Successful treatment of parotid fistula with tympanic neurectomy

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Abstract

Background Parotid fistula is a cause of great distress and embarrassment to the patient. A host of treatment modalities have been described in past but no unanimity exists regarding the most satisfactory of all. Tympanic neurectomy is an effective procedure for persistent parotid fistula with no significant side effects.

Objective: To describe our experience with tympanic neurectomy for the treatment of persistent parotid fistula and discuss the other treatment modalities described.

Setting Tertiary care referral centre.

Methods Two cases with post traumatic parotid fistula recalcitrant to conservative therapy were treated with tympanic neurectomy between 2004–2005. The cases were followed up regularly for any recurrence of fistula.

Results Successful and immediate cessation of flow from parotid fistula with no recurrence in subsequent followup.

Conclusion Tympanic neurectomy is a safe and effective procedure for the successful treatment of persistent parotid fistula.

Key words Salivary gland fistula · Glossopharyngeal nerve · Chorda tympani nerve

Key message: Tympanic neurectomy is a reliable and effective method for treatment of cases with persistent parotid fistula.

Introduction

Parotid fistula most commonly arises due to penetrating trauma to parotid duct or gland. Acute post-traumatic parotid injuries mostly go unrecognized until chronic sequelae like fistula or sialocoele formation occurs.

External parotid fistula is classified into two types: glandular and ductal fistula. Glandular fistula respond well to conservative treatment and usually close off spontaneously while ductal fistula respond poorly and spontaneous closure occurs less frequently [1]. Parotid fistula persisting for 3–6 months need intervention for healing [2]. There is no uniform consensus regarding the treatment of choice for chronic ductal fistula and different modalities of management have been proposed (Table 1).

Anatomy of tympanic plexus

The tympanic plexus is an arborization of nerves situated on the promontory of middle ear. It is formed by the tympanic branch of the glossopharyngeal nerve (Jacobson's nerve) and the carotico-tympanic branch of the internal carotid plexus. Jacobson's nerve carries secretomotor parasympathetic preganglionic fibres to the parotid gland, originating in the inferior salivatory nucleus in the medulla. The nerve divides on the promontory, giving an anterior branch that courses up towards the eustachian tube and a posterior branch that passes vertically anterior to the round window niche (Fig. 1). These branches lie in a groove and can either be covered by mucosa only or lie in a bony semi-canal or may be completely surrounded by bone.

The tympanic nerve then continues vertically as the lesser superficial petrosal nerve which reaches the anterior

surface of the temporal bone through a small opening lateral to the hiatus for the greater petrosal nerve. It leaves the middle cranial fossa either through the foramen ovale or emissary sphenoidal foramen [3] and joins the otic ganglion. Postganglionic fibres leave the ganglion to join the auricotemporal nerve and thus get conducted to the parotid gland.

The term “tympanic neurectomy” was first coined by Golding-Wood in 1962 which he applied in treating three cases of chronic recurrent parotitis. We present our experience with two cases of persistent parotid fistula and their successful management with tympanic neurectomy.

Table 1 Classification of reported methods in literature for the management of parotid fistulae

1. Diversion of parotid secretion
A. Reconstructive methods
– delayed primary repair of duct
– reconstruction of duct with vein graft
– mucosal flaps
– suture of proximal duct to buccal mucosa
B. Formation of a controlled internal fistula
C. Parotidectomy
2. Depression of parotid secretion
A. Surgical approaches
– Duct ligation
– Sectioning of Jacobson’s nerve or auricotemporal nerve
B. Conservative approaches
– No oral alimentation, pressure and occlusive dressings
– Antisialogogues: atropine, probanthine
– Radiotherapy

Fig. 1 Tympanic plexus and the parasympathetic connections. (1) Jacobson’s nerve; (2) carotico-tympanic branch; (3) tympanic plexus; (4) branch to eustachian tube

Case reports

Case I: A forty-five year old male presented in February, 2004 with a left sided parotid fistula persisting for a duration of five months. He had history of road traffic accident prior to initiation of salivary leak from skin. Tympanic neurectomy was performed and there was immediate cessation of the salivary leak from skin on the first post operative day. There has been no recurrence of symptoms for last three and a half years.

Case II: A fifty-two year old male sustained firearm injury on 3rd February, 2005. He sustained multiple fracture of facial bones with right sided facial nerve palsy. Salivary leak from breach in skin started from the fifth day following firearm injury. He presented to us with a right sided parotid fistula persisting for nine months and moderate conductive hearing loss. There was extensive scarring around the fistula along with right facial palsy and malocclusion. He underwent tympanic neurectomy and after the procedure round window reflex and ossicular status were assessed. They were found to be normal and no further intervention was done for hearing improvement. The salivary leak decreased considerably on the first postoperative day followed by complete cessation by the third day. There has been no recurrence since last two and a half years.

