



COMPARISON OF FREY SYNDROME FOLLOWING SUPERFICIAL PAROTIDECTOMY (SP GROUP) AND PARTIAL SUPERFICIAL PAROTIDECTOMY (PSP GROUP) BY USING PORCINE DERMAL COLLAGEN GRAFT

ENT

Asraf Ali Bissash Department of oral and maxillofacial surgery, The first affiliated hospital of Zhengzhou University-450052

Bin Qiao* Associate Professor, Department of oral and maxillofacial surgery, The first affiliated hospital of Zhengzhou University-450052*Corresponding Author

Rafiq Ahmed Bhat Department of Cardiology, Zhengzhou University People's Hospital, Zhengzhou, 450003

ABSTRACT

Purpose: Comparison of Frey syndrome rates following superficial parotidectomy (SP group) and partial superficial parotidectomy (PSP group) by using porcine dermal collagen graft. **Methods:** 250 patients presented with a benign parotid tumor at the department of oral and maxillofacial surgery of Zhengzhou University of China between January 2018 to December 2019 were included in the study. 125 patients underwent superficial parotidectomy and 125 underwent superficial partial parotidectomy Porcine Dermal Collagen graft was used in surgery. The patients who underwent superficial parotidectomy were compared to those who underwent partial superficial parotidectomy in terms of Frey syndrome development and recurrence at 6 months. **Results:** The SSP group included 125 patients (51 women and 74 men) with a mean age of 48.4 ± 9.6 years; the PSP group included 125 patients (77 women and 48 men) with a mean age of 50.2 ± 11.2 years. Most common tumor observed was pleomorphic adenoma followed by Warthin's tumour, Basal cell carcinoma, myoepithelioma and cystadenoma in both the group. Frey syndrome was seen in 3 (2.4%) patients in PSP group and in 9 (7.4%) patients in SP group. Immediately facial paralysis was significantly more common in SP group (19.2%) than PSP group (4.0%). **Conclusion:** Compared to the SP group, the PSP group had shorter operative durations and fewer postoperative complications. Therefore, PSP should be considered in suitable cases. Permacol produced good results in both postoperative facial contouring and prevention of Frey's syndrome.

KEYWORDS

Partial superficial parotidectomy, Superficial parotidectomy, Porcine dermal collagen, Frey syndrome

Introduction

Tumors of the salivary glands represent 3% to 10% of all head and neck neoplasms; 75% to 85% of them originate in the parotid gland, and 70% to 80% are benign. Most involve the superficial lobe of the parotid, which accounts for 80% of the gland parenchyma.[1]

The treatment of parotid tumours requires the removal of both the tumour and parts of the surrounding parotid tissue. One of the following operations is chosen: extracapsular dissection, partial superficial parotidectomy, superficial parotidectomy, total parotidectomy with or without preservation of the facial nerve, and with or without neck dissection.[2-4]

The preferred surgical methods are superficial parotidectomy (SP) and partial superficial parotidectomy (PSP).[5-6] The primary difference between the two procedures is that the branching pattern and location of the facial nerve, rather than the size and extent of the tumor, determines the magnitude of dissection and the amount of parotid tissue that is removed in SP.[7] To prevent these complications, various techniques have been developed and different materials are being used during the operation. To reduce the incidence of Frey's syndrome and obtain better aesthetic results after excision, sternomastoid-muscle transposition has been used.[8]

Permacol (porcine dermal collagen) is a strong biological, non-absorbable implant with natural properties that make it suitable for use in the maxillofacial region. It may solve the postoperative problems of facial contouring deformities and Frey's syndrome, after parotid surgery.[9] A number of previous studies have compared the two types of parotid surgery by noting the incidence of post-operative complications,[10-12] but these studies did not use permacol implant to prevent Frey syndrome. Therefore, the aim of the present study was to compare the clinical outcomes and complication rate of patients following SP or PSP.

