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Strategic Post Operative Evaluation of Anterior Maxillary Osteotomies performed for Repositioning of Anterior Dento-Osseous Segment: An Original Research Study

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ABSTRACT
Aim: The exclusive aim of this study was to comprehensively evaluate the patients in their post operative phase wherein repositioning of anterior dental-osseous segment was performed by anterior maxillary osteotomy. The study was primarily targeted to assess possible post operative complications as related to anterior maxillary osteotomy procedure in studied patients.**Materials & Methods:** Total thirty young patients were studied in detail. Simple Random Sampling methodology was used to select patients from department. All thirty patients with surgically repositioned anterior dental-osseous segment were selected. Three basic methodologies (for anterior maxillary osteotomy) were used in surgery depending on the requirements and clinical conditions. Standard sterilization and surgical protocols were followed during surgeries. Patients were evaluated for few predetermined post operative complication in two months, four months and six months follow up phases. Data thus received was compiled in table and subjected to basic statistical analysis. **Statistical Analysis and Results:** The primary data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Out of thirty patients, males were 22 and females were 8. Maximum nineteen patients were treated for skeletal anomalies by anterior maxillary osteotomy procedures. P value was highly significant this. Maximum 6 patients were recognized with bleeding as post operative complication. Moreover, p values were significant for Malposition, Oronasal or Oroantral Fistulas, Inter-Dental Spacing Related, Airway Obliteration.95% coefficient interval was noted maximum for Bleeding [1.96] and minimum for Necrosis [1.01]. **Conclusion:** Within the limitations of the study, authors concluded that variouspost operative complications are related with anterior maxillary osteotomy procedure however, they are mostly curable. Post operative complications related to bleeding, maxillary sinusitis and inter-dental spacing were seen in about half of the studied patients.
Key Words: Anterior Maxillary Osteotomy, Bleeding, Nonunion, Malposition, Palatal Tear, Hematoma

I. INTRODUCTION

As we all are aware that Orthognathic Surgery is normally conductedin patients affected by congenital or growth related or traumatic skeleton-dentalanomalies. Such patientsusually look forenhancement in facial aesthetics and related functions.[1]Orthognathicsurgery and treatment of dento-facialand craniofacial anomalies has come along way as it was discovered somewhere near tothe 19th century. Therapeutic rehabilitations of anomalies by surgicalproceduresusually have an involuntary risk of facing complications. Such post surgical complications are ranging from mild to severe and physical to psychological.[2,3]Traditionally, a steadyand accurate repositioning of mandibles preceded the capability to reposition maxilla. Many of the researchers in the literature have shown that

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almost all surgical modules mandatorily end up with some complications and thereforespecializedskill and understanding is compulsory to avoidthem. After having experiences from several orthognathic surgeries, researchers have concluded that comprehensive understanding of the possible complications is deemed necessary.[4,5] It literallyfacilitatesthemultidisciplinary surgical team to rendersuccessful surgery with minimum post operative complications. During the literature search, authors noticed that there are very few studies those have actually discussed intra-operative and post operative complications associatedwith anteriormaxillary osteotomies. In the younger patients, maxillary excess may be either anterior or complete.[6,7]In both the circumstancespatients is suffering from severe gummy smile with excessive over jet and deep overbite. In case of anterior maxillary excess usuallypatient present with labial inclination of the upper six frontal teeth. Such clinical symptoms typically cerate convex facial profile particularly in the upper lip area. In patients with complete maxillary excess,patients typically present with protuberance of lower orbital rim, nose and upper lip. This creates the lower facial appearance very offensive.Commonly, Le fort one osteotomy procedures is conductedto clinicallymanage complete maxillary excess while anterior maxillary segmental osteotomy is performed for anterior maxillary excess patients.[2,4,8]The ultimate aim of this study was to comprehensively evaluate the patients in their post operative phase wherein repositioning of anterior dental-osseous segment was performed by anterior maxillary osteotomy. The study was predominantly focused to assess possible post operative complications as related to anterior maxillary osteotomy procedure in studied patients.

