Essentials of Sports Injury Prevention & Rehabilitation

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Lecture – 10

Anatomy of Upper Limb

Good morning everyone, myself Dr. Atul Sharma.
module 1: essentials of sports injury prevention and rehabilitation. In this module, we are going to read about the relevant anatomy of the upper and lower limb, and various types of injuries, and how we can prevent those injuries, and rehabilitation of these injuries. In this module, we will read about the bony anatomy, various muscles; that is musculature of the upper limb and lower limb. So, students, first we will learn about the anatomy of the upper limb. In this, first we will learn the bony anatomy of the upper limb, and the musculature anatomy of the various muscles of the upper limb.

Upper limb as we all are aware, is made up of arm, forearm and fingers; but in the anatomical meaning it consists of humerus, radius, ulna, wrist bone that is carpal bones, metacarpal bones and phalanges. Apart from this upper limb, humerus, radius, ulna, carpal and metacarpal bones, there are two more interesting bones which are part of our upper limb. One is the scapula and the other is the clavicle. Scapula is also known as wing bone, and clavicle is also known as collar bone.

Clavicle transmits the weight of our upper limb to the trunk; and the scapula provides the complete movement of our shoulder girdle. Scapula is a flat bone which rotates over the thoracic cavity. I just drew the sketch of a scapula. This process is known as an acromion process. And that shallow cavity is the glenoid cavity, and with the help of the clavicle, it makes shoulder girdle in which head of humerus fits in this cavity and the clavicle bone transmits the weight of our upper limb to the thoracic cage. So it is a very small but important bone. Humerus is our arm bone. It is a long bone. It is around 12 inches or more than 12 inches as per the height of the individual. It is located between the shoulder joint and the elbow joint. It has various parts: the head, then neck, shaft, and the condyles. This is the head of the humerus. It is the neck of the humerus, its shaft and the condyles. And generally fractures in childhood are supracondylar fractures, and the fracture of the shaft.

Then comes our forearm bone that is our radius and ulna. Radius bone is our lateral bone, and the ulna is the medial bone. Its upper part is the trochlea and shaft and the styloid. In same way, the radius bone. These are the two bones. Radius is a lateral bone that is outside or towards the thumb side; and this is our ulna bone which is towards the little finger side. And both are the long bones and their length depends on the height of the individual.

Then comes our carpal bones. These are eight in numbers and arranged in two rows. The proximal rows towards the radius ulna side are our scaphoid, lunate, triquetrum and pisiform. And the distal row trapezium, trapezoid, capitate and hamate. These make two C-shaped rows and these carpal bones make joint with the metacarpal bones.

Metacarpals are five in numbers, and the head of metacarpal makes the knuckles of our fist. And, phalanges in the thumb there are only two phalangeal bones and in rest of the fingers they have three phalanges: proximal, middle and distal phalanges. And they make metacarpal-phalangeal joints, proximal phalangeal joints and distal interphalangeal joints.

After these bony structures, now we can read about the various muscles of the upper limbs. So first we will cover around the shoulder and scapula. Scapula is a flat bone but it gives origin to, or is surrounded with lots of muscles. Rhomboid major, rhomboid minor, teres major, teres minor, supraspinatus and infraspinatus, Subscapularis and serratus anterior. Few names you can see when we go just go back in the slides. Supraspinatus, this is a spinous process, this supraspinatus, infraspinatus as the name suggests, then subscapularis below the scapula.

Rhomboid major, rhomboid minor, teres major, teres minor and serratus anterior. Here, I just want to tell you about the rotator cuff. Rotator cuff is made up of four muscles: supraspinatus, infraspinatus, teres minor and subscapularis. These four muscles make the rotator cuff, and the importance of rotator cuff is that when the movement of our arm, that is during movement of humerus in the shoulder girdle, it stabilizes the arm as deltoids is a very powerful muscle. So these small muscles have a very big role in the stability of the shoulder joint.

Now, trapezius and sternocleidomastoid, these two muscles are helping muscles for the stability of the shoulder joint. Then comes the major muscles of our arms: that is deltoid. It is our shoulder muscles which we see from our naked eye, that is deltoid muscle. It is a multipennate muscle and it covers our entire shoulder girdle. Then comes triceps, as name suggests tri means it has three heads, and the biceps it has two heads.

Biceps muscle is our main arm muscles which we can see from our naked eye; and the triceps our back muscle of the arm. Then the common flexors of the forearm which originate from the medial side of the forearm; and lateral side it is the common extensor. If there is some trouble in the extensor, or some injuries in the extensors, it causes tennis elbow which is very common and

on the medial side it is the golfer's elbow and the various muscles of the palms. Now, we will cover various joint movements of our shoulder joint. Shoulder joint provides all kinds of movements which you can think of.

Flexion, extension, internal rotation, external rotation, circumduction and horizontal abduction, adduction and abduction. So the shoulder joint is a unique kind of a joint. It gives all kinds of movements. Then comes the elbow joint. Elbow joint generally provides two movements that are flexion and extension.

Radiolar joint provides our supination, supination and pronation; and the wrist joint again provides flexion, extension and circumduction. Little bit of adduction and abduction. These are the small joints of the fingers which give flexion and extension. And opposition is the main work of the thumb joint. Touching each and every finger is opposition.

So friends, so students: in this module where we have learnt about the anatomy of the upper limb. I will just recap about the anatomy of the upper limb. So we learnt about scapula, clavicle that is the collar bone, then the arm humerus, radius, ulna, carpal bones, metacarpal bones and phalanges. Thumb has only two phalanges and a metacarpal bone. And the humerus is a long bone of the arm.

Then the forearm bones are radius and ulna. Carpal bones are 8 in numbers, scaphoid, lunate, triquetrum, pisiform. Then the distal row is, trapezium, trapezoid, capitate and hamate. Then the metacarpals and phalanges; metacarpals are 5 in number, the head of the metacarpal makes the knuckle of our fist; and the thumb has only two phalanges and the rest of fingers have 3 phalanges.

The shoulder joint has various muscles. It is periscapular muscles which are rhomboid major, rhomboid minor, teres major, teres minor, supraspinatus, infraspinatus, subscapularis and serratus anterior. Rotator cuff muscles are supraspinatus, infraspinatus, teres minor and subscapularis. Then comes the trapezius and sternocleidomastoid which helps to stabilize our scapula. Deltoid muscle which is our triangular muscle, triceps muscle, biceps muscle, common flexors of the forearm; the minor injury or major injury of which causes the golfer elbow. The common extensors of the forearm which causes tennis elbow. And, muscles of the palm.

Now joints of movements, shoulder joint which gives flexion, extension, adduction, adduction, horizontal adduction, horizontal abduction and circumduction. The movement of a bowler is circumduction. Elbow joint gives flexion, extension. Radioulnar joint gives supination and pronation. Wrist joint gives circumduction, flexion, extension, adduction and abduction. So that is all for today's lecture.

We will meet next and read about anatomy of lower limbs. Thank you so much.