# EFFECT OF TWO TRIANGULAR FLAP DESIGNS FOR REMOVAL OF IMPACTED THIRD MOLAR ON MAXIMAL MOUTH OPENING

<sup>1</sup>MUHAMMAD ASIF SHAHZAD <sup>2</sup>MUHAMMAD FAISAL MUNIR <sup>3</sup>M RAFIQUE CHATHA <sup>4</sup>AQIB SOHAIL

#### ABSTRACT

The aim of this study was to compare the effect of marginal flap and paramarginal flap designs on maximum mouth opening following surgical removal of impacted mandibular third molars. This comparative study consisted of sixty patients which were divided into two groups of thirty each and was carried out at Oral and Maxillofacial Department, Lahore Medical and Dental College, Lahore from June 2012 to October 2013. Maximum mouth opening was recorded preoperatively. A marginal flap was used in one randomly chosen half of the patient's sample, and a paramarginal flap was used in the other half. The effect of these flaps on maximum mouth opening was studied postoperatively. No significant difference was found between marginal and paramarginal flaps on maximum mouth opening at second and seventh days after surgical removal of impacted mandibular third molar (P>0.05). Therefore, the decision to use a marginal flap or a paramarginal flap may be based on surgeon's preference.

Key Words: Impacted mandibular third molar, marginal flap, paramarginal flap.

### **INTRODUCTION**

Third molar impaction surgery is a common dental procedure that requires a sound understanding of surgical principles and patient management skills.<sup>1</sup> Surgical removal of impacted mandibular third molar often involves trauma to the soft and hard tissues due to preparation and retraction of a mucoperiosteal flap and removal of bone, which is frequently followed by oedema of varying degree, trismus (limited mouth opening)<sup>2</sup>, pain and at times delayed healing.<sup>3</sup> Some researchers stated that the difficulty of removing an impacted mandibular third molar depends on its accessibility. Therefore, to gain access to the area and visualize the overlying bone that must be removed, the surgeon must choose the most appropriate flap design to allow placement and stabilization of retractors and

For Correspondence: Dr Muhammad Asif Shahzad, House No.141-C Punjab Co-operative Housing Society, DHA, LahoreCell: 0333-4336976Email: drasif\_395@hotmailcomReceived for Publication:January 30, 2015

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instruments for the removal of an impacted tooth.<sup>4,5</sup> However, little attention has been given to the soft tissue that must be incised and reflected to gain surgical access to the impacted tooth.<sup>6</sup>

Over the years, the authors suggested different types of flap designs that can be used for the removal of impacted mandibular third molar,<sup>5,7,8,9</sup> while only few studies have been carried out to compare the effect of choosing a certain flap design over another on post operative complaints.<sup>10</sup>

The aim of this study was to compare the effect of using marginal flap and paramarginal flap designs on maximum mouth opening following mandibular third molar surgery.

#### **METHODOLOGY**

This comparative study composed of patients presenting to the Department of Oral and Maxillofacial Surgery, Lahore Medical and Dental College, Lahore for evaluation and management of impacted mandibular third molars between June 2012 and October 2013. The study got approval from the ethical committee of the institution. The inclusion criteria consisted of: Patients with no history of medical illness or taking any medication that could influence the surgical procedure or postoperative wound healing, non-smokers, and healthy dental and periodontal status. An attempt was made

<sup>&</sup>lt;sup>1</sup> Muhammad Asif Shahzad, BDS, FCPS, Assistant Professor Oral&Maxillofacial Surgery, Lahore Medical& Dental College, Tulspura, Lahore

<sup>&</sup>lt;sup>2</sup> Muhammad Faisal Munir, BDS, FCPS, MFDSRCS (London), Assistant Professor Oral&Maxillofacial Surgery

<sup>&</sup>lt;sup>3</sup> M Rafique Chatha, BDS, MDS (Hons), FCPS, Professor Oral & Maxillofacial Surgery/Principal Dental Section

<sup>&</sup>lt;sup>4</sup> Aqib Sohail, BDS, FCPS, MOMSRCPS (Glasgow), Professor and Head Oral&Maxillofacial Surgery

to include only those mandibular third molars that were of comparable technical difficulty, positioning and angulations as seen on periapical and panoramic radiographs.

Based on the inclusion criteria, sixty patients were included in the study. The demographic data was recorded and informed consent was taken. A thorough history was taken. Patients were assessed clinically and were divided into two groups, I and II randomly by using random numbers table. Those patients operated by using the marginal flap and bone cutting were kept under group I. Patients operated by using the paramarginal flap and bone cutting were included in group II. Pre operative maximum mouth opening was measured by using the millimeter scale from the upper incisal edge to the lower incisal edge of central incisors.

Patients were operated under local anesthesia; 2% lidocaine with 1:100000 adrenaline (Medicaine R; Houns co; Ltd; Korea). A standard surgical procedure was followed. The patients were operated by the same operator and operative protocol.

The marginal flap incision started near the mesiobuccal edge of the second molar to its distal surface. A relieving incision was made in the mesial region without cutting the interdental papilla. Another relieving incision was made along the mandibular ramus (Fig 1). The paramarginal flap incision was similar to that used with the marginal flap; however, instead of making a sulcular incision in the second molar, an incision was made while maintaining a distance of 2 mm from the free gingival margin (Fig 2).

Then, a full thickness mucoperiosteal flap was elevated. Minimum ostectomy and tooth sectioning was performed by using the round bur and the fissure bur respectively while preserving the distal bone adjacent to the second molar. The flap was approximated by interrupted sutures with 3/0 mersilk (Ethicon) and postoperative instructions were given to the patients. All patients were given Amoxicillin (500mg 3 times a day for 5 days) and diclofenac tablets (50mg 3 times a day for 3 days). Patients were followed up at second and seventh postoperative days and maximum mouth opening was measured.

