Chapter 13
Left–Right Asymmetries and other Common Anatomical Variants of Temporomandibular Articular Surfaces

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ABSTRACT

In this chapter, the authors describe systematically left-right asymmetries and other common anatomical variants of the temporomandibular articular surfaces as they can appear in daily clinical practice. Digital photography and macroscopic observation were used to evaluate morphologic features of TMJ surfaces of elderly subjects at 100 glenoid fossae and articular eminences of dried skull bases, and at 100 dried mandibles. Mandibular condyle shape in the horizontal plane and in the frontal plane were evaluated using a standardized classification devised by Öberg et al. (1971). Degenerative form and surface changes of the TMJ were assessed using a scale devised by Wedel et al. (1978). The antero-posterior and medio-lateral diameter of the temporomandibular articular surfaces were measured using a digital caliper. The orientation was determined using a clinical goniometer. Morphologic left-right asymmetries of the temporomandibular articular surfaces were frequently present in mandibular condyles and in glenoid fossae. In general, mandibular condyles showed more often morphologic left-right

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asymmetries than glenoid fossae. Anatomical variants of the articular surfaces of the left and right mandibular condyles resulted from differences in shape. The majority of the articular surfaces had an oblong horizontal outline and a rounded frontal outline. One fifth of the mandibular condyles showed pear-shaped horizontal outlines and flat or ridge-shaped frontal outlines. An important incidence of left-right asymmetries and other common anatomical variants of the temporomandibular articular joint surfaces must be considered at observation and therapy of the temporomandibular joint; arthrokinematic functional consequences may result.

INTRODUCTION

Development of the Temporomandibular Joint

Formation of the TMJ starts during embryologic development but completion normally stops before the age of 30 years (Björk, 1955; Ingervall et al., 1976; Morimoto et al., 1987; Mérida-Velasco et al., 1999; Katsavrias, 2002). The inferior joint cavity is formed in the ninth week of embryologic development. The glenoid fossa and the superior joint cavity are formed two weeks afterwards (Mérida-Velasco et al., 1999). The articular eminence of the TMJ develops after birth and enchondral calcification of the mandibular condyle periphery begins during the teen-age period (Figure 1) (Ingervall et al., 1976; Katsavrias, 2002).

The morphology of the temporomandibular articular surfaces changes constantly during life time. Changes after the age of 30 are considered adaptations to altered functions. Consequently, the function of the TMJ is assumed to show up anatomical variants and specifically asymmetries (Katsavrias, 2002).

Asymmetries of the Mandibular Condyle

In literature only a few publications about left-right asymmetries and anatomical variants of the TMJ are available. There is a lack of systematic investigations concerning asymmetries of the temporomandibular articular surfaces in recent dried skulls. Available information relates to morphologic differences of mandibular condyles.

In a western population of 286 patients, Sheppard (1982) found mandibular condyle asymmetry in 40% of the cases. In a study conducted by Capurso and Bonazza (1990), macroscopic observation of 100 dry Sardinian skulls revealed asymmetry of mandibular condyles in 30% of the cases. Evaluation of 26 X-rays of patients with temporomandibular joint dysfunction by

Figure 1. Cross section of the temporomandibular joint, lateral view