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Pre and post surgical orthodontics: A literature review

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Abstract

Surgical orthodontics refers to surgical procedures carried out as an adjunct to or in conjunction with orthodontic treatment. These are usually carried out to eliminate an etiologic factor or to correct severe dentofacial abnormalities that cannot satisfactorily be treated by growth modification procedures or by orthodontic camouflage. However, surgical treatment is not a substitute for orthodontics. Instead, it must be properly coordinated with orthodontics and other dental treatment for achieving good overall results especially in case of severe dentofacial problems.

Keywords: Orthognathic surgery, surgical orthodontics, patient management

Introduction

When a severe skeletal deformity exists in non-growing teen and adult patients with significant skeletal jaw discrepancy, the goals of treatment are often impossible to achieve by orthodontics alone [2]. In these circumstances, both orthodontics and surgery are required to correct the dental malposition and the skeletal disharmony. Combined orthodontic and surgical treatment usually requires about 18-24 months to complete.

The treatment may be divided into four stages:

- a) Treatment Planning
- b) Presurgical Orthodontics
- c) Surgical Treatment
- d) Post-Surgical Orthodontics

a. Treatment Planning

In treating jaw discrepancies, camouflage and surgery have different treatment modalities, often involving opposite orthodontic mechanics and different extraction decisions.

Mucogingival considerations

Maintenance of attached gingiva is important.

Straining of the attached gingiva occurs due to following reasons:

- Orthodontic expansion of the dental arches
- Surgical incisions in the vestibule.

Loss of attached gingiva can occur if the teeth have to be tipped facially. In the Genioplasty, Incisions in the labial sulcus irt lower anteriors, Incisions in the vestibule causes tendency to contract on scarring results in stretching of the attached gingiva and may result in recession if there is not adequate attached gingiva.

Mandibular 3rd molars though, pose more of a problem. It is better to remove them 6 months before a BSSO, so that the socket is properly healed at the time of surgery. Recently, on table extractions are also performed. Complications if this is not done include:

- Bad split
- If tooth is removed during surgery, chances of infection are more.
- Difficult to use rigid internal fixation, due to the space occupied by the tooth.
- Increased chances of fracture of thin lingual plate.

b. Presurgical Orthodontics

Goals

- Align and level teeth without concern for dental occlusion.
- Establish proper anterior-post. and vertical position of the incisors.
- Achieve arch compatibility.

A general guideline is that every patient will need a more or less constant period of postsurgical orthodontics (4-6months). Presurgical preparation time varies.

If the patient is not properly prepared: -

- Surgery cannot be carried out effectively,
- Quality of the result is diminished
- Postsurgical orthodontic treatment time increases.

Selection of the appliance

1. Stability
2. Esthetics
3. Slot Size
4. Bonding vs Banding

1. Stability

It is important to stabilize the teeth against stresses encountered at surgery and during IMF. Use of a preadjusted appliance is recommended due to the stability provided by a rectangular wire in a rectangular slot. Proffit does not recommend using a Begg appliance for surgical patients, as he feels the stability provided by a round wire is much less. But many surgical cases have been done with a Begg appliance using a rectangular wire in the ribbon mode.

2. Esthetics

Lingual appliances are not recommended as:

Impossible to use the appliance for stabilizing the teeth during surgery or IMF. Post operative patients have difficulty in mouth opening for the first few months.

Hugo *et al.* (2000) reported the use of a maxillary lingual and mandibular labial appliance in orthognathic patients. But they too mentioned the use of labial appliances just before the surgery and thereafter until the end of the treatment.

3. Slot Size

Either slot size – 18 or 22

17x 25 ss for 18 slot

21x25 ss or TMA for 22 slot

segmented arch mechanics - 22 slot

4. Bonding vs banding

Bond anteriors, and band posteriors.

In case of any perio problems, bands are to be avoided Anteroposterior dental “decompensation” may involve specific extractions and anchorage needs.

In case of Class II cases, Use of Class III elastics

1. Upright mandibular incisors and
2. Advance maxillary molars into a full Class II occlusion.

In case of Class III cases, Use of Class II elastics-

1. To procline mandibular incisors
2. Establish adequate reverse overjet.

Presurgical leveling in deep-bite cases

In a deep-bite or low-angle case, incisors are intruded presurgically, Surgery will tend to move the mandible upward at the chin and downward at the gonial angle, due to the pivot effect. This increase in posterior facial height will elongate

the muscles of mastication and is unstable [3].

