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Distraction osteogenesis versus orthognathic surgery

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Distraction osteogenesis (DO) initially developed by Ilizarov for limb lengthening has recently been applied to the correction of severe congenital or acquired craniofacial deformities as an early alternative to orthognathic surgery. Distraction osteogenesis involves the lengthening and reshaping of deformed bone by surgical fracture and gradual separation of bony segments. The surgeon lengthens and reshapes deformed bone by surgically fracturing the bone and slowly separating (distracting) the resultant segments with specially fabricated hardware. The bony fragments are held in place during the first week following surgical fracture to allow callus to form between the fragments. During the next several weeks, the fragments are gradually separated at a rate of 1 to 2 millimetres per day, up to a pre-determined length (e.g., 20 days for 20 millimetres or 5/8 inches). The bone segments are moved gradually to allow callus formation and adaptation of fibromuscular attachments. Once the desired length and shape is achieved, the hardware is left in place for an additional 6 weeks until the newly formed bone calcifies. The primary advantage claimed in connection with distraction osteogenesis is that it allows major reshaping of the facial bones without bone grafts or jaw wiring. Proponents claim that distraction osteogenesis may be safer than other methods of facial reconstruction, since it can involve less blood loss and a lower risk of infection. Orthognathic surgery is the surgical correction of skeletal anomalies or malformations involving the midface, mandible and maxilla. These malformations may be present at birth or may become evident as the patient grows and develops. Jaw malformations can cause chewing and eating difficulties, abnormal speech patterns, early loss of teeth, and disfigurement and dysfunction of the maxilla and mandible. Malocclusion may be caused by a deficiency or excess of bony tissue in one or both jaws, or by trauma to the facial bones. In orthognathic surgery, an osteotomy is made in the affected jaw, and the bones are repositioned in a more physiologic alignment. Generally, the bones are held in their new positions with plates, screws and wires. The patient may also need arch bars placed on both jaws to add stability. Patients with deficient bone tissue may require grafts from their ribs, hips or skull. Alloplastic replacement of missing bone may also be required. Several studies have evaluated DO as a definitive mandibular advancement technique and it has been proved that advancements of between 6 and 10 mm resulted in no significant differences in stability be it distraction or orthognathic surgery. With the enthusiasm of successful results using midfacial and mandibular distraction, it has been asserted that the introduction of DO techniques would result in the elimination of traditional orthognathic surgery. However, this has not proved to be the case. In patients with syndromic craniosynostoses, DO can be applied at strategic times as part of a staged surgical treatment plan for the management of severe skeletal discrepancies. Distraction may be regarded as a useful additional technique to minimize skeletal deformities but definitive orthognathic surgery remains the treatment of choice to enable accurate occlusal correction and good facial balance.

Biography

Simon Chummar completed his BDS, MDS, from Royal College of Surgeons of Edinburgh, AO Fellow from United Kingdom. He is Scholar from International Bone Research Association, Germany. He is a specialist Implantologist and Oral and maxillofacial surgeon, at present he is working in a Dental department, NMC Specialty Hospital, UAE.

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