II. MATERIALS & METHODS

This clinical study was planned, designed and executed in the department of Oral and Maxillofacial Surgery of the dental institution in which thirty young patients were studied in detail. Both male and female patients were included in the study. Simple Random Sampling methodology was used to select patients from department. It is the way in which everypatient of the subset has an equal possibility of being chosen.Primary abstract of the study was consulted with statistician to finalize the appropriate sample size. Generally, repositioning of anterior dental-osseous segment is one of the integral procedures in orthognathic surgery. This repositioning is frequently attempted as ‘posterior repositioning’ for different dental and skeletal corrective treatments. Many of the initial researchers had used this technique to manageankylosed maxillary canines and to shut single tooth diastemas. All thirty patients with surgically repositioned anterior dental-osseous segment were selected [with miscellaneous underlying indications like dental/skeletal corrections/cosmetic corrections/diastema closure/treatment of ankylosed maxillary canines, correction of bimaxillary protrusion, anterior open biteetc]. Three basic methodologies (for anterior maxillary osteotomy) were used in surgery depending on the requirements and clinical conditions. These were combinations ofWunderer technique, Wassmund technique, Cupar technique. Authors did not endeavor to demarcate and study the post operative complications as related with these sub-techniques. Optimum blood supply of the mobilizedalveolar segment was ensured during surgery as the success of the overall success of the segmental osteotomy is critically dependent onit. Standard sterilization and surgical protocols were followed during surgeries. The procedure was performed under generalanesthesia with naso-tracheal intubation. Patients were explained in detail about the study and signed consents were obtained. General information of each patient was recorded in preformed format. Standard follow up regime was formulated wherein patients were recalled after two months, four months and six months. Patients were evaluated for few predetermined post operative complication in these follow up phases. Authors have categorized and studied variouscomplicationslike bleeding related/nonunion/ malposition/ perfusion deficiency/ nerve injury/ oro-nasal or oro-antral fistulas/ maxillary sinusitis/ tooth hypersensitivity related/inter-dental spacing related/hematoma/necrosis/airway obliteration/ palatal tear. Authors did not endeavor to review intra-operative complication of the said surgery.Data thus received was compiled in table and subjected to basic statistical analysis. P value less than 0.05 was considered significant ($p< 0.05$).

III. STATISTICAL ANALYSIS ANDRESULTS

In this study, all obviousresults and data were sent for statistical analysis using statistical software Statistical Package for the Social Sciences version 21 (IBM Inc., Armonk, New York, USA). The source data was subjected to suitable statistical tests to obtain p values, mean, standard deviation, chi- square test, standard error and 95% CI. Table 1shows that out of thirty patients, males were 22 and females were 8. Maximum nineteen patients were treated for skeletal anomalies by anterior maxillary osteotomy procedures. P value was highly significant here (0.02). Minimum patients were for (one each) for BimaxillaryProtrusion and AnkylosedMaxillary Canines by anterior maxillary osteotomy procedures. P value was highly significant here (0.01). Table 2 shows basic statistical representation with mean, standard deviation and standard error for post operative complications (anterior maxillary osteotomy). Maximum 6 patients were identified with bleeding as post operative complication.

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Therefore it was the commonest complication among all. Malposition, Perfusion Deficiency, Nerve Injury, Necrosis and Airway Obliteration were minimally identified complications. Standard error was maximum [0.985] for Inter-Dental Spacing and minimum for Airway Obliteration [0.027]. Standard deviation was maximum [0.980] for Bleeding and minimum for Nerve Injury [0.012]. Table 3 demonstrates statistical representation including 95% CI and Pearson chi-square test with level of significance evaluation for post operative complications (anterior maxillary osteotomy). P value was significant for Malposition [0.010], Oronasal or Oroantral Fistulas [0.001], Inter-Dental Spacing Related [0.002], Airway Obliteration [0.010]. 95% coefficient interval was noted maximum for Bleeding [1.96] and minimum for Necrosis [1.01]. Pearson Chi-Square Value was maximum for Inter-Dental Spacing [1.956] and minimum for Oronasal or Oroantral Fistulas [1.008].

Table 1: DISTRIBUTION OF PATIENTS

Key Diagnosis	Male	Female	Total	P value
Skeletal Correction Related	14	5	19 [64 %]	0.02*
Dental Correction Related	4	2	6 [20 %]	0.80
Esthetic Related	2	1	3 [10 %]	0.06
BimaxillaryProtrusion Related	1	-	1 [3 %]	0.12
AnkylosedMaxillary Canines	1	-	1 [3 %]	0.01*
Total	22	8	30 [100 %]	***p<0.05 significant**

Table 2: BASIC STATISTICAL REPRESENTATION WITH MEAN, STANDARD DEVIATION AND STANDARD ERRORFOR POST OPERATIVE COMPLICATIONS (ANTERIOR MAXILLARY OSTEOTOMY)

