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Case Report | **Oral and Maxillofacial Surgery**

Distraction Osteogenesis: Changing Lives

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Abstract

Background: A method of generating new bone following a corticotomy or an osteotomy and gradual distraction based on the tension-stress principle proposed by Ilizarov is called distraction osteogenesis. DO works in following phases: Osteotomy or surgical phase - Latency period - Distraction phase - Consolidation phase - Appliance removal - Remodeling period. ***Case report:*** A 21 years old female patient reported to the department of orthodontic with the chief complaint of forwardly placed upper front teeth. Her past medical, dental, post natal and family history did not show any relevant reporting. ***Material and method:*** The osteotomy was prepared by extending the line from medial aspect of posterior border of ramus till the buccal cortical plate between first and second molar and the intraoral bidirectional distractors (figure 3) were secured in place and the distraction was done twice a day at a rate of 1mm/day. The distraction was initiated five days after the surgery and then continued till 11 days. ***Conclusion:*** DO can effectively treat facial asymmetry

Keywords: Distraction osteogenesis; Intraoral distractors; Corticotomy; osteotomy.

INTRODUCTION

A method of generating new bone following a corticotomy or an osteotomy and gradual distraction based on the tension-stress principle proposed by Ilizarov is called distraction osteogenesis [1, 2]. Although conventional orthognathic surgery and craniofacial has been very successful but in recent years the practice of surgery has been altered by an increased understanding and manipulation of biological systems; for example, induction of the native tissue [1-3]. In Distraction osteogenesis controlled traction is applied across the site of surgically produced bone disruption while it is healing [4]. Distraction osteogenesis (DO) was first used by Codivilla (1905) to lengthen the femur axially while Mandibular distraction in humans by extraoral distractor was first reported in 1992 in patients suffering from hemifacial microsomias [5, 6].

DO works in following phases: Osteotomy or surgical phase - Latency period - Distraction phase - Consolidation phase - Appliance removal - Remodeling period. Surgical phase involves performing osteotomy and leaving distraction appliance in place. This phase is followed by latency phase that involves early stages of bone healing at bony interface that lasts for 7 days. The Distraction phase may be at a rate of 1 mm per day i.e., 0.5 mm twice each day. “Regenerate” is the new immature bone that is formed. Mineralization of the regenerate bone takes place during the consolidation phase. The appliance still remains in place. Then appliance is removed followed by remodeling which is the period from the application of normal functional loads to the complete maturation of the bone [6].

Here is a case report of a 21 years old female patient who underwent distraction and how it transformed her life.

CASE REPORT

A 21 years old female patient reported to the department of orthodontic with the chief complaint of forwardly placed upper front teeth. Her past medical, dental, post natal and family history did not show any relevant reporting. Her built was mesomorph and her gait and posture was normal. Her lips were incompetent. There was 9mm of upper incisor show and lip separation at rest was of 13mm. The mandibular dentition was shifted towards left by 2mm with convex facial profile

having retrognathic mandible and orthognathic maxilla. The TMJ examination was normal with mouth opening of 25mm. the swallowing pattern was mature, the tongue dysfunction was not present and nasal respiration was present.

Intraoral examination showed that apart from second quadrant, third molar was present only in 2nd quadrant

After that her photographic, dental and radiographic records were taken and the treatment was initiated in accordance to the space analysis (Figure 1).

