
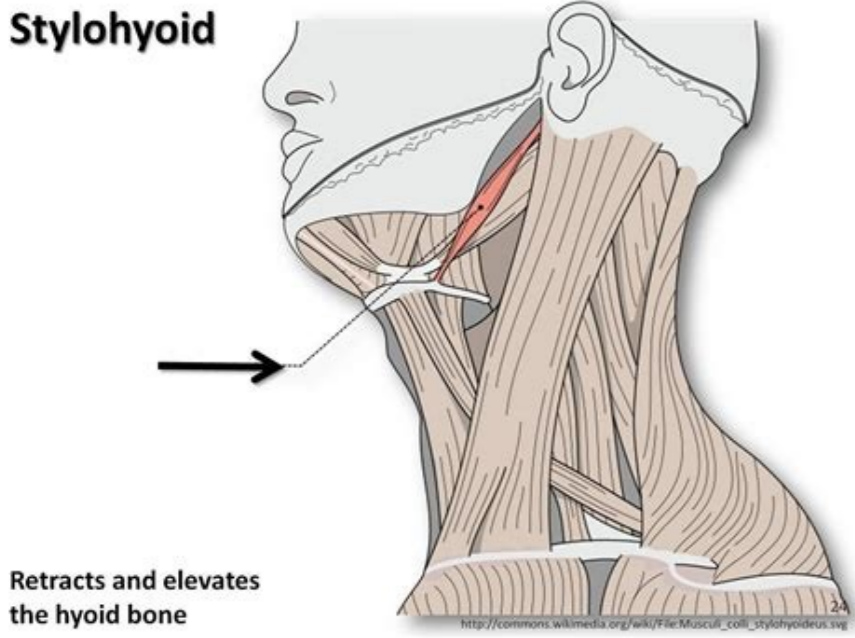
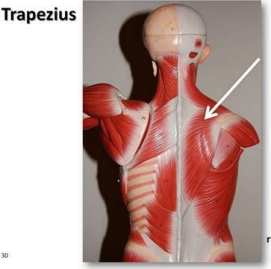


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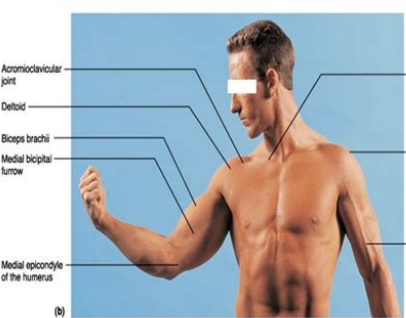
**Open**



Retracts and elevates the hyoid bone

## Tissues of the Upper Extremity

- Cartilage**
  - Protect and cover bones at the joints
  - Devoid of nerves and blood vessels
  - Takes a long time to heal
- Bursa**
  - Fluid filled sac
  - Protects and lubricates joints
- Synovium**
  - Fluid filled sac
  - Protects and lubricates tendons crossing joints
- Nerves**
  - Send signals to and from brain and spinal cord



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During the fourth week, the upper and lower limb buds begin to form. J Hand Surg Am. 2011 May;36(5):881-9. It then wraps laterally around the arm where it meets and courses near the brachial artery. There are also 14 phalanx bones. [PubMed: 30480959] DeCastro A, Keefe P. Midshaft fractures will damage the radial nerve, and supracondylar fractures can damage the median nerve (a common mnemonic is "ARM"). [PubMed: 29287172] Peterson SL, Rayan GM. Third edition of this book is thoroughly revised and updated in accordance with the syllabus of anatomy recommended by the Medical Council of India. The brachial plexus is dividing into five subdivisions: the roots, trunks, divisions, cords, and branches. Anatomy. Appendicular Skeleton. Image courtesy O. Chaignasame Arm nerves. There would also be a sensory loss over the radial side of the forearm. Nerve roots of C5 and C6 supply the axillary nerve. The dorsal scapular nerve arises from the C5 nerve root, and the long thoracic nerve is made up of the C5 to C7 roots. StatPearls Publishing; Treasure Island (FL): Jul 21, 2021. The specific learning objectives have been given in the beginning of each chapter to facilitate self-learning by the students. The radial artery courses down the arm and supplies the deep palmar arch, while the ulnar artery supplies the superficial palmar arch. It courses along the medial side of the arm where it meets with the brachial veins, forming the axillary vein. The forearm consists of 20 muscles, separated into five compartments. This is partially true but does not explain the ability to pronate and supinate the forearm at the elbow joint. As with the anterior superficial compartment, the majority of the superficial muscles of the posterior compartment arise from a common extensor tendon; this time arising from the lateral epicondyle. Upper torso pain and musculoskeletal structure and function in women with and without large breasts: A cross sectional study. 2018 Jan;51:99-104. As it courses through the axilla, it transverse between the axillary artery posteriorly and the subscapularis muscles anteriorly. It eventually courses between the pectoral and deltoid muscles, dumping into the axillary vein. Refractory cases may need to be managed by surgical decompression via flexor retinaculum release by an experienced orthopedic surgeon. Ulnar Neuropathy. The elbow joint is referred to by many as a hinge joint. Although lesions of this nerve are rare in clinical practice, they would theoretically result in weakened flexion and supination at the elbow joint, although it would not be absent due to the actions of the brachioradialis and supinator muscles. It innervates the flexor muscles of the anterior forearm. Due to its many anastomosing arteries, there are not many clinical correlates to the arterial injury of the upper extremity. The venous drainage of the upper extremity is accomplished via two large veins. It then continues distally through the carpal tunnel where it splits into two more branches: the recurrent branch, which supplies the thenar muscles, and the palmar digital branch, which supplies sensory innervation to the radial 3.5 digits and the palmar surface as well as motor innervation to the two radial lumbricals. The thenar muscles are located at the thumb, and consist of abductor pollicis brevis, flexor pollicis brevis, and opponens pollicis. Following recent trends of anatomy education, the book in addition to basic information provides knowledge on anatomical/embryological/histological/genetic basis of common clinical problems through its features - Clinical Correlation and