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## ORIGINAL ARTICLE

# Superficial Parotidectomy by Retrograde approach through Marginal Mandibular Nerve Dissection

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## ABSTRACT

**Background:** Parotid gland is most commonly involved in tumors, comprising about 80% of the salivary gland neoplasms. Majority of parotid tumors are benign in nature, the most common being pleomorphic adenoma. Superficial Parotidectomy is the preferred treatment option, using either anterograde or retrograde approach. The objective of this study was to determine the post-operative facial nerve status and other complications following superficial parotidectomy by retrograde dissection for benign lesions of parotid gland.

**Material and Methods:** This prospective clinical study included a total of 22 patients who had superficial Parotidectomy by retrograde technique involving marginal mandibular nerve dissection. These patients were studied post-operatively for facial nerve status, Frey's Syndrome, wound infection and salivary fistula.

**Results:** Out of a total of 22 patients, 54.54% developed temporary facial palsy on ipsilateral angle of mouth and all of them recovered by the end of 3 months post-surgery. Two patients (9.09%) developed salivary gland fistula and both of them healed spontaneously within two weeks. Frey's Syndrome and wound infection were not seen in any of the patients included in the study. Histopathology of these lesions revealed pleomorphic adenoma (n=20) and Warthin's tumor (n=2), respectively.

**Conclusion:** The use of marginal mandibular nerve as a landmark for retrograde dissection of facial nerve in superficial Parotidectomy is a reliable method to ensure lower percentage of facial nerve injury and associated complications.

**Key words:** Facial Nerve, Marginal mandibular nerve, Retrograde Approach, Superficial Parotidectomy

### Authors' Contribution:

<sup>1,2</sup> Conception, synthesis, planning of research and manuscript writing  
Interpretation, discussion, <sup>3</sup>. Active participations in data collection  
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## Introduction

Salivary gland tumors are generally rare head and neck tumors, representing less than 2% of all.<sup>1</sup> Of these tumors, the most commonly involved salivary gland is the parotid.<sup>2</sup> Parotid gland tumors may present in a vast variety of histological subtypes that have entirely different clinical behavior with majority of these tumors originating in the superficial lobe and are benign in nature. In the benign neoplasms, Pleomorphic Adenoma has the highest incidence, comprising about 80% of the salivary gland tumors.<sup>3</sup> They are slow growing, painless tumors<sup>4</sup>

and are commonly seen in female patients 30-50 years of age.

Pre-operative work up of patients for pleomorphic adenoma of parotid gland involves a thorough history followed by complete clinical examination. Fine needle aspiration cytology (FNAC) of parotid gland and a CT scan showing the extent of tumor, whether involving only the superficial lobe or deep lobe, or both are preferred investigations performed for these lesions. The involvement of facial nerve and any consequent paralysis,

both on clinical and radiological grounds is the most serious complication after a parotid gland surgery,<sup>4</sup> and strongly suggests the presence of underlying malignant disease.

Treatment option for Pleomorphic Adenoma is purely surgical (i.e. Parotidectomy). It is a fairly common, well standardized procedure for parotid tumors, whether benign or malignant. Superficial parotidectomy is a more common surgery than total parotidectomy. Total or subtotal conservative parotidectomy is most commonly carried out, with minimal morbidity, for benign conditions of parotid while more radical procedures are used consistently for high-grade malignancies.<sup>5</sup> Lately, a trend towards conservative surgical approach for benign parotid tumors have been observed. Ease in perioperative facial nerve monitoring due to technological improvement has led to increased use of retrograde approach to facial nerve dissection in benign parotid tumor surgery.<sup>6</sup>

Facial nerve status is the main pivoting factor in concluding a successful parotid surgery. The main aim is to avoid any damage to facial nerve that may cause facial disability.<sup>7</sup> It supplies the muscles of facial expression and holds an important position in post-operative tenure as facial paralysis poses a deep anatomical, functional, and psychological impact on the welfare of patient. Parotid gland has a very intimate relationship with the terminal branches of facial nerve, the later passing between the superficial and deep lobes of the gland.<sup>8</sup> This close proximity is the deciding factor for a successful parotidectomy, since the most crucial series of steps in surgery involves identifying the facial nerve, protecting it from iatrogenic trauma and finally preserving it at the end of tumor removal.<sup>8</sup> The other known complications after Superficial Parotidectomy include Frey's syndrome, salivary fistula, and wound infection.<sup>9</sup>