Subjects and Methods

Study design, settings and participants:

It was a hospital based study conducted over a period of two years from January 2018 to December 2019 in oral and maxillofacial surgery department of a tertiary care hospital of Zhengzhou University of China. This study included 250 patients presented with a benign parotid tumor, as assessed by fine-needle aspiration biopsy, CT and magnetic resonance imaging, were enrolled. Patients with malignant

salivary gland tumours were excluded. The patients were assigned randomly to one of two groups according to the extent of parotidectomy: 125 underwent superficial parotidectomy and 125 underwent superficial partial parotidectomy.

Surgical technique. All patients were told about the technique and the origin of Permacol, and consented to its use. For the SP technique, the main facial nerve trunk was identified and traced to its branches. The parotid duct was then ligated in all cases. Subsequently, the entire superficial parotid tissue region was excised with the tumor en bloc.

For the PSP technique (figure 2), only the branches surrounding the tumor were exposed, and the parotid tumor was excised with a surrounding 0.5 to 1-cm cuff of normal parotid tissue. The parotid duct was preserved in all patients. This method removed only the tumor-bearing area, and avoided the requirement for more extensive facial nerve dissection.

After excision, a Permacol sheet was applied so that the perimeter of the tissue deficit was covered (Figure 1). This way the Permacol sheet sets a barrier between the neural fibres of the auriculotemporal nerve and the sympathetic fibres of the overlying sweat-producing glands of the overlying flap of skin. To suture the Permacol implant to the parotid tissue, absorbable 3/0 polyglactin 910 (Vicryl) stitches were used. Permacol was applied with care to avoid injury to the exposed parotid nerve plexus. Care was also taken to ensure that the sheet applied would be tense enough to resemble the contour of the parotid and adequately support the overlying flap. Vacuum suction drains were used in all cases; the skin flap was put back in its place and sutured in layers. Patients were followed up till 6 months to see complications.

Statistical analysis

Data were analyzed and statistically evaluated using SPSS software, version 19 (Chicago II, USA). Quantitative data was expressed in mean, standard deviation while qualitative data were expressed in percentage. Statistical differences between the proportions were tested by chi square test or Fisher's exact test. 'p' value less than 0.05 was considered statistically significant.

Ethical issues

All participants were explained about the purpose of the study. Confidentiality was assured to them along with informed written consent. The study was approved by the Institutional Ethical Committee.

Results

The SSP group included 125 patients (51 women and 74 men) with a mean age of 48.4 ± 9.6 years; the PSP group included 125 patients (77 women and 48 men) with a mean age of 50.2 ± 11.2 years. Most common tumor observed was pleomorphic adenoma followed by Warthin's tumour, Basal cell carcinoma, myoepithelioma and cystadenoma. The operative time was 136.2 ± 34.5 minutes in the SP group and 95.1 ± 29.6 minutes in the PSP group. Frey syndrome was seen in 3 (2.4%) patients in PSP group and in 9 (7.4%) patients in SP group. Immediately facial paralysis was significantly more common in SP group (19.2%) than PSP group (4.0%). (Table 1)

Discussion

Frey syndrome or auriculotemporal syndrome symptoms typically emerge during eating or mastication and manifest itself as an edema and sweating in the facial region innervated by the auriculotemporal nerve or the greater auricular nerve.[13] Frey syndrome incidence following parotidectomy varies between 2.6% and 97.6% in the literature. This variance is due to factors such as the time passed since parotidectomy, the diagnosis being based on Minor test or clinical findings.[14]

Permacol (Tissue Science Laboratories, UK) is a sterile, off-white, moist, tough but flexible flat sheet of acellular cross-linking porcine collagen, which is biocompatible and not allergenic. It allows the development of cells on the underlay, which permits infiltration from fibroblasts and supports tissue revascularisation. It is easy to use, durable, and yet flexible. It is easy to form in the operating room, as it can be cut easily with scissors and sutured to tissues when required.[9] This allows the surgeon to use it quickly and precisely. It has produced good results in cases of repair of ileoanal pouch-vaginal fistulas[15] and to support an overlying skin graft.[16] However, the authors mentioned that it had no beneficial effect on contraction of skin grafts compared with skin grafts alone.[16] Permacol has also been used as an implant for soft-tissue reconstruction of the lip after removal of a haemangioma.[17]

