

A case series of skeletal deformity patients undergoing orthognathic surgery at Rehman Medical Institute, Peshawar

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Abstract

Introduction: Extreme dento-skeletal problems fall outside the scope of conservative approaches i.e orthodontic camouflage or growth modification. Orthognathic surgery in such cases is the only option left. Envelop of discrepancy of severity places a limit on the movement of the teeth orthodontically. These dento-skeletal deformities require a multidisciplinary approach for optimal results. Orthodontists and maxillofacial surgeons play key roles in the management of such patients. This article reports series of 11 orthognathic surgery cases. Before hand patients malocclusion was decompensated orthodontically followed by orthognathic surgery.

Material and Methods: Retrospectively records of 11 patients were reviewed who had undergone orthognathic surgery at Rehman Medical Institute. These were assessed for age, gender, ethnicity, reason for seeking treatment, duration of pre-surgical Orthodontics, surgical procedure performed, duration of post surgical orthodontics and complications.

Results: The mean age of patients was 22.7 years. There was a male preponderance of 1 : 3.6 and the entire sample was of Pakistani origin. Out of 11 cases, the skeletal Class III cases were more (54 %), 9 % were skeletal Class II, 9% of vertical maxillary excess and 27% reporting with asymmetry. Double Jaw surgeries were performed more as compared to single jaw surgeries. Lefort 1 osteotomy was the most commonly performed procedure. Mean time of pre-surgical orthodontics was 24.9 months (SD 11.36, range of 9 to 44 months). Mean time of post- surgical orthodontics was 8 months (SD 3.86, range of 4 to 14 months). The main complication encountered with mandibular surgery was numbness in the lower lip area.

Conclusions: There is a positive trend of orthognathic surgeries in Peshawar (Pakistan) and patients are seeking it mostly for esthetic reasons. It still requires education of the population. Orthodontists are taking additional pre and post surgical orthodontics time in comparison to the recommended evidence based duration. This can be reduced with proper diagnosis and treatment planning as well as robust collaboration between different specialties.

Keywords: Dento-skeletal disharmony; orthognathic surgery; envelop of discrepancy.

Introduction

In the Modern era, great importance is placed on physical appearance. Facial beauty is defined in terms of averageness and symmetry. Facial appearance and aesthetics have great impact on the patient's self-confidence and quality of life along with

social adjustments.¹ Patients with dento-facial deformities either because of skeletal or dental discrepancy having a compromised quality of life can benefit from orthognathic surgery.² These patients are treated either by camouflage, growth modification or orthognathic surgery. Severe cases with ceased growth are left with the option of surgery only.³ Hullihen first reported the orthognathic correction of mandibular elongation. Later several procedures were performed for correction of larger mandibles. Trauner and Obwegeser marked the beginning of modern era in orthognathic surgery via introducing an intraoral approach i.e sagittal split ramus osteotomy of the

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mandible. Obwegeser in 1969 was the first to describe Lefort I osteotomy in maxilla that could move the jaw in all three planes of space. Orthognathic surgery needs a multidisciplinary treatment approach and the main role is that of the surgeon and orthodontist.⁴ Till 1960's, surgeons rarely depended on the orthodontics to move teeth prior to surgery. Surgery was either performed before orthodontics or after the removal of braces. Many cases were performed in that era without orthodontics but later surgeons realized the limit placed on the movement of jaws during surgery by the over jet.⁵ Orthodontics first approach became a standard procedure after 1970's in which interactive diagnosis and planning was done by orthodontist and surgeon. Comprehensive pre-surgical orthodontics needs 8 to 18 months in which alignment, leveling, decompensation, derotations, arch coordination is performed and a short period of post surgical orthodontics for settling and better stability of occlusion.^{2,4}

In this study 11 cases with different types of dento facial deformities were assessed. For all the patients, photographs, clinical examination and radiographs including OPG and Lateral Cephalogram were taken at the first visit. For some cases supplemental records were taken e.g Postero-anterior cephalogram etc.

Material and methods

A retrospective study was undertaken in which 11 cases were reviewed who had undergone orthognathic surgery at RMI. Age, gender, ethnicity, reason for seeking treatment, classification of malocclusion, duration of pre-surgical orthodontics, surgical procedure performed, duration of post surgical orthodontics and complications were reviewed (Table 1).

