

## Functional and aesthetic comparison of lower lip split incisions and modification of McGregor incision.

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### **Abstract:**

The open mouth provided the basis for various surgical approaches to tumors of the oral cavity. If this access is inadequate it is generally added to by splitting the lower lip in the mid line. Roux in mid-19th century first described lower lip splitting procedure which was later modified by Trotter and Konig. Midline vertical incision may cause scar contractures and notching at the vermilion cutaneous border and results in disruption of the round smooth chin pad counter. This study includes patients who were diagnosed to be having oral squamous cell carcinoma in which lip split approach was used to access tumor. From the present study, it becomes apparent that chin appearance and chin pad counter becomes a standalone criteria in clinical comparison of Roux-trotter and McGregor incision. In our experience, McGregor incision with lateral modification in the neck is the one that poses the fewest problems and produces the best cosmetic results as compared to Roux-Trotter.

**Keywords:** Roux-trotter, McGregor incision, chin, lip.

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### I. Introduction

The open mouth provided the basis for various surgical approaches to tumours of the oral cavity(1). If this access is inadequate it is generally added to by splitting the lower lip in the mid line. The mid line was initially selected in preference to one or the other side of the lip. Intra oral resections are regularly carried out in association with a neck dissection. With the sub mandibular incision common to virtually all the standard neck dissection incisions used in managing neck node metastases from intra oral primaries, the two procedures, neck dissection, radical or functional, and lip splitting used to provide access to the intra oral tumour.

Splitting of the lower lip was advocated by Dieffenbach in 1834, by Bernard in 1853,(2) and by Burow in 1855.(3) All of whom advocated a simple, straightline vertical split of the lower lip to the middle of the mandibular symphysis. Roux in mid-19th century first described lower lip splitting procedure which was later modified by Trotter and Konig.(4)(5)(6)

The incision was then extended into a collar incision according to the surgical requirements. Although this technique is a simple, reliable surgical procedure, it has cosmetic and functional disadvantages. Midline vertical incision may cause scar contractures and notching at the vermilion cutaneous border and results in disruption of the round smooth chin pad counter.

In 1984 Ramon et al described a stepped technique.(7) It starts with a midline incision of the vermilion and continues down to 2cm above the labiomental fold, where is extended at the right angle for 1cm. It is brought around the chin in small steps, through the depressor labii inferioris muscle about 2cm laterally the mentalis muscle, reaching the inferior mandibular border lateral to mentalis muscle. This technique may reduce both vertical and circumferential scar contracture and it avoids chin pad disruption. However, the flaps are small size and if there is ischemic loss of tips, the scar will act like curvilinear scar and contract and/or pucker.

In the modification made by McGregor, the incision begins in the centre of the lip as in the classical version but stops in the hollow just above the chin prominence.(8) Thereafter, it follows the curve around the base of the chin prominence on the side of the intraoral resection to reach the sub mental area and join the submandibular part of the neck dissection incision.

### II. Patients and methods

The present study pertaining to clinical analysis of Roux-Trotter incision and McGregor incision is carried out in a tertiary cancer institute. The study included 8 patients who were operated between March 2020 and August 2020 for oral cancer. They were evaluated retrospectively after minimum follow up period of 4-6 months in surgical oncological OPD.

This study includes patients who were diagnosed to be having oral squamous cell carcinoma based on histopathological studies in which lip split approach was used to access tumour.

Exclusion criteria's:

1. Patients who had received any neoadjuvant treatment either radiotherapy or chemotherapy.
2. Those who were previously operated.
3. Patients who required anterior mandibulectomy or with any mentolabial region anomaly.
4. Patients in whom skin is involved with primary tumour.

4 cases of each 2 commonly used lip splitting incision Roux-trotter and McGregor were analysed. The patients had to assess themselves about the eight criteria as-good/fair/poor. At the same time the examiner evaluated the patient for the same criteria.

Chin appearance and chin pad counter-subjectively assessed as good/fair/poor.

Vermilion and lip skin appearance- subjectively assessed as good/fair/poor.

Lip movement- patient was asked to clench his teeth and retract his lip.

Lip and chin sensation-brush border discrimination test.

Oral continence-drooling from corner of mouth or spillage of water while drinking.

The patients were evaluated on follow up visit 6 weeks after completion of their treatment in case underwent adjuvant therapy.

Demography:

Age distribution: 40-50 years:4,30-40 years :3, 20-30 years :1

Sex distribution:patients included 6 males and 2 females.

Side: 3 patients with right side involvement and 5 patients with left side of oral cavity involvement.

Site: buccal mucosa -3,retromolar trigone-1,gingivobuccal complex-4.

