

# A survey of facial nerve dissection techniques in benign parotid surgery among maxillofacial and ear, nose, and throat surgeons in Nigeria

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## Abstract

**Objective:** The aim of the present study is to identify the facial nerve dissection technique routinely used during parotidectomy for benign parotid tumors by Nigerian Oral and Maxillofacial (OMF) and Ear, Nose, and Throat (ENT) Surgeons.

**Materials and Methods:** A questionnaire-based study was conducted among Oral and Maxillofacial and Ear, Nose, and Throat Surgeons in Nigeria, on their experience with antegrade and retrograde facial nerve dissection techniques in parotid surgery. The respondents were asked to indicate their choice of dissection techniques in revision parotidectomy, limited superficial parotidectomy, and in obese patients with large tumors. They were also asked to indicate if they routinely used perioperative facial nerve monitoring devices in parotid surgery for benign tumors.

**Result:** About half (47.5%) of them routinely used the antegrade technique, while only a few (12.5%) used the retrograde technique. A large number of them (40%), however, used a combination of antegrade and retrograde routinely. Technical ease was the main reason for the choice of technique. The antegrade technique was the technique of choice by most respondents for revision parotidectomy (60%) and limited superficial parotidectomy (62%). However, the retrograde approach was the technique of choice by most of them (47%) in case of parotidectomy in obese patients with large tumors. The routine use of perioperative facial nerve monitoring devices is an uncommon practice among OMF and ENT surgeons in Nigeria.

**Conclusions:** The antegrade approach for facial nerve dissection is the most common technique used in parotid surgery by Nigerian OMF and ENT surgeons. Nigerian surgeons need to consider the retrograde approach in selected cases of parotid surgery especially for localized tumors that are amenable to limited superficial parotidectomy. Inclusion of perioperative facial nerve monitoring devices is also advocated.

**Key words:** Antegrade, dissection, Facial nerve, retrograde, survey

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## Introduction

Parotidectomy is a common surgical procedure for the treatment of benign and malignant lesions of the parotid gland. This procedure is commonly performed by oral and maxillofacial (OMF) surgeons and ear, nose, and throat

(ENT) surgeons. On account of the fact that the terminal branches of the facial nerve are closely related to the parotid gland, identification, protection, and preservation of the facial nerve is central for successful parotid surgery.<sup>[1,2]</sup> Two

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approaches, antegrade and retrograde are commonly used to identify and dissect the facial nerve.<sup>[2]</sup>

The antegrade approach is the conventional / standard technique of identification and dissection of the facial nerve.<sup>[3]</sup> It is usually the standard procedure for a trainee to master.<sup>[1]</sup> The technique involves identification of the facial nerve trunk as it leaves the stylomastoid foramen. This is accomplished through identification of the nerve trunk via its relationship with the tympanomastoid suture, the tragal pointer or the posterior belly of the digastrics.<sup>[4]</sup> It is well known that the location of the nerve trunk may challenge even an experienced surgeon who operates on obese patients, especially those with large tumors or during revision surgery.<sup>[5]</sup> Other authors have also suggested that exposure of the trunk is not necessary in limited superficial parotidectomy for the treatment of localized tumors, and its avoidance may reduce the risk of serious nerve damage.<sup>[6]</sup>

Recent beliefs among surgeons,<sup>[7,8]</sup> in a more conservative surgical approach to benign parotid tumors and the technological improvements in perioperative monitoring of the facial nerve have renewed the interest in the antegrade approach to facial nerve dissection in parotid surgery, for benign tumors.<sup>[9]</sup> The retrograde approach involves identification of the peripheral branches of the facial nerve, using soft tissue landmarks. It has been observed that soft tissue landmarks of the peripheral branches are easier to identify than is commonly thought, especially with the aid of the facial nerve stimulator.<sup>[1,10]</sup>

The aim of the present study is to identify the facial nerve dissection technique routinely used during parotidectomy for benign parotid tumors by Nigerian OMF and ENT Surgeons. Their experience on the use of perioperative facial nerve monitoring devices during parotid surgery has also been considered.