Case 1

18 years old male patient was referred to Rehman Medical Institute. His chief

complaint was that of a protrusive lower lip. Problem list of the patient was skeletal class III with maxillary deficiency and mandibular prognathism, acute nasolabial angle, reverse overjet of -5 mm, no incisal show at rest and 2 mm incisal show on smile existed, non-consonant smile, missing upper 1st premolars, proclined upper incisors, retroclined lower incisors and retrusive upper lip (Table II). Maxillary Advancement via Lefort 1 osteotomy and mandibular Set back Via BSSO was performed.



Fig. 1a Pre-surgical photographs



Fig. 1b Post-surgical photographs

Case 2

25 years old male patient reported at RMI with a chief complaint of horse shoe face and long jaw. Problem list included skeletal class III with maxillary deficiency and mandibular prognathism, non consonant smile, molars and canines in class III bilaterally, reverse overjet of -5 mm, mild upper arch crowding, moderate lower arch crowding, retained lower right c, proclined upper incisors and retroclined lower incisors. Nasolabial angle was acute (Table 2). Maxillary advancement via Lefort 1 osteotomy and mandibular set back Via BSSO was performed.



Fig 2. a. PreSurgical



Fig 2.b Postsurgical

Case 3

25 year old male patient was referred to RMI with a chief complaint of long lower jaw and difficulty in speech. Problem list was skeletal class III with maxillary deficiency and mandibular prognathism. Molars and canines

were in class III, reverse overjet was -9.5 mm, mild crowding existed in both upper and lower arches with proclined upper incisors. Upper lip was retrusive and patient had acute nasolabial angle (Table 2). Maxillary advancement was performed via Lefort I osteotomy and mandibular set back Via BSSO was performed.



Fig 3. A .PreSurgical Fig 3. b.Post Surgical

Case 4 22 years old male patient reported at RMI with a chief complaint of very long lower jaw. He was not comfortable with his smile and speech. He had a history of accident and nasal fracture at the age of 5 years. Problem list was Skeletal Class III with maxillary deficiency and mandibular prognathism, increased facial height, nasal deviation with a dorsal hump, class III molar occlusion on both right and left sides. Upper right canine was impacted and removed. Upper left canine was in Class III and there was a reverse overjet of -13 mm. Incisal show at rest was 4 mm and on smiling there was full incisal show with 2mm of gum show. Nasolabial angle was obtuse with retrusive upper lip (Table 2). Maxillary advancement and impaction via Lefort I osteotomy and mandibular set back via BSSO was performed.



Fig 4a Presurgical Fig 4b Post Surgical

Case 5 22 years old male patient was referred to RMI with a chief complaint of very long lower jaw with speech masticatory problem. He had no significant family history. Problem list

included skeletal class III relationship due to maxillary deficiency and mandibular prognathism with increased facial height, increased incisal show (6 mm) and at smile being 100 % with 3 mm of gum show, class III molar and canine relationship on both right and left sides, bilateral lingual cross-bite and reverse overjet being -11 mm. Upper incisor inclination was increased and lower incisors were retroclined. Upper lip was retrusive with an obtuse nasolabial angle (Table 2). Maxillary advancement and impaction via Lefort I osteotomy and mandibular set back via BSSO was performed.



Fig 5. a.Presurgical Fig 5.b..Post Surgical

Case 6

19 years old female patient was referred to RMI with a chief complaint of dished in face and inability of the upper and lower to meet. Problem list included mild skeletal class III, dorsal nasal hump, class III molar and canine relationship on both sides and reverse overjet being -5 mm (Table 2). Maxillary advancement via Lefort I osteotomy was performed.



Fig 6a Presurgical Fig 6b Post Surgical

CASE 7

Adult male patient was referred to RMI with a chief complaint of very deficient chin and dorsal nasal hump. Problem list included skeletal class II with mandibular deficiency, increased facial height and class II div 1 incisor relationship with an overjet of 9 mm and retrusive lower lip (Table 2). Mandibular

advancement via BSSO/ genioplasty was performed.



