Orthodontic surgery and esthetics

Orthodontic treatment generally follows esthetic, functional, and prosthetic objectives, where individual aspects of isolated cases are accorded varying importance as they arise. Increasing esthetic expectations and awareness of modern dental treatment options disseminated by the media have resulted in increased interest and greater willingness of adults to consider orthodontic treatment. Thus, esthetic orthodontics is primarily adult orthodontics.

A peculiarity of orthodontic treatment in adults compared with pediatric or adolescent orthodontics is the age-associated involution of the connective tissues that leads to a reduction in cell density, thickening of the fibre bundles, delayed fibroblast proliferation and reduced vascularization. These are the causes of slower dental movement and delayed tissue and bone reactions. Absent sutural growth, the age of the periodontium, specific periodontal diagnoses and tissue atrophy also make treatment in adults particularly challenging.

As a rule, esthetically-oriented adult orthodontics therefore has an interdisciplinary inclination. Occlusion, function and esthetics are considered to be equivalent parameters in modern orthodontics, and particularly here in combined orthodontic-maxillofacial surgical treatment. This was achieved through the optimization of diagnostic tools and further development and increasing experience in orthopedic surgery.

Nowadays, treatment of adult patients with oral malposition and mastication impairment is one of the standard tasks of the orthodontist. If the discrepancies in spatial allocations of the upper and lower dentition are particularly pronounced, and where the cause is primarily skeletal and not only dentoalveolar, conventional orthodontic therapy is limited and combined orthodontic-surgical therapy is indicated for remodeling of the jaw bases.

Treatment for a skeletal dysgnathia (Class III) using combined orthodontic-maxillofacial surgical correction is discussed in this article.

Chronological development of maxillofacial surgery of the mandible

The first orthodontic-maxillofacial surgical procedure on the mandible described in the literature was that of the American surgeon Hullihen in 1848. This procedure was a segmental osteotomy of the anterior mandible (a posterior shift [retrusion] of a protruding mandibular alveolar process following a burn injury).

Toward the end of the 19th century, the method of orthodontic-maxillofacial surgical correction of dysgnathias by surgical retraction or protrusion of the mandible was revisited. Jaboulay described resection of the Processus condylarem Blair osteotomy on the Corpus mandibulae.

The continuity resection in the horizontal branch by Blair was the first surgical prognathism procedure. The patient first visited the dentist Whipple in St. Louis in 1891 and was then referred to the most renowned orthodontist of the day,

![Diagrammatic representation of the osteotomy lines on the outer (continuous line) and the inner compacta (dashed line) of the mandible; 4 = inner saw cut above the N. mandibularis.](image)
Dr. Edward Hartley Angle, who ultimately recommended the surgical procedure mentioned above. Six years later, the procedure in this osteotomy on the *Corpus mandibulae* was also published by the Hamburg surgeon Floris. Parallel with this development in the U.S., von Auffenberg in Europe conceived a step-by-step osteotomy for correcting a mandibular retrusion, which was performed by von Eiselberg in 1901.

The era of orthodontic surgery in Europe began only after World War I. The experience gained there led to a substantial extension of the indications for orthodontic-maxillofacial surgical procedures, as well as to the transferral of this surgical technique to the area of elective procedures. In the early 1920s, Bruhn and Lindemann set transversal osteotomy of the *Ramus mandibulae* as the standard method at the time for the surgical correction of mandibular prognathism. This method, which continued to have many adherents well into the 1960s, is today known as the Bruhn-Lindemann procedure.

In 1955, Wassmund, who saw its drawbacks in a possible dislocation of the proximal segment by the muscles inserted there, described a modification of the Bruhn-Lindemann surgical technique. In the early 1950s, a new era in orthodontic surgery of the mandible was begun with Kazanjian’s resumption of the technique of transverse oblique severing of the ascending ramus, first performed by Perthes in 1922. Shuchard modified this method in 1954 by enlarging the bony insertion surface, and in 1955 Obwegeser introduced sagittal splitting at the horizontal ramus of the mandible. He shifted the buccal osteotomy line obliquely from the last molar to the posterior margin of the jaw angle. Since then, this method of sagittal split at the mandible has been called sagittal split according to Obwegeser–Dal Pont (Fig. 1). Epker developed the incomplete sagittal split into a routine method.

Clinical case presentation

**History and diagnosis**

A 25-year-old patient presented on his own initiative. He complained of functional (impairment of mastication and jaw joint pain) and esthetic impairment (sunken face with facial asymmetry). He had undergone orthodontic treatment between the ages of 8 and 15 and reported pain in the area of the anterior mandible.

The lateral image showed a retrusive lower face inclined forward with mid-facial hypoplasia — *regio infraorbitale* — a flat upper lip and an elongated lower face compared with the mid-face — 47:53 percent instead of 50:50 percent (Table I; Fig. 2a). Owing to the negative sagittal overjet, there was a positive lower lip step. The frontal image shows mandibular deviation (laterognathia) to the right, which can be traced to growth asymmetry in the jaw (Fig. 2b).

In addition, there was a Class III dysgnathia angle with conspicuous mandibular midline deviation to the right, frontal and right lateral crossbite, anterior mandibular labial tilt and a steep anterior mandible. Tooth 26 had been missing for some time (Figs. 3a–e). FRS analysis (Table I and II) clearly shows the strongly sagittal and relatively weak vertical dysgnathia both in the soft-