

Complications Of Le Fort I Osteotomy - A Review

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Abstract:

Surgery is a valuable option for those deformities of head and neck that can't be corrected and managed. For an estimated outcome Oral and maxillofacial surgeries are opted. Among one is Lefort Osteotomy which is widely used in case of Orthognathic Surgery. Although it is the opted conventional surgical type, it still has some complications.

For management of the complications, the Knowledge about various types of complications & worsening effects of Lefort I osteotomy to be clear.

Keywords: Osteotomy, Surgery, Orthognathic, Complications.

Introduction:

The LeFort I osteotomy is one of the usual surgical procedures used to correct the Oral and Maxillofacial deformities. This osteotomy provides three dimensional correction inclusive of advancement, retrusion, elongation, and shortening. This procedure is often used hand in hand with mandibular surgery for correction of malocclusion specifically for class II and III, Obstructive sleep apnea, Atrophy of maxilla, Asymmetry of face etc.,

Rene LeFort named the term LeFort I osteotomy in 1901 after the fracture pattern extends from the nasal septum, along the tooth apices, and through the pterygomaxillary junction. The first description of a LeFort I surgery was done by Cheever in the year 1864 for Nasopharyngeal Tumor Resection (Cheever, 1870)

Our team has extensive knowledge and research experience that has translate into high quality publications(Kumar, 2018; Janani and Kumar, 2019; Vijayakumar Jain *et al.*, 2019; Albert and Sekhar, 2020; Kalaivani *et al.*, 2020; Subhashini, Abdul Wahab and Santhosh Kumar, 2020; Fauzi and Saravana Dinesh, 2021; Jayaindraeswaran, Senthil Nathan and Arun, 2021; Karthik *et al.*, 2021; Sandhya and Others, 2022)

Lefort I Osteotomy is widely used due to its best post surgical outcomes in Orthodontics and Trauma Care. In spite of that, Complications of the surgery is of great importance. Thus in this Article, The Complications

of Lefort I Osteotomy are discussed briefly.

Complications of Lefort I Osteotomy

The LeFort I osteotomy complications have been reported as follows,

Anatomical

- Malposition of Maxilla
- Non - Union of Osteotomy Gap
- Nasal Septum deviation
- Nasolacrimal duct obstruction
- Haemolacria from nasolacrimal duct perforation

Septic

- Abscess
- Sinusitis Maxillaris
- Brain abscess

Ischemic

- Necrosis of the Maxilla
- Retraction of the Gingiva

Vascular

- Severe Hemorrhage
- Delayed formation of arteriovenous fistula
- Epistaxis
- Pseudoaneurysm

Neurologic

- Unilateral third nerve palsy
- Total unilateral Blindness
- Oculomotor nerve palsy
- Tapia Syndrome
- Adie's Syndrome

Otologic

- Middle ear Tympanometric changes
- Eustachian tube dysfunction and Tinnitus (Buchanan and Hyman, 2013)

A Study by Kramer et al conducted on 1000 patients between 1983 and 2002, In this they have found that complications occurred in 6.4% of patients (Kramer *et al.*, 2004). Anatomical complications affected 26 (2.6%) patients, including 16 (1.6%) with a deviation of the nasal septum and 10 (1.0%) with non-union of the osteotomy gap. Patients with major anatomical irregularities, like cleft lip and palate, were more likely to experience complications. These patients, representing 11.5% of the population, experienced nearly half the complications. Furthermore, patients with segmental LeFort 1 osteotomies or anterior movements greater than 9 mm were at a higher risk for complications. Careful preoperative planning and appropriate preoperative consultation should be followed in these specific situations. Efforts to minimize

maxillary movement (e.g., with two-jaw surgery) are recommended to reduce complications (Kramer *et al.*, 2004).

And also in a study conducted by Sandeep Garg and Supreet Kaur to evaluate the rate of post operative complications following conventional Le Fort I osteotomy, Twenty-five healthy adult patients who had to undergo Le Fort I osteotomy without segmentalization of maxilla were included in the study. All the patients were followed up for a period of 6 months to assess the rate of various post-operative complications such as neurosensory deficit, maxillary sinusitis, vascular complications, aseptic necrosis, pulpal sensibility, unfavourable fractures, ophthalmic complications and instability or non-union of maxilla, etc.

Results of this study showed that buccal mucosa responded to pin prick, fine touch as well as to two point discrimination test in 96 % of the patients at the end of 6 months except for 1 patient who did not respond to any of the three testing modalities (Garg

and Kaur, 2014). Which is relatable to a study by Shehab Al- Din et al. with 20 patients showed fine touch sensation was present in 19 patients at 6 months while 85 % of patients regained some pin prick sensation at 6 months in the buccal mucosa (Al-Din, Coghlan and Magennis, 1996).

