

Combination of Rigid and Non-Rigid Fixation in Maxillary Orthognathic Surgery: Case Report

Dr. Rahul VC Tiwari^{1*}, Dr. Philip Mathew², Dr. Arun Ramaiah³, Dr. Yasmin Jose⁴, Dr. Raja Satish Prathigudupu⁵, Dr. Bhaskar Roy⁶

¹FOGS, MDS, OMFS & Dentistry, JMMCH & RI, Thrissur, Kerala, India

²HOD, OMFS& Dentistry, JMMCH & RI, Thrissur, Kerala, India

³Senior Fellow, Cleft & Craniofacial Centre, St. Thomas Hospital, Malakkara, Pathanamthitta Chengannur, Kerala, India

⁴Clinical Observer, OMFS, Jubilee Mission Medical College Hospital, Thrissur, Kerala, India

⁵Senior Registrar, Ministry of Health, Amiri Dental Casualty, Kuwait

⁶PG Student, OMFS, KVG Dental College and Hospital, Sullia, DK, Karnataka, India

*Corresponding author

Dr. Rahul VC Tiwari

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Abstract: Every reduction requires fixation. The osteotomized segments are fixed with various techniques as described in the literature. Fixation is broadly classified into rigid and non-rigid. Non-rigid fixation is the old and gold technique which is still used by various surgeons. Rigid fixation has gained lot of attraction in the recent decades. All the budding surgeons prefer rigid fixation. Either of the one will be preferred choice of treatment, but we present here a case in which both non-rigid and rigid fixation techniques are used in the Le Fort I maxillary advancement orthognathic surgery and has provided excellent stability. **Keywords:** Rigid fixation, Non-rigid fixation, Orthognathic surgery, Maxillary advancement, Stability.

INTRODUCTION

Maxillary orthognathic surgery especially Le Fort I orthognathic surgery is the most frequently used method to correct the retrognathic and prognathic maxilla [1-3]. Stability is the major issue which is considered post-operatively for proper function and occlusion [4]. Relapse is common complication noted [5-7]. Various techniques to achieve and improve stability has been documented. Yet, rigid fixation has taken over non-rigid fixation [8-10] Miniplate fixation is often preferred in maxillary advancement surgeries [11].

But, in superior repositioning some surgeons prefer non-rigid fixation too [12-14]. Numerous studies have investigated the horizontal and vertical stability after Le Fort I osteotomy [1-10] Surgeons have also use various natural and synthetic grafts during fixation [11-16]. Still the debate achievement of stability by rigid and non-rigid fixation is on go. We have used the combination technique and have achieved excellent stability. This case report briefs the same technique of fixation.

CASE REPORT

A 25-year-old male patient reported to us with a chief complaint of gummy smile. He also added that he is unable to close the lip during the normal time and also teeth show at rest. He was having a vertical maxillary excess with recessive chin, maxillary and mandibular dentoalveolar protrusion of anterior teeth and incompetent lips. (Figure 1) Cephalometric analysis revealed increased SNA and SNB angle, increased middle facial height, increased inclination of maxillary

and mandibular teeth and decreased interincisal angle. (Figure 2) Clinicoradiographically the diagnosis was confirmed as vertical maxillary excess. Treatment was planned for pre-operative orthodontics followed by orthognathic surgery and end with post-operative orthodontia. Pre-operative alignment of both the arches was done NiTi and stainless-steel wires. (Figure 3, 4, 5) Overjet and overbite of 6 mm was present. (Figure 6) Le Fort I superior impaction, anterior maxillary osteotomy and mandibular sub apical osteotomy under general anesthesia was performed. Wiring (non-rigid fixation) was done on the zygomatic buttress and miniplate (rigid) fixation was done on pyriform region bilaterally maintaining the trajectories of forces and fixing the appropriate vertical and horizontal buttresses to achieve better stability. Excepted stability was achieved with this type of combination technique. (Figure 7, 8) Occlusion was achieved with molar relation intraoperatively. (Figure 9, 10) Overjet and overbite was achieved normal (Figure 11).



Fig-1: Patient Clinical Picture



Fig-2: Lateral Cephalogram



Fig-3: Pre-Operative Occlusion Front Side



Fig-4: Pre-Operative Occlusion Right Side



Fig-5: Pre-Operative Occlusion Left Side



Fig-6: Pre-Operative Overjet and Overbite

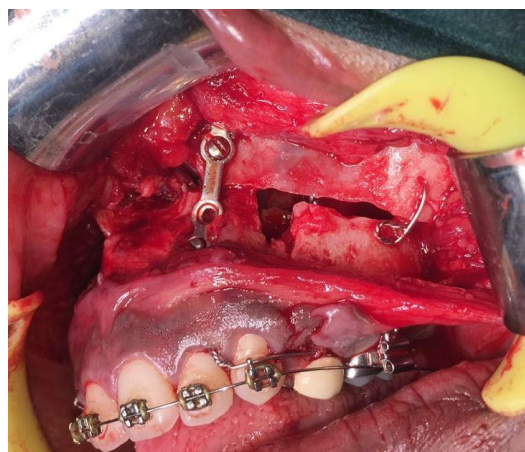


Fig-7: Fixation Left side

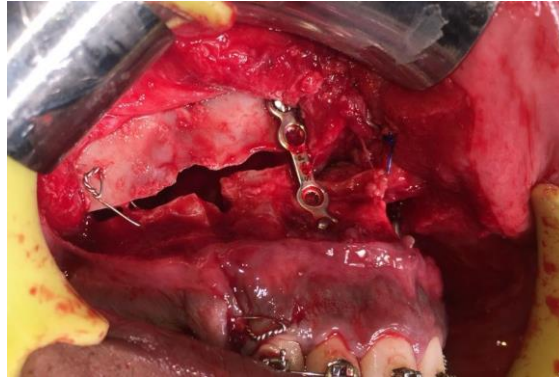


Fig-8: Fixation Right Side



Fig-9: Post-Operative Occlusion Right Side



Fig-10: Post-Operative Occlusion Left Side



Fig-11: Post-Operative corrected overjet and overbite

DISCUSSION

The restoration of normal jaw function, optimal facial aesthetics, and long-term stability are the goals of successful orthognathic surgery [4]. The Le Fort I osteotomy with impaction is a common orthognathic procedure used in the correction of maxillary deformities. Critical analysis of long-term stability of the osteotomies has been lacking in literature [7]. A number of studies on the Le Fort I osteotomy have shown that, in general, the procedure is stable [3-10]. However, situations that has historically proven problematic for intraoperative stabilization and postoperative stability include inferior repositioning, advancement and superior repositioning when bone contact is poor or thin. Conversely, superior repositioning has been reported as a stable movement. A quantitative assessment of the immediate postsurgical changes after a 1-piece Le Fort I osteotomy with impaction with either anterior or posterior repositioning still required investigation. The anterior maxilla moves superiorly more than twice as much as the posterior maxilla. This continued superior movement post-surgically was resorption and remodeling occurring at the surgical site and the “telescoping effect” that sometimes results from superior maxillary repositioning. Another likely cause was periodic tightening of the suspension wires during fixation. Many minor and sometimes major discrepancies in maxillary position were not seen until release of fixation. Rigid fixation caused early variance from the desired position. Researchers have compared patients treated with wire osteosynthesis and rigid internal fixation after Le Fort I advancement. They found no statistical difference in postoperative movement between the 2 groups in the horizontal plane, although comparison of mean values suggested improved stability with rigid fixation. In the vertical plane, there was a statistically significant, although minimal, improvement in stability with rigid internal fixation versus wire osteosynthesis [17]. Louis *et al.* studied postoperative relapse versus the amount of maxillary advancement in a group of sleep apnea patients who underwent bimaxillary surgery. They noted slightly increasing relapse with increasing amounts of maxillary advancement. However, these differences were not statistically significant [18] Many investigations have been fraught with problems of study design and heterogeneity of the sample. Critical, quantitative evaluation of the stability of this technique remains limited. In this dilemma of rigid and non-rigid fixation we have used both in conjunction by using rigid fixation in pyriform and non-rigid in posterior buttress region and have achieved a remarkable stability.

CONCLUSION

Rigid fixation methods offer advantages over wire osteosynthesis methods that require MMF. The increased convenience and decreased anxiety with not having MMF may be a more important consideration in choosing rigid fixation than is potential enhancement in

stability. Further data must be collected and analyzed to provide a statistically significant statement as to which method of fixation is superior on the basis of postoperative stability. Improved ability to accurately predict the relapse of Le Fort I osteotomies will enable surgeons and orthodontists to better plan their procedures and, if necessary, to include the appropriate amount of overcorrection into the treatment plan.

REFERENCES

1. Araujo A, Schendel SA, Wolford LM, Epker BN. Total maxillary advancement with and without bone grafting. *Journal of oral surgery (American Dental Association: 1965)*. 1978 Nov;36(11):849-58.
2. Bell WH, McBride KL. Correction of the long face syndrome by Le Fort I osteotomy: A report on some new technical modifications and treatment results. *Oral Surgery, Oral Medicine, Oral Pathology and Oral Radiology*. 1977 Oct 1;44(4):493-520.
3. Bishara SE, Ortho D, Chu GW, Jakobsen JR. Stability of the LeFort I one-piece maxillary osteotomy. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1988 Sep 1;94(3):184-200.
4. Eskenazi LB, Schendel SA. An analysis of Le Fort I maxillary advancement in cleft lip and palate patients. *plastic and reconstructive surgery*. 1992 Nov 1;90:779-.
5. Harsha BC, Terry BC. Stabilization of Le Fort I osteotomies utilizing small bone plates. *The international journal of adult orthodontics and Orthognathic surgery*. 1986;1(1):69.
6. Hartog BJ. *An evaluation of stability and soft tissue changes after superior repositioning of the maxilla* (Doctoral dissertation, University of Iowa).
7. Houston WJ, Jones E, James DR. A method of recording change in maxillary position following orthognathic surgery. *The European Journal of Orthodontics*. 1987 Jan 1;9(1):9-14.
8. Luyk NH, Ward-Booth RP. The stability of Le Fort I advancement osteotomies using bone plates without bone grafts. *Journal of maxillofacial surgery*. 1985 Jan 1;13:250-3.
9. Proffit WR, Phillips C, Turvey TA. Stability following superior repositioning of the maxilla by LeFort I osteotomy. *American Journal of Orthodontics and Dentofacial Orthopedics*. 1987 Aug 1;92(2):151-61.
10. Viteporn S, Melsen B, Terp S, Bundgaard M. Postsurgical change of mandibular position in patients following Le Fort I osteotomy. *The International journal of adult orthodontics and orthognathic surgery*. 1990;5(2):91-8.
11. Willmar K. On Le Fort I osteotomy; A follow-up study of 106 operated patients with maxillo-facial deformity. *Scandinavian journal of plastic and reconstructive surgery*. 1974;12:suppl-12.

12. Burton DJ, Berarducci JP, Scheffer RB. Proplast grafting: A new method for stabilization of maxillary advancements. *Oral Surgery, Oral Medicine, Oral Pathology.* 1980 Nov 1;50(5):387-9.
13. Kent JN, Zide MF, Kay JF, Jarcho M. Hydroxylapatite blocks and particles as bone graft substitutes in orthognathic and reconstructive surgery. *Journal of Oral and Maxillofacial Surgery.* 1986 Aug 1;44(8):597-605.
14. Schendel SA, Eisenfeld J, Bell WH, Epker BN, Mishelevich DJ. The long face syndrome: vertical maxillary excess. *American journal of orthodontics.* 1976 Oct 1;70(4):398-408.
15. Van Sickels JE, Jeter TD, Aragon SB. Rigid fixation of maxillary osteotomies: a preliminary report and technique article. *Oral surgery, oral medicine, oral pathology.* 1985 Sep 1;60(3):262-5.
16. Proffit WR, Phillips C, Prewitt JW, Turvey TA. Stability after surgical-orthodontic correction of skeletal Class III malocclusion. 2. Maxillary advancement. *The International journal of adult orthodontics and orthognathic surgery.* 1991;6(2):71-80.
17. Egbert M, Hepworth B, Myall R, West R. Stability of Le Fort I osteotomy with maxillary advancement: a comparison of combined wire fixation and rigid fixation. *Journal of oral and maxillofacial surgery.* 1995 Mar 1;53(3):243-8.
18. Louis PJ, Waite PD, Austin RB. Long-term skeletal stability after rigid fixation of Le Fort I osteotomies with advancements. *International journal of oral and maxillofacial surgery.* 1993 Apr 1;22(2):82-6.