



SURGERY FIRST CONCEPT IN TREATING A BIMAXILLARY PROTRUSION CASE

Orthodontics

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ABSTRACT

From the first day when the patient gets his/ her Orthodontic treatment started, the most common and repeated question which the patient asks their orthodontists is "When will my braces be removed". This means the duration of the orthodontic treatment is crucial for the patient's happiness. In order to satisfy the ever demanding orthodontic patient, many researchers have proposed various techniques to reduce the overall treatment duration. To name a few, Wilckodontics[1], Micro-Osteoperforations[2], Low level-laser therapy[3] & PAOO[4]. In this case we have used the Surgery first concept which was introduced by Brachvogel[5] in 1991, in order to reduce some of the disadvantages and negative outlook of pre-surgical orthodontics.

This case showcases the successful implementation of the surgery first concept in treating an individual with prognathic maxilla accompanied with a gummy smile.

KEYWORDS

Surgery first concept, Bimaxillary protrusion

BACKGROUND

Treating skeletal malocclusion is a challenge for both Orthodontists & the Oral Surgeon. Extensive detailed planning must go into treating such cases as their coordination is the secret for the successful outcome of such cases.

But in treating a case scheduled for Orthognathic surgery, Orthodontist first has to align the teeth properly over the basal bone, be it the maxilla or the mandible. This is called Decompensation or Reverse Orthodontics which usually takes around 8-10 months depending on the malalignment of a particular case. At the end of this phase of treatment, the patient actually looks worse than before as the teeth are either proclined or retroclined to be positioned upright over the basal bone. For example in a skeletal class III case, usually the mandibular teeth will be retroclined in compensation to the deficient maxilla and the maxillary teeth will be proclined in relation to the upper jaw. So the decompensation procedure involves the proclining of the mandibular teeth and retroclining of the maxillary teeth.

Challenges faced with Conventional Orthognathic Surgical cases

According to O'Brien et al[6] 2009, the pre surgical phase / orthodontic phase, in an case involving orthognathic surgery has been widely criticised by most patients as being the most cumbersome and de motivating also to some extent since most patient's appearance worsens during this phase of pre-surgical orthodontics. The average duration as outlined by Luther et al[7], 2003 is between 7 to 47 months. Therefore this phase will have a direct and exponential effect on periodontal tissues and increased risk of dental caries. Therefore the surgery first concept which was introduced by Brachvogel in 1991 seems justified.

CASE PRESENTATION

A female patient reported to our department with a complaint of prognathic upper accompanied with a gummy smile. On examination the patient revealed a mesofacial type of face type and a convex profile with an average growth pattern. Also incompetent lips at rest and exhibited a 4-5mm of gingival display on smile (figure 1). Intra oral examination revealed a class I malocclusion on left side with end-on molar and canine relationship on the right side with an overjet of 5mm and an overbite of 2mm. Both the dental arches were well aligned. (figure 2)

The Cephalometric analysis revealed a prognathic maxillary and mandibular dentoalveolar portions as noted in the values of upper incisor to NA and lower incisor to NA. Also the IMPA revealed highly proclined lower incisors. Since the patient exhibited a skeletal

deformity which could not be correct with Orthodontics alone, a combined approach of Orthodontics & Orthognathic surgery was adopted and since the patient wanted the treatment to be over as soon as possible, the Surgery first approach was chosen for this particular case with segmental osteotomy with removal of all the first premolars during the surgery.

TREATMENT

The treatment plan was to first bond the upper and lower teeth with 022"slot MBT brackets and place a passive 17" X 25" Stainless steel wires so that it becomes easy for the maxillofacial surgeons to stabilise the arches during and after the surgery. But before the surgery the maxilla-mandibular relation (centric relation) was recorded on a Hanau articulator after doing the face-bow transfer. Later on the mounted casts, a model surgery was done by sawing off all the maxillary and mandibular first premolars and pushing back the protruded anterior sections of both the jaws, and a surgical splint was fabricated on the models using heavy body silicone impression material.

The bimaxillary segmental osteotomy surgery was done during which the maxillary and mandibular first premolars were extracted. The post surgical results showed a considerable reduction in the patients gummy smile and her prognathism too. However the molar relation on the right side remained the same as the pre-treatment condition of end-on relation of both molar and canines. The overjet and overbite were normal post surgery. The residual spaces distal to the canines were eventually closed in 7months time.

Thus following the surgery first approach, the treatment duration could be foreshortened to a considerable extent. In this case the total treatment duration was 10months. The patient showed a significant improvement in her outlook and appearance too.

Critical Appraisal: Although the patient's main concerns about her prognathic profile were addressed successfully, there was shortcoming on the dental front. Like the end-on canine relation on the right side could not be converted to a class one relationship with mild midline mismatch.

INVESTIGATIONS

Clinically the patient exhibited a gummy smile of around 4-5mm. Cephalometric analysis was carried out to determine the Anterior posterior & vertical relationship of the jaws, the dental and the soft tissue parameters (table 1).