Surgical procedure

The procedure was performed under adequate local anaesthesia. A tympanotomy incision was made in the ear canal from the position six o’clock to twelve o’clock. The tympanomeatal flap was elevated upwards to expose the promontory and the hypotympanum. The mucosa was lifted off the promontory to expose the tympanic nerve, its anterior and posterior branch. Diathermy current was kept at minimum and used to section the nerve proximal to the point where the branches were given (Fig. 2). No use of drill was made. The tympanomeatal flap was repositioned and the canal was packed with gelfoam and an umbilical tape that was removed on the fifth day.

Discussion

Persistent parotid fistulae are particularly distressing to the patient because the secretion of the entire gland is expressed via the external conduit and trickles down the neck. The management is classically divided into procedures that divert parotid secretions into the mouth or those that depress the parotid secretions.

Conservative management has been recommended [4, 5] as the treatment of choice for post traumatic fistula. It is when fistula does not respond by these measures that further active intervention is required. Ligation of parotid duct was proposed [6] in order to induce parotid gland

atrophy. This procedure is associated with prolonged post operative pain due to distension of the gland [7] as well as an increased risk of infection to the parotid gland following ligation. Buccal branch of facial nerve is at risk during the intraoral dissection. The duct may also rupture following ligation leading to reformation of fistula. Moreover, response to glandular form of fistula to this mode of management is not encouraging.

Reconstruction of parotid duct is associated with difficulty in identification of proximal parotid duct due to scarring and possibility of facial nerve injury. Long term patency is also doubtful both when duct is reconstructed or when controlled internal fistula is made.

Fig. 2 Division of tympanic nerve after elevation of tympanomeatal flap and exposure of tympanic plexus

Parotidectomy described as a treatment modality, is a major surgical procedure carrying with it the risk of damage to facial nerve as well as that of post operative salivary fistula. Chronic inflammation with obliteration of tissue planes makes dissection difficult and adds to the morbidity along with other factors like prolonged recovery time [1, 8].

Radiotherapy has also been used to abolish parotid secretion in dosage ranging from 600–2000 rad [1]. It is effective only for a transient period of time and often ends in a parotidectomy [9]. There is always a risk of development of carcinoma of irradiated skin, underlying mucosa, thyroid gland and salivary glands [10] and radiation as a modality of treatment for a benign condition like parotid fistula should never be justified.

Lysis of auricotemporal nerve as a treatment modality requires extensive parotid dissection and has been found to be largely unsuccessful.

Parasympathetic denervation by tympanic neurectomy appears to be a safe and effective procedure for treatment of both ductal fistula and glandular fistula [11]. The other procedures are ridden with greater risks along with lesser chance of efficacy. The largest series in English literature comes from Mandour et al [12] who treated twenty patients by tympanic neurectomy and observed that salivary outflow from the fistula was markedly decreased after the second week. Duration needed for complete arrest of outflow was three months in eleven patients, four months in six cases and five months in three cases (mean being 3.6 months). In both of our patients, the procedure was rewarding in a very short period of time with complete cessation within first to third postoperative day without any complications or untoward effect on hearing.

The parasympathetic fibres carried by the tympanic plexus are responsible for both the trophic and secretomotor stimuli to the parotid secretory units. It leads to total and complete denervation of parotid gland causing decrease in parotid salivary secretion followed by glandular atrophy

Fig. 3 Postoperative photographs of patients showing complete healing of parotid fistula

and complete arrest of glandular function. Rerouting of fibres is definitely a possibility but it is, rather, a slow process. The axon plasma is supplied at a rate of 1mm per day and the renewed innervation will commence only after, approximately, two months. This time period is sufficient for the parotid fistula to heal before the function of the gland recuperates [13].

Sectioning of chorda tympani has been advocated by some authors to be of additional benefit considering the fact that chorda may also contribute to parasympathetic supply to parotid gland [9, 14]. However, in a study, Ross [15] measured the salivary outflow from the Stenson duct in eight patients with normal parotid gland at the time of stapedectomy using 2v of faradic current stimulation. He observed that resting flow rate increased on electric stimulation of tympanic plexus from two to fifteen drops per minute while stimulation of chorda did not result in any increase of the resting parotid outflow rate. The chorda is a nerve of importance for other salivary glands and tongue and unnecessarily it should not be sacrificed for the treatment of parotid fistula.

There has been some argument against considering tympanic neurectomy as a preferred mode of treatment for parotid fistula. It has been observed that parasympathetic fibres which reach the otic ganglion and are not affected by tympanic neurectomy might reach by way of the geniculate ganglion or by anastomoses between the chorda tympani and the otic ganglion in the infratemporal fossa. This anatomical basis may explain the persistent function of the parotid gland after tympanic neurectomy but the major stimulus being from Jacobson's nerve, the failure rate of the procedure is minimal. The procedure is effective and safe without posing any significant post operative complications as compared to other alternative procedures cited for healing of parotid fistulae.

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