And regarding Tooth Sensibility, Kahanberg and Engstrom evaluated the post-operative effects of Le fort I osteotomy in which they concluded that tooth sensibility is lost in over 90 % of teeth immediate post-operatively but gradually returns by 18 months in almost all teeth. At 6 months postoperatively 70–90 % of teeth studied showed a vital response (Kahnberg and Engström, 1987)

Friehofer reported a rate less than 1 % (Freihofer, 1984) while Kramer et al. (Kramer *et al.*, 2004), in a prospective study of 1,000 patients, described extensive bleeding requiring blood transfusion in 11 (1.1 %) patients.

Bendor-Samuel et al. (Bendor-Samuel, Chen and Chen, 1995) reported a left Oculomotor palsy following a Le Fort I osteotomy occurring as a result of a fracture of the base of skull, leading to a cavernous sinus injury with probable thrombosis and carotid-cavernous fistula. Newlands et al. reported a rare case of an ipsilateral sixth nerve palsy and partial third nerve palsy following a Le Fort I osteotomy and proposed fracture at superior orbital fissure as injury mechanism (Newlands, Dixon and Altman, 2004)

Conclusion:

The LeFort I osteotomy of the maxilla is among the Unique Core procedures in orthognathic surgery for the management of facio-skeletal deformities. Traditionally, the surgery has been known for its low technical difficulty and dependable results. The LeFort

I can also be used to treat obstructive sleep apnea and maxillary atrophy. The complications are also a part and parcel of any kind of a surgical procedure, likewise in Lefort- I Osteotomy procedure some possible complications are discussed. An Importance should be given on proper presurgical orthodontics and solid presurgical planning to ensure predictable and stable results. The risk of complications is considerably less for healthy individuals. In overall, the planning for surgery should be made with considerable management such as post operative care for best results.

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Conflict of interest:

All the authors declare that there was no conflict of interest in the present study.

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References:

- Al-Din, O.F., Coghlan, K.M. and Magennis, P. (1996) 'Sensory nerve disturbance following Le Fort I osteotomy', *International journal of oral and maxillofacial surgery*, 25(1), pp. 13–19.
- Bendor-Samuel, R., Chen, Y.R. and Chen, P.K. (1995) 'Unusual complications of the Le Fort I osteotomy', *Plastic and reconstructive surgery*, 96(6), pp. 1289–96; discussion 1297.
- Buchanan, E.P. and Hyman, C.H. (2013) 'LeFort I Osteotomy', *Seminars in plastic surgery*, 27(3), pp. 149–154.
- Cheever, D.W. (1870) 'Displacement of the upper jaw: Medical and surgical reports of the Boston City Hospital'.
- Freihofer, H.P. (1984) 'Latitude and limitation of midface movements', *The British journal of oral & maxillofacial surgery*, 22(6), pp. 393–413.
- Garg, S. and Kaur, S. (2014) 'Evaluation of post-operative complication rate of Le Fort I osteotomy: A retrospective and prospective study', *Journal of maxillofacial and oral surgery*, 13(2), pp. 120–127.
- Kahnberg, K.E. and Engström, H. (1987) 'Recovery of maxillary sinus and tooth sensibility after Le Fort I osteotomy', *The British journal of oral & maxillofacial surgery*, 25(1), pp. 68–73.
- Kramer, F.-J. et al. (2004) 'Intra- and Perioperative Complications of the LeFort I Osteotomy: A Prospective Evaluation of 1000 Patients', *Journal of Craniofacial Surgery*, pp. 971–977. doi:10.1097/00001665-200411000-00016.
- Newlands, C., Dixon, A. and Altman, K. (2004) 'Ocular palsy following Le Fort I osteotomy: a case report', *International journal of oral and maxillofacial surgery*, 33(1), pp. 101–104.
- Nair, Anoop, et al. "Prospective Observational in Vivo Study on Zirconia and Titanium Dental Implants in an Indian Context." *International Journal of Dental Research & Development (IJDRD)* 7 (2017): 9-16.
- Lone, PARVEEN AKHTER, T. A. S. L. E. E. M. Kouser, and A. S. I. F. Iqbal. "Unusual bear maul injuries." *J Dent Res Development* 5.01 (2015): 11-22.
- SIVARANJANI, SS, et al. "Single Immediate Denture for a Diabetic Patient-A Case Report." *International Journal of Dental Research & Development (IJDRD)* 6.6 (2016) 17 22 (2016).
- Jain, S. O. U. R. A. B. H., N. Raghunath, and NITIN V. Muralidhar. "A comparison of W angle, Pi Angle and YEN angle as an indicator for assessing anteroposterior Skeletal dysplasia in various malocclusion among regional population: a cephalometric study." *IJDRD* 8.3 (2018): 29- 40.
- Aura-Tormos, Juan Ignacio, et al. "Current trends in orthodontic journals listed in Journal Citation Reports. A bibliometric study." *American Journal of Orthodontics and Dentofacial Orthopedics* 156.5 (2019): 663-674.
- Kabulov, B. O. L. A. T., et al. "Effect of mechanical processing of minced meat on the change of yield stress." *International Journal of Mechanical and Production Engineering Research and Development* 9.5 (2019): 333-42.
- Albert, D. and Sekhar, M.R.M. (2020) 'Awareness About the Specialty of Oral and Maxillofacial Surgery among the Medical Fraternity in South India: A KAP Survey', *Int J Dentistry Oral Sci*, 7(11), pp. 926–930.
- Fauzi, N. and Saravana Dinesh, S.P. (2021) 'Analysis of Skeletal Malocclusion Patients Opting Only for Orthognathic Surgery Without Orthodontic Treatment', *Int J Dentistry Oral* [Preprint]. Available at: https://www.academia.edu/download/73120746/IJDOS_2377_8075_08_6069.pdf.
- Janani, K. and Kumar, M.P. (2019) 'EFFECTIVENESS OF CHLORHEXIDINE AND WARM SALINE MOUTHRINSES AGAINST BACTERIAL COLONIZATION ON SILK SUTURE MATERIAL IN THIRD MOLAR SURGERY-A CLINICO-MICROBIOLOGICAL STUDY', *International Journal of Clinical Dentistry*, 12(2). Available at: <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=19395833&AN=136102760&h=4wtDrQr5hPLKTx1p1ThQGGjWVfqBSJBokO6WH%2FQzOQv47j316aqg0dmtjgarnZJCi8orc%2FrFrwUmayQT0BbiVQ%3D%3D&crl=c>.

