could cause foreign body reactions or hypersensitivity to the patients. Moreover it is easily available, inexpensive, non-toxic and non-irritant to the surrounding tissues. There are no chances of inadvertent injury to the facial nerve and its branches and serves the purpose of causing fibrosis of gland parenchyma and spontaneous closure of the fistula with no complications. Based on this experience, we would like to stress that only two cases have been treated at our institute with hypertonic saline for parotid fistulae and more clinical experience with a larger patient sample size is required before we can conclusively recommend it.

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Source of Support: Nil, **Conflict of interest:** None declared.