

Muscles Connecting the Upper Limb to the Vertebral Column

1-Trapezius:

O: external occipital protuberance, superior nuchal line, ligamentum nuchae (along dorsal spine of cervical vertebra),
spines of all thoracic vertebrae and their supraspinous ligament " the extension of ligamentum nuchae ".

Ins: (opposite to the Ori. Of Deltoid)

Upper fibers : Post. border lateral third of clavicle.

Mid.(lateral fibers): inner surface of acromial process.

Lower fibers: upper border of dorsal spine of scapula.

N.S: Spinal accessory nerve (motor) and C3 and 4 (sensory)

XI(11) cranial nerve (spinal part).

*Note that accessory nerve = XI(11) cranial nerve which has 2 parts :
cranial / spinal

Action :

Upper fibers :elevate the scapula.

middle fibers: pull scapula medially toward the ribs (retracts).

lower fibers: pull medial border of scapula downward .

*anterior fibers rotates the scapula.

Question 1 : to put your hand over your head what are the responsible muscles??

- Supraspinatus for initiation (0-15) or (0-18)

- middle fibers of Deltoid (15 or 18 -90)

- Trapezius & serratus anterior :after 90, rotation of scapula.

Question 2 : to touch the acromial process of the other side which muscle is responsible , and which nerve will stop the movement of the muscle if we cut it??

-muscle: pectorals major , medial & lateral pectoral nerve.

*always choose the easiest movement...

2-Latissimus dorsi :

O: Iliac crest, lumbar fascia, spines of lower six thoracic vertebrae (T7-T12), lower three or four ribs, and inferior angle of scapula ,then all fibers make conversion to ins.

Ins: Floor of bicipital groove of humerus.

N.S: Thoracodorsal nerve (branch of post. Cord of post. Division)

Root value (the most root which innervate the muscle mainly)is: C6, **7**, 8.

Action :Extends, adducts, and medially rotates the arm

Its called the climbing muscle

Raising of the trunk above the arm

3-Levator scapulae:

Origin :Transverse processes of first four cervical vertebrae.

Insertion :Medial border of scapula between superior angle & the root of dorsal spin (upper part of medial border).

Nerve supply:C3 and 4 and dorsal scapular nerve (from C5)

Root value:C3, 4, 5.

Action :Raises medial border of scapula.

4- Rhomboid minor:

Origin: dorsal spines of seventh cervical and first thoracic vertebrae.

Insertion :Medial border of scapula dorsally*, opposite the root of the dorsal spin.
dorsally :(with Rhomboid major & Levator scapulae) and note that ventrally there is serratus anterior.

Nerve supply:Dorsal scapular nerve.

Action:Raises medial border of scapula upward and medially.

5-Rhomboid major:

Origin: Second to fifth thoracic dorsal spines.

Insertion :Medial border of scapula ,below the root of the dorsal spin.

Nerve supply: Dorsal scapular nerve **C4, 5**.

Action: Raises medial border of scapula upward and medially.

6-Deltoid:

-A site for intramuscular injection because its bulky muscle.

Origin: (3 types of fibers)

Anterior fibers : Lateral third of anterior border of clavicle.

Posterior fibers : lower border of dorsal spin of scapula.

middle fibers: outer of acromion.

Insertion : deltoid tuberosity which comes on Middle of lateral surface of shaft of humerus.

N: Axillary nerve (from post. Cord) **C5, 6** but mainly C5 .

Action:

Middle fibers : Abducts arm (15-90), anterior fibers: flex and medially rotate arm; posterior fibers extend and laterally rotate arm.

7- Supraspinatus:

O: Supraspinous fossa of scapula.

Ins: Greater tuberosity of humerus; capsule of shoulder joint.

N.S: Suprascapular nerve (branch from upper trunk)

Root value : C4,5,6 and mainly 5.

Action : Abducts arm and stabilizes shoulder joint

**Initiation of abduction 0-15 degrees, clinically : when the patient could not do this step , that indicates to injury in Suprascapular nerve.

* Suprascapular nerve sinks suprascapular notch (deep to the ligament), into Supraspinous fossa to innervate Supraspinatus then enter between dorsal spinal and glenoid cavity to innervate Infraspinatus.

8-Infraspinatus:

Ori: Infraspinous fossa of scapula.

Ins: Greater tuberosity of humerus ; capsule of shoulder joint

N.S : Suprascapular

Action: Laterally rotates arm , extends, and stabilizes shoulder joint (because of its site; below and posterior to the shoulder joint).

9-Teres major:

Ori : Lower third of lateral border of scapula , till inferior angle.

Ins : Medial lip of bicipital groove.

** worth to note that bicipital groove has 3 important muscles : Latissimus dorsi (floor), Teres major (medial lip), pectorals major (lateral lip), the tendon in the groove = long head of biceps

N.S: Lower subscapular nerve(branch of posterior cord) , Root value : (**C6**, 7).

Action : Medially rotates (because of its anterior "Ins" to the humerus), adducts arm and stabilizes shoulder joint.

10-Teres minor:

"we watch it always from scapular region ; (the back) "

Origin: Upper two thirds of lateral border of scapula

Insertion: Greater tuberosity of humerus; capsule of shoulder joint

N.S: Axillary nerve (which supplies deltoid also).

