

By 8 weeks of gestation, portions of the TMJ are present and by 21 weeks the superior portion of the lateral pterygoid attaches to the anterior and medial intra-articular disc, and the area is considered to be prenatally developed. Bony development of the maxilla may not be completed until as long as 2 years after full skeletal height is achieved (Rocabado & Iglarsh 1991).

The function of the TMJs is closely related to that of the cervical spine and can be influenced by postural adaptations associated with childhood habits. These habits include thumb sucking; prolonged use of a bottle or pacifier; and open-mouth breathing associated with asthma, allergies, or other **upper respiratory obstructions**.

Osteology

The bones of the TMJ are the mandible and the temporal bone (figure 7.1). The mandible is essentially suspended from the temporal bones on either side of the skull by ligaments.

The mandible is a U-shaped bone with condyles on each end. The body of the mandible is the more horizontal component; it receives the lower teeth at the alveolar process at the upper margin of the body. Notable markings on the interior of the body of the mandible are the **digastric fossa**, site of the attachment of digastric muscles on the inferoanterior aspect

of the anterior portion of the body, and the **mylohyoid line**, the area of attachment of the flat mylohyoid muscle on the interior surface of the body of the mandible (Neumann 2010).

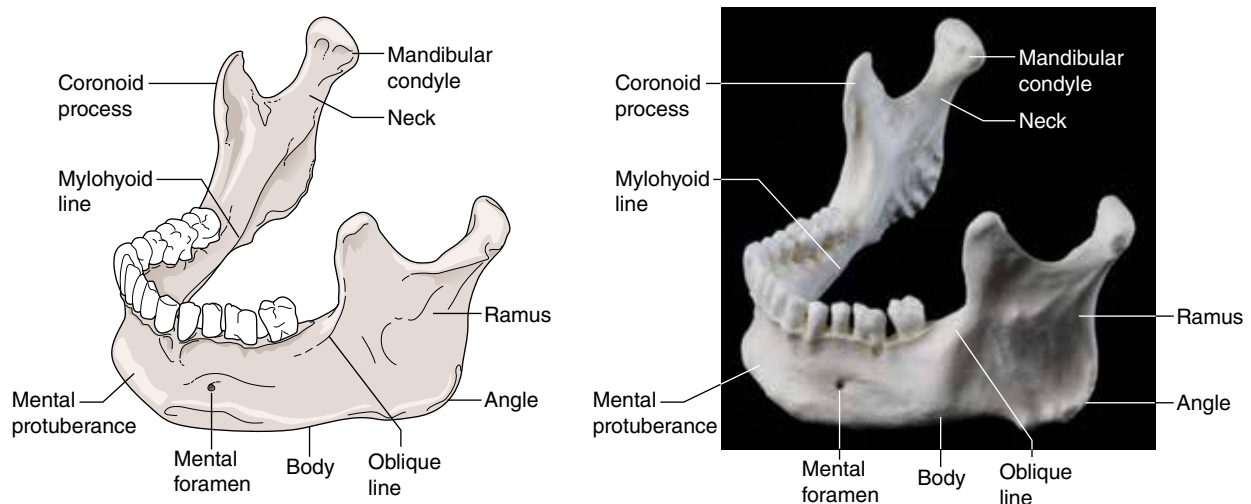
► KEY POINT

The mandible is a U-shaped bone with condyles on each end. The ramus is the more vertical component of the mandible.

The ramus is the more vertical component of the mandible. At the superior end of the ramus are two projections, the **coronoid process** and the **mandibular condyle**. The coronoid process is the anterior bony projection that provides attachment for the temporalis and the masseter muscles. The most superior portion of the coronoid process rests deep to the zygomatic arch, and its anterior aspect can be palpated posterior to the third molars high in the intraoral cavity. The mandibular notch is the area between the coronoid process and the mandibular neck.

The angle of the mandible is the posterior inferior portion of the mandible where the body and the ramus meet. This bony area is sandwiched in muscle, with the internal surface providing attachment for the medial pterygoid muscle and the lateral surface covered by the masseter.

The mandibular neck is the posterior projection of the ramus that supports the con-



► **FIGURE 7.1** TMJ anatomy.

dyle. Located on the anterior aspect of the neck is the **pterygoid fossa**, which provides attachment for the inferior head of the lateral pterygoid. The mandibular condyle is a continuation of the neck of the mandible. This convex condyle has a lateral and a medial pole. The lateral pole is not as long as the medial pole and rests anterior to the medial pole. An extended line transecting the anterior and posterior halves of each condyle would meet at a point just anterior to the **foramen magnum**. This is notable from a clinical standpoint when mobilizing the joint (see Clinical Correlation 7.1).

The mandibular condyle articulates with the disc, and together with the disc and the temporal bone form the TMJ, the unilateral component of the craniomandibular complex.

At the inferior and lateral aspect of the temporal bone is the mandibular fossa. The mandibular fossa rests above the mandibular condyle, but only a portion of the bone is suitable for the loading and weight bearing required for proper functioning of the TMJ. The most superior bony portion of the mandibular fossa forms the roof of the TMJ. This region of bone is quite thin, and there may be only 3 mm of bone thickness between the superior portion of the mandibular fossa and the cranial cavity. The bony roof is covered by a thin layer of fibrocartilage that makes the area a poor choice for weight-bearing activities (Levangie & Norkin 2011).

It is notable that the cartilaginous covering of the temporal bone in the TMJ is fibrocartilage rather than the hyaline cartilage typically associated with synovial joints. Compared with hyaline cartilage, fibrocartilage allows for increased tolerance of repetitive or high loads as well as improved ability to repair damage sustained during micro- or macrotrauma (Krause 1994). When microtrauma to

the joint exceeds the tissue's ability to repair itself, tissue breakdown occurs. **Parafunctional activities** are activities that contribute to microtrauma of the TMJ, including finger-nail biting, lip chewing, gum chewing, tooth grinding (**bruxism**), and jaw clenching. These parafunctional activities repetitively load the joint and over time may produce a sequence of degenerative changes to the joint such as joint laxity, disc dysfunction, and changes to the articular cartilage (Rocabado & Iglarsh 1991). For example, during normal functional use of the craniomandibular complex, the teeth come into full occlusion only during swallowing and to a lesser degree, during chewing (Rocabado & Iglarsh 1991). Even during chewing, food creates varying degrees of separation of the upper and lower arches of the teeth. Consider the increased repetitive loading of the TMJs when the patient chews gum several hours during the day compared with eating at normal intervals. In general, the clinician should counsel the patient to avoid parafunctional activities.

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The more vertical posterior border of the mandibular fossa is called the **posterior glenoid tubercle** and rests just anterior to the external auditory meatus. Occasionally, this area of the mandibular fossa can be fractured with a blow to the anterior mandible. The fibrocartilage covering the posterior glenoid tubercle is thin.

CLINICAL CORRELATION 7.1

When joint mobilization of the TMJ is indicated, the clinician will mobilize the mandibular condyle in order to separate the bone/disc/bone surfaces and elongate the joint capsule. The lateral mobilization force in this case is not purely lateral but is directed laterally and slightly anteriorly, along a line parallel to the mandibular condyle.