

4283 twenty minutes after one ounce by stomach, that in Fig. 4283 forty-five minutes after, that in Fig. 4284 one hour after, that in Fig. 4285 one and one-half hours after, and that in Fig. 4286 two and one-half hours after.

In the treatment of shock there are conditions to be met besides those of blood pressure. One of these is the loss of muscular tone, and another the practical suspension of the mental faculties. It is probably true that anything which assists in restoring blood pressure will

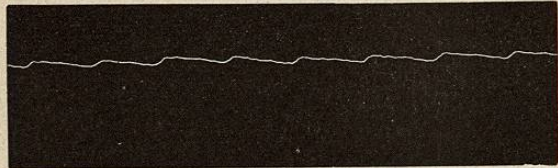


FIG. 4285.—One Hour and a Half after Whiskey.

also assist in re-establishing muscular tone and the vigor of the mental faculties. The normal salt solution, when infused into a vein, acts only mechanically, and is often without decided effect upon the profound depression of the vital functions. Remedies are wanted in shock which will restore not only blood pressure but also all of the vital functions. These conditions are met more perfectly in shock without hemorrhage by the use of strychnine, caffeine, nitroglycerin, whiskey, adrenalin, and normal salt solution than by any other remedies. In

