INTRODUCTION TO OCCLUSION: The Biomechanics of Mandibular Movement


Power Point Presentation

TERMS, DEFINITIONS AND CONCEPTS

I. TERMS

Occlusion: refers to the way in which teeth come together. By definition Occlusion is "the static and dynamic relationship between the maxillary and mandibular teeth." Adapted from: The Glossary of Prosthodontic Terms, eighth edition The editorial council of The Journal of Prosthetic Dentistry, Mosby, 1999

If a person is completely edentulous (has no teeth at all) then there is no occlusion. However dentures can be made to restore a patient to an artificial occlusion. You will be learning how to make dentures in Removable Prosthodontics in year 2.

II. FUNCTIONAL ANATOMY/ SKELETAL ANATOMY OF THE MASTICATORY SYSTEM:

A. Dentition and Support Structures: Teeth and Support Structures

32 permanent teeth (crown and root)
Gingival tissues, Alveolar bone and Periodontal ligament

B. Skeletal Anatomy

1.Maxilla: Two maxillary bones fused together at the mid-palatal suture.

The superior border of the maxilla forms the floor of the nasal cavity and the floor of the orbits. The bone forms the palate and the alveolar ridges inferiorly. Since the maxillary bones are fused to the surrounding bones of the skull, the maxillary teeth are also considered to be a fixed part of the skull.

2.Mandible: Is a U-shaped bone which does not have a bony attachment to the skull. It is suspended below the maxilla by muscles and ligaments.
Condyle: The part of the mandible which articulates with the cranium and where movement occurs. The condyles have both medial and lateral projections, called poles.

Ascending Ramus, Coronoid Process, Body of the mandible

3. Temporal Bone: The squamous portion of the temporal bone contains a concave fossa, the articular or Glenoid fossa, where the mandibular condyle is situated. The articular eminence is a convex bony surface located anterior to the fossa. The convexity is highly variable and dictates the condylar pathway anteriorly.

4. Temporomandibular Joint: It is a very complex joint in the human body. It combines two movements, a "hinging" movement (Ginglymoid joint), with a gliding movement (arthroidial joint) which combined is known to be a Ginglymoarthrodial Joint.

The Temporomandibular joint, TMJ, is formed by two bones, the condyle of the mandible and glenoid fossa of the temporal bone which are separated by a biconcave articular disc. The disc is considered a non-ossified bone. Functionally the joint is considered a compound joint, The articular disc allows for complex movement.

   a) Two Types of Movement:

      1) Rotational: Around three axes (Horizontal, Sagittal, Frontal/Vertical. **Need to know Horizontal and Vertical).

      2) Translational

C. BIOMECHANICS OF MANDIBULAR MOVEMENT: 4 Muscle Groups plus 1

1. Masseter m.- Elevates the mandible. The superficial portion aids in protrusion.
2. Temporalis m.- Elevates the mandible. Can also retract the mandible.
3. Medial Ptergoid m.- Elevates the mandible.
4. Lateral Ptergoid m.- Two Distinct Portions with different functions:

   a) Superior head-Active during the power stroke (closure of the mandible against resistance). It works in conjunction with the elevator muscles. The direction of the muscle pull is more medial than anterior and it appears that the muscle serves to:

      1) Stabilize the TMJ during the power stroke.

   b) Inferior head- Larger than the superior head and active in:
1) Protrusion - when both left and right lateral pterygoid m. contract simultaneously. 
2) Lateral movements - when only one inferior belly of the lat. pterygoid m. constricts contra laterally. (ie. the left lat. pterygoid m causes the mandible to move in a right lateral movement).

And

5. Digastric m. - Two portions. Generally it is not considered a muscle of mastication, however it has influence on the function of the mandible by depressing the mandible and raising the hyoid bone.

D. BORDER MOVEMENTS: Three planes of the limits of the mandible’s range of motion. The planes are the reproducible outer range of motion of the Mandible. Mandibular movement is limited by the ligaments, muscles of mastication, the articular surfaces of the TMJ's and the morphology and alignment of teeth.

“mandibular movement occurs as a complex series of interrelated three-dimensional rotational and translational activities, determined by the combined and simultaneous activities of both TMJs.” Okeson

1. Planes of Movement:
   a. Sagittal Plane-
   b. Horizontal Plane-
   c. Frontal Plane- Note the postural position or "rest" position is the upper most position within the frontal plane, with no tooth contact. It is just below CO.

2. Functional Movement: Not border movements. They are the masticatory movements determined by the conditional responses of the neuromuscular system and so fall within the limits of the border movements.

F. POSSELT'S ENVELOPE OF MOTION: A combination of:

1. The three dimensional border movements and functional movements.