T status-T4-7,T2-1

N status-N0-7,N1-1

Mandibulectomy: Marginal mandibulectomy-1,Segmental mandibulectomy-6, Hemimandibulectomy-1.

None of selected group of patients undergoing segmental mandibulectomy received any bony reconstruction.

Roux-Trotter incision is used in 4 patients to address the oral primary tumour site. Chin is squeezed between two fingers to mark exact midline of chin and continued in midline till hyoid in the neck later converted horizontally into the ipsilateral neck to help with the neck dissection part of surgery.

McGregor incision is used in 4 patients to address the oral primary site of tumour. After lip splitting and chin sparing into ipsilateral side rather coming back into midline as in conventional incision we have continued laterally in the vertical manner up to the upper skin crease and continued horizontally in the neck for neck dissection. This modification was acquired to avoid midline longitudinal scar contractures,to decrease the length of subplatysmal flap and to ease the access of neck for neck dissection.



Roux-Trotter incision



McGregor Incision



Post operative Roux-Trotter incision



Post operative McGregor Incision

### III. Results

Table no.1 shows the number of patients with poor results graded by patients. Table no. 2 shows the number of patients with poor results graded by examiner. Table no.3 shows the number of patients in whom both their evaluation and that of the examiner was considered to be poor. In general, the patients tended to regard the results more favourably. This may be attributed to the fact that they had lower expectations relative to the functional and aesthetic outcome of the procedure. Although in some cases there was a disparity between the opinion of the examiner and that of the patient, in most cases both parties and examiner were found to be in agreement. The results obtained were analysed in terms of number of poor results that enabled us to critically rate these incisions.

The functional outcome depended on three criteria-lip movement, lip sensation and oral continence. The aesthetic outcome depends on criteria-chin appearance, chin pad counter, lip skin appearance and vermilion appearance.

#### Chin appearance

Patient's evaluation revealed that Roux-trotter incision 3/4 (75%) has more poor results compared to McGregor incision. The examiner evaluated 4/4 (100%) poor results with Roux-trotter incision and 1/4 (25%) poor results with McGregor incision.

**Table no.1:**Number of patients with poor results: patient's evaluation

Type of incision	Roux-Trotter	McGregor
Chin appearance	3	0
Chin sensation	1	1
Chin pad counter	4	0
Vermilion appearance	1	1
Lip skin appearance	2	1
Lip sensation	2	2
Lip movement	2	1
Oral incontinence	2	2

#### Chin sensation

Patient's evaluation revealed equal number 1/4 (25%) poor results between Roux-trotter incision and McGregor incision. The examiners evaluation revealed 2/4(50%) poor results with Roux-trotter incision and 2/4 (25%) poor results with McGregor incision. Both patients and examiner revealed 1/4 (25%) poor results with both Roux-trotter incision and McGregor incision.

### Chin pad counter

Patients and examiner both agreed on 4/4 (100%) poor results with Roux-trotter incision.

Table no.2: Number of patients with poor results: Examiner's evaluation

Type of incision	Roux-Trotter	McGregor
Chin appearance	4	1
Chin sensation	2	1
Chin pad counter	4	0
Vermilion appearance	2	1
Lip skin appearance	2	1
Lip sensation	2	2
Lip movement	2	2
Oral incontinence	3	3

### Vermilion appearance

Patient's evaluation revealed 1/4 (25%) poor results with Roux-trotter incision and 1/4 (25%) poor results with McGregor incision. The examiner revealed 2/4 (50%) poor results with Roux-trotter incision and 1/4 (25%) poor results with McGregor incision. Both patients and examiner agreed on 2/4 (50%) poor results with Roux-trotter incision and 1/4 (25%) poor results with McGregor incision.

### Lip skin appearance

Patients and examiner are in accordance with 2/4(50%) poor results with Roux-trotter incision and 1/4(25%) poor results with McGregor incision.

### Lip sensation

Patients and examiner are in accordance with 2/4(50%) poor results with either Roux-trotter incision or McGregor incision.

Table no.3: Number of patients with poor results as assessed by both patients and examiner

Type of incision	Roux-Trotter	McGregor
Chin appearance	3	0
Chin sensation	1	1
Chin pad counter	4	0
Vermilion appearance	2	1
Lip skin appearance	2	1
Lip sensation	2	2
Lip movement	2	1
Oral incontinence	2	2

### Lip movement

Patients revealed 2/4(50%) poor results with Roux-trotter incision and 1/4(25%) results with McGregor incision. Examiner revealed 2/4(50%) poor results with either type of incision. Both patients and examiner agreed on 2/4(50%) poor results with Roux-trotter incision and 1/4(25%) poor results with McGregor incision.