## Materials and Methods

A self-administered questionnaire was distributed among the OMF and ENT Surgeons practicing in all the six geopolitical zones of Nigeria [Appendix 1]. A total of 47 questionnaires were distributed. The following information was requested for: specialty, institution of practice, number of parotid surgeries done each year, facial nerve dissection technique used, and the rationale for using that technique. The respondents were also asked to indicate their choice of dissection technique in the following scenarios: revision parotidectomy, limited superficial parotidectomy, obese patients with large tumors, and traumatic nerve injury. They were also asked to indicate if they routinely used nerve monitors/stimulators and continuous intraoperative electromyography facial nerve monitoring during parotid surgery, and if they routinely employed preoperative percutaneous facial nerve marking. Surgeons were also asked to indicate the rate of postoperative facial nerve weakness at

one week and six months in their practice.

## Results

A total of 40 respondents (response rate of 85%) returned the questionnaire and were included in the analysis. Twenty-four (60%) OMF Surgeons and 16 (40%) ENT surgeons were practicing in Nigeria. Most respondents ((87.5%) were currently practicing in tertiary hospitals [Table 1]. Sixty percent of the respondents operated on less than five cases of parotid surgery a year. About half (47.5%) of them routinely used the antegrade technique and only a few (12.5%) employed the retrograde technique routinely. A large number of them (40%), however, used a combination of antegrade and retrograde techniques routinely [Table 1]. Technical ease was the main reason for choice of technique [Table 1]. Table 2 shows the respondents' choice of facial nerve dissection technique for three scenarios. The antegrade technique was the technique of choice by the respondents for revision parotidectomy and limited superficial parotidectomy. However, the retrograde approach was the technique of choice by most of them in case of parotidectomy on obese patients with large tumors. The routine use of perioperative facial nerve monitoring devices is uncommon in parotid surgery in Nigeria. Table 3 shows the respondents' response to the routine use of facial nerve monitoring devices: nerve stimulator (5%), nerve monitor (15%), continuous intraoperative electromyography nerve monitor (10%), and preoperative percutaneous facial nerve marking (25%).

**Table 1: Characteristics of the respondents and response to questions on number of parotid surgery per year and facial nerve dissection technique**

Specialty	Frequency (%)
OMFS	24 (60)
ENT	16 (40)
Institution of practice	Frequency (%)
Teaching hospital	35 (87.5)
General hospital	3 (7.5)
Private hospital	2 (5)
Approximate number of parotid surgery per year	Number (%)
<5	24 (60)
5-15	14 (35)
>15	2 (5)
Facial nerve dissection technique	Frequency (%)
Antegrade	19 (47.5)
Retrograde	5 (12.5)
Combined (Antegrade + Retrograde)	16 (40)
Rationale for choice of technique	Frequency (%)*
Technical ease	35 (42.7)
Operative time	6 (7.3)
Nerve morbidity	22 (26.8)
Proficiency	19 (23.2)

\*, respondents indicated more than 1 options

**Table 2: Respondents choice of technique in 3 scenarios**

	Antegrade (%)	Retrograde (%)	*Combination (%)
Revision parotidectomy	4 (60)	13 (32)	3 (8)
Limited superficial parotidectomy	25 (62)	12 (30)	3 (8)
Obese patient with large tumour	14 (35)	19 (47)	7 (18)

\*Antegrade + retrograde

**Table 3: Participants response to routine use of perioperative monitoring devices**

Monitoring devices	Number of respondents (%)	
	No	Yes
Facial nerve stimulator	38 (95)	2 (5)
Facial nerve monitor	34 (85)	6 (15)
CIENM*	36 (90)	4 (10)
Preoperative percutaneous facial nerve marking.	30 (75)	10 (25)

\*Continuous intraoperative electromyography nerve monitor

**Table 4: Estimated postoperative nerve weakness rate**

Transient rate at 1 week postoperative	
Rate	Number of respondents (%)
<10%	15 (37.5)
10-30%	18 (45)
30-50%	7 (17.5)
>50%	0 (0)
Total	40 (100)
Permanent rate at 6 months postoperative	
Rate	Number of respondents (%)
0-2%	23 (57.5)
2-4%	12 (30)
4-6%	4 (10)
>6%	1 (2.5)
Total	40 (100)

Table 4 shows the postoperative nerve weakness rate at one week (transient) and six months (permanent), as indicated by the respondents. A total of 33 surgeons (82.5%) estimated a rate of postoperative transient nerve weakness of less than or equal to 30% at one week. A permanent rate of nerve weakness of 0 – 4% was estimated by about 88% of the respondents. Only one surgeon indicated a permanent rate of postoperative nerve weakness of more than 6%.