Complications	n	Mean	Std. Deviation	Std. Error
Bleeding Related	6	2.01	0.980	0.290
Nonunion	1	0.28	0.682	0.636
Malposition	2	1.41	0.029	0.927
Perfusion Deficiency	1	0.03	0.808	0.210
Nerve Injury	1	0.24	0.012	0.609
Oronasal or Oroantral Fistulas	2	1.04	0.054	0.287
Maxillary Sinusitis	4	2.31	0.983	0.121
Tooth Hypersensitivity	3	1.76	0.602	0.349
Inter-Dental Spacing Related	4	2.08	0.032	0.985
Hematoma	2	1.41	0.840	0.740
Necrosis	1	0.33	0.532	0.673
Airway Obliteration	1	2.00	0.129	0.027
Palatal Tear	2	0.21	0.030	0.283

Table 3: STATISTICAL REPRESENTATION INCLUDING95% CI AND PEARSON CHI-SQUARE TEST WITH LEVEL OF SIGNIFICANCE EVALUATIONFOR POST OPERATIVE COMPLICATIONS (ANTERIOR MAXILLARY OSTEOTOMY)

Complications	95% CI	Pearson Chi-Square Value	df	Level of Significance (p value)
Bleeding Related	1.96	1.025	1.0	0.086
Nonunion	1.43	1.183	2.0	0.500
Malposition	1.09	1.376	1.0	0.010* [SIGNIFICANT]
Perfusion Deficiency	1.90	1.093	1.0	0.080
Nerve Injury	1.21	1.029	1.0	0.400
Oronasal or Oroantral Fistulas	1.39	1.008	1.0	0.001* [SIGNIFICANT]
Maxillary Sinusitis	1.47	1.093	1.0	0.086

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Tooth Hypersensitivity	1.28	1.650	2.0	0.100
Inter-Dental Spacing Related	1.19	1.956	1.0	0.002 *[SIGNIFICANT]
Hematoma	1.92	1.039	1.0	0.076
Necrosis	1.01	1.218	2.0	0.800
Airway Obliteration	1.06	1.279	1.0	0.010 *[SIGNIFICANT]
Palatal Tear	1.91	1.035	1.0	0.080

IV. DISCUSSION

There are numerous surgical techniques discussed for esthetically correct facial abnormalities.Different procedures like LeFort I surgery,anterior segmental osteotomy, two-sided sagittalsplit osteotomyare among the most frequently attempted oral surgical procedures.[9,10]Nevertheless, patients withunusually shaped maxilla or mandible require intricatesurgical techniques. These are frequently involving multi disciplinary surgeries so as to ensure esthetic oriented results and comfort. Ideally, all these procedures must end up with no post operative complications or symptoms. However, this is mostly unachievable due to several patients related factors.Therefore, researchers have focused themselves to minimize these complications instead of zeroing it. Suchattempts normally necessitatebrilliant surgical skillsand adequate bone volume.[11,12] Moreover, they does not guarantee complete complication free situation.With the ever increasing surgical expertise and understanding, clinicians have managed to minimize the intra-operative and post-operative complication in the anterior segmental osteotomy procedures.Interestingly, most of the western and Asian practitioners and researchers believe that knowledge of basic surgical principles and a carefultreatment plan can ensure successful ortho-gnathic surgery with minimum complications in post operative follow up phase.[13,14] Overall success of such osteotomy surgeries is dependent on multiple factors including patients factors like type/extent of deformity. Normally, repositioning of anterior dental-osseous segment is one of the integral procedures in orthognathic surgery.[15,16] This repositioning is frequently attempted as 'posterior repositioning' for different dental and skeletal corrective treatments. Commonly, anterior maxillary osteotomy procedures are performed for dental/skeletal corrections/cosmetic corrections/diastema closure/treatment of ankylosed maxillary canines, correction of bimaxillary protrusion, anterior open bite. Since the orthognathic surgeries usually require thorough planning and complex surgical protocols, minute error while execution is expected from surgical team. This acts as basic starting point of development of post operative complications.[17,18]Our paper primarily aimed to evaluate the patients in their post operative phase wherein repositioning of anterior dental-osseous segment was performed by anterior maxillary osteotomy. The study was primarily targeted to assess possible post operative complications as related to anterior maxillary osteotomy procedure in studied patients. There have been many researches in the literature that discuss soft and hard tissue changes after orthognathic surgery but very only some discussed anterior segmental surgery of upper and lower jaws. Segmental maxillary surgery was conducted for many years before total maxillary osteotomy popularized.[7,13,16,19] Anterior maxillary osteotomy offers enhancement of occlusion, but frequently at the expense of facial aesthetics.

V. CONCLUSION

Within the limitations of the study, authors concluded that different post operative complications are associated with anterior maxillary osteotomy procedure however, they are mostly treatable and non grievous. Post operative complications related to bleeding, maxillary sinusitis and inter-dental spacing were seen in approximately half of the studied patients. Complications like perfusion deficiency, nonunion, nerve injury, necrosis and airway obliteration were reported in one-one cases only. Our study outcomesmust be taken as suggestive for assuming prognosis for similar clinical situations. Neverthelessauthorslook forward tohave some other large scale studies that may further establish certain critical and concrete norms in these regards.