Fig 7a Presurgical **Fig 7b Post Surgical**

Case 8

22 year old male patient was referred to RMI with a chief complaint of very long face. He already had his orthodontic treatment done that involved all first premolar extractions. Problem list included skeletal class II with mandibular deficiency, high vertical, acute nasolabial angle, incompetent lips, obtuse labiomental angle, increased incisal show at rest and smile (Table 2). Maxillary impaction via Lefort I osteotomy along with genioplasty for vertical reduction and advancement were performed.



Fig 8a Pre - surgical **Fig 8b Post - surgical**

Case 9

19 years old female patient reported to RMI with a chief complaint of increased gum show on right side during smiling. She had a history of trauma at the age of 3 years to the chin. Later condylectomy due to ankylosis was performed on the left side that led to the restricted growth on the left side of the mandible. Problem list included skeletal class II with mandibular deficiency, acute nasolabial angle, deep mentolabial fold, short face height, deviation of chin to left by 6mm. increased incisal show on left side by 6 mm, maxillary cant of 6mm to right and proclined lower incisors (Table 2). Clock wise rotation of maxilla and mandible via Lefort I

osteotomy and BSSO respectively were performed.



Fig 9a Presurgical



Fig 9b Post Surgical

Case 10

18 year old boy was referred to RMI with a chief complaint of deviated chin towards left side and difficulty in biting. Problem list included skeletal class III with maxillary deficiency and mandibular prognathism, increased face height, edge to edge incisal bite, incoincident midlines, proclined upper and retroclined lower incisors, increased face height, acute nasolabial angle and retrusive upper lip (Table 2). Asymmetric BSSO was performed.



Fig 10a Presurgical **Fig 10b Post Surgical**

Case 11

19 year old female patient came to RMI with a chief complaint of closed mouth and history of gun-shot injury during child hood on left side. Problem list included skeletal class II with deficient mandible, chin deviation to the left by 4mm, edge to edge bite with minimal overbite. Upper left 1st, 2nd, lower right and left 1st molars were missing. Canines on both sides were in Class II. Lower midline was off to the right side by 3mm, muscles on left side of the face were hyper plastic with facial

paralysis on the left side. There was squinting and blindness in the left eye (Table 2). Asymmetric BSSO with advancement was performed.



Fig 11a Presurgical



Fig 11b PostSurgical

Results

Mean age of patients was 22.7 years (SD 4.8, range 18 - 35 years). A male preponderance was observed in reported patients with female to male ratio being 1.3 : 6. Out of eleven cases, skeletal class III, II cases were 54 % and 9 % respectively, 9% had vertical maxillary excess, 27% had asymmetry. All patients had Pakistani origin and they had esthetic reason for seeking treatment. Three patients had skeletal class III and one had vertical maxillary excess. Lefort I osteotomy

was performed in eight patients, BSSO in nine and genioplasty was performed in two patients. Double jaw surgery was performed in five patients out of which four had severe skeletal class III and one had asymmetry. Single jaw surgery was done in three cases for vertical maxillary excess and maxillary advancement in a skeletal class III patient. Single jaw mandibular BSSO was performed in two cases out of which one was skeletal class II and the second for correction of asymmetry. Mean time of pre-surgical orthodontics was 24.9 months (SD 11.36, range of 9-44 months). Mean time of post-surgical orthodontics was 8 months (SD 3.86, range of 4-14 months). Complications included numbness in the lower lip area in patients who had undergone BSSO either for advancement, setback or correction of asymmetry. Mean time for the numbness was 4 months. The patients who went for genioplasty (02) developed some numbness in chin area (01). Patient who had undergone for maxillary impaction developed more swelling and numbness on the right side for three months post surgically. Both patients who went maxillary impaction developed flaring of nose.

Table I. SUMMARY OF CASES

Case / Gender	Pt age	Family / trauma history	problem	Procedure performed	Chief Complaint	complications
1/ M	18	Not significant	Skeletal class III	Maxillary advancement via Lefort I and mandibular Set back via BSSO	Protrusive lower lip	Numbness lower lip
2/ M	25	Not significant	Skeletal class III	Maxillary advancement via Lefort I and mandibular Set back via BSSO	Horse shoe face / long lower jaw	Numbness lower lip
3/M	25	Not significant	Skeletal class III	Maxillary advancement via Lefort I and mandibular Set back via BSSO	Long lower jaw / difficulty in speech	Numbness whole lower lip
4/M	22	Trauma of nose at the age of 5 years	Skeletal class III	Maxillary advancement via Lefort I and mandibular Set back via BSSO / genioplasty for vertical reduction	Very long lower jaw / difficulty in speech and eating	Nose asymmetry more prominent Biting force on right side, Numbness on right side of lower lip

