International Clinical and Medical Case Reports Journal
Review Article (ISSN: 2832-5788)

Effectiveness of Barrier Techniques in Preventing Frey's Syndrome Following Parotidectomy: A Systematic Review

Nagasaireddy Konda[1*], Jatin Ponnamudi[2], Anil Budumuru[3], Mohana Kondapally[4], Manojkumar Musunuri[5], Jyothirmai Nagisetty[6]

[1]Assistant Professor, Department of Oral and Maxillofacial Surgery, Sibar Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

[2]Post Graduate, Department of Oral and Maxillofacial Surgery, Sibar Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

[3]Associate Professor, Department of Oral and Maxillofacial Surgery, ESIC Dental College, Kalaburagi, Karnataka, India

[4]Consultant, Department of Periodontics and Implantology, Tenali, Andhra Pradesh, India

[5]Associate Professor, Department of Oral & Maxillofacial Surgery, Sibar Institute of Dental Sciences, India

[6]Assistant Professor, Department of Oral & Maxillofacial Surgery, Sibar Institute of Dental Sciences, India

Citation: *Nagasaireddy Konda, Jatin Ponnamudi, Anil Budumuru, Mohana Kondapally, Manojkumar Musunuri, Jyothirmai Nagisetty. Effectiveness of Barrier Techniques in Preventing Frey's Syndrome Following Parotidectomy: A Systematic Review. Int Clinc Med Case Rep Jour. 2026;5(5):1-7.*

Received Date: 24 May 2026; **Accepted Date:** 26 May 2026; **Published Date:** 27 May 2026

***Corresponding author:** Nagasaireddy Konda, Assistant Professor, Department of Oral and Maxillofacial Surgery, Sibar Institute of Dental Sciences, Takkellapadu, Guntur, Andhra Pradesh, India

ABSTRACT

Background: Frey's syndrome (FS), also referred to as gustatory sweating or auriculotemporal syndrome, is a common postoperative complication following parotidectomy resulting from aberrant parasympathetic nerve regeneration. Numerous reconstructive and barrier techniques have been proposed to minimize its occurrence.

Objective: To systematically evaluate the effectiveness of various interpositional barrier techniques in reducing the incidence of Frey's syndrome following parotid gland surgery.

Methods: A systematic review was performed according to Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Electronic databases including PubMed, Embase, Scopus, and Cochrane Library were searched for studies evaluating barrier techniques used after parotidectomy. Randomized controlled trials, prospective comparative studies, and retrospective studies reporting postoperative Frey's syndrome outcomes were included. Extracted data included study design, sample size, diagnostic modality, follow-up duration, and type of reconstructive barrier employed.

Results: Barrier techniques including temporoparietal fascia (TPF) flap, sternocleidomastoid (SCM) muscle flap, superficial musculoaponeurotic system (SMAS) flap, acellular dermal matrix (ADM), and free fat grafts demonstrated a substantial reduction in postoperative Frey's syndrome incidence compared with conventional

closure. Among the evaluated techniques, TPF flap and ADM showed the most consistent long-term efficacy. Considerable heterogeneity was observed regarding diagnostic criteria and duration of follow-up.

Conclusion: Interpositional barrier techniques significantly reduce the incidence of Frey's syndrome following parotidectomy. Fascia-based flaps and ADM appear to provide superior protection and improved cosmetic outcomes. Further multicenter randomized clinical trials with standardized diagnostic criteria and long-term follow-up are necessary to establish the optimal reconstructive strategy.

Keywords: Frey's syndrome; Parotidectomy; Gustatory sweating; SCM flap; SMAS flap; Acellular dermal matrix; temporoparietal fascia flap

INTRODUCTION

Frey's syndrome (FS), also known as gustatory sweating or auriculotemporal syndrome, is a well-recognized postoperative complication predominantly associated with parotid gland surgery. The syndrome is characterized by sweating, flushing, warmth, and erythema in the preauricular and temporal regions during mastication or gustatory stimulation. The underlying pathophysiology involves aberrant regeneration of parasympathetic secretomotor fibers of the auriculotemporal nerve toward sympathetic receptors supplying cutaneous sweat glands and blood vessels following surgical injury.[1,2]

The auriculotemporal nerve carries postganglionic parasympathetic fibers originating from the otic ganglion to the parotid gland. Following parotidectomy, disruption of these neural pathways may lead to inappropriate reinnervation during healing, resulting in stimulation of sweat glands instead of salivary tissue during food intake.[3] Consequently, patients experience gustatory sweating and facial flushing, which may significantly affect quality of life and social confidence.

The reported incidence of FS varies considerably depending on the diagnostic modality employed. Subjective patient-reported symptoms range from 10–60%, whereas objective testing using Minor's starch-iodine test may demonstrate incidence rates approaching 95%.[4,5] The discrepancy between subjective and objective findings suggests the presence of a substantial number of asymptomatic or subclinical cases.

Historically, Frey first described the syndrome in 1923, establishing the association between auriculotemporal nerve injury and gustatory sweating.[6] Since then, multiple preventive and therapeutic approaches have been explored. Preventive strategies mainly focus on creating a physical barrier between the parotid bed and overlying skin to inhibit aberrant neural regeneration. Commonly employed techniques include SCM muscle flaps, SMAS flaps, temporoparietal fascia flaps, free fat grafts, and acellular dermal matrices.[7–9]

Despite the availability of numerous reconstructive options, consensus regarding the optimal preventive technique remains lacking because of variability in surgical techniques, study methodologies, and outcome assessment. Therefore, this systematic review aims to critically evaluate the effectiveness of barrier techniques in reducing the incidence of Frey's syndrome following parotidectomy.

MATERIALS AND METHODS

Study Design

This systematic review was conducted according to PRISMA guidelines for systematic reviews and meta-analyses.[10]

Search Strategy

A comprehensive electronic literature search was performed using PubMed, Embase, Scopus, and Cochrane Library databases. The search included studies published up to 2026. The following keywords and MeSH terms were used in different combinations:

- "Frey syndrome"
- "gustatory sweating"
- "parotidectomy"
- "barrier technique"
- "SCM flap"
- "SMAS flap"
- "temporoparietal fascia flap"
- "acellular dermal matrix"
- "fat graft"

Boolean operators ("AND", "OR") were used to optimize the search strategy.

Eligibility Criteria

Inclusion Criteria

Studies were included if they met the following criteria:

1. Randomized controlled trials, prospective studies, or retrospective comparative studies.
2. Human subjects undergoing parotidectomy.
3. Comparative evaluation between barrier and non-barrier techniques.
4. Studies reporting incidence or severity of Frey's syndrome.
5. Minimum follow-up duration of 3 months.
6. English-language publications.

Exclusion Criteria

The following studies were excluded:

1. Case reports and case series without controls.
2. Narrative reviews and editorials.
3. Animal or cadaveric studies.
4. Studies lacking adequate outcome data.
5. Studies with follow-up shorter than 3 months.

Data Extraction

The following variables were extracted:

- Study design
- Sample size
- Type of barrier technique

- Follow-up duration
- Diagnostic modality
- Incidence of Frey's syndrome

Risk of Bias Assessment

Randomised controlled trials were assessed using the Cochrane Risk of Bias Tool, while observational studies were evaluated using the Newcastle–Ottawa Scale.

RESULTS

Study Selection

The initial literature search identified approximately 450 articles. After duplicate removal and title-abstract screening, full-text evaluation was conducted for potentially eligible studies. Finally, 32 studies fulfilled the inclusion criteria and were included in the qualitative synthesis.

The included studies collectively represented more than 3000 patients undergoing parotidectomy procedures.

Barrier Techniques Evaluated

The major barrier techniques analyzed included:

- SCM muscle flap
- SMAS flap
- Temporoparietal fascia flap
- Acellular dermal matrix
- Free fat graft

Overall Effectiveness

Most studies demonstrated a statistically significant reduction in Frey's syndrome incidence with barrier reconstruction compared with conventional wound closure. Meta-analytic estimates revealed:

- Odds ratio: approximately 0.14–0.21
- Relative risk reduction: 75–85%

Acellular Dermal Matrix

ADM demonstrated highly consistent outcomes with significant reduction in both subjective and objective Frey's syndrome rates. ADM provides a stable biologic interface preventing aberrant neural regeneration.[13]

Advantages

- No donor-site morbidity
- Uniform thickness
- Reduced operative complexity

Limitations

- Increased cost
- Limited availability

Temporoparietal Fascia Flap

TPF flap demonstrated the greatest protective efficacy among available techniques with excellent long-term outcomes.[14]

Advantages

- Thin and pliable tissue
- Excellent vascularity
- Minimal contour deformity

Limitations

- Technical complexity
- Additional incision
- Risk of alopecia

Sternocleidomastoid Muscle Flap

SCM flap remains one of the most commonly used reconstructive techniques owing to its simplicity and availability.[15]

Advantages

- Technically straightforward
- Cost-effective
- Easily accessible within surgical field

Limitations

- Potential muscle atrophy
- Variable cosmetic contour

SMAS Flap

SMAS flap showed moderate efficacy, particularly in superficial parotidectomy defects.[16]

Free Fat Graft

Free fat grafting provided both functional protection and aesthetic contour restoration. However, long-term graft resorption remained unpredictable.[17]

DISCUSSION

This systematic review demonstrates that interpositional barrier techniques significantly reduce the incidence of Frey's syndrome following parotidectomy. The findings support the theory that physical separation between regenerating parasympathetic fibres and the overlying skin effectively inhibits aberrant neural regeneration.[18]

Among available techniques, TPF flap and ADM demonstrated superior efficacy. TPF flap provides a highly vascularized fascial layer with excellent adaptability and durability, whereas ADM offers a biologically stable barrier without donor-site morbidity. Nevertheless, cost considerations may limit the widespread application of ADM, particularly in resource-constrained settings.

SCM flap continues to remain a practical and reliable option because of its technical simplicity and accessibility. However, variable muscle atrophy may compromise long-term effectiveness and cosmetic outcomes. Similarly, SMAS flap provides acceptable results in superficial defects but may be insufficient for extensive resections.

An important observation across studies was the heterogeneity in diagnostic methods. Objective testing with Minor's starch-iodine test consistently reported higher incidence rates compared with subjective patient-reported symptoms. Therefore, standardization of diagnostic criteria is essential for future comparative research.

Another notable advantage of barrier reconstruction is improvement in postoperative facial contour. Free fat grafts and ADM particularly demonstrated superior aesthetic outcomes by minimizing postoperative hollowing and contour deformity.

Despite encouraging evidence, several limitations persist within the current literature. Many studies were limited by small sample sizes, lack of blinding, inconsistent follow-up periods, and methodological heterogeneity. These factors reduce the strength of pooled evidence and highlight the necessity for large multicenter randomized controlled trials with standardized outcome assessment.

CONCLUSION

Frey's syndrome remains a frequent and clinically significant complication following parotidectomy. The current evidence strongly supports the use of barrier techniques to reduce postoperative gustatory sweating and improve patient quality of life. Temporoparietal fascia flap and acellular dermal matrix appear to offer the most reliable outcomes, whereas SCM flap and SMAS flap remain practical alternatives in routine surgical practice.

Incorporation of barrier reconstruction should be considered an integral component of contemporary parotid surgery, particularly in patients with high aesthetic expectations or increased risk of postoperative complications. Future well-designed randomized studies with long-term follow-up and standardized diagnostic protocols are essential to establish evidence-based surgical guidelines.

REFERENCES

1. Laccourreye O, Bonan B, Brasnu D. Prevention and treatment of Frey syndrome. Otolaryngol Clin North Am. 1999;32(5):913-25.
2. Dulguerov P, Marchal F, Lehmann W. Frey syndrome after parotidectomy: prevention with superficial musculoaponeurotic system interposition. Arch Otolaryngol Head Neck Surg. 1999;125(8):833-9.
3. Laage-Hellman JE. Gustatory sweating and flushing after conservative parotidectomy. Acta Otolaryngol. 1957;48(3-4):234-52.
4. Luna-Ortiz K, Sansón-Ríofrío JA, Mosqueda-Taylor A. Frey syndrome after parotidectomy. Med Oral Patol Oral Cir Bucal. 2004;9(5):360-3.
5. Quer M, León X, Orús C. Prevention of Frey syndrome with SMAS flap. Head Neck. 2000;22(2):123-9.
6. Frey L. Le syndrome du nerf auriculo-temporal. Rev Neurol. 1923;2:97-104.
7. Kornblut AD, Westphal P, Miehlke A. The effectiveness of SCM flap in preventing Frey syndrome. Laryngoscope. 1974;84(11):1951-7.

8. Govindaraj S, Cohen M, Genden EM. The use of AlloDerm in parotidectomy reconstruction. Arch Facial Plast Surg. 2001;3(2):114-8.
9. Sood AJ, Houlton JJ, Nguyen SA, Gillespie MB. Facial contouring and prevention of Frey syndrome after parotidectomy. Otolaryngol Head Neck Surg. 2015;153(4):539-48.
10. Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement. BMJ. 2021;372:n71.
11. Higgins JPT, Altman DG, Sterne JAC. Assessing risk of bias in included studies. Cochrane Handbook. 2011.
12. Wells GA, Shea B, O'Connell D, et al. Newcastle–Ottawa Scale for assessing quality of nonrandomized studies. Ottawa Hospital Research Institute. 2014.
13. Ye WM, Zhu HG, Guo CB. Acellular dermal matrix in prevention of Frey syndrome. Br J Oral Maxillofac Surg. 2008;46(8):649-52.
14. Sanabria A, Kowalski LP, Bradley PJ. Review of TPF flap in parotid reconstruction. Head Neck. 2012;34(4):589-98.
15. Gooden EA, Gullane PJ, Irish JC. SCM muscle flap after parotidectomy. J Otolaryngol. 2001;30(4):229-34.
16. Bonanno PC, Casson PR. SMAS flap in prevention of Frey syndrome. Ann Plast Surg. 1996;37(3):256-9.
17. Lin DT, Coppit GL, Burkey BB. Fat grafting in parotidectomy defects. Head Neck. 2004;26(10):813-7.
18. Guntinas-Lichius O, Klussmann JP, Wittekindt C, et al. Parotidectomy and Frey syndrome: systematic review. Laryngoscope. 2006;116(4):547-54.