## Discussion

Surgeons have traditionally performed complete superficial parotidectomy for benign lesions of the parotid gland involving the superficial lobe. Several authors have cited the advantages of complete superficial parotidectomy; and these include the versatility of this approach in the face of unclear or unknown pathology, uniformity of the approach, and ease of standardization of teaching.<sup>[11]</sup> Minimizing

damage to the facial nerve is one of the primary objectives of parotidectomy and it has encouraged the development of alternative surgical techniques, including, limited superficial parotidectomy, extracapsular dissection, and selective deep lobe parotidectomy.<sup>[7,8]</sup> Although, the antegrade technique used to be the standard approach for identification and dissection of the facial nerve during parotid surgery, the advent of the conservative surgical approach to parotid surgery has recently renewed interest in the retrograde approach to the facial nerve.<sup>[1,2,4,8,12,13]</sup>

In the present study, the antegrade technique was the most frequently used approach for facial nerve dissection during parotidectomy, by surgeons who participated in the survey. Only a few preferred the retrograde technique, although a large number of them (40%) employed a combined antegrade–retrograde technique. This finding implies that Nigerian surgeons still employ the traditional antegrade technique learnt during training. A survey by O'Regan *et al*,<sup>[2]</sup> on OMF and ENT surgeons in the United Kingdom revealed that the antegrade technique was used routinely by 87% of the surgeons, while only 4% routinely employed the retrograde technique.

The antegrade technique is usually the standard procedure for a trainee to master during training.<sup>[11]</sup> This approach usually uses conventional landmarks and allows a more confident and reliable identification of the nerve.<sup>[11]</sup> However, identification of the trunk may prove difficult in some situations. In addition, this approach is usually associated with more extensive dissection, which is likely to consume more operative time, it resects a larger portion of the superficial lobe, possibly resulting in a larger contour defect, and may necessarily adequately resect the lesion.<sup>[4]</sup> The retrograde technique is a useful option if the surgeon fails to identify the nerve trunk. The advantages of the retrograde technique include: selective exposure of the branches of the nerve, avoidance of unnecessary exposure of the trunk, with subsequent reduction of serious damage, shorter operating time, reduced intraoperative blood loss, less normal parotid removal, and a more favorable cosmetic outcome.<sup>[1,4,10]</sup> One potential drawback of the retrograde facial nerve dissection approach is that during dissection, multiple communicating branches within the anterior parotid gland may be identified and unnecessarily followed.<sup>[4]</sup>

Bhattacharyya *et al*,<sup>[4]</sup> compared the antegrade and retrograde techniques for the outcome measures of surgical time, surgical margin status, volume of normal parotid tissue removed relative to the size of the primary tumor, and postoperative complications. It was observed that retrograde parotidectomy exhibited statistically significant clinical advantages in terms of decreasing the operative time by 1.4 hours, decreasing intraoperative blood loss by 27 ml, and significantly reducing the volume of normal parotid tissue excised.<sup>[4]</sup> In addition, there were no cases of temporary or permanent paralysis of the facial nerve.<sup>[4]</sup> Wang *et al*,<sup>[10]</sup> reported no permanent facial paresis in 383 patients after retrograde identification of the facial nerve. A

recent study also reported no permanent nerve damage in 99% of the patients, six months after retrograde parotidectomy.<sup>[11]</sup>

Technical ease (42.7%), nerve morbidity (26.8%), and proficiency (23.2%) are the major reasons for the choice of technique by the respondents. Technical ease and proficiency are related to the experience / training acquired over a period of time. However, recent evidence suggests no difference in rate of temporary / permanent nerve damage between antegrade and retrograde parotidectomy.<sup>[4,14]</sup>

The antegrade approach was the technique of choice by Nigerian surgeons for revision and limited parotidectomy. However, most of them agreed to the fact that the antegrade technique would be difficult in obese patients with large tumors, hence their choice of retrograde technique for this scenario. Previous studies have shown that limited parotidectomy with a retrograde approach conserved more normal parotid tissue and reduced the risk of nerve injury.<sup>[4,8,11,15]</sup> It was also seen that the retrograde technique was a preferred approach for revision parotid surgery and in obese patient with a large parotid tumor.<sup>[1,2,16]</sup>