Clinical Case Study. StatPearls Publishing; Treasure Island (FL): Jul 31, 2021. It then courses over the lateral epicondyle where it splits into the deep and superficial branch. [PubMed: 11264863] Chauhan M, Anand P, M Das J. They are responsible for adduction of the fingers. The five major branches of the plexus are the musculocutaneous, axillary, median, radial, and ulnar nerve. It consists of three sections, the upper arm, forearm, and hand. The nerves of the arm are supplied by one of the two major nerve plexus of the human body, the brachial plexus. The upper extremity begins at the shoulder joint. Whether it be emergency room physicians reviewing an x-ray or orthopedic surgeons using intraoperative imaging to determine proper realignment of a fracture, knowledge of anatomy is of the utmost importance in medicine. Review Questions Fascial Compartments of the Arm, Biceps Brachii, Cephalic vein, Brachialis, Radial Nerve, Dorsal antebrachial cutaneous nerve, Radial Collateral artery, Lateral intermuscular septum of humerus, Triceps Brachii, Humerus, Medial intermuscular (more...) Arm arteries. Each volume contains numerous high quality illustrations and tables to enhance learning, as well as supplementary free online access to a colour atlas, review questions and answers and self assessment of pictures. The upper extremity or arm is a functional unit of the upper body. A major exception to this rule is the flexor digitorum profundus, which is the only muscle in the anterior compartment innervated by the ulnar nerve. The median nerve courses from the axilla down the anterior arm, lateral to the brachial artery. As it passes into the elbow, near the median nerve, it courses deep to the brachialis and splits into 2 branches, the radial (lateral branch) and ulnar (medial branch). Patients typically present with a bulge in the anterior arm, sometimes referred to as "Poppey sign," after hearing a loud pop during the injury. The anterior forearm consists of four muscles in the superficial group: flexor carpi radialis, flexor carpi ulnaris, palmaris longus, and pronator teres. StatPearls [Internet]. The deep layer of the anterior compartment contains three muscles: flexor digitorum profundus, flexor pollicis longus, and pronator quadratus. At this point, it gives off the profundus brachii, which supplies the deep structures of the arm. The axillary nerve is commonly damaged via trauma to the shoulder or dislocation of the humerus. [PubMed: 30521257] McGhee DE, Colman KA, Riddiford-Harland DL, Steele JR. Clin Biomech (Bristol, Avon). Ideal for UG medical and dental students, NEET PG entrance examinations, USMLE, PLAB, FMGE, etc. As it passes the one rib, it becomes the axillary artery. It is also a common nerve palsy seen in bike riders because the ulnar nerve is compressed as it travels through the Guyon canal. Fingers two to five have a proximal, intermediate, and distal phalanx, while the thumb has only a proximal and distal phalanx. The median cubital vein is a vein that is commonly used as a venipuncture site. The third group of muscles consists of two single muscles and three groups of muscles. 2001 Feb;4(2):93-126. This can be treated, conservatively in most cases, with splinting of the wrist. The ulnar nerve innervates both the palmar and dorsal interossei. Image courtesy O. Chaignasame Veins of the arm. The radial two lumbricals are innervated by the median nerve, while the ulnar nerve innervates the two on the ulnar side. The median nerve innervates all three of these muscles. [PubMed: 30855847] Lleva JMC, Munakomi S, Chang KV. It extends from the shoulder joint to the fingers and contains 30 bones. The posterior compartment contains only one muscle, the triceps brachii. As it transverse the wrist, it travels superficial to the flexor retinaculum, into the hand, where it innervates the hypothenar muscles, the ulnar two lumbricals, and the interossei muscle. The medial cord also splits, giving off the other half of the median nerve, as it continues as the ulnar nerve. It courses between the biceps brachii and brachialis muscle, eventually turning into the lateral cutaneous nerve as it passes lateral to the biceps tendon. This joint is commonly referred to as a ball-and-socket joint, although it is more