Battle-Axe Injury to the Side of the Face: Involvement of the Parotid and its Implications: Case Report

Adwait U Kulkarni 1 *, Gardellini Tatiana 2, Aniruddha M Wankhade 3, Deepak Kaul 4

1MDS, Associate Professor, Department of Oral and Maxillofacial Surgery, M.A. Rangoonwala College of Dental Sciences and Research Centre, Pune, India.
2Epidemiologist and Research Advisor, University of South Florida, Tampa, USA.
3P6 student, Department of Oral And Maxillofacial Surgery, M. A. Rangoonwala College of Dental Sciences and Research Centre, Pune, India.
4Associate Professor, Department of Oral And Maxillofacial Surgery, M. A. Rangoonwala College of Dental Sciences and Research Centre, Pune, India.

ABSTRACT
Fistulas of the parotid gland occur as a result of either ductal or parenchymal injury. The most common etiologies are postoperative complication after parotid gland surgery and trauma. Numerous methods including pressure dressing, total parotidectomy, tympanic neurectomy, radiotherapy, and pharmacotherapy have been advocated in the treatment of salivary fistulas, but none of these has proven to be totally satisfactory. The use of transdermal scopolamine and glycopyrrolate in injectable or oral form, have recently been described in the management of post-traumatic parotid fistulas. We report the case of a 38-year-old male with a parotid fistula secondary to penetrating battle-axe injury successfully treated using glycopyrrolate, which finds only rare reference in world literature.

INTRODUCTION
Salivary fistula is a chronic communication between the salivary gland or duct and the skin through which saliva is discharged. Fistula of the parotid gland occurs as a result from either ductal or parenchymal injury. The most frequent etiologies are postoperative complication after parotid gland surgery and trauma. 1 Early detection of injury and prompt treatment are important since fistula may cause discomfort as well as wound dehiscence and infection. 2

Acute post-traumatic parotid injuries mostly go unrecognised until chronic sequelae like fistula or sialocele formation occurs. External parotid fistula is classified into two types: glandular and ductal fistula. Glandular fistulae respond well to conservative treatment and usually close off spontaneously while ductal fistulae respond poorly and spontaneous closure occurs less frequently. 3 Parotid fistula persisting for 3–6 months needs intervention for healing. 4

CASE REPORT
A 38-year-old male reported to the casualty with multiple lacerations over his body. The patient gave history of interpersonal altercation and had received multiple blows with a battle axe. On examination, the patient showed multiple lacerations all over his body, the most predominant one being a linear contuse lacerated wound (CLW) extending from 1 cm lateral to corner of mouth till occipital region on left side (Fig. 1). The CLW appeared deep transecting through the skin, buccal fat pad, superficial parotid, anterior ramus of mandible, deep lobe of parotid and oral mucous membrane. In the posterior aspect the CLW seems to involve skin, subcutaneous tissue and muscles of lateral neck namely trapezius and sternocleidomastoid. There appeared to be no injury to deep structures like carotid sheath and cervical spine. The ear lobe was separated to be included in the inferior margins/flap of the CLW. Occlusion was disturbed with a mild cross bite and open bite on the same side. Simultaneously, anterior open bite was also noted. He was diagnosed with left mid ramus fracture (Fig. 2). Emergency investigations were undertaken and the patient was taken in the minor OT for closure of facial CLW under sedation anaesthesia to control blood loss.

In the minor OT, the patient was sedated and closure of CLW was contemplated from posterior aspect. Closure till ear lobe was done in 3 layers. Haemostasis was archived using electrocautery. More profuse bleeding that was experienced from the ends of the fractured ramus was controlled by gross reduction of the

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Adwait U. Kulkarni

After 2 weeks, the parotid fistula showed complete healing (Fig. 5). Scanty salivary flow was observed from the left Stanson's duct. The treatment was well tolerated and the patient reported only mild dryness of mouth. No recurrence was observed during 3 months follow up (Fig. 6). After that the patient did not turn up for follow up.

DISCUSSION

Parotid fistula most commonly arises due to penetrating trauma to parotid duct or gland. Other causes include post-parotidectomy, post incision and drainage of a parotid abscess, ulceration due to a large parotid stone. Sialography may be performed but is usually not necessary to establish the diagnosis of parotid duct injury. If performed, water-soluble contrast material should be employed because it is more easily drained and absorbed, and it does not remain as an irritant to the gland. In doubtful cases fluid can be sent for laboratory analysis; the amylase levels, which will be found to exceed 100,000 U/L confirms the diagnosis. Computed tomography fistulography can be performed to look for the extent of the fistula.

An injury classification system has been devised by Van Sickels for parotid duct injuries as per the site of trauma. This system divides the parotid duct into the following three regions: posterior to the masseter muscle or intraglandular (site A); overlying the masseter (site B); anterior to the masseter (site C). The decision to use a certain modality of treatment depends upon the site and type of injury sustained.
Battle-axe injury to the side of the face

Fig. 3 Immediate post op AP skull view showing fracture reduction and internal fixation.

