



Deep Cervical Fascia Rotational Flap for Prevention of Frey's Syndrome Following Partial Superficial Parotidectomy A Case Report and Review

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Abstract

Aim: In this article, we present an innovative technique by utilizing the investing layer of deep cervical fascia as a biological barrier following partial superficial parotidectomy. The aim is to prevent the onset of Frey's syndrome (FS) after parotidectomy.

Technique: Our article focuses on using the Superficial layer of deep cervical fascia [SLDCF] flap technique following partial superficial parotidectomy. This method aims to facilitate healing without complications and specifically works to prevent FS in post-parotidectomy patients.

Diagnosis: The case discussed in this study includes a benign salivary gland tumor confirmed by fine-needle aspiration cytology.

Outcome: The article showcases the effective use of a pioneering technique and provides an extensive review of Frey's syndrome, covering its occurrence, mechanisms, variations, and preventive measures.

Clinical Significance: Using the deep cervical fascia investing layer as a biological barrier after partial superficial parotidectomy shows promise in preventing FS in post-parotidectomy patients.

Keywords: Frey Syndrome; Pleomorphic Adenoma; Post Operative Complications; Surgical Flaps

Abbreviations

FS: Frey's Syndrome; SLDCF: Superficial Layer of Deep Cervical Fascia

Introduction

Frey's syndrome, also known as Baillarger's syndrome, auriculotemporal syndrome, or Gustatory sweating, was initially de-

scribed in 1923 by Lucja Frey, a Polish physician and neurologist [1]. It is characterized by flushing and sweating in the preauricular area in response to masticatory or salivary stimuli [2]. The reported incidence of Frey's syndrome ranges from 4% to 96% [3].

In our case, we employed a straightforward technique that utilized the investing layer of deep cervical fascia as a biological barrier.

er following partial superficial parotidectomy. The superficial layer of deep cervical fascia (SLDCF) is a well-defined fibrous tissue sheet that encircles the neck, enveloping the sternocleidomastoid and trapezius muscles, as well as the parotid and submandibular glands. It divides into the face, with the outer lateral layer extending towards the zygoma and temporal region, while the inner medial layer attaches to the skull base [4].

The purpose of this article is to present a unique case demonstrating the application of a technique-based preventive approach to Frey's syndrome following partial superficial parotidectomy surgery.

Observations

Case report

A 34-year-old male of Indian descent presented to the Department of Oral and Maxillofacial Surgery with a chief complaint of a swelling beneath his right ear that had persisted for the past 7 years. Upon examination, a solitary, firm, relatively movable swelling measuring approximately 8cm x 5cm was observed below the right ear. The swelling was non-tender and non-fluctuant. A slight elevation of the earlobe was noted, while no cervical lymphadenopathy or any signs of facial nerve deficit were detected. Fine Needle Aspiration Cytology was performed, confirming the presence of a benign salivary gland tumour. Histopathologically, the tumour was confirmed to be a pleomorphic adenoma. However, an MRI could not be performed due to financial constraints.

Surgical technique

Informed consent was obtained before surgery. The patient underwent a Partial Superficial Parotidectomy under general anaesthesia. Modified Blair's incision was made, followed by deep-layer dissection. The marginal mandibular nerve was identified, and retrograde dissection of the facial nerve was carried out. The tumour was carefully dissected with 1cm of surrounding normal parotid gland and removed. However, the remaining portion of the parotid gland lacked coverage by the parotid fascia, which posed a high risk of developing Frey's Syndrome (FS).

To address this issue, a superiorly based flap of the investing layer of deep cervical fascia was harvested. The flap was rotated to cover the defect created after tumour removal (Figure 1). The harvested fascia was tightly plicated between the gland and the overlying cutaneous tissue (Figure 2). The surgical site was meticulously closed in layers. The patient remained hospitalised for 5 days and received intravenous antibiotics and analgesics. On the second postoperative day, mild facial nerve weakness was observed in the area innervated by the mandibular branch of the facial nerve (House Brackman scale: mild dysfunction). However, during the third week after surgery, the facial nerve weakness had completely resolved. Follow-up examinations were conducted at 3 weeks, 6 weeks, 3 months, 6 months and 1 year post-surgery, revealing no signs of Frey's Syndrome or postoperative concave deformity.

To our knowledge, this is the first reported case presenting this unique approach involving the harvesting and rotating the investing layer of deep cervical fascia during partial superficial parotidectomy. Since the tumour measured about 8 cm, this technique was used to prevent Frey's syndrome, as tumour size above 4 cm is a known risk factor for its occurrence [5]. The patient's successful recovery and absence of Frey's Syndrome after several months of follow-up support the effectiveness of this technique. Written informed consent was obtained from the patient to publish this case report and accompanying images.

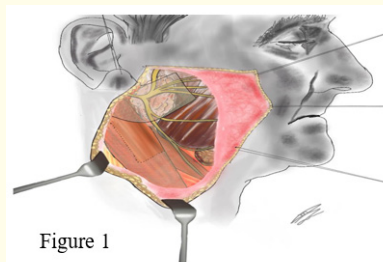


Figure 1



Figure 2

Figure 1: Shows a vector image of the SLDCF rotational flap and, **2:** Shows the SLDCF rotational flap plicated onto the parotid gland.

Reduced thermal sweating
Reflex is interrupted by anaesthetizing the tongue, otic ganglion, auriculotemporal nerve or by section Jacobson's nerve.
Cervical sympathetic chain anaesthesia does not impact gustatory sweating.
Sweating is induced by parenteral pilocarpine and suppressed by atropine.