Incisors are not intruded presurgically in the deepbite or short-face patient, surgery will move the chin down, thus introducing an opening mandibular rotation, which tends to be more stable than straightforward or closing rotations.

In case of lower anterior facial height is short and distance, between the mandibular incisor edge and the chin is normal. Such cases leveling by extrusion of posterior teeth is indicated, so that the chin will move down at surgery.

In case of lower anterior facial height is excessive, an accentuated mandibular curve of Speed leveled presurgically by intrusion of the anterior segment and also leveled surgically with a subapical osteotomy after segmental leveling [3].

Stabilizing wires [4]

1) Full dimension, filling the slot.

- 17 x 25 ss for 18 slot.
- 21 x 25 ss or TMA for 22 slot.
- 19 x 25 wire in a 22 slot is acceptable

2) Attachments for IMF

- Attachments on the arch-wire are preferred
- Kobayashi hooks useful

3) The stabilizing wire must be passive

c. Final surgical Planning

2 weeks before surgery:

OPG.

Lateral ceph.

Casts.

Photos – intra and extra-oral.

PA ceph – if there is facial asymmetry.

IOPA and occlusal view if needed.

Face bow transfer onto an articulator if needed.

Need for a facebow transfer

1. Mandibular dentition: condylar relation maintained.

Mandible is required to auto-rotate.

Segmental subapical procedures of the mandible.

2. In case of 2 jaw surgeries.

Condyle - mandibular dentition relation is to be changed during surgery, a facebow transfer is not needed

Model Surgery [6, 7, 8]

Purpose of model surgery

- 1) To verify that the planned movements are possible.
- 2) To relate the mandibular and maxillary dentitions in the position where the surgical splint will be made.



Fig 1: Model Surgery

Requirements of the splint

- Fit the teeth accurately

- Minimum thickness – not more than 2 mm
- Excess acrylic should be trimmed off the buccal aspect, to allow for proper visual verification during surgery and oral hygiene maintenance.

Post operative events

1. Hospitalization
 - 2-3 days for single jaw
 - 4-5 days for double jaw
2. Facial edema – 2-3 weeks
3. Resumes partial function in 2 weeks
4. Mastication after 6-8 weeks
5. Complete bone healing – 6 months

Post operative care

1. 1-week soft diet
 - Milk, mashed potatoes, scrambled eggs
2. After 2 weeks – more chewing
 - Chapattis, vegetables, and meat in small pieces
3. Progress to normal diet
4. Normal diet in 6-8 weeks

Post Operative Physiotherapy

1. As soon as the initial intracapsular joint edema has resolved – after about 1 week.
 - a) 1st week after surgery: open and close mouth gently within comfortable limits
 - b) Over next 2 weeks: 10–15-minute sessions of opening and closing and lateral movements.
 - c) 3rd – 8th weeks, range of motion is increased, and should be normal in 8 weeks.
2. Orthodontist should see the patient within the 1st week – review the occlusal status and check the status of the orthodontic appliance.
3. Postsurgical orthodontics
 - a) adequate bone healing
 - b) adequate mouth opening

d. Postsurgical Orthodontics

1. After adequate healing of bone (surgeon's opinion)
2. Splint and stabilizing wires should be removed together
3. Splint and wires provide solid occlusion
4. Prevent CO-CR discrepancy
5. Splint and light elastics to guide occlusion
6. Working archwires placed
 - a) 0.016" steel
 - b) 21 x 25 NiTi or Braided Steel
 - c) Stabilizing wire left in place in 1 arch
7. Light box elastics
 - a) Extrude teeth
 - b) Guide occlusion
 - c) Elastics crossing osteotomy site
8. Protocol
 - a) 1st month – full time, including while eating
 - b) 2nd month – Full time, remove while eating
 - c) 3rd month – Night time only
9. Good amount of settling in first month
10. Step bends in archwires



Fig 2: Archwires

Retention

- Not very different from routine orthodontics.
- Transverse retention
- Fixed retainers

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