Cephalometric analysis revealed a prognathic maxilla and a reduced nasolabial angle. Vertically the patient had a steep mandibular plane angle as was evident by the values of Occlusal to FH plane and SN to Mandibular plane. The dental picture revealed proclined upper & lower anterior teeth as given by the values of U1 to Sn plane and IMPA respectively. (table 2)

Table 1: Definition and Cephalometric parameters used in this case

Measurement	Definition
AP Skeletal Relationship	SNA (degrees)
	The angle between the anterior cranial base (SN) & NA line
	A-N Perp (mm)
	The perpendicular distance from A to the N Perpendicular line to the FH plane (Or-Po)
	SNB
	The angle between the anterior cranial base (SN) & NB line
Vertical Skeletal relationship	N perp- Pog(mm)
	The perpendicular distance from Pog to the N Perpendicular line the FH plane
	ANB (degrees)
	The angle between NA & NB lines
	Wits appraisal (mm)
	The distance between the perpendicular point of A & B to the occlusal plane
Dental Relationship	Palatal Plane to FH plane angle (degrees)
	The angle between palatal plane to FH plane
	Occlusal plane to FH plane (degrees)
	The angle between the upper occlusal plane to the FH plane
Soft tissue relationship	SN- Mandibular plane angle (degrees)
	The angle between the anterior cranial base(SN) to the mandibular plane (Go-Me)
	Occlusal plane to mandibular plane angle (degrees)
	The angle between the upper occlusal plane & mandibular plane

Table 2: Comparison of the Pre and Post Treatment Cephalometric values

	Measurement	Pre treatment	Post Treatment
AP-Skeletal Relationship	SNA (degrees)	81°	82°
	A-N Perp (mm)	-2mm	+2 mm
	SNB	73°	79°
	N perp- Pog(mm)	-20mm	-18mm
	ANB (degrees)	8°	3°
	Wits appraisal (mm)	3mm	2mm
Vertical Skeletal relationship	Palatal Plane to FH plane angle (degrees)	1°	0°
	Occlusal plane to FH plane (degrees)	20°	17°
	SN- Mandibular plane angle (degrees)	40°	32°
	Occlusal plane to mandibular plane angle (degrees)	25°	23°
Dental Relationship	U1- SN (degrees)	120°	103°
	IMPA (degrees)	102°	91°
Soft tissue relationship	Nasolabial angle (degrees)	106°	118°

Table 3: Cogs Soft Tissue Analysis:

Variable	Normal	Pretreatment	Posttreatment
Facial Convexity angle	12°	23°	20°
Maxillary prognathism	6 mm	15 mm	5 mm
Mandibular Prognathism	0 mm	6 mm	0 mm

Vertical height ratio	1 mm	1.08	1
Nasolabial angle	102°	106°	118°
Upper lip Protrusion	3 mm	7 mm	4 mm
Lower Lip Protrusion	2 mm	11 mm	5 mm
Mentolabial Sulcus	4 mm	7 mm	5 mm
Vertical lipchin ratio	0.5	0.4	0.5
Maxillary incisor ratio	2 mm	10 mm	4 mm
Interlabial gap	2 mm	15 mm	8 mm

OUTCOME AND FOLLOW-UP

At the end of the treatment most of the objectives of the treatment plan were achieved. There was drastic reduction of gummy smile (figure 3) with reduced maxillary prognathism as was evident by the post treatment cephalometric analysis (table 3). Alignment of teeth and closure of the residual space distal to the canines was taken up during the post surgical phase of fixed orthodontics. This phase was started after one and half months post surgery and lasted for around 8 months. (figure 4)

The patient was extremely happy and satisfied with the surgical result immediately after the surgical oedema subsided. She later opted for fixed lingual retainers for both the arches.

DISCUSSION

Ever since Simon P Hüllien[8] published his first case report – “Case of Elongation of the Underjaw and Distortion of the Face and Neck” way back in 1849 in the American Journal of Dental Science, dentistry has come a long way in treating facial deformities.

C. S. Huang & Y.-R. Chen[9] concluded that the surgery-first approach uses osteotomy to solve the majority of skeletal and dental problems. Surgeons must be aware that any surgical movement has six degrees of freedom. Patients who undergo the surgery-first approach appreciate the immediate improvement in facial aesthetics, oral function, and self-confidence with total treatment duration within 12–18 months.

Hiroshi Nagasaka[10] & others reported the “surgery first” approach, combined with skeletal anchorage systems, provided significant benefits to skeletal Class III patients compared with traditional surgical-orthodontic treatment. The highlights being rapid profile improvement, more efficient and effective decompensation, and greatly reduced treatment time.

Carlos Villegas[11] & co authors described a “surgery first” approach in a patient with complex dentofacial asymmetry and class III malocclusion. Liou Et Al[12] in their article detailed the surgery-first approach which treats facial esthetics first and then occlusion, whereas the conventional approach treats occlusion first and then facial esthetics. The surgery-first approach uses osteotomy to solve both skeletal problems and dental compensation and a “transitional” occlusion is set up postoperatively. Orthodontics in the surgery-first approach is a postoperative adjunctive treatment to transform the transitional occlusion into a final occlusion. They also described the indications for the Surgery first concept and also the general / specific guidelines for this treatment approach.

Critical Appraisal to be shifted to the last Critical Appraisal: Although the patient's main concerns about her prognathic profile were addressed successfully, there was shortcoming on the dental front. Like the end-on canine relation on the right side could not be converted to a class one relationship with mild midline mismatch.



Fig 1: Pre Treatment Extra Oral Photos



Fig 2: Pre treatment intra oral photographs



Fig 3: Post treatment Extra oral photos



Fig 4: Post treatment Intra oral photos

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