There are two principal approaches to identify and dissect the facial nerve.<sup>10</sup> Firstly, the more commonly used technique is anterograde dissection where the main trunk of nerve is identified first and it is traced to its division into terminal branches.<sup>11</sup> Secondly, the less explored technique is the retrograde approach where one of the terminal branches is singled out and dissected back to its main trunk. In the past, antegrade approach was used entirely but with time, many surgeons in West have

started practicing retrograde approach. However, in Pakistan, no such studies have been conducted so far, making acquisition of such data on local population impossible.

The objective of this study was to determine the post-operative facial nerve status as well as other complications with a three-month follow-up, after superficial Parotidectomy by retrograde dissection for benign lesions of parotid gland.

## Material and Methods

This prospective clinical study comprised of all the patients who had parotid gland neoplasms, and went through superficial Parotidectomy at the Department of ENT/Head and Neck Surgery in Pakistan Institute of Medical Sciences (PIMS), Pakistan from January 2015 till December 2018. Ethical approval was taken from Ethics Review Board prior to the commencement of the study. Non probability consecutive sampling technique was used for sample collection over a period of 4 years. All the patients were counselled about the details of their condition, proposed procedure and its complications, and informed consent was taken from each of the patient before registering them for the study.

A total of 22 patients who underwent retrograde parotidectomy were included. All the patients gave detailed history, went through thorough clinical examinations and radiological investigations. Patients with previous history of surgery and recurrences, malignant and metastatic lesions and pre-operative facial paralysis were excluded from the study.

The retrograde approach was used which involved identification of the marginal mandibular nerve followed by dissection in a retrograde manner to find and preserve main trunk of facial nerve. All the specimens were sent for histopathology to ensure the benign nature of the lesion. The variables studied were facial nerve palsy, temporary and permanent, and the time taken by the patient to recover from any facial weakness (if facial nerve was damaged).

## Results

Of the total 22 patients, 12 (54.54%) were males and 10 (45.45%) were females. The age of patients age of patients was years 17-66 and with mean age of  $37.5 \pm 14.09$ . Male patients included in this study had the age of patients was years 17-66 and with a mean of 34.41 while female patients rage of patients was years 28-51 with mean of  $41.1 \pm 7.89$ . Time taken for surgery ranged between 50 and 160 minutes. In post-operative patients, complications such as facial nerve weakness, Frey's syndrome, wound infection and salivary fistula were studied. Of the total 22 patients, 12 patients exhibited facial nerve weakness.

Among the 12 patients that experienced facial palsy, 9 (75%) had slight weakness at the angle of mouth by the end of first week post-surgery, 3 (25%) had persistent facial weakness at ipsilateral angle of mouth on one month follow up and by the end of three month, all of the patients had recovered completely. Only two patients (9.09%) developed salivary gland fistula which healed spontaneously. (Table I).

Table I: Post-operative complications and three-month follow-up after superficial parotidectomy					
Complications	No. of patients n (%)	Follow up n (%)			
		1	2	3	4
Facial nerve weakness	12 (54.54%)	9 (75%)	–	3 (25%)	Nil
Frey's Syndrome	Nil	–	–	–	–
Wound infection	Nil	–	–	–	–
Salivary fistula	2 (9.09%)	2 (9.09%)	Nil	Nil	Nil

1-First week, 2-Second week, 3-First Month, 4-Third Month

Other complications (Frey's syndrome and wound infection) were not seen in any of the patients in the study. All the specimens retrieved during surgery were sent for histopathology and were reported to be pleomorphic adenoma (n=20) and Warthin's tumor (n=2).