5/M	2	Not significant	Skeletal class III	Maxillary advancement via Lefort I and impaction /mandibular set back via BSSO	Long lower jaw / gap between upper and lower teeth	Numbness whole lip 3 months, after 3 only left side lip & right side gum
6/F	19	Not significant	Skeletal class III	Maxillary advancement via Lefort I osteotomy	Upper and lower teeth don't meet/dished in upper face	nil
7/M	35	Not significant	Class II	Mandibular advancement / genioplasty.	Very short chin/ Dorsal hump	
8/M	22	Not significant	VME	Maxillary impaction 7mm via Lefort I osteotomy / genioplasty for vertical reduction and advancement 10 mm	Very long face vertically / gum show	Flaring of nose, Numbness of upper lip right side, chin numbness.
9/F	19	History of trauma on left side during childhood/ Tmj ankylosis / condylectomy	Asymmetry/ Maxillary cant	Clock wise rotation of maxilla and mandible via Lefort I osteotomy / BSSO respectively	Increased gum show on right side during smiling	Septal deviation to right side with mild flaring
10/M	18	Not significant	Mandibular asymmetry	Asymmetric BSSO 10 mm	Chin on left side/ difficulty in biting	Numbness of lower lip
11/F	21	Gunshot injury at 3 years of age/ Tmj ankylosis	Mandibular asymmetry/ Deficiency	Mandibular advancement via BSSO 9mm	Deficient chin/mild asymmetry to the left	Nil

Table II. Clinical Features

	Case 1	Case 2	Case 3	Case 4	Case 5	Case 6	Case 7	Case 8	Case 9	Case 10	Case 11
Profile	Concave	Concave	Concave	Concave	Concave	Concave	Convex	Convex	Convex	Concave	Convex
Incisal show at rest	No show	2	2 mm	5 mm	6 mm	No show	2 mm	7mm	2 mm Right / 4 mm left	2 mm	Right 2 mm
Incisal show at smile	2 mm	100% with no gum show	5 mm no gum show	100 % with 2 mm of gum show	100 % show with 3 mm gum show	2 mm	100 % with 2 mm of gum show	100% with 3 mm of gum show	100 % with 6 mm of gum show	5 mm	Right 6 mm
Molar relationship	Class III Rt /Class III left	Class III Rt/Class III left	Class III Rt/Class III left	Class III Rt/Class III left	Class III Rt/Class III left	Class III Rt/Class III left	Class II Rt/Class II left	End on Class II Rt/End on Class II left	Class I Rt/Class I left	Class III Rt/Class I left	NA Rt/NA Lft
Canine r.ship Rt	Class III Rt/Class III left	Class III Rt/Class III left	Class III Rt/Class III left	Class III Rt/NA left	Class III Rt/Class III left	Class III Rt/Class III left	Class II Rt/Class II left	Class II Rt/Class II left	Class I Rt/Class I left	Class III Rt/Class III left	Class II Rt/Class II left
Cross bite Posterior	RT side molars lingual	Rt & lft premolars Lingual	Rt & lft molars /premolars	Bilateral lingual	Bilateral lingual	nil	Nil	Nil	Nil	Molars & Premolars left lingual cross bite	Nil
Overjet	-5 mm	-5mm	-9.5	-13	-11	-4	9mm	3 mm	2 mm	Edge to edge	Edge to edge
Overbite	Not applicable	Not applicable	Not applicable	No applicable	Not applicable	Not applicable	2 mm	Incomplete bite	2 mm	Nil	Nil
Crowding/ Spacing	Mild both arches	Mild Upper / moderate lower	Mild upper and lower	Mild upper & Lower teeth	Mild Upper and lower	Mild upper & lower teeth	Severe lower arch/extraction of lower premolars done	Severe upper and lower arch before extractions.	Nil/ Mild spacing lower arch	Nil	Nil
Midlines	Lower Off to left by 2 mm	on	on	Upper on	3 mm left lower	on	On	on	on	Lower towards left by 10 mm	Off to right by 3 mm

