

# Use of irradiate animal pericardium membrane for prevention of Frey's syndrome after parotidectomy

P. GENNARO, P. DI CURZIO, V. MITRO, A. FACCHINI, G. SAPONARO, F. CASCINO, G. AMODEO, G. GABRIELE, C. UNGARI

Maxillo-Facial Surgery Unit, Policlinico "Umberto I", "Sapienza" University, Rome, Italy

**Abstract.** – **BACKGROUND:** Frey syndrome is a common complication that appears few months after parotid surgery with flushing and sweating of the parotid-temporal area during mastication. It presumably originates from an aberrant nervous regeneration in which the parasympathetic fibers of the parotid gland would combine themselves with the sympathetic fibers of the sweat glands and with the cutaneous vessels.

**AIM:** In the present study we analyze the effectiveness of a collagenous membrane derived from animal pericardium (APM) to prevent Frey's syndrome after parotidectomy.

**MATERIALS AND METHODS:** We studied a total of 40 patients with benign tumors of the parotid gland, including 30 patients with pleomorphic adenoma, 7 patients with Warthin tumor and 3 with basal cells adenoma.

The patients were divided into 2 groups: group 1 (experimental n=20) executed superficial parotidectomy with replacement of bovine pericardial matrix (BPM); group 2 (control n=20) underwent superficial parotidectomy followed by reposition of superficial musculoaponeurotic system (SMAS) flap. All patients were questioned over their subjective symptom and tested with Minor's test after 12 months from the intervention and introduced in a follow-up of 3 years.

**RESULTS:** Subjectively Frey syndrome was referred in 5% of patients in group 1 and in 10% in group 2, while 0 cases were observed in group 1 after the starch-iodine test, 2 cases in group 2 (10%).

**CONCLUSIONS:** Considering the present results, although this study needs further implementation, we can affirm that BPM is a valid option in preventing Frey's syndrome whereas SMAS flap is not available.

*Key Words:*

Frey syndrome, Parotidectomy, Tumors, Parotid gland.

## Introduction

Frey's syndrome is a common complication that appears few months after parotid surgery

with flushing and sweating of the parotid-temporal area during mastication. It presumably originates from an aberrant nervous regeneration in which the parasympathetic fibers of the parotid gland would combine themselves with the sympathetic fibers of the sweat glands and with the cutaneous vessels<sup>1</sup>.

Its intensity is variable, ranging from simple congestion to sweat drip of the region interested. Such symptomatology is unpleasant for the patient and often provokes limitation of social life<sup>2,3</sup>.

To prevent it, many treatment methods involving the use of temporalis miofascial flap, femoral fascia, sternocleidomastoid flap and implants have been reported<sup>4-8</sup>.

However, additional surgical donor sites, the longer operating time and the eventual comorbidities at the donor site could lead to other problems.

In the last years a APM, has been used in our Department as a barrier to prevent Frey's syndrome, providing satisfactory results.

## Materials and Methods

The study included 40 patients who were treated between from January 2009 and April 2010 in the Department of Maxillofacial Surgery of Policlinico Umberto I, Sapienza University of Rome, Italy.

The patients were divided into two groups: 20 patients were treated with BPM (group 1= experimental) other 20 were randomly selected from a wide sample of patients who executed superficial musculoaponeurotic system (SMAS) flap (group 2 = control). Of these, 30 had pleomorphic adenoma; 7 had Warthin tumor and 3 had basal cell adenomas. There were 24 males (60%) and 16 females (40%). Their age ranged between 55 and 86 (mean 55 years).

Fisher's exact test was used for statistical analysis.

All patients were informed about the technique and the origin of BPM, and gave consent to its use.

Eight patients had partial superficial parotidectomy, 31 superficial parotidectomy, and 1 total parotidectomy combined with excision of the facial nerve.

Data were collected retrospectively with a cross compare from medical records, archive material and the histologic examination. The patients were evaluated by using a validated questionnaire for subjective symptoms of gustatory sweating and flushing as well as satisfaction with the aesthetic appearance of their cheek. Starch's iodine test was performed randomly in 10 patients of each group to evidence the areas of hyperhidrosis. All patients underwent a 3 years follow-up.

### **Surgical Technique**

A preauricular-submandibular S-shaped incision was performed. The skin flap was elevated above the parotid fascia and beyond the tumor to ensure its complete exposure. Superficial parotidectomy or extracapsular lumpectomy were executed in a standard manner. After complete removal of the tumor and the involved parotid tissues, a APM of a given size was placed to fill the space in patients of group 1 (Figure 1) The membrane was fixed to the