In our study Frey syndrome was seen in 3 (2.4%) patients in PSP group and in 9 (7.4%) patients in SP group while in study by Huang G et al[18] 6 of 79 patients who received partial superficial parotidectomy (7.6%) exhibited Frey syndrome, and 5 patients (6.3%) exhibited temporary facial paralysis and 55 of the 241 patients on whom they performed superficial parotidectomy (22.8%) exhibited temporal facial paralysis, and 2 (0.8%) exhibited permanent facial paralysis. Frey syndrome occurred in 38 patients (15.8%).[15] In their study, tumor recurrence was not observed in any of the patients. We also did not observe any tumor recurrence in the both the group in this study. In study by Kilavuz AE et al,[19] overall complication rates were 21.6% and 12.2% in the SP and PSP groups, respectively. But recurrence of tumor was not observed in either group. In a study by Emodi O et al[7], Frey's syndrome occurred in 27.7% of the patients: Four cases treated with SP and nine cases treated with PSP. Similarly, Papadogeorgakis et al[20] reported that Frey's syndrome affected 18% of patients who had undergone SP, and 5% who had undergone PSP. However, these studies did not reveal a significant difference in the incidence of Frey's syndrome in patients treated by PSP or SP, which may have been the result of small sample sizes.

It is important to mention that patients should be always informed that Permacol is of porcine origin, mainly for religious reasons. The group of patients in this study shows that Permacol can produce good results after excision of parotid tumours. A Permacol 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.[9]

Conclusion and recommendations

Permacol, a porcine dermal collagen, improved surgical outcomes in both the group. It reduced the occurrence of Frey's syndrome and surgical site depression. Still suoperficial partial parotidectomy is better surgery than superficial parotidectomy.

Acknowledgement

The authors are grateful to all the participants for their support and contribution

Table 1: Analysis of patient characteristics in the SP and PSP groups

	SP group (n=125)	PSP group (n=125)	P value
Age (years)	48.4±9.6	50.2±11.2	0.32
Male/female	51/74	48/77	0.69
Diagnosis			
Pleomorphic adenoma	89 (71.2%)	94 (75.2%)	0.81
Warthin's tumour	18 (14.4%)	14 (11.2%)	
Basal cell carcinoma	10 (8.0%)	8 (6.4%)	
Myoepithelioma	6 (4.8%)	5 (4.0%)	
Cystadenoma	2 (1.6%)	4 (3.2%)	
Operative time (minutes)	136.2±34.5	95.1±29.6	<0.01
Recurrence	0 (0.0%)	0 (0.0%)	-
Postop complication			
Frey syndrome	9 (7.2%)	3 (2.4%)	0.13
Surgical Site Decompression	8 (6.4%)	4 (3.2%)	0.37
Immediate facial paralysis	24 (19.2%)	5 (4.0%)	<0.001
Permanent facial dysfunction	0	0	-



Fig. 1. Permacol sheet correctly placed and sutured.

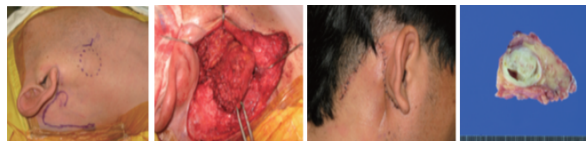


Fig. 2. Surgical procedure of partial superficial parotidectomy via the retroauricular hair line incision approach. (A) An incision was made along the postauricular sulcus and hairline without a preauricular incision. **(B)** After finding the trunk of the facial nerve and its branches, partial superficial parotidectomy was performed, resulting in the removal of some surrounding parotid parenchyma. **(C)** Postoperative photograph of a patient, taken immediately, showing a good cosmetic outcome without a visible incision scar or a sunken defect of the parotid region. **(D)** The mass was removed completely, along with normal parotid parenchyma, without capsular rupture.