Statistical analysis of the data in this study was done by using SPSS version 17. The qualitative variables in the demographic data like gender and mandibular side of impaction were presented as proportions and percentages (%) and quantitative variable like age were presented as means and standard deviations. The values of the two groups regarding maximum mouth opening were compared for the marginal and paramarginal flaps and as there was a difference, it was tested for significance by t test as the data was quantitative in nature.

# RESULTS

This present comparative study was conducted at Lahore Medical and Dental College, Lahore between June 2012 to October 2013. It consisted of sixty patients divided into two groups of thirty each who required surgical removal of mandibular third molar impaction.

Marginal flap group included patients of ages ranging between 18 to 30 years (mean/SD,  $23.46\pm3.34$ ) while patients in paramarginal flap group were of ages ranging between 18 to 30 years (mean/SD,  $24.16\pm3.17$ ).

There were no significant differences between the marginal and paramarginal flaps in terms of maximum mouth opening before surgery, at second and seventh days after surgery (Table 1). However, both techniques had a significant restricted mouth opening at second day after surgery (P<0.001), and a significant improvement at seventh day after surgery (P<0.001).

## DISCUSSION

Surgical removal of the mandibular third molar impaction is the most frequently performed procedure in oral and maxillofacial surgery. Therefore, minimizing postoperative morbidity has a significant impact medically, legally and economically. The two main





Fig 1: Incision for marginal flap



Fig 2: Incision for paramarginal flap

			After surgery		
Measurement	Flap type	Before surgery	Secondy day	Seventh day	
Maximum mouth opening (mm) (Means/SD)	Marginal flap	$44.20 \pm 8.13$	$32.94 \pm 6.33$	$42.60 \pm 8.62$	
	Paramarginal flap	$44.03 \pm 8.92 \text{ NS}$	$30.56\pm6.74$ NS	$42.47 \pm 8.85 \text{ NS}$	

TABLE 1: PREOPERATIVE AND POSTOPERATIVE MAXIMUM MOUTH OPENING IN MARGINAL VERSUS PARAMARGINAL FLAP GROUPS

mistakes made by the general dentist when removing the impacted lower third molars are inadequate flap design and inadequate bone removal. The flap must be large enough to provide unobstructed visibility to the tooth and encasing bone.<sup>7,10</sup>

Several studies looking into flap design as a potential risk factor for post operative limited mouth opening have been reported.<sup>10,11,12</sup> Raising a mucoperiosteal flap is accepted to cause trauma to the periosteum and the underlying bone, but the clinical significance of this in mandibular third molar surgery is debated.<sup>13,14</sup> The age of patients in this study was comparable to previous studies researching flap design and postoperative morbidity.

In the present study, two different flap designs were assessed clinically on the post operative complaint of trismus following lower third molar surgery. There were no significant differences between the marginal and paramarginal flaps in terms of maximum mouth opening before surgery, at second and seventh days after surgery. However, both techniques had a significant restricted mouth opening at second day after surgery and a significant improvement at seventh day after surgery.

The limitation of mouth opening after mandibular third molar surgery is an expected outcome and it has been suggested that triangular mucoperiosteal flaps induce inflammation of masticator muscles, leading to trismus secondary to raising a mucoperiosteal flap.<sup>11</sup>

In a clinical study, Van Gool et al.<sup>15</sup> and Suarez-Cunqueiro et al.<sup>16</sup> concluded that trismus was not affected by the type of incision and flap design. Sandhu et al<sup>14</sup> evaluated the effect of modified triangular and envelope flap designs on trismus postoperatively and they found no significant difference in postoperative trismus in either group. Similarly, Kirk et al.<sup>13</sup> investigated the influence of envelope and modified triangular flap designs on postoperative trismus and they reported that the flap designs used in their study did not adversely affect patients in terms of postoperative trismus.

Our results on postoperative trismus are in agreement with many of these results reported in the literature. Thus, it was found that there was no advantage in choosing either of these flap techniques over the other to reduce the severity of trismus.

However, the findings of other authors differ from ours with respect to the effect of flap design on limited mouth opening (trismus).<sup>17,18</sup> Shevel et al<sup>18</sup> found that when a small incision with minimal reflection of the mucoperiosteum was made, postoperative maximum mouth opening were significantly more than when a larger incision with a standard flap was used. Clauser and Barone<sup>19</sup> also compared a conservative technique without incision with a standard technique plus incision for partially erupted third molars and showed that a nonsurgical approach reduced postoperative morbidity. The study conducted by Nageshwar<sup>20</sup> also showed that maximum mouth opening was significantly more in patients who underwent small comma flap incision than those who had undergone standard envelope flap incision.

Sowray<sup>21</sup> wrote about the relationship between the type of incision and cheek swelling resulting in post operative trismus. McCagie<sup>22</sup> also insisted that when an incision is extended into the sulcus, as in standard triangular flap or modified triangular flap, it will result in more swelling. According to this opinion, an envelope incision will avoid this complication, since its anterior extension being confined to the gingival trough. Therefore, if the patient had a marked swelling of the cheek, then there was a concomitant degree of trismus.

The fact that present study found no significant differences between surgical techniques with respect to trismus may be attributable to the use of triangular mucoperiosteal flaps in both of the study groups.

Although there were no differences regarding clinical outcomes of both flap designs, however, both of the flap designs provided a good view for the operation site.

### CONCLUSION

Results of the present study suggest that there were no significant differences in maximum mouth opening between the study groups. Therefore, the decision to use a marginal flap or a paramarginal flap may be based on surgeon's preference.

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