Routine use of facial nerve monitoring devices during parotidectomy is not common among Nigerian surgeons, as indicated by their responses to the use of these devices. This is in contrast with experience in Europe and America where routine use of these devices are common.<sup>[2,4]</sup>

The routine use of facial nerve monitor devices is very essential in retrograde parotidectomy on account of the technical difficulties in identifying the branches during dissection and most importantly because of the anatomical variations in the position of the peripheral branches.<sup>[1,2,4]</sup> Technological improvements in perioperative nerve monitoring of the facial nerve with the aid of monitoring devices, during the last 10 – 15 years, have made identification of the peripheral branches easier; and retrograde parotidectomy more popular.<sup>[9]</sup> Non-availability of these devices in Nigeria may also be a major reason why Nigerian surgeons prefer the antegrade technique of nerve dissection to the retrograde technique.

In the present survey, about 83% of the respondents indicated an estimated postoperative transient nerve weakness rate of 30% at one week, and about 88% of them also estimated a permanent rate of 0 – 4% at six months. In a similar survey among OMF and ENT surgeons in the United Kingdom, 86% of the respondents estimated a rate of permanent nerve weakness of 0 – 2% at six months, and a further 13% of them estimated a rate of permanent nerve weakness of 2 – 4%.<sup>[2]</sup> Transient nerve weakness following parotidectomy is not an uncommon event, however, recovery is expected in most cases within six months after operation.<sup>[1,4]</sup> Bhattacharyya et al,<sup>[4]</sup> reported no difference in transient nerve weakness rate between retrograde and antegrade parotidectomy; and no case

of permanent nerve weakness was reported in both techniques. In a recent report on retrograde nerve dissection during parotidectomy,<sup>[11]</sup> about 66% of the patients had transient nerve weakness after one week, however, after six months, 99% of the patients had normal nerve function.

## Conclusions

The antegrade approach to facial nerve dissection is the most common technique used in parotid surgery by Nigerian OMF and ENT surgeons. Nigerian surgeons need to consider the retrograde approach in selected cases of parotid surgery, especially for localized tumors that are amenable to limited superficial parotidectomy. Inclusion of facial nerve monitoring devices in the parotid surgery armamentarium is also advocated to reduce the risk of facial injury during surgery.

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## Appendix 1: The questionnaire

### A survey of facial nerve dissection techniques in benign parotid surgery among OMFS and ENT consultants

Specialty      OMFS    ENT

Country of practice:.....

#### Institution of practice

Tertiary Hospital

General Hospital

Private Practice

1. Do you regularly perform parotid surgery      Yes     No

2. Number of Parotid surgery done in a year (Approximate)

A. <5       B. 5-15       C. >15

3. Which nerve dissection technique do you routinely use?

Anterograde     Retrograde     Combined approach

4. Rationale for choice of technique? (Tick as many as possible)

A. Technical easy     B. Operative time     C. Nerve morbidity     D. Proficiency

5. Please indicate your choice of dissection technique in these scenarios

	Antegrade	Retrograde
. Revision parotidectomy	<input type="checkbox"/>	<input type="checkbox"/>
. Limited superficial	<input type="checkbox"/>	<input type="checkbox"/>
. Obese patients with large tumours	<input type="checkbox"/>	<input type="checkbox"/>
. Traumatic facial nerve injury	<input type="checkbox"/>	<input type="checkbox"/>

6. Do you routinely use peri-operatively?

A nerve stimulator      Yes     No

A nerve monitor      Yes     No

7. Do you routinely use continuous intraoperative electromyography facial nerve monitoring during parotid surgery?

Yes     No

8. Do you routinely employ preoperative percutaneous facial nerve marking?

Yes     No

9. Please indicate your postoperative nerve weakness rate as a percentage:

#### Transient rate @ 1 week postop

A. <10%     B. 10-30%     C. 30-50%     D. >50%

#### Permanent rate @ 6 months

A. 0-2%     B. 2-4%     C. 4-6%     D. >6%