Other probl ems	Upper 1 st premola rs Rt and left missing	Retaine d lower Rt c	nil	Inc. Face height, Missing lower Incisor & Missing Right upper canine	Inc. Face height		Inc. Face height	Inc. Face height, speech	Condy lectom y done on left side, asym metric chin to left by 6 mm	Inc. Face height, Chin off to left by 10 mm	Upp er left 1 st & 2 nd mola r / lower right & left 1 st , asym metri c chin to left by 4 mm
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Discussion

Attractiveness in humans is generally attributed to inner and outer beauty. While inner beauty is considered as a product of personality and intelligence, a strong indicator for outer beauty is averageness of human face.⁶⁻⁸ If pictures of human faces are overlapped to create a composite image, it becomes closer to an ideal face and perceived as more beautiful, a phenomenon that was first noticed by Charles Galton in 1883. Since then various studies have confirmed it.⁹ Scientific data confirms that physical attractiveness provides an added social advantage to an individual. People that are considered better looking get higher marks in their exams¹⁰ and are less likely to be convicted nor get longer sentences.¹¹ They usually earn significantly more than their less attractive counterparts and are more likely to attain a marriage partner from the higher strata of the society.¹²

Data from the third National Health and Nutrition Examination Survey in USA states that approximately 20% of the population has an abnormal bite relationship due to malocclusion. In about 2 % of population, it is severe enough to be at the limit of orthodontic treatment and may need surgical intervention.¹³ If we apply these figures to Pakistan, it would mean for a projected population of 200 million, 4 million people in

Pakistan have occlusal relationship severe enough to warrant surgical treatment.

Orthognathic surgery has made a relatively late entry into Pakistani society with no large series outcome data available in the literature. In a society that values facial beauty a lot, its need and effect cannot be underestimated. In majority of the western studies, the principle motivation for undergoing this surgery is either functional or aesthetic.

Proothi et al in a review of 501 patients, showed that while 76% of the patients felt that their appearance was affected by the position of their jaws, only 15% indicated this as their primary motivation for surgery. 36% patients stated malocclusion as their main reason for seeking treatment.¹³ In another retrospective cohort study of patients over 40 years of age who had undergone orthognathic surgery, the main motivating factor for seeking treatment was also functional rather than aesthetic.¹⁴ Yu et al in a prospective control study found the major reason for seeking treatment in Chinese subjects was esthetics (83.33%), followed by occlusal improvement (50%) and self-confidence (48.1%).¹⁵ Multiple studies have shown overall good outcome following surgery and improvement in quality of life, individual well-being and self-esteem.¹⁶⁻¹⁹

Historically, the first description in English scientific literature was from Chever, who described Le Fort I osteotomy for the purpose

of removing nasopharyngeal tumour.²⁰ Wassmund performed surgical procedure for the first time in 1921 to correct dentofacial deformity,²¹ while Auxhausen used it to correct an anterior open bite.²² The main complications associated with Le fort I osteotomy was hemorrhage. Since the introduction of hypotensive anesthesia and improved surgical technique, this complication has significantly reduced. In an extensive literature review on complications of Le Fort I osteotomy, Fiere et al concluded that the intra and post-operative hemorrhage of this procedure is infrequent and never alters the prognosis. The bony necrosis has disappeared since the last technical improvements. The secondary displacement remains a problem which seems less important actually because of the use of plates and screws and the improved surgeon's skill. Overall, Le Fort I osteotomy has become a reliable surgical procedure if the indications and technical points are respected.²³

While the efforts to develop a universal procedure to correct mandibular deformities with Hüllihen in 1846, the modern intra oral osteotomy that is known as Bilateral Sagittal split osteotomy (BSSO) was developed by Obwegeser and Trauner in 1957.²⁴ The main challenge in developing this procedure was to preserve the inferior alveolar nerve that enters the mandible at lingual and exits at the mental foramen. With modern BSSO, mandible can be shortened or lengthened through intra oral approach while preserving the nerve. The main complication of this procedure though remains the sensory disturbances due to inferior alveolar nerve manipulation. While there is wide variation in the reported incidence of nerve disturbance following this procedure, it is generally accepted that most of the patients would feel some kind of sensory deficit following the procedure. The long term incidence of nerve disturbance, however, is between 6 – 8%.²⁴⁻²⁷

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