REFERENCES

- McFarland J. Hundred mixed tumors of the salivary glands. Br J Surg. 2011;63:457-68.
- Upton DC, McNamar JP, Connor NP, Harari PM, Hartig GK. Parotidectomy: ten-year review of 237 cases at a single institution. Otolaryngol Head Neck Surg. 2007;136:788-92.
- Roh JL, Kim HS, Park CI. Randomized clinical trial comparing partial parotidectomy versus superficial or total parotidectomy. Br J Surg. 2007;94:1081-7.
- Smith SL, Komisar A. Limited parotidectomy: the role of extracapsular dissection in parotid gland neoplasms. Laryngoscope. 2007;117:1163-7.
- Pia F, Policarpo M, Dosdegani R, Olina M, Brovelli F, Aluffi P. Centripetal approach to the facial nerve in parotid surgery: personal experience. Acta Otorhinolaryngol Ital. 2003;23:111-5.
- Bhattacharyya N, Richardson ME, Gugino LD. An objective assessment of the advantages of retrograde parotidectomy. Otolaryngol Head Neck Surg. 2004;131:392-6.
- Emodi O, El-Naaj IA, Gordin A, Akrish S, Peled M. Superficial parotidectomy versus retrograde partial superficial parotidectomy in treating benign salivary gland tumor (pleomorphic adenoma). J Oral Maxillofac Surg. 2010;68(2):2092-8.
- Chow TL, Lam CY, Chiu PW, Lim BH, Kwok SP. Sternomastoid-muscle transposition improves the cosmetic outcome of superficial parotidectomy. Br J Plast Surg. 2001;54:409-11.
- Papadogeorgakis N, Petsinis V, Christopoulos P, Pavrovouniotis N, Alexandridis C. Use of a porcine dermal collagen graft (Permacol) in parotid surgery. Br J Oral

- Maxillofac Surg. 2009;47:378–81.
10. Koch M, Zenk J, Iro H. Long-term results of morbidity after parotid gland surgery in benign disease. *Laryngoscope*. 2010;120:724–30.
11. Zhang SS, Ma DQ, Guo CB, Huang MX, Peng X, Yu GY: Conservation of salivary secretion and facial nerve function in partial superficial parotidectomy. *Int J Oral Maxillofac Surg*. 2013;42:868–73.
12. Dell'Aversana Orabona G, Bonavolontà P, Iaconetta G, Forte R, Califano L. Surgical management of benign tumors of the parotid gland: extracapsular dissection versus superficial parotidectomy - our experience in 232 cases. *J Oral Maxillofac Surg*. 2013;71:410–13.
13. Rustemeyer J, Eufinger H, Bremerich A. The incidence of Frey's syndrome. *J Craniomaxillofac Surg*. 2008;36:34–7.
14. Linder TE, Huber A, Schmid S. Frey' syndrome after parotidectomy: a retrospective and prospective analysis. *Laryngoscope*. 1997;107:1496–1501.
15. Smith M, Hooks VH, Jenkins B. Patch repair of ileoanal pouch-vaginal fistula with Permacol collagen implant. *Am Surg*. 2007;73:514–5.
16. MacLeod TM, Sarathchandra P, Williams G, Sanders R, Green CJ. Evaluation of a porcine origin acellular dermal matrix and small intestinal submucosa as dermal replacements in preventing secondary skin graft contraction. *Burns*. 2004;30:431–7.
17. Benito-Ruiz J, Guisantes E, Serra-Renom JM. Porcine dermal collagen: a new option for soft-tissue reconstruction of the lip. *Plast Reconstr Surg*. 2006;117:2517–9.
18. Huang G, Yan G, Wei X, He X. Superficial parotidectomy versus partial superficial parotidectomy in treating benign parotid tumors. *Oncol Lett*. 2015;9:887–90.
19. Kilavuz AE, Songu M, Pinar E, Ozkul Y, Ozturkcan S, Aladag I. Superficial Parotidectomy Versus Partial Superficial Parotidectomy: A Comparison of Complication Rates, Operative Time, and Hospital Stay. *J Oral Maxillofac Surg*. 2018;76(9):2027–32.
20. Papadogeorgakis N, Skouteris CA, Mylonas AI, Angelopoulos AP: Superficial parotidectomy: technique modifications based on tumor characteristics. *J Craniomaxillofac Surg*. 2004;32:350–3.