Fig. 4 Photograph showing salivary cutaneous salivary discharge/flow (black arrow).

Fig. 5 Photograph showing completely healed salivary fistula after 2 weeks.

Fig. 6 (a) & (b) Post operative results after 2 weeks.
The classifications described in literature are based on the location of the parotid injury; none of them provides information about the extent or depth of the injury, which is also a critical aspect in the diagnosis and treatment planning in cases of parotid gland trauma. So we proposed a classification of parotid injuries on the basis of depth/extension of injury into parotid gland (Tables 1, 2).

Both surgical and non-surgical approaches are accepted as modalities of treatment for parotid fistula and sialocele. 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.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.9

Parotidectomy has been discouraged as a treatment modality as earlier document reports postoperative facial palsy in 75% of the cases and morbidity increases in the presence of granulation tissue and fibrosis.1

The results of tympanic neurectomy were disappointing probably because with time re-innervation of the gland tends to occur. Although popular in the past, this method tends to be abandoned due to short-term and poor results.10 The procedure is not predictable and is discouraged by several authors.11

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 up in a parotidectomy subsequently.12 There is always a risk of development of carcinoma of irradiated skin, underlying mucosa, thyroid gland and salivary glands13 and hemter radiation as a modality of treatment for a benign condition like parotid fistula should never be justified.

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. 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 minimises parotid secretions and this probably allows the injured gland or duct to heal.14 This method requires maximal patient compliance which is very difficult to obtain over a prolonged period of time.

Recently use of botulinum toxin A (BTX-A) has been encouraged for persistent fistulæ.13 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.15 It has been advocated that fibrin glue is rendered inactive by saliva leading to recurrence of the fistulous tract.16

Atropine and glycopyrrolate is a quaternary ammonium structure that competitively inhibits acetylcholine receptors in salivary glands and other peripheral tissues. Thus, indirectly, it may decrease salivary production.17

Glycopyrrolate appears to be five to six times more potent than atropine in its antisialogogue effect and also exhibits a selective, prolonged effect on salivary secretion and sweat gland activity. It has minimal cardiovascular, ocular and central nervous system effect in contrast to that of atropine. Atropine has significant systemic effects such as dysrhythmias and undesirable CNS action.19 Glycopyrrolate has been used in a treatment of sialorrhea and chronic severe drooling. Of available anticholinergic drugs glycopyrrolate is appealing because of its potency and less systemic adverse effects.

**CONCLUSION**

The management of parotid fistula of traumatic origin is well documented. However the technique of its management is still open to debate and there appears no consensus yet. The condition itself is very disturbing to the

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**Table 1:** Classification of parotid injuries on the basis of depth/extension of injury into parotid gland.

<table>
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<tr>
<th>Sr. No</th>
<th>Grade</th>
<th>Depth or extension of injury in to parotid gland</th>
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<tbody>
<tr>
<td>1.</td>
<td>G1</td>
<td>Depth involving only capsule.</td>
</tr>
<tr>
<td>2.</td>
<td>G2</td>
<td>Depth involving capsule and parenchyma.</td>
</tr>
<tr>
<td>3.</td>
<td>G3</td>
<td>Depth involving capsule and parenchyma and deep lobe of parotid gland across the mandibular ramus.</td>
</tr>
<tr>
<td>4.</td>
<td>G4</td>
<td>G1 + G2 + G3 with injury to the duct.</td>
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</tbody>
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**Table 2:** Facial nerve in injury.

<table>
<thead>
<tr>
<th>Grade</th>
<th>Involvement of facial nerve in injury</th>
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<tbody>
<tr>
<td>F0</td>
<td>No evidence of facial nerve damage</td>
</tr>
<tr>
<td>F1</td>
<td>Involvement of temporal branch of facial nerve</td>
</tr>
<tr>
<td>F2</td>
<td>Involvement of zygomatic branch of facial nerve</td>
</tr>
<tr>
<td>F3</td>
<td>Involvement of buccal branch of facial nerve</td>
</tr>
<tr>
<td>F4</td>
<td>Involvement of mandibular branch of facial nerve</td>
</tr>
<tr>
<td>F5</td>
<td>Involvement of cervical branch of facial nerve</td>
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Battle-axe injury to the side of the face

5

patient. It is our opinion that the vast armamentarium which includes CT scan, sialography, fistulography, salivary amylase etc. is at the disposal of the maxillofacial specialist and this should be selectively and judiciously employed for effective management of the parotid fistula of traumatic origin. Moreover, classifying parotid gland injuries based on extent of the damage and glandular structures involved may enable more accurate treatment planning, which needs elaborate studies.

REFERENCES