There are also other types of osteotomies that are used in mandibular orthognathic surgery. The **vertical ramus osteotomy** divides the mandibular ramus from the sigmoid notch down to the angular region. The bony cut is made posterior to the point where the mandibular nerve enters the bone, and this is why it has lower incidence of IAN injury than BSSO. Also patients tend to have fewer TMJ complaints after IVRO than BSSO. A great disadvantage of this method is, however, that it can be used only to setback procedures of the mandible (Figure below).

**Figure 1. The vertical ramus osteotomy can be used to set the mandible posteriorly**

The **inverted L-osteotomy** is a versatile procedure to treat severe mandibular deformities. In large asymmetry cases, an inverted L-osteotomy or IVRO may be preferable to the BSSO. The inverted L-osteotomy is also a good procedure for secondary correction of proximal segment mal-rotation following BSSO. Exposure of the lateral ramus and completion of the inferior vertical osteotomy are the same as for the IVRO. The main difference is that the vertical osteotomy ends just superior to the mandibular foramen (Figure below).

**Figure 2. The inverted L-osteotomy can be used to set the mandible posteriorly. It also allows vertical lengthening or shortening of the ramus without affecting the major muscles of mastication.**

The vertical body osteotomy involves the removal of a piece of the mandibular body usually through combined extra oral and intra oral approaches. Indications for this procedure are mandibular prognathism where the body is long in relation to the ramus or when it is useful to utilize space from planned extractions sites or already missing teeth (Fig. 6).
Figure 3. The vertical body osteotomies can be performed in any area of the mandible to move the anterior segment of the mandible posteriorly, or alter the vertical and transverse position.

The step osteotomy may be indicated in cases of mandibular prognathism, retrognathism, asymmetry, and apertognathia. By performing bilateral step-shaped cuts in the body of the mandible, the lower jaw is divided into three separate, independently moveable pieces. This osteotomy is particularly well suited in cases with edentulous spaces (Fig.4).

Figure 4. The step osteotomy to allow retrusion of the anterior fragment of the mandible

The mandibular subapical osteotomies are designed to alter portions of the mandibular dental alveolus. Indications include leveling the occlusal plane, changing the anteroposterior position of the teeth, correcting asymmetries and changing the axial angulation of the teeth (Fig. 5).

Figure 5. The anterior subapical osteotomy (Wolford & Fields 1999).

In 1942, the horizontal osteotomy of the symphysis called genioplasty was introduced by Hofer. Other than the introduction of an intraoral approach by Obwegeser (1957), very little has changed. It cuts the mandible in a horizontal direction in the front of the chin. The bone cut is anterior and inferior to the point where the nerve exits the bone (Fig. 9). The genioplasty is also often used in combination with BSSO, which may increase the tension on the nerve.

Figure 6. The genioplasty