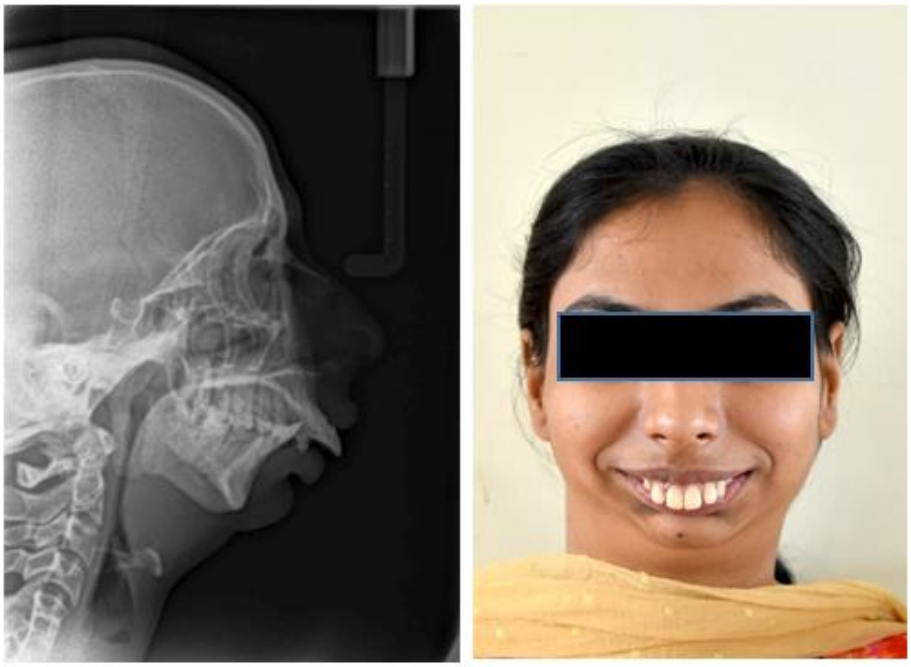

Figure 1: Radiographic and photographic records of the patient

The pre-operative orthodontic treatment was initiated and the skeletal advancement required was 11mm. The osteotomy was prepared by extending the line from medial aspect of posterior border of ramus till the buccal cortical plate between first and second molar (Figure 2). The intraoral bidirectional distractors (Figure 3) were secured in place and the distraction was done twice a day at a rate of 1mm/day. The distraction was initiated five days after the surgery and then continued till 11 days. Distractors were removed 2 months after the distraction period, post-op orthodontic treatment was continued.

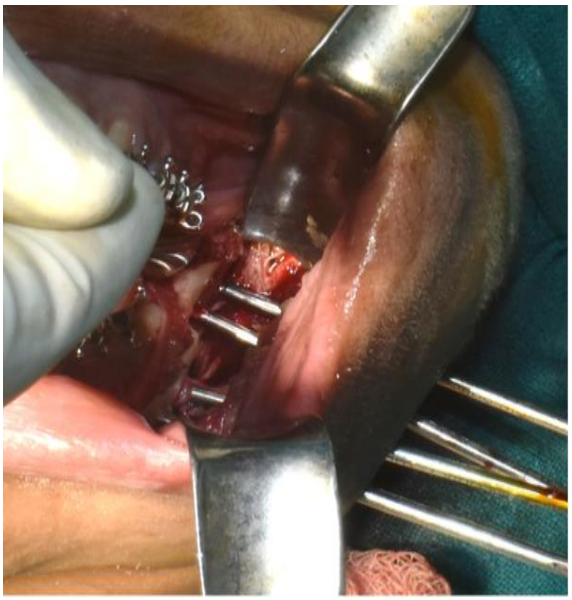

Figure 2: Placement of distractor

Figure 3: Comparision at Different Intervals

DISCUSSION

Distraction osteogenesis is a useful and well-established technique for bone and soft tissue formation in moderate to severe bone deficiency cases, both in the mandible, maxilla, and midface. DO demonstrates good results with long-term stability. The IDD are more comfortable to the patients and permit greater retention periods which contribute to long-term stability. In the future, better understanding of the biomolecular mechanisms that mediate DO may allow for the improvement of bone regeneration using different molecular mediators, growth factors, or stem cells. Further research might allow for shorter consolidation periods using different methods like shock wave therapy. Development of biodegradable devices may spare the need for a second surgery to remove the distraction devices. Development of new methods and devices for better control over the vector of elongation will improve clinical and functional results significantly. Three-dimensional imaging and custom devices designed specifically for each patient will allow for better prediction of bone and soft tissue formation [7].

Although orthognathic surgery has gained a generalized acceptance for maxillomandibular deformity correction, several limitations are associated with acute advancement of osteotomized bone segments. Large skeletal discrepancies require such extensive bone movements that the surrounding soft tissues might not adapt to their new position, resulting in relapse or compromised function and esthetics. The application of osteodistraction offers novel solutions for surgical-orthodontic management of developmental anomalies of the craniofacial skeleton as bone may be molded into different shapes along with the soft tissue component gradually thereby resulting in less relapse [7].

CONCLUSION

Distraction osteogenesis can be effectively used as a treatment for mandibular advancement.

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