Table 1: Substantiates of Aberrant Renervation Theory [8].

Type of flap/Biomaterials, Author and Year	Advantages	Disadvantages
Parotid Masseteric fascia by Singleton., <i>et al.</i> [12], 1980.	Acts as a cleavage plane for covering the parotid gland.	Lack of prevention of FS.
Increased thickness of skin flap by Singleton., <i>et al.</i> [13], 1980.	Reduces the surface area of the skin affected by the syndrome.	The incidence of FS is still obscure.
Temporoparietal fascia (TPFF) by Sultan., <i>et al.</i> [14], 1995.	A gold standard method with a good outcome. Decreased incidence of FS after parotidectomy.	Needs the second incision Risk of injuring the superficial temporal artery. Technique sensitive.
Sternocleidomastoid muscle (SCMF) by Kierner., <i>et al.</i> [15], 1999.	Favoured technique due to its proximity to the parotid region.	Its role in preventing FS is still ambiguous. The incidence of FS is still undetermined, due to the small sample size and sample heterogenicity.
Superficial muscular aponeurotic system (SMAS) flap by Barbera., <i>et al.</i> [16], 2014	Highly recommended method for parotidectomy Acts as a barrier to both the parotid gland and dermis. According to Bonanno <i>et al.</i> , this method effectively prevents Frey syndrome.	Technique sensitive Longer working time
Platysma Muscle Flap (PMF) by Hayashi., <i>et al.</i> [17], 2016.	The incision is easy to harvest, largely covers the defect A study done by Hayashi <i>et al</i> in 2016, shows no incidence of FS.	To prevent further complications, complete coverage should be done to the defect.
Pericardial patch by Wang., <i>et al.</i> [18], 2019.	The incidence of FS is confirmed with Minor's starch iodine test. Highly preferred method for superficial parotidectomy.	Risk of allergic reaction.
Platysma cervical fascia sternocleidomastoid flap (PCS) by Kim., <i>et al.</i> [19], 2012.	The decreased onset of FS. Reduces the cosmetic defect. Highly preferred method for superficial parotidectomy.	Technique sensitive.
Biomaterial and Autologous Implantation by Ye., <i>et al.</i> [20], 2008.	Provides intact extracellular graft Acts as a scaffold.	Prevention of FS is still enigmatic due to limited sample size studies.
Autologous Fat Implant by wang., <i>et al.</i> [21], 2016.	Acts as a barrier material to prevent FS.	Requires the second incision. Risk of complications like haematoma and seroma formation.

Table 2: Flap techniques to prevent Frey's syndrome.

MANAGEMENT OF FREY’S SYNDROME	
Medical Management	
Topical	Aluminium chloride Diphenyl methyl sulphate Scopolamine Antiperspirants
Local Injections	Alcohol Atropine Scopolamine Glycopyrrolate Botulinum Toxin A(BTA)
Commonly used	Anticholinergics- The postganglionic cholinergic pathways innervate the sweat glands. ²²
Surgical Management	
Initial/Acute Forms	Excision of the localized area of the involved skin
Severe/Refractive Forms	Transection of the Auriculotemporal, Greater Auricular, Tympanic neurectomy at the level of Jacobson’s nerve and transection of chorda tympani. ¹²

Table 3: Approaches to address Frey’s syndrome.

Discussion

Salivary gland tumours, constituting 3-6% of head and neck tumours, are usually noncancerous. The primary benign tumours, representing 53-77% of parotid tumours, commonly appear in the superficial lobe, causing a noticeable bulge. Surgical removal is the sole effective treatment for pleomorphic adenoma [6]. Gustatory sweating was first documented in 1757 by Duphenix, who misinterpreted it as saliva [7]. Frey’s Syndrome (FS), initially linked to parotid injuries, has been observed post-infection, resection, and neck dissection. FS can manifest in inflammatory conditions or trauma in the sympathetic trunk’s upper thoracic and cervical portions [8]. The “Aberrant Regeneration” theory, introduced in 1938, posits that faulty nervous regeneration contributes to FS [9]. Substantiation of Aberrant Renervation Theory is shown in table 1.

Factors that can influence the development of Frey’s Syndrome include the extent of resection, tumor location, tumor size, type of resection, previous radiotherapy, previous parotidectomy, and kind of pathology [10]. Tumor size larger than 4 cm is the only statistically significant predictor of FS development.

Common signs and symptoms of Frey’s Syndrome include sweating, pain, warmth, and redness in the parotid and preauricular area due to salivary stimulation. The onset of FS can vary, ranging from 2 weeks to 2 years, but typically occurs within 3 to 6 months after parotidectomy [11]. To prevent Frey’s Syndrome, various surgical techniques have been developed, as listed in table 2.

Management options for FS are outlined in table 3.

In our case, we employed a novel approach using a deep cervical fascia rotational flap following partial superficial parotidectomy. This innovative technique eliminates the need for a second incision to raise the flap and does not compromise the tumor margins. It offers the advantage of reduced donor site morbidity.

Conclusion

This case report presents a unique approach involving SLDCF flap placement following partial superficial parotidectomy. This method may be particularly beneficial for young patients who prioritize aesthetic considerations since the donor site is not no-

ticeable. Despite efforts to minimize the occurrence of Frey's syndrome, it is important to inform and educate patients that its occurrence cannot be predicted and may occur even years after surgery. While treatable, it cannot be eliminated. Given the limitations of the current approach, future studies involving larger cohorts and long-term follow-up are warranted to validate this approach.

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