### Oral incontinence

Patients revealed 2/4(50%) poor results with both Roux-trotter incision and McGregor incision. Examiner revealed 3/4(75%) poor results with both Roux-trotter incision and McGregor incision. Patients and examiner are in accordance with 2/4(50%) poor results with both Roux-trotter incision and McGregor incision.

## IV. Discussion

This study on clinical analysis of lower lip-splitting incisions would enable us to use the most appropriate incision. The results provided an insight into the patterns of outcome with each of these two incisions. However, before discussing the findings of this study it is worth mentioning certain limitations of this study.

Firstly the patients in whom these incisions were used varied in terms of site of oral cancer, tumour stage, node status, age, sex and follow-up period. Each one of these factors could influence the outcome of this study.

The surgeons who performed the lip-split were part of the head and neck wing of the division of surgical oncology. It is headed by a general surgeon and also included two plastic surgeons and an otorhinolaryngologist. The lip-splitting approach used was largely the discretion of the surgeon.

The parameters for evaluating the aesthetic and functional criteria were similar to the study undertaken by Rapidis et al in Athens, Greece. (9) This study also evaluated the aesthetic and functional results of lip

splitting incisions. Alternatively the other option was to use the method used by Devine et al.(10) This is based on the UW-QOL questionnaire. (University of Washington-Quality of Life). This study however compared lip-splits with mandibular lingual releasing techniques. The parameters laid down in the questionnaire were found to be more appropriate for mandibulectomy or mandibulotomy and not for lip-split alone.

To achieve the best postoperative functional and aesthetic results after a lip-splitting approach, adherence to the basic surgical principles and correct closure of the incision are still critical. This includes meticulous suturing in layers and careful approximation of previously determined skin points. Special attention should also be paid to proper alignment of the vermilion border, which is an especially prominent aesthetic unit.

The straight midline incision, as reported by Dieffenbach(11), Roux(4), Trotter(5), Burow(3) and others, can result in excessive scarring, vermilion notching, and reduced lip mobility secondary to pronounced scar contracture because it disrupts many muscle fibres, most notably those of the orbicularis oris muscle. On the other hand, midline lip-splitting incisions have the advantage of avoiding injury to branches of the mental nerve or the marginal mandibular branch of the facial nerve. This type of incision also guarantees near-normal postoperative lip sensation and function, sparing the patient embarrassing and irritating situations, such as food and saliva incontinence or slurred speech.

Various authors have proposed modifications, by breaking the incision line to better conform to the anatomic contours of the region and thus causing less muscle fibre disruption and scar contracture. At the same time, more anatomic landmarks are offered for correct approximation during suturing, thus reducing the risk of vermilion stepping. Of these various modifications, the most popular over the years have been the techniques proposed by McGregor and Mc-Donald(8), Hayter et al(12) and Rassekh et al.(13) McGregor modification avoids cutting through the chin pad. Similar to that is the Rassekh et al(13) modification, which introduces a half-hexagonal flap in the chin and a small triangular flap in the vermilion area.

The Hayter et al(12) modification of the McGregor incision incorporates chevrons in the vermilion area and mentolabial groove. Other authors, such as Ramon et al,(7) have proposed stepped incisions in the lower lip to better conform to the anatomy of the region and to avoid straight lines. In the present analysis we incorporate the McGregor modification of midline lip split incision and added further modification to it by avoiding getting back into midline and continuing laterally in neck to add more cosmetic value.

In the present clinical analysis, regardless of type lower lip split incision made most problems associated with incontinence of food and saliva. However, it should be noted that oral incontinence in patients having ablative surgery is not attributed only to the lip-splitting incision but also could be the result of three other factors: impaired lip motility caused by scarring and loss of facial nerve function; loss of lip sensation caused by extirpation of the inferior alveolar nerve; and loss of lip support caused by removal of teeth and underlying bony structures. The design of the lip-splitting incision can further affect the already disturbed function. Since only one patient in the present study underwent marginal mandibulectomy and none of them had a bony reconstruction for mandibular bony defect, the attribution of either type of incision to oral incontinence is hard to say.

From the present study, it becomes apparent that chin appearance and chin pad counter becomes a standalone criteria in clinical comparison of Roux-trotter and McGregor incision. Other than these two criteria's the choice of incision for the lip split solely depends on surgeon's preferences for case to case. If the need to extend the incision in the neck arises, standard precautions to avoid injury to the marginal mandibular branch of the facial nerve should be taken. In our experience, McGregor incision with lateral modification in the neck is the one that poses the fewest problems and produces the best cosmetic results as compared to Roux-Trotter midline lip and chin split incision.

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NO conflicts of interest for present study.

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