## Discussion

A very small proportion of head and neck tumors (2-10%) constitutes salivary gland neoplasms. More than 80% of

all salivary gland tumors are located in the parotid gland and roughly 80% of them are benign in nature.<sup>1</sup> This study comprised of 22 patients of benign tumors of parotid gland, who underwent superficial Parotidectomy by retrograde approach at the Department of ENT/Head and Neck Surgery, PIMS Islamabad. All the patients who underwent the surgery had their marginal mandibular nerve identified first and that was traced back to the main trunk of facial nerve. Superficial Parotidectomy is the surgery of choice in majority of these cases. Facial nerve preservation is crucial to warrant a successful surgery. The successful identification and preservation of facial nerve can be done by two methods of dissection, anterograde and retrograde.<sup>4</sup> In anterograde dissection, facial nerve is pinpointed as it comes out of stylomastoid foramen by identifying tragal pointer, posterior belly of digastric or tympanomastoid suture. The retrograde approach comprises of identifying one of the peripheral branches of facial nerve (i.e. marginal mandibular or buccal branch) and tracing it back to the main trunk. It has been observed that retrograde dissection guarantees a much higher rate of facial nerve preservation, lesser time to identify and reach facial nerve and overall lower incidence of complications.<sup>8</sup> The marginal mandibular nerve is nearly the same thickness as the main trunk of facial nerve is a resilient nerve. One of the reasons for post-operative weakness of this nerve is the extent of exposure. This branch is exposed in its entirety and is manipulated throughout the surgery that can lead to temporary facial weakness at the angle of mouth.

The retrograde approach is a preferred technique due to wider field of vision as compared to anterograde approach which has a very narrow field of vision to identify the main trunk of facial nerve. The former approach also does not require retraction of the surgical field to identify the landmarks for identification which are deeply buried in the tissue planes. The incidence of bleeding in retrograde approach is much less and landmarks for marginal mandibular nerve identification are considerably superficial.<sup>9</sup>

O' Regan et al studied 138 patients undergoing retrograde superficial parotidectomy and reported that 66% of the patients exhibited facial weakness for the first week and 38% had it for the first month. But by the end of

first six months, 99% of the patients had fully recovered.<sup>12</sup> These results are comparable with our study that showed a similar, if not identical pattern, where 40.9% patients showed facial weakness at first week and this percentage reduced to 22.7% by the end of first month post-surgery. On three months follow up, all the patients with facial weakness had recovered completely. Patel et al concluded in their study that retrograde dissection in superficial parotidectomy had an overall lower percentage of facial nerve damage and better tumor removal regardless of tumor size.<sup>13</sup> This was in harmony with the results of our study as tumor was exposed sufficiently and removed completely. The Facial nerve weakness too was limited only to the marginal mandibular branch in all the effected patients. It was reversible and for a short period of time. Furusaka et al also demonstrated that retrograde parotidectomy is associated with lesser number of facial nerve paralysis, surgical time, blood loss when compared with anterograde Parotidectomy.<sup>14</sup>

In addition to facial nerve weakness as a post-operative complication, only one other complication was seen in 2 (9.09%) of our patients i.e., salivary gland fistula. These patients were managed with regular aseptic dressings with frequent follow-up assessment. Both these patients exhibited resolution of fistula within two weeks by just daily dressings and reported no other complaints.

In our study, the total number of operative times ranged between 50 and 160 minutes. The earlier attempts generally required more time due to lack of skill building and a relatively newer approach used in surgery. The time also depended on the size of tumor and its extent where large and more infiltrating tumors required more time for removal as compared to smaller and limited ones.

In a study conducted by Scarpini et al, it was seen that retrograde technique permitted a more conservative approach although the complication rates were almost the same.<sup>15</sup> All of the above-mentioned studies were taken into account and their results were compared to our study which showed that retrograde approach for Parotidectomy is a more reliable method to ascertain the post-operative integrity of facial nerve.

## Conclusion

Our study demonstrated that use of retrograde approach for marginal mandibular nerve in superficial parotidectomy in benign lesions of parotid gland is associated with lower percentage of facial nerve injury and other complications. Furthermore, it is also associated with less operative time and adequate removal of tumor.

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