20. Jayaindraeswaran, J., Senthil Nathan, P. and Arun, M. (2021) 'Comparison Of Microbial Accumulation In Silk And Antibacterial Suture Following Third Molar Surgery', *Int J Dentistry Oral Sci*, 8(7), pp. 3442–3445.
21. Kalaivani, N. et al. (2020) 'Requirement of Osteoplasty in Dental Implant Surgery-A Retrospective Analysis', *Journal of long-term effects of medical implants*, 30(2), pp. 141–145.
22. Karthik, E.V.G. et al. (2021) 'Periodontal Pinhole Surgery For Gingival Recession: A Case Report', *Int J Dentistry Oral Sci*, 8(7), pp. 2950–2954.
23. Kumar, M.P. (2018) 'KNOWLEDGE REGARDING BIOLOGY AND TREATMENT OF EXTRACTION SOCKETS AMONG UNDERGRADUATE DENTAL STUDENTS', *International Journal of Clinical Dentistry [Preprint]*. Available at: <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=19395833&AN=134920787&h=WXGra%2BTQvc5Xl4l2zp79LgDJJiq0tsyxGwePD0AwA%2BwX%2Fw4GGXNL3rXjlhz07CzNPCUYmKsYykbH9CY2YtqMbg%3D%3D&crl=c>.
24. Sandhya, R. and Others (2022) 'KNOWLEDGE, ATTITUDE AND PRACTICE ON CRYOTHERAPY IN ENDODONTICS AMONG DENTAL STUDENTS-A QUESTIONNAIRE SURVEY', *International Journal of Early Childhood Special Education*, 14(5). Available at: <https://search.ebscohost.com/login.aspx?direct=true&profile=ehost&scope=site&authtype=crawler&jrnl=13085581&AN=162695107&h=Jung%2FAvGPbYAbr3yqVGfF1TquT1SmxOqanVcEP%2Ba9WgMDkUoO0nFaQMMX29a3AkCpTHJanE3ioOvbiCTkiEnIA%3D%3D&crl=c>.
25. Subhashini, R., Abdul Wahab, P.U. and Santhosh Kumar, M.P. (2020) 'Incidence of miniplate removal following its fixation in maxillofacial surgery-a retrospective study', *Int J Dentistry Oral Sci. S*, 5, pp. 144–146.
26. Vijayakumar Jain, S. et al. (2019) 'Evaluation of Three-Dimensional Changes in Pharyngeal Airway Following Isolated Lefort One Osteotomy for the Correction of Vertical Maxillary Excess: A Prospective Study', *Journal of maxillofacial and oral surgery*, 18(1), pp. 139–146.