

## Retained upper third molars during Le Fort I osteotomy with downfracture



Ann. Ital. Chir., 2017 88, 2: 155-159  
pii: S0003469X17026756

Marco Friscia\*, Marzia Petrocelli\*, Carolina Sbordone\*, Raffaele Corvino\*, Fabio Maglito\*,  
Francesco Maria Cassandro\*\*, Giorgio Iaconetta\*\*\*, Luigi Califano\*

\*Maxillo-Facial Surgery Division, Department of Neurosciences, Odontostomatological and Reproductive Sciences, University of Naples Federico II

\*\*Oral Surgery Division, Department of Neurosciences, Odontostomatological and Reproductive Sciences, University of Naples Federico II

\*\*\*Neurosurgery Division, University of Salerno

### Retained upper third molars during Le Fort I osteotomy with downfracture

**AIM:** *The aim of our study is to demonstrate that the presence of upper wisdom teeth must be evaluated before and during Le Fort I osteotomy because attention must be focused to the disadvantages or facilitations of surgery depending on molar presence.*

**MATERIALS OF STUDY:** *Our study has analyzed two groups, each one including 20 patients, 10 males and 10 females, with an age between 16-30 years. The first group was treated with Le Fort I osteotomy leaving in situ the wisdom upper third molars. The second group was treated with Le Fort I osteotomy after the extraction of the wisdom upper third molars.*

**RESULTS:** *Group A: upper third molar avulsion, necessary in 5 cases, was the main reason for prolongation of surgical time. However, in group A, increased bleeding occurred in 3 cases, bone irregularities and bone interferences occurred in 2 cases, neurological injuries occurred in 2 cases, any complications occurred in 8 cases. Group B: the management of the hemorrhage resulting from the vascular injuries, occurred in 7 cases, was the main reason for prolongation of surgical time. However, in group B, bone irregularities and bone interferences occurred in 4 cases, neurological injuries occurred in 3 cases, any complication occurred in 6 cases.*

**DISCUSSION:** *In literature is actually discussed the risks related to the presence of lower third molars during mandibular osteotomies.*

**CONCLUSIONS:** *Our study is designed to be helpful to the beginner surgeons during their first time approach to this kind of surgery.*

**KEY WORDS:** Retained third molar, Le Fort I osteotomy, Wisdom teeth extraction

### Introduction

Le Fort I osteotomy with downfracture is an upper jaw fracture and mobilization of the maxilla. Stoker, Epker and Obwegeser described this technique during 1900<sup>1-7</sup>.

In 1998, Cheung described how the presence of the upper third molar influences the transversal angulation of the cut through the tuberosity during Le Fort I osteotomy. In 2011 Balaji concluded that its presence reduces surgical manipulation and prevents neurovascular injuries<sup>2,3</sup>.

The aim of our study is to show how the presence of retained third molars during Le Fort I osteotomies and the inconveniences or facilitations related to its presence: we compared two groups of patients, all treated with Le Fort I osteotomy for different pathologies (third class malocclusion, second class malocclusion, open bite in first class dental occlusion, palatal transversal contrac-

tion). Our work also wants to be a guide for beginner surgeons who approach this kind of surgery for the first time.

## Materials and Methods

Our study has analyzed two groups, each one including 20 patients, 10 males and 10 females, with an age between 16-30 years.

The first group was treated with Le Fort I osteotomy leaving in situ the wisdom upper third molars. Out of 10 males 3, were affected by third class malocclusion, 2 by second class malocclusion, 2 by open bite in first class dental occlusion, 3 by palatal transversal contraction. Out of 10 females, 4 were affected by third class malocclusion, 3 by second class malocclusion, 2 by open bite in first class dental occlusion, 1 was affected by palatal transversal contraction.

The second group was treated with Le Fort I osteotomy after the extraction of the wisdom upper third molars. The extraction of the upper third molar was performed six months before surgery for each patient. Out of 10 males, 4 were affected by third class malocclusion, 2 were affected by second class malocclusion, 2 were affected by open bite in first class dental occlusion, 2 were affected by palatal transversal contraction. Out of 10 females, 3 were affected by third class malocclusion, 2 were affected by second class malocclusion, 3 were affected by open bite in first class dental occlusion, 2 were affected by palatal transversal contraction.

Serious intraoperative hemorrhage may be resulting from Le Fort I osteotomy caused by involuntary vascular resection of palatine descending arteries <sup>8,9</sup>. The presence of upper third molar may prevent vascular injuries during pterygoid process osteotomy. In our groups, vascular injuries with increased bleeding occurred in 3 cases (1M, 2F) in group A and in 7 cases (3M, 4F) in group B. Intraoperative neurological injuries (pterygoid process) may result from Le Fort I osteotomy through the trans-

mission of indirect stress and strains like traction, compression and rebound. It may also result from direct trauma, for instance traumatic pterygomaxillary separation, difficult down fracture <sup>9,10</sup>. The presence of wisdom upper third molars may protect from these problems because allows the Obwegeser osteotome to sit in the right position preventing nerve cutting. In our study, neurological injuries occurred in 2 cases (2F) in group A and in 3 cases (2M, 1F) in group B.

During Le Fort I osteotomy, comminuted fractures and displaced bone spiculae may occur <sup>10</sup>. The presence of wisdom upper third molars may protect from these issues because contributes to the correct positioning of Obwegeser osteotome and allows a finer osteotomy. In this way, we reduced the surgery time. In our study, bone irregularities occurred in 2 cases (1M, 1F) in group A, in 4 cases (3M, 1F) in group B.

Sometimes the presence of upper wisdom teeth may lead to increased surgical time because, if it is deeply impacted, it could be involved in the bone cut and its damage would its extraction necessary during the surgery time. Moreover, during maxilla-mandible surgery, posterior impaction of maxilla may be necessary but the presence of retained upper third molar could be an obstacle. In such case, the wisdom molar avulsion can be made necessary. In our study, upper third molar avulsion was necessary in 5 cases (3F, 2M) in group A.

The preparation of Le Fort I osteotomy followed by downfracture needs to find the pterygomaxillary suture; the presence of wisdom upper third molars may distort the direction of Obwegeser osteotome and lead to increased surgery time.



Fig. 1: Group A patient preoperative Rx opt showed a patient affected by third class malocclusion, male, with retained upper third molars.



Fig. 2: Group A patient intraoperative view showed a surgical image of a patient affected by third class malocclusion, male, with retained upper third molars treated with bimaxillary repositioning. It was performed Le Fort I osteotomy and downfracture on the upper jaw. It's one of 8 cases without surgical inconveniences and without consequent prolongation of surgery time.



Fig. 3: Group B patient preoperative Rx opt showed a patient affected by second class malocclusion, female, without retained upper third molars.

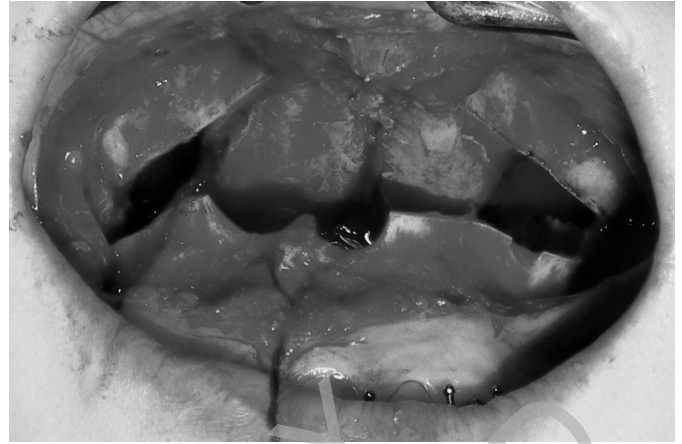


Fig. 4: Group B patient intraoperative view showed a surgical image of a patient affected by second class malocclusion, female, without retained upper third molars treated with bimaxillary repositioning. It was performed Le Fort I osteotomy and downfracture on the upper jaw. It's one of 7 cases with intraoperative haemorrhage caused by involuntary vascular resection of palatine descending arteries and consequent lengthening of surgical time.

Compared to average intraoperative time for Le Fort I (1 h), the surgery time was longer in 10 cases in group A and in 11 cases in group B.

However, both of the groups experienced lengthening of surgery time due to different reasons: avulsion of wisdom third upper molar was the main reason for the time increase in the Group A, followed by vascular injuries and bone irregularities while, in Group B, the management of the hemorrhage resulting from the vascular injuries was the main reason for the increased surgery time, followed by bone irregularities.

## Results

In our study we compare two groups of patients, one with retained third upper molar, one without retained third upper molar, all treated with Le Fort I osteotomy for different pathologies (third class malocclusion, second class malocclusion, open bite in first class dental occlusion patients, palatal transversal contraction) and, during surgery time, we analyze advantages and disadvantages due to the presence or absence of wisdom upper third molars.

Compared to average intraoperative time for Le Fort I (1 h), the lengthening of surgery time occurred in 10 cases in group A and in 11 cases in group B.

Specifically, lengthening of surgical time in each group was due to different reasons.

Group A: upper third molar avulsion, necessary in 5 cases, was the main reason for prolongation of surgical time. However, in group A, increased bleeding occurred in 3 cases, bone irregularities and bone interferences occurred in 2 cases, neurological injuries occurred in 2 cases, any complications occurred in 8 cases.

Group B: the management of the hemorrhage resulting from the vascular injuries, occurred in 7 cases, was the main reason for prolongation of surgical time. However, in group B, bone irregularities and bone interferences

occurred in 4 cases, neurological injuries occurred in 3 cases, any complication occurred in 6 cases.

It is evident from our comparison (Group A vs Group B) that we do not have significant differences in complications incidence and in surgical time lengthening. However our study can be important for the beginner surgeon as it emphasizes the importance of preoperative or intraoperative evaluation of the wisdom upper molar presence and the possible related complications during Le Fort I osteotomy.

## Discussion and Comments

In literature is actually discussed the risks related to the presence of lower third molars during mandibular osteotomies. There is still controversy about whether the presence of a retained or impacted third molar in the lower jaw increases the risk of a bad split or not and the decision to remove the molars before or during orthognathic surgery may be considered case by case<sup>8-13</sup>

We can find different information about the difficulties in Le Fort I osteotomy in cases of atypical morphology of the maxilla with the presence of abnormally vertical excessive or medio-lateral and anteriorposterior thick walls of the maxilla, maxillary sinus hypoplasia or aplasia, tough pterygoid process and densely sclerotic maxillary tuberosities, patients with cleft-craniofacial anomalies or patients with prior trauma or corrective surgeries. All these conditions may cause difficult downfracture and pterygomaxillary separation and may increase the risk for vascular, neurological injuries<sup>9,14</sup>.

TABLE I - *Analysis of our experience*

	Vascular injuries (no. of cases)	Avulsion of the third upper molar (no. of cases)	Bone Irregularities and bone interferences (no. of cases)	Neurological injuries (no. of cases)	Consequent Lengthening of surgical time (no. of cases)	Any complication
Group A	3	5	2	2	10	8
Group B	7	0	4	3	11	6

*Legend*

The table shows our sample survey: vascular injuries with increased bleeding occurred in 3 cases (1M, 2F) in group A, and in 7 cases (3M, 4F) in group B. Neurological injuries occurred in 2 cases (2F) in group A and in 3 cases (2M, 1F) in group B. Bone irregularities occurred in 2 cases (1M, 1F) in group A, and in 4 cases (3M, 1F) in group B. Upper third molar avulsion was necessary in 5 cases (3F, 2M) in group A. Prolongation of surgery time occurred in 10 cases in group A (mainly due to intraoperative avulsion of third molar) and in 11 cases in group B (mainly due to the management of hemorrhage). Any complications were acknowledged in 8 cases (6M, 2F) in group A, in 6 cases (2M;4F) in group B.

Cheung described how the presence of upper third molar influences the transversal angulation of the cut through the tuberosity during Le Fort I osteotomy. Balaji reported that its presence is a favorable factor to reduce surgical manipulation of the neurovascular complex of this area <sup>2,3</sup>.

Le Fort I osteotomy of the maxilla is the surgical approach to correct mid-dentofacial deformity. The procedure is generally easy, with a low incidence of complications and the average surgery time is approximately one hour. The procedure consists of a fracture of the upper jaw and its mobilization (downfracture) <sup>15</sup>. We follow Stoker and Epker's and then Obwegeser's technique and, after infiltration with local anesthesia, we perform a circumvestibular mucosa incision with scalpel or electrode hand, then we dissect up the maxilla to zygomatic process the pterygoid recess and the nasal floor <sup>17-21</sup>. Then we performed Le Fort I osteotomy line on the anterior and posterolateral wall of the maxilla using a saw blade; nasal walls and nasal septum are fractured, pterygoid osteotomy is obtained with Obwegeser osteotome <sup>22</sup>. So we obtain free maxillary mobilization with a complete separation of pterygoid process, finally we level bone irregularities and bone interferences with palatine descending arteries using punch forceps and bone tampers <sup>1-7</sup>.

During Le Fort I osteotomy, some complications may occur: the most important and the most dangerous are vascular injuries caused by vascular resection of palatine descending arteries; neurological injuries caused by pterygoid process resection without preservation of nerve or by the transmission of indirect stressed and strains like traction compression and contrecoup; bone interferences caused by comminuted fractures and displaced bone spiculae <sup>9,15,23</sup>.

**Conclusion**

The aim of our study is to demonstrate that the presence of upper wisdom teeth must be evaluated before and during Le Fort I osteotomy because attention must be focused to the disadvantages or facilitations of surgery depending on molar presence. Our study is designed to be helpful to the beginner surgeons during their first time approach to this kind of surgery.

**Riassunto**

L'avulsione del terzo molare superiore nei pazienti sottoposti a chirurgia mascellare nell'ambito della chirurgia ortognatica deve essere valutata di volta in volta in base allo specifico caso clinico dal momento che può comportare vantaggi e svantaggi. Nel nostro studio abbiamo preso in considerazione due gruppi entrambi composti da 20 pazienti, 10 maschi e 10 femmine di età compresa tra i 16 e i 30 anni, sottoposti ad osteotomia di Le Fort tipo I. Nel primo gruppo il terzo molare superiore è stato lasciato in situ, nel secondo gruppo si è proceduto ad avulsione dello stesso. I parametri che abbiamo valutato sono stati: tempo chirurgico, danno vascolare, danno alle strutture nervose, irregolarità ossee residue. La comparazione dei risultati, alla luce dei parametri sopracitati non ha portato a differenze significative, ecco perché la conclusione del nostro lavoro è stata quella di valutare di volta in volta, in base al planning chirurgico, l'eventuale o meno avulsione preoperatoria del terzo molare superiore.

## References

1. Obwegeser H: *Surgical correction of small retrodisplaced maxillae*. Plast Rec Surg, 1969; 44:351-65.
2. Balaji SM: *Influence of third molars in Le fort I osteotomies*. Ann Maxillo-Fac Surg, 2011; 1:136-44.
3. Cheung LK, Fung SC, Li T, Samman N: *Posterior maxillary anatomy: Implications for Le Fort I osteotomy*. Int J Oral Max Fac Surg, 1998; 27:346-51.
4. Wilmar K: *On Le Fort I osteotomy*. Scand Plast Rec Surg supp 112, 1974.
5. Bell WH: *Le Fort I osteotomy for correction of maxillary deformities*. J Oral Surgery, 33:412-426, 1975.
6. Epker BN Wolford LM: *Middle third facial osteotomies their use in the correction of acquired and developmental deformities and craniofacial deformities*. J. Oral Surg, 1975; 33:491-514.
7. Proffit WR, White RP, Sarver DM: *Trattamento delle deformità dentofacciali*. Ed. Elsevier, 2004; 250-60.
8. Bell WH, You ZH, Finn RA: *Wound healing after multisegmental Le Fort I osteotomy and transection of the descending palatine vessels*. J Oral Maxillofac Surg, 1995; 53:1425e33.
9. Hoffman GR, Islam S: *The difficult Le Fort I osteotomy and downfracture: A review with consideration given to an atypical maxillary morphology*. Department of Oral and Maxillofacial Surgery, John Hunter Hospital, Newcastle, New South Wales, Australia Journal of Plastic, Reconstructive & Aesthetic Surgery, 2008; 61, 1029e1033.
10. Cheung LK, Fung SC, Li T: *Posterior maxillary anatomy: implications for Le Fort I osteotomy*. Int J Oral Maxillofac Surg, 1998; 27:346e51.
11. Kriwalsky MS, Maurer P, Veras RB, Eckert AW, Schubert J: *Risk factors for a bad split during sagittal split osteotomy*. Department of Oral and Plastic Maxillofacial Surgery, Martin-Luther-University Halle-Wittenberg, Head: Prof. Dr. Dr. Johannes Schubert. British Journal of Oral and Maxillofacial Surgery 46, 2008; 177-79.
12. Albert J, Haddad H, Reena M Talwar, Cameron ML Clokie: *The importance of recognizing pathology associated with retained third molars*. www.cda-adc.ca/jcda. 2006, Vol. 72, No. 1.
13. Parker DW, Proffit WR, White RP, Turvey TA: *Retained third molars with orthodontics and orthognathic surgery*. American Association of Oral and Maxillofacial Surgeons J Oral Maxillofac Surg, 2008; 66:1864-868.
14. Beukes J, Reyneke JP, Becker PJ: *Variations in the anatomical dimensions of the mandibular ramus and the presence of third molars: Its effect on the sagittal split ramus osteotomy*. Int J Oral Maxillofac Surg, 2013; 42:303-307 2012.
15. Lanigan DT, Hey JH, West RA: *Major vascular complications of orthognathic surgery: Hemorrhage associated with Le Fort I osteotomies*. J Oral Maxillofac Surg, 1990; 48:561e73.
16. Turvey TA, Fonseca RJ: *The anatomy of the internal maxillary artery in the pterygopalatine fossa: Its relationship to maxillary surgery*. J Oral Surg, 1980; 38:92e5.
17. Johnson LM, Arnett GW: *Pyramidal osseous release around the descending palatine artery: A surgical technique*. J Oral Maxillofac Surg, 1991; 49:1356e7.
18. O'Regan B, Bharadwaj G: *The identification and protection of the descending palatine artery in Le Fort I osteotomy: A forgotten technique?* Br J Oral Maxillofac Surg, 2007; 45:412e4.
19. O'Regan B, Bharadwaj G: *Prospective study of the incidence of serious posterior maxillary haemorrhage during a tuberosity osteotomy in low level Le Fort I operations*. Br J Oral Maxillofac Surg, 2007; 45:538e42.
20. Robinson PP, Hendy CW: *Pterygoid plate fractures caused by the Le Fort I osteotomy*. Br J Oral Maxillofac Surg, 1986; 24:198e202.
21. Lanigan DT, Romanchuk K, Olson CK: *Ophthalmic complications associated with orthognathic surgery*. J Oral Maxillofac Surg, 1993; 51:480e94.
22. Lanigan DT, Guest P: *Alternative approaches to pterygomaxillary separation*. Int J Oral Maxillofac Surg, 1993; 22:131e8.
23. Moloney F, Worthington P: *The origin of the Le Fort I maxillary osteotomy: Cheever's operation*. J Oral Surg, 1981; 39:731e4.