**Biomechanics**

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**Id:** 15742 **Section:** B

**Question 1 A**

**Answer :**

***HUMEROULNAR JOINT***

Humeroulnar joint is the joint of "Elbow Complex." It is consists of two bone,

* The Ulna
* The Humerus

The joint is formed by the articulation of,

* Trochlera Notch Of Ulna
* Trochlea Of Humerus

***Movements Of Humeroulnar Joint***

It is modified hinge type joint which allows it to perform,

* Flexsion
* Extension
* Circumduction

During flexion and extension the concave fossa slides in the same direction in which the ulna moves so with the elbow flexsion the fossa slide around the trochlea is an anterior and distal dricetion. And with elbow extension the fossa slide in a posterior and proximal direction. The elbow moves from 0 degree of extension to 145 to 150 degree flexsion.

**Question 1 B**

**Answer**

**Humeroradial Joint**

The Humeroradial joint is of the Elbow Complex. It also consists of two bones,

* The Radius
* The Humerus

This joint is formed by the articulation of,

* Head Of The Radius
* Capitulum Of The Humerus

**Movements Of Humeroradial Joint**

It is the hinge-pivot type joint. The movements occur at this joint are,

* Flexsion
* Extension
* Pronation
* Supination

As the elbow flexes and extends the concave radial head slides in the same direction as the bone motion so with elbow flexion the concave head slides anteriorly and with elbow extension it slides posteriorly. With pronation and supination of the forearm, the radial head spins on the capitulum.

**Question 1 C**

**Carrying Angle**

"The angle formed between the long axis of Humerus and long axis ulna when the forearm is supinated"

**Normal angle:**

* In Men 5 degree
* In Women 10 degree

The angle is more in Women due to Wider Pelvis,

* Cubitus Valgus Increase in Carrying Angle
* Cubitus Varus Decrease in Carrying Angle

**Importance**

The carrying angle values increase progressively from childhood until 16 years when stabilization is noticed. Useful in management in elbow displacement and fractures, Epicondylar disease, surgical planning for reconstruction of elbow and walking, swinging and carrying objects.

**Question No 3 A**

**Answer**

**Muscle Twitch**

**Definition**

" The mechanical response of muscle to a single stimulus of its motor nerve is known as muscle twitch."

A muscle twitch is an involuntary contraction of the fibers that make up a muscle. Nerves control muscle fibers. When something stimulates or damages a nerve, it causes the muscle fibers to contract, resulting in a twitch. A person can often see or feel these twitches below the skin.

**Summation**

**Definition**

Summation occurs as successive stimuli are added together to produce a stronger muscle contraction. When mechanical responses to successive stimuli are added to an initial response, the result is known as summation.

**Refractory Period**

**Definition**

" If a second stimulus occurs during the latency period of the first muscle twitch, it produces no additional response and the muscle is said to be completely refractory. The greater the frequency of stimulation of the muscle fibers the greater the tension produced in the muscle as a whole."

**Question 3 B**

**TYPE OF MUSCLE CONTRACTION**

**Isometric Contraction:**The type of muscle contraction in which the length of muscle does not change but the tension increase.

**Example Of Isometric:**

Isometric contraction would be carrying an object in front of you. The weight of the object would be pulling downward, but your hands and arms would be opposing the motion with equal force going upwards.

**Isotonic Contraction:**

Same as isometric but a change in the length of muscle. Muscle shortens and movement occure.

**Example :** Squats, stair climbing, bicep curls and push-ups.

**Concentric Contraction:**

Concentric contraction are those which cause the muscle to shortens as it contracts.

**Example** A bending of an elbow from straight to fully flexed causing a concentric contraction of the bicpes brachii muscle. Concentric contraction are the most common type of muscle contraction and occur frequently in daily life and sporting activities.

**Eccentric**

Eccentric contraction are the opposite of the concentric contraction and occur when the muscle lengthens as it contracts. This is less common and usually involves the control or deceleration of a movement being initiated by eccentric muscle agonist.

**Question 3 C**

**Grade III strain.**

This strain tears the muscle all the way through, sometimes causing a pop sensation as the muscle rips into two separate pieces or shears away from its tendon. Grade III strains are serious injuries that cause complete loss of muscle function, and there is no pain felt or minimum pain felt because in severe injury the nerve fibers cut off and the sensation connection also cuts off so you cannot felt the sensation of pain.

**Question No 2 A**

**WRIST COMPLEX**

**Joints**

The wrist complex is consists of two joint,

* Radiocarpal Joint
* Midcarpal Joint

**The Radiocarpal joint :**

Has, The radius and the radioulnar disk with scaphiod, Lunate and the triquetrum.

**The Midcarpal Joint:**

It has scaphiod, lunate and triquetrum with trapizeum, trapizoid, capitate and hemate.