Action :Laterally rotates arm and stabilizes shoulder joint.

11-Subscapularis:

Origin: Subscapular fossa of scapula.

Insertion: Lesser tuberosity of humerus

Nerve supply: Upper and lower subscapular nerves (branches of posterior cord), Root value: C5, **6**, 7.

Action :Medially rotates arm and stabilizes shoulder joint.

**Rotator Cuff muscle....(4 muscles surround the shoulder joint and stabilize it, and help in the attachment with capsule of shoulder joint by their tendons)...

- the tendons of the subscapularis (anterior), supraspinatus (superior), infraspinatus & teres minor (posterior)muscles.

- in the inferior part (un supported) : there is no muscle or tendon, & the capsule laxes inferiorly ;so that helps in dislocation of the shoulder joint when the head of humerus gets outside of glenoid cavity. And the doctor will then try to do reduction of shoulder.

-The tone of these muscles assists in holding the head of the humerus in the glenoid cavity of the scapula during movements at the shoulder joint (and that's why they called rotator).

**Spaces between muscles (in scapular region):

1-Quadrangular Space:

The quadrangular space is an intermuscular space, located immediately below the shoulder joint.

Bounders: teres minor (above), teres major (below), medially by the long head of the triceps and laterally by the surgical neck of the humerus.

Content: The axillary nerve and the posterior circumflex humeral vessels (branch of third part of axillary artery).

2-Triangular space:

Bounders: teres minor (above), teres major (below), long head of triceps (laterally).

Content: Radial nerve and the profunda brachii artery (which is a branch of brachial artery-the continuation of axillary artery after lower border of teres major-) then they are both pass along spinal artery.

3-the other Triangular space:

Bounders: teres major (above), shaft of humerus(laterally), medially by the long head of the triceps.

Axillary Nerve

The axillary nerve arises from the posterior cord of the brachial plexus , Root value (C5 and 6) in the axilla.

It passes backward and enters the quadrangular space with the posterior circumflex humeral artery.

As the nerve passes through the space, it comes into close relationship with the inferior aspect of the capsule of the shoulder joint and with the medial side of the surgical neck of the humerus. It terminates by dividing into anterior and posterior branches which innervate deltoid and teres minor (motor) & the skin over deltoid muscle especially lower part (sensory).

*if the patient has injury in axillary nerve then will be:

- loss of sensation
- loss of action(eg. abduction)
- atrophy in deltoid

Branches of axillary nerve :

-upper lateral cutaneous nerve of the arm (which supplies the skin over deltoid), articular branch to the shoulder joint.

-anterior terminal branch (which winds around the surgical neck of the humerus beneath the deltoid muscle; it supplies the deltoid and the skin that covers its lower part).

- posterior terminal branch, which gives off a branch to the teres minor muscle and a few branches to the deltoid, then emerges from the posterior border of the deltoid as the upper lateral cutaneous nerve of the arm.

"It is thus seen that the axillary nerve supplies the shoulder joint, two muscles, and the skin covering the lower half of the deltoid muscle"

The axillary nerve can be injured in dislocations of the shoulder joint

Suprascapular nerve: (a branch of upper trunk of brachial plexus)

It passes posterolaterally from its origin, through the suprascapular foramen (notch) - deep to ligament - to reach the posterior scapular region (suprascapular fossa) to innervate supraspinatus, then passes through the spinoglenoid notch to the infraspinous fossa and innervate the infraspinatus muscle.

Notice that :the nerve (which consist of fibers) exists below the ligament while the artery is above in order not to block the blood supply while exposure to pressure.

Notice also : the suprascapular nerve has no cutaneous branches.

Arterial Anastomosis Around the Shoulder Joint:

Collateral circulation of scapula means : different pathways for blood to reach it (laterally upper than axillary artery to compensate the blood supply for the upper limb if The extreme mobility of the shoulder joint results in kinking of the axillary artery and a temporary occlusion of its lumen) . And so, ensuring that an adequate blood flow takes place into the upper limb irrespective of the position of the arm. This is often as a result of anastomoses ...

Axillary artery is continuation of subclavian artery from the 1st rib ,and it continues as brachial artery after the lower border of teres major.

*What are the (arteries) branches of the subclavian artery and the axillary artery that contribute in forming arterial anastomosis that exists between them??

-Branches from the Subclavian Artery:

The suprascapular artery (a branch of thyrocervical trunk), which is distributed to the supraspinous and infraspinous fossae of the scapula

The transverse cervical artery (superficial & deep), which gives off a deep branch that runs down the medial border of the scapula.

-Branches from the Axillary Artery

The subscapular artery and its circumflex scapular branch supply the subscapular and infraspinous fossae of the scapula, respectively.

The anterior circumflex humeral artery

The posterior circumflex humeral artery

Both the circumflex arteries form an anastomosing circle around the surgical neck of the humerus.

*places of anastomoses:

- supraspinous fossa.

- infraspinous fossa.

- subscapular fossa.

- Inferior angle.

The end..

Hopefully, it was useful

And remember always.. " no pain, no gain "