REFERENCES

1. Jędrzejewski, M., Smektała, T., Sporniak-Tutak, K. et al. Preoperative, intraoperative, and postoperative complications in orthognathic surgery: a systematic review. Clin Oral Invest2015;19:969–77.
2. Gunaseelan R, Anantanarayanan P, Veerabahu M, Vikraman B, Sripal R. Intraoperative and perioperative complications in anterior maxillary osteotomy: a retrospective evaluation of 103 patients. J Oral Maxillofac Surg. 2009;67(6):1269-73.
3. Rosenquist B. Anterior segmental maxillary osteotomy. A 24-month follow-up. Int J Oral Maxillofac Surg. 1993;22(4):210-3.

ISSN:0975-3583,0976-2833 VOL12,ISSUE05,2021

4. Hua Z, Chen Z, Wang Y. [Anterior segmental maxillary osteotomies (ASMO)]. Zhonghua Kou Qiang Yi XueZaZhi. 1997;32(2):118-20.
5. Girod A, Odin G, Yachouh J. Complications de la chirurgieorthognathique. A propos d'unesérie de 84 patients [Complications of orthognathic surgery. Apropos of a series of 84 patients]. Rev StomatolChirMaxillofac. 2001;102(1):21-5.
6. Chow LK, Singh B, Chiu WK, Samman N. Prevalence of postoperative complications after orthognathic surgery: a 15-year review. J Oral Maxillofac Surg. 2007;65(5):984-92.
7. Choi SK, Kwon KH. Treatment of anterior open bite by posterior maxillary segmental osteotomy and miniplates: a case report. MaxillofacPlastReconstr Surg. 2020;15;42(1):20-9.
8. Gupta A, Sharma SD, Kataria V, Bansal P, Sharma R. Experience with Anterior Maxillary Osteotomy Techniques: A Prospective Study of 20 Cases. J Maxillofac Oral Surg. 2020;19(1):119-24.
9. Sharma S, Gupta A, Sharma R, Rathee I. Palatal tear: A complication during anterior maxillary osteotomy using cupartechnique. Indian J Dent Sci 2017;9:32-5.
10. Brito L, Olate S, Villa J, Navarro P, Haidar ZS, de Moraes M. Interproximal bone in maxillary anterior teeth in subjects with Class III facial deformity: Are there options for segmental maxillary osteotomy in "surgery first"? Br J Oral Maxillofac Surg. 2019;57(2):140-4.
11. Bhagat SK, Kannan S, Babu MRR, MuruganKanagasabapathy T, Kumar Jain M, Ramesh C, Radha A. Soft Tissue Changes Following Combined Anterior Segmental BimaxillaryOrthognathic Procedures. J Maxillofac Oral Surg. 2019;18(1):93-9.
12. Yunuen A, Guzmán I. Tratamientoortodóncicoquirúrgico de unamaloclusión CII esqueletalsevera. Reporte de casoclínico. Rev Odont Mex. 2009;13(3):158-64.
13. Wolford L, Karras S, Mehra P. Considerations for orthognathic surgery during growth, Part1: Mandibular deformities. Am J OrthodDentofacialOrthop. 2001;119(2):95-101.
14. Da Silva, L. ConsideracionesGenerales en el Diagnóstico y tratamiento de lasMaloclusionesClase III. Rev LatinoamOrtodOdontop. 2005.
15. Mariuxi L, López D. Objetivosque se puedenlograr con unCamuflajeOrtodóncico en pacientesClase Ill quirúrgicos. Revisión de la literatura. Rev LatinoamOrtodOdontop. 2017;691-9.
16. Shawky M, El-Ghareeb T, Hameed L. Evaluation of the three-dimensional soft tissue changes after anterior segmental maxillary osteotomy. International journal of oral and maxillofacial surgery. 2012;41(6):718-26.
17. Ramírez H, Pavic M, Vásquez M. Cirugíaortognática: diagnóstico, protocolo, tratamiento y complicaciones. Análisis de experienciaclínica. Rev. Otorrinolaringol. Cir CabezaCuello. 2006;66(3):221-31.
18. Ho M, Boyle M, Cooper JC, Dodd M, Richardson D. Surgical complications of segmental Le Fort I osteotomy. British J Oral Max Surg. 2011;49(7):562-6.
19. Kahnberg K, Hagberg C. The approach to dentofacial skeletal deformities using a multisegmentation technique. Clin Plastic Surg. 2007;34(3):477-84.