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| **Name:** |
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| 4A-4 |
| **Basic Science Question:** |
| Explain the anatomy of the temporomandibular joint (TMJ) |
| **Report:** |
| The temporomandibular joint consists of the articulation point between the head of the mandibular condyle and the mandibular fossa of the temporal bone. The mandibular fossa is comprised of two boney features that play a role in the articulation of the joint. The articular eminence is the ridge surrounding the mandibular fossa that is broken up into the anterior and posterior slope. The anterior slope is non-load bearing while the posterior slope is pressure bearing. The posterior slope is the area where pressure is formed during mastication. The articular tubercle is the lateral aspect of the articular eminence. The tubercle is the boney feature that the mandibular condyle gets fixated upon during dislocation of the jaw.  The TMJ is classified as a diarthrosis or synovial joint. More specifically, a ginglymoarthrodial joint due to the combination of two primary actions: gliding and hinge movement. Within the TMJ, located between the mandibular fossa and the condyle, there is a biconcave disc that separates the joint into two compartments: superior and inferior. The superior compartment plays a role in the gliding or translatory movement while the inferior compartment plays a role in hinge movement. Furthermore, the disc is comprised of both fibrocartilage in the central region and elastic fibers in the posterior region. The fibrocartilage allows the disc to withstand compressive forces that occur during translatory and hinge motions. Conversely, the elastic fibers in the posterior region of the disc allow the jaw to open and shut. Within the joint, the disc is attached to both the internal periphery of the capsular ligament and the medial and lateral poles of the condyle. Additionally, the joint is lined with a synovial membrane that produces synovial fluid. The fluid lubricates the articular cartilage that is found on the head of the mandibular condyle and functions to facilitate smooth jaw movement between the articulating bones of the joint.  Further, the TMJ is covered by a dense fibrous connective tissue called the joint capsule. The connective tissue of the joint capsule runs circumfrentially from the mandible to the zygomatic bone in order to maintain articulation of the joint as well as facilitate necessary movement. Ligaments such as the temporomandibular, sphenomadibular, and stylomandibular provide support to the TMJ. For instance, the temporomandibular ligament originates from the zygomatic process of the temporal bone and inserts into the neck of the mandibular condyle. Therefore, it prevents posterior and excess lateral displacement of the condyle. The sphenomandibular ligament originates from the spine of the sphenoid and inserts into mandibular lingula. It becomes taut during excessive opening of the mandible. Finally, the stylomandibular ligament originates from the styloid process of the temporal bone and inserts into the angle of the mandible. Excessive protrusion of the mandible will cause this ligament to become taut.  The TMJ is innervated by the fifth cranial nerve - the mandibular branch of the trigeminal nerve. Turning to the mandibular branch, the joint is innervated by the auriculotemporal, massesteric and deep temporal nerve. The auricultemporal nerve branches to the majority of the joint. The masseteric branches posteriorly and innervates the posterior region of the joint. Finally, the deep temporal nerve branches anteriorly and innervates the anterior portion of the joint. The function of the aforementioned nerves is to provide sensory information about the joint. For example, the nerves would provide proprioception such as the joints location in space or pain reception.  The major arterial supply of the TMJ originates from two branches of the external carotid artery. The superficial temporal artery supplies the posterior capsule of the joint with blood while the maxillary artery supplies the anterior joint cavity. |
| **References:** |
| 1. Alomar X, Medrano J, Cabratosa J, Clavero JA, Lorente M, Serra I, Monill JM, Salvador A. Anatomy of the temporomandibular joint. Semin Ultrasound CT MR. 2007 Jun;28(3): 170-83. doi: 10.1053/j.sult.2007.02.002. PMID: 17571700. 2. Bordoni B, Varacallo M. Anatomy, Head and Neck, Temporomandibular Joint. 2020 Jul 31. In: StatPearls [Internet]. Treasure Island (FL): StatPearls Publishing; 2020 Jan-. PMID: 30860721. |