The radiocarpal joint is formed by the radius and radioulnar disk as part of the triangular fibrocartilage complex (TFCC) proximally and by the scaphoid, lunate, triquetrum distally.

The proximal joint surface is composed of,

Has two radial facets, which articulates with the scaphoid; and lunate

The TFCC, which articulates with the triquetrum, although it also has some contact with the lunate in the neutral wrist.

**CONTRIBUTION OF WRISTS COMPLEX**

The wrist complex has three contributions,

1. To control length-tension relationships in the multi Articular hand muscles

 2. Allow fine adjustment of grip

3. The wrist muscles appear to be designed for balance and control the adjustments

**RANGE OF MOTION**

The wrist complex is biaxial motions of extension/flexion ulnar deviation/radial deviation.

Pronation / supination may found especially at the radiocarpal joint

Normal ranges are

65 to 85 of flexion, 60 to 85 of extension, 15 to 21 of radial deviation, 20 to 45 of ulnar deviation.

**Question 2 B**

**Answer**

**CARPLE TUNNEL SYNDROME**

When the median nerve becomes compressed with in the carpal tunnel, a neuropathy known as carpal tunnel syndrome (CTS) proposed that the proximal edge of the TCL (Transverse Carpal Ligament) is the most common site for wrist flexion induced median nerve compression. When the TCL is cut to release median nerve compression, the carpal arch may widen. This is known as carple tunnel syndrome.

**Question No 4 A**

**Answer**

**DIFFERENT BETWEEN CARNIAL AND SPINAL NERVE**

**Cranial Nerve:**

Those nerve which originate from brain called cranial nerve. We have 12 pairs of cranial nerves. Cranial nerve are the pairs of nerve that connect the brain to the different part of,

* Head
* Neck
* Trunk

Each of them name from their function and structure, Each nerve also has a corresponding Roman numeral between I and XII.

**Spinal Nerve:**

These are the those nerve which originates from the spinal cord. In human body there are 31 pairs of spinal nerves.

Spinal nerves supply all the areas of the body except the head and neck region.

**Ventral And Dorsal Ramus Form Ventral And Dorsal Root**

From spinal cord two root originate one ventral and one dorsally, root on ventral or anterior side is called ventral root and root on dorsal or posterior side is called dorsal root. Dorsal root has ganglion, The dorsal root is the afferent sensory root and carries sensory information to the brain. The ventral root is the efferent motor root and carries motor information from the brain. These two roots ventral and dorsal unite and form spinal nerve. Each spinal nerve give rise to ventral and dorsal ramus.

**Question No 4 B**

**Neuropraxia:**

Neuropraxia is a type of peripheral nerve injury, and is known as the mildest form of nerve injury. It is classified as a transient conduction block of motor or sensory function without nerve degeneration, although loss of motor function is the most common finding.

**Axontomesis:**

The second degree in which the axon is damaged but the surrounding connecting tissue remains intact is called axonotmesis, severe form of nerve injury, seen typically after closed fractures and dislocations. There is loss of conduction but the nerve is in continuity and the neural tubes are intact.

**Neurotmesis:**

The last degree in which both the axon and connective tissue are damaged is called neurotmesis. Neurotmesis meant division of the nerve trunk such as may occur in an open wound. It is now recognized that severe degrees of damage.

**Question No 5 A**

**Answer**

**WOLF'S LAW**

This law is proposed by German anatomist Julius Wolf's in 1892

This law states that,

"Bone grows and remodels in response to the forces that are placed upon it in a healthy person. After an injury to a bone, placing specific stress in specific directions to the bone can help it remodel and become normal, healthy bone again."

**Question No 5 B**

**Answer**

**FRACUTURE**

A fracture is a broken bone. It can range from a thin crack to a complete break. Bone can fracture crosswise, lengthwise, in several places, or into many pieces. Most fractures happen when a bone is impacted by more force or pressure than it can support.

**STAGES OF FRACTURE REPAIR**

**Stage 1**

* Immediately after the fracture, extensive bleeding occurs. Over a period of several hours a large blood clot or fracture hematoma develops.
* Bone cells at the site become deprived of nutrients and die. The site becomes swollen, painful, and inflamed.

**Stage 2**

* Granulation tissue is formed as the hematoma is infiltrated by capillaries and macrophages which begin to clean up the debris.
* Some fibroblasts produce collagen fibers that span the break while others differentiate into chondroblasts and begin secreting cartilage matrix.
* Osteoblasts begin forming spongy bone.
* This entire structure is known as a fibrocartilaginous callus and it splints the broken bone.

**Stage 3**

* Bone trabeculae increase in number and convert the fibrocartilaginous callus into a bony callus of spongy bone.
* Typically takes about 6-8 weeks for this to occur.

**Stage 4**

* During the next several months, the bony callus is continually remodeled.
* Osteoclasts work to remove the temporary supportive structures while osteoblasts rebuild the compact bone and reconstruct the bone so it returns to its original shape/structure.