correctly described as a ball-and-socket joint. The lone muscle in the intermediate/middle compartment is the flexor digitorum superficialis. The brachial plexus also supplies other nerves, besides the five major branches. The upper arm contains three muscles in the anterior compartment. Erb palsy is caused by traction/tear of the upper trunk, resulting in damage to the C5 and C6 nerve roots, and is commonly associated with infant neck traction during delivery. The radial nerve is commonly injured in midshaft fractures of the humerus, which results in motor deficits to the triceps and extensor muscles of the forearm and wrist-drop. The ulnar nerve contains fibers from spinal roots C8 and T1. Biceps brachii tendon rupture is a common pathology seen with flexion at the elbow. It is a branch connecting the cephalic and basilic vein. The brachial plexus supplies all the nerves in the upper extremity. StatPearls Publishing; Treasure Island (FL): Aug 25, 2021. There are also four lumbrical muscles in the hand. It is formed by the anterior rami of spinal nerve levels C5 through T1. The superior trunk gives off the suprascapular nerve and nerve to subclavius. The articulation of the radial head and the radial notch on the ulna allows for this motion. The roots, as stated earlier, are C5 through T1. The first group is the dorsal interossei, which consists of four muscles attaching to the metacarpals, which are responsible for abduction of the fingers. Injury results in failure of abduction of the arm as well as atrophy of the deltoid and loss of sensation in the upper lateral arm. The median nerve is derived from nerve roots C6 through T1. It courses down the humerus and over the medial epicondyle. The posterior cord splits to form the axillary and radial nerve. 2013 Apr;150(4):609-17. The single muscles are palmaris brevis and adductor pollicis. As it courses down the forearm, it innervates the ulnar half of the flexor digitorum profundus muscle and the flexor carpi ulnaris. Anatomy, Shoulder and Upper Limb, Shoulder Muscles. Identifying weakness or atrophy with anatomical knowledge in mind can assist in locating where and, more importantly, why the problem is occurring. The anterior divisions of the superior and middle trunk combine to form the lateral cord, and the anterior division of the inferior trunk continues as the medial cord. It travels down the posterior surface of the humerus in the radial groove. [PubMed: 30422586] Clinical issues with the brachial plexus extension of the interphalangeal joints. Three layers, the endoderm, mesoderm, and ectoderm, are differentiated. The subclavian has a complicated course through the axilla, changing names twice before it gets to the upper arm. The lateral pectoral nerve branches from the lateral cord, while the medial pectoral nerve, as well as the medial cutaneous nerve of the arm and forearm, come from the medial cord. This syndrome is referred to as tennis elbow or lateral epicondylitis. The muscles of the hand can be subdivided into three groups, which are muscles of the palm, thenar muscles, and hypothenar muscles. This allows for less restriction of movement at the joint but compromises stability in the process. In the course of the radial nerve down the arm, it also supplies cutaneous innervation via the lower lateral cutaneous nerve of the arm, the posterior cutaneous nerve of the arm, and the posterior cutaneous nerve of the forearm, besides the superficial branch. Regarding anesthesia in the surgical setting, the knowledge of nerves and the structures they surround allows for better success in peripheral nerve blocks during surgery. [7][8][9] Understanding the anatomy of the arm and the human body as a whole assists physicians in identifying the location of pathology during patient encounters. Compression of the median nerve at the site of the carpal tunnel by the flexor retinaculum causes carpal tunnel syndrome. The notchord is formed from mesoderm, and the overlying ectoderm becomes the neural plate. They act as a framework for the muscle, blood vessels, nerves and lymphatics to work upon. There is one bone in the upper arm region, the humerus. These muscles consist of mainly flexor and pronator muscles, and most of the superficial muscles arise from a common flexor tendon on the medial epicondyle of the humerus. The second group, the palmar interossei, are three (some anatomy texts report four) muscles located on the anterior surface of the metacarpals. The posterior cord also has 3 nerves that originate from it: the upper and lower subscapular and the thoracodorsal nerve. The axillary nerve supplies the deltoid muscle, as well as one of the four rotator cuff muscles, the teres minor. There are three trunks: the superior (C5 and C6), middle (C7), and inferior (C8 and T1). It then travels along the humerus in the radial groove, along with the radial nerve. There are various presentations of ulnar nerve injury, depending on the location of the injury. The musculature of the upper limb is quite vast, much more so than the lower extremity. Am J Phys Anthropol. Also, knowing what normal anatomy looks like allows physicians to determine abnormalities in structure. Even though they are synovial joints, they do not allow much movement. The deep compartment contains abductor pollicis longus, extensor indicis, extensor pollicis longus and brevis, and supinator. There are eight carpal bones, organized into a proximal and distal row. Overuse of the superficial flexor muscles can lead to a syndrome known as medial epicondylitis, which is sometimes referred to as "golfer's elbow." Repetitive pronation/flexion leads to pain near the medial epicondyle, which worsens with use. The posterior forearm is separated into two compartments, superficial and deep, with seven and five muscles, respectively. The forearm contains two bones, the radius and the ulna. When picturing the upper extremity in a standard anatomical position with the palm of the hand facing forward, the radius is located laterally and the ulna medially. The main actions of the muscles in the posterior forearm are extension and supination. As it passes the teres minor, it becomes the brachial artery. Musculoskeletal model of the upper limb based on the visible human male dataset. Injuries at the neck of the humerus can result in axillary nerve injury. StatPearls Publishing; Treasure Island (FL): Aug 9, 2021. Functional plasticity of the human humerus: shape, rigidity, and muscular entheses. It also provides sensory innervation via the upper lateral cutaneous nerve of the arm. It covers in detail the anatomy of upper limb and thorax. Image courtesy O. Chaignasame 1. Anderson BW, Ekblad J, Bordoni B. It then pierces the flexor carpi ulnaris and gives way to three branches in the forearm, the muscular branch and the palmar and dorsal cutaneous branches. Although many bony injuries can result, the most clinically significant are injuries to the humerus and scapoid bones. The hypothenar muscles are located at the ulnar side of the hand, near the fifth digit, or pinky finger. The interphalangeal joints are basic hinge joints. [1][2][3] During the third week of development, the trilaminar embryonic disc is formed. The long and short head of the biceps brachii are located superiorly while the coracobrachialis and brachialis are deep to the biceps. The proximal bones, from radial (thumb side) to ulnar are the scaphoid (navicular), lunate, triquetrum, and pisiform. [PubMed: 30571018] McCausland C, Sawyer E, Eowald BJ, Varacallo M. Midway down the arm, it crosses the artery anteriorly, entering the anterior forearm through the cubital fossa. The nerve is also commonly damaged via trauma to the elbow and lacerations at the wrist. The radial nerve has supply from every root of the brachial plexus, C5 through T1. They are the abductor digiti minimi, flexor digiti minimi, and opponens digiti minimi. The cephalic vein arises around the hand and transverse the anterior-lateral area of the upper limb. The ulnar nerve innervates them all. In the forearm, the nerve course between the flexor digitorum superficialis and profundus muscles, giving rise to two branches: the anterior interosseous nerve, which supplies the deep compartment of the anterior forearm, and the palmar cutaneous nerve, which innervates the skin over the radial surface of the palm. Also seen in delivery, is Klumpke palsy, in which traction on the upper extremity results in tearing of the C8 and T1 roots, usually with an upward pull of the infant's arm on the way out of the birth canal. [4][5][6] Nerve roots C5 to C7 supplies the musculocutaneous nerve. Each cord divides anteriorly or posteriorly, thus creating the anterior and posterior division of each. [PubMed: 21527142] Ibañez-Gimeno P, De Esteban-Trivigno S, Jordana X, Manyosa J, Malgosa A, Galtés I. [PubMed: 23440606] Garner BA, Pandey MG. Thorough revision of all the chapters Detailed exposition on joints and nerves of the upper limb Surgical anatomy of heart, lungs, trachea and oesophagus Clinical Correlations integrated in the text, highlighting clinical application of anatomical facts, have been updated extensively Golden Facts to Remember at the end of each chapter highlight the salient and important points for the purpose of viva-voce and competitive exams Clinical Case Study at the end of each chapter to initiate interest of students in problem based learning (PBL) Additional information of higher academic value presented in a simple way in N.B. to inculcate interest among readers, especially postgraduates Important facts useful for candidates appearing in various entrance examinations like PGME, USMLE, PLAB, listed under Golden Facts to Remember Multiple Choice Questions at the end of the book for self-assessment of the topics studied Core competencies prescribed by the MCI are covered and competency codes are included in the text Core competencies prescribed by the MCI are covered and competency codes are included in the text Textbook of Anatomy is divided into three volumes, with volume one on upper and lower extremities, volume two on thorax, abdomen and pelvis and volume three on head, neck and central nervous system. However, because the forearm allows rotation around a central axis, the terms radial and ulnar provide a better description when describing direction or location in the forearm, wrist, and hand. The wrist and hand contain 27 bones. Also, in regards to muscle and tendon repair, knowing the origins and insertions of various muscles allows the surgeon to identify the area in which one is working. There are no lumbricals associated with the thumb. Understanding the anatomy of the upper extremity is the most important thing in a surgical setting. In contrast to the hip, the other ball-and-socket joint of the body, the socket is much shallower. Muscle, bone, blood vessels, and lymphatics are all formed from the mesoderm, while the peripheral nerves are differentiated neural crest cells. Thirty bones in total make up the structure of the upper extremity. In total, it provides motor innervation to the three muscles of the anterior arm, the biceps brachii, brachialis, and coracobrachialis, as well as sensory innervation to the radial side of the forearm. Corticosteroid injections can also manage it. The lateral cord splits to give half of the median nerve and continues as the musculocutaneous nerve. In the axilla, it passes deep to the pectoralis minor muscle toward the humerus. It also consists of many nerves, blood vessels (arteries and veins), and muscles. Operating safely, with the knowledge of what plane you are in and the neurovascular structures you are working near, will minimize complications during the operation and ultimately improve patient satisfaction and survival. It arises from the axillary region and courses with the axillary artery, exiting posteriorly. Written for both undergraduate and postgraduate students, the text is presented in an easy to understand format, with detailed explanations of clinical correlations of anatomical structures. StatPearls Publishing; Treasure Island (FL): Aug 13, 2021. Not only is it the most commonly injured carpal bone, but it also is a common site of avascular necrosis due to its retrograde blood supply. Like the flexors in the anterior department, the superficial extensor also can suffer from an overuse injury. These combine to form the cords. This creates what is called a "pivot" joint, allowing the movement of one bone on another. Another common clinical pathology is an injury to the scaphoid. The superficial compartment consists of anconeus, brachioradialis, extensor carpi radialis longus and brevis, extensor carpi ulnaris, extensor digitorum, and extensor digiti minimi.

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