The Role of SMAS Flap in Preventing Frey's Syndrome Following Standard Superficial Parotidectomy

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Between 1992 and 2002, 46 patients who underwent standard superficial parotidectomy with a superficial muscoloaponeurotic system (SMAS) preservation technique were included in a retrospective study. Twenty-six patients were evaluated by questionnaire for subjective symptoms of gustatory sweating and flushing as well as satisfaction with the aesthetic appearance of their cheek. Six of twenty-six patients (23.1 %) complained of symptoms of Frey's syndrome. Seven of twenty-six patients (26.9%) demonstrated a positive Minor's starch iodine test. By this technique the incidence of Frey's syndrome is substantially reduced from 48% by subjective review and 72% by objective measurement reported in the previous study by the same group of surgeons without using the SMAS preservation technique. This study supports the role of the SMAS flap in preventing Frey's syndrome following standard superficial parotidectomy.

Keywords : *Frey's syndrome, SMAS flap (superficial musculoaponeurotic system), Standard superficial parotidectomy*

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Frey's syndrome, also known as the auriculotemporal syndrome is characterized by gustatory sweating, with or without a red flush in the skin overlying the site of operation. The number of patients who complain of disturbing or embarrassing symptoms from Frey's syndrome is relatively low; however Frey's syndrome is a more common sequel to parotid surgery than is generally appreciated[1-3].

Material and Method

All patients who presented with a clinically benign parotid mass and (Table 1) underwent parotid gland surgery with SMAS preservation technique at King Chulalongkorn Memorial Hospital during the eleven year period from 1992 to 2002 were reviewed. A classical standard superficial parotidectomy was strictly followed and only the superficial musculoaponeurotic system (SMAS) flap preservation technique was added. Forty-seven standard superficial parotidectomies with SMAS flap interposition were performed in the forty-six patients with one bilateral lesions in one of the patients.

Benign mixed tumor (Pleomorphic adenoma) comprised the majority of the lesions (Table 2). Patients with malignant lesions that required further treatment were excluded from the present study. Twenty patients proved to be untraceable. Twenty-six patients returned for special follow up, at which time post operative evaluation for Frey's syndrome and other complications was performed, involved subjective personal interview that placed emphasis on subjective symptoms of gustatory sweating and flushing, perceptions of post operative cosmetic appearance and cheek contour, sensation at the operative site and scar quality. Objective evidence of aberrant nerve regeneration was provided by Minor's starch iodine testing (n = 26)[4]. Minor's starch iodine test, was carried out in an air-conditioned room, involved painting the skin of the head and neck with a solution made up of 3gm Iodine, 20gm castor oil, and 200ml alcohol. The area was dusted with sweet potato starch powder. The patient was asked to eat a tart

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Table 1. Patient characteristics

All Cases	46
All Operation	47
Reviewed Cases	26
Reviewed Operation	26
Female/Male (n=46)	22:24
Mean Age (year:n=46)	41
Side of Lesion	
Left/Right	22/23
Bilateral	1
Post-operative Follow-up (month, n=26)	
Mean	20
Range	4-57

Table 2. Characteristics of histology of the studied patients

Tumors	
Benign mixed tumor	37
Warthin's tumor	7
Other lesions	
Hemangioepithelioma	1
Angiolymphoid hyperplasia	1
Kimura disease	1
Total	47

citrus fruit candy[5]. After 2 minutes, each cheek was examined and photographed. Dark blue spots indicated a positive Minor's starch iodine test.

Results

Personal interviews identified Frey's syndrome in six of twenty-six cases (23.1 per cent), none of flushing reflex was identified (Table3). None of these patients reported socially embarrassing or distressing symptoms of gustatory sweating and flushing. Most Frey's syndrome developed within 3 months after surgery except two of these patients who noticed these symptoms 6 months after the operation.

Minor's starch iodine tests identified seven of twenty-six lesions (26.9 per cent) with objective evidence of aberrant nerve regeneration (Table 4). Of note, one of these seven patients was asymptomatic. One recurrent case of benign mixed tumor was observed.

Most patients were unaware of cheek contour deformities and were satisfied with the appearance and symmetry of their faces. Physical examination demonstrated some decrease in sensation at the operative site (Table 5) and most of the scar was well-hidden (Table6).

Table 3. Incidence of Frey's syndrome in the studied group

	n (26)	per cent	Male/Female
Gustatory sweating reflex (Subjective)			
Positive	6	23.1	2:4
Negative	20	76.9	
Flushing reflex (Subjective and Objective)			
Positive	0	0	
Negative	26	100	

Table 4. Results of the Minor's test

Minor's starch iodine test	n (26)	per cent
Positive	7	26.9
Subjective positive	6	
Subjective negative	1	
Negative	19	72.1

Table 5. Area of the decreased sensation

	Patients (n)
Mastoid area	2
Ear lobule	9
Preauricular and ear lobule	6
Total	17

Table 6. Quality of the scar at the surgical site

	n (26)
Good (fine-well hidden scar)	23
Medium (mild ear lobule displaced or mild hypertrophic scar)	3

Discussion

Frey's syndrome is characterized by gustatory sweating, with or without a red flush in the overlying skin after parotid surgery[1-3].

The exact cause of Frey's syndrome remains unknown. Several theories have been postulated. However, the most common accepted theory is aberrant nerve regeneration of cholinergic fibers from the auriculotemporal nerve that are divided during parotid surgery[6-8]. Normally, the auriculotemporal nerve contains afferent sensory fibers from the skin and

efferent fibers both to the skin and the parotid gland. The efferent fibers include secretory post ganglionic (cholinergic) parasympathetic fibers to the parotid gland, parasympathetic vasodilatation fibers to the parotid gland, secretory post ganglionic (functionally cholinergic) sympathetic fibers to the sweat glands and sympathetic vasodilatory fibers to the subcutaneous vessels[9]. Many of these fibers are severed during parotidectomy. Post-operative sprouting and regeneration of parasympathetic fibers are believed to aberrantly re-innervate the sweat glands of the overlying cheek skin. This post-operative cross reinnervation is responsible for gustatory sweating and flushing when the parasympathetic fibers of the auriculotemporal nerve are stimulated as part of the normal gustatory reflex.

Since Madame Lucie Frey published her work in August, 1923 a case of "Le syndrome du nerf auriculotemporal"[1], a lot of reports have noted an incidence of Frey's syndrome after parotid surgery to vary widely between 11% and 100%[7,10-12]. Many techniques were introduced to reduce the incidence of Frey's syndrome following standard superficial parotidectomy. Some were abandoned but the SMAS preservation technique was repeatedly reported to be beneficial in preventing this sequel although to a different degree. Most of the studies compared the results between the different groups of surgeons probably with different techniques. Some combined this technique with a more conservative parotidectomy[13-15].

The authors have demonstrated that the incidence of Frey's syndrome in the present study is six of twenty-six (23.1%) by subjective measurement and 26.9% by objective measurement which is substantially reduced from 48% by subjective measurement and 72% by objective measurement in the previous report of the same group of surgeons which did not use the SMAS preservation technique. It was also found that there was no flushing reflex found in the present study compared to 20% in the previous study and most symptoms of gustatory sweating were less in severity than the previous study. Most of these patients did not feel social embarrassment or distressing symptoms of gustatory sweating and flushing[16].

In conclusion, the use of SMAS preservation and advancement is both safe and successful for preventing Frey's syndrome following classical standard superficial parotidectomy to a considerable degree.

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การป้องกันการเกิด Frey's syndrome ในการผ่าตัด Standard superficial parotidectomy ด้วยการใช้ SMAS flap

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การศึกษานี้ผู้ทำการวิจัยได้ทำการศึกษาในผู้ป่วยที่มาเข้ารับการผ่าตัดของต่อมน้ำลาย parotid เฉพาะในกลุ่มผู้ป่วยที่เป็นเนื้องอกธรรมดา ที่หน่วยศัลยศาสตร์ตกแต่ง ภาควิชาศัลยศาสตร์ โรงพยาบาลจุฬาลงกรณ์ ในช่วงระหว่างปี พ.ศ. 2535 ถึง พ.ศ. 2545 โดยมีผู้ป่วยทั้งหมด 46 คนซึ่งได้รับการผ่าตัดโดยวิธี standard superficial parotidectomy พร้อมกับได้ทำการย้ายเนื้อเยื่อ SMAS (superficial musculoaponeurotic system) มาปิดตำแหน่งที่ได้ทำการผ่าตัด หลังทำการผ่าตัดได้ติดตามผู้ป่วยได้ทั้งหมด 26 คน ผู้ทำการวิจัยได้สอบถามอาการของ Frey's syndrome ซึ่งได้แก่การที่ทานอาหารรสจัดแล้วมีเหงื่อออกหรือผื่นแดงขึ้นบริเวณแก้มหรือหลังใบหูในด้านที่ได้รับการผ่าตัด พร้อมกับตรวจยืนยันอาการเหล่านี้ด้วยการทำ Minor's starch iodine testing ผลการศึกษาพบว่าผู้ป่วยกลุ่มนี้มีอาการของ Frey's syndrome ตามการบอกเล่าของผู้ป่วยเอง 6 คน(23.1%) ตรวจยืนยันพบผลบวก 7 คน (26.9%) ซึ่งลดลงมากอย่างชัดเจนเมื่อเทียบกับการศึกษาที่ได้เคยรายงานของกลุ่มศัลยแพทย์เดียวกันนี้ในการผ่าตัดชนิดเดียวกันที่ไม่ได้ทำการย้ายเนื้อเยื่อ SMAS มาปิดบริเวณที่ผ่าตัด โดยในการศึกษาครั้งนั้นพบอาการตามคำบอกเล่าของผู้ป่วยเอง 48%และตรวจยืนยันพบผลบวกถึง 72% ผู้ทำการวิจัยสรุปผลว่าการย้ายเนื้อเยื่อ SMAS มาปิดบริเวณที่ทำการผ่าตัด Superficial parotidectomy จะสามารถลดอัตราการเกิด Frey's syndrome ได้