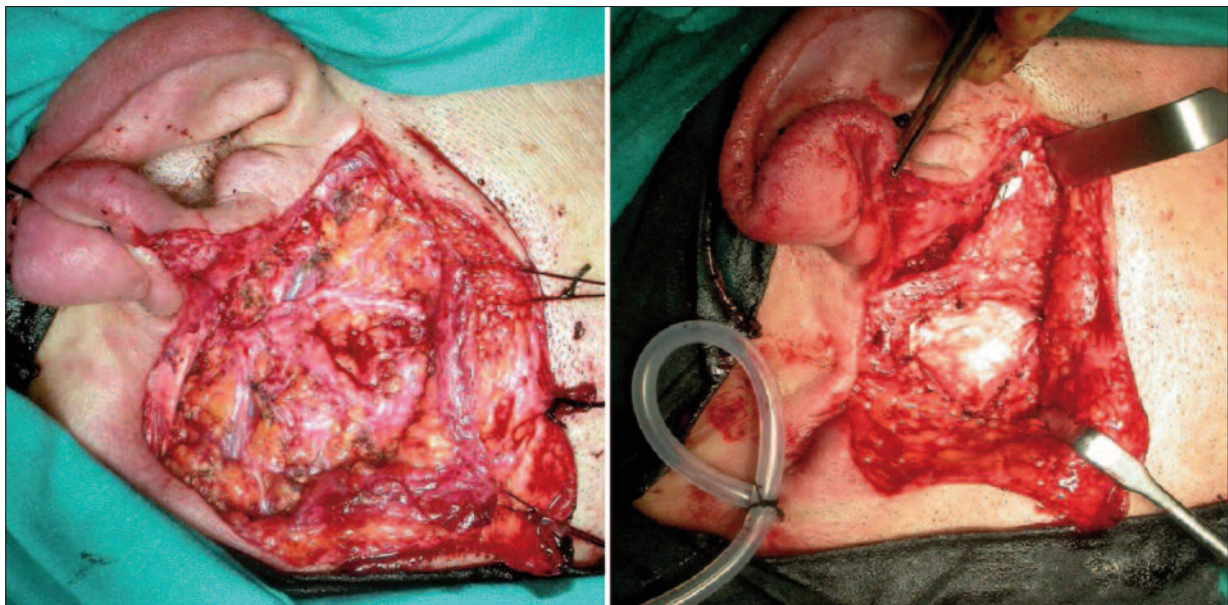
surrounding tissues to prevent loosening and displacement. This way the APM served as a barrier between the neural fibers of the auriculotemporal nerve and the sympathetic fibers of the overlying sweat-producing glands of the skin. To suture BPM to the parotid tissue, absorbable 3/0 polyglactin 910 (Vicryl) stitches were used.

Suction drainage was used routinely postoperatively to prevent hematomas or seromas. The suction tubes were inserted between the remaining parotid beds and the BPM.

### **Results**

Subjective Frey syndrome was noted in 1 patient from group 1 and 2 patients from group 2. No patient from group 1 and 2 from group 2 had a positive starch-iodine test.

In group 1 there were no major complications. One patient of group 1 had transient seroma that was successfully treated with needle aspiration and pressure dressing. One patient of group 2 who underwent total parotidectomy reported definitive paralysis of marginal mandibular branch of the facial nerve. Another patient of group 2 developed a keloid scar. None of the patients developed hematoma, salivary fistula or wound infection. There were no cases of membrane extrusion-displacement.



**Figure 1.** (Left) Patient with recurrent pleomorphic adenoma of the parotid gland: superficial parotidectomy with preservation of the facial nerve; (Right) Insertion of BPM sheet.

**Table I.** Numbers of patients with subjective and objective Frey syndrome in group 1 and group 2

|   | Group 1 (BPM) n=20 | Group 2 (SMAS) n=20 |
|---|--------------------|---------------------|
| Subjective Frey syndrome                    | 1 (5%)             | 2 (10%)             |
| Objective Frey syndrome                     | 0                  | 2 (10%)             |
| <b>Complications in group 1 and group 2</b> |                    |                     |
| Facial nerve injury                         | 0                  | 1 (5%)              |
| Keloid                                      | 0                  | 1 (5%)              |
| Seroma                                      | 1 (5%)             | 0                   |

Fisher’s exact test was used to perform a statistical analysis in the confrontation of the two groups. Our findings did not receive sufficient statistical significance due to the small group of patients.

### Discussion

Many materials, including autologous adipose tissue, temporal fascia, fascia lata femoris and sternocleidomastoid myocutaneous flaps, have been used as barriers to isolate misconnected nerve fibers between the postganglionic parasympathetic nerve fibers and the nerve fibers that innervate the subcutaneous sweat gland, effectively lowering the incidence of Frey’s syndrome. However, adipose tissue is easily absorbed. The amount of sternocleidomastoid myocutaneous flap requested to fill the wound gap is quite long and it causes important scar. Additional donor sites, the longer operating time, and the corresponding complications at the donor site, made acceptance by patients impossible<sup>5,9,10</sup>. Some Authors also used botulinum toxin type A locally to treat the syndrome, with good results<sup>11,12</sup>. Nevertheless, the mean period of efficacy was only 17 months, and the outcome was uncertain. For patients in whom synthetic materials or skin substitutes were used, the wound surface lasted unhealed for a long time, and the material was rejected<sup>13</sup>. Since materials such as APM have been used, these problems have been relatively unknown. APM, derived from solvent preserved-irradiated animal pericardium, provides a reliable closure of the tissue defect and serves as a scaffold for the cellular repair mechanism, which will replace this scaffold by patient-own tissue. It is used in different surgical areas such as neurosurgery, abdominal surgery, gynecology.

We also use APM for the reconstruction of the orbital floor, closure of the maxillary sinus wall, protection of the schneiderian membrane in sinus lift surgery, membrane for guide tissue regeneration and guide bone regeneration with excellent results.

### Conclusions

Even though we still consider that SMAS flap is the best technique to prevent Frey syndrome after parotid surgery, we consider APM as a valid alternative when SMAS flap cannot be used. This happens when SMAS is removed to ensure a radical tumor excision.

A BPM sheet placed on the parotid defect acts as a barrier between the parotid tissues and the overlying flap. It covers and protects the exposed parotid nerve plexus and therefore helps to reduce the incidence of Frey’s syndrome. In this study, of 20 patients treated with APM, none developed objective Frey syndrome and 1 reported subjective Frey syndrome. Complications consisted in a case of transient seroma. Of course the small sample of the study does not allow valid conclusions to be drawn. Further studies with bigger samples will help to better evaluate the use of APM in parotid surgery.

Although no statistical relevance was granted to our results, due to the small number of patients, we still think that our results are of clinical relevance and we think the study should be implemented in order to reach a statistical significance.

### Disclosure of Interest

Authors declare no conflict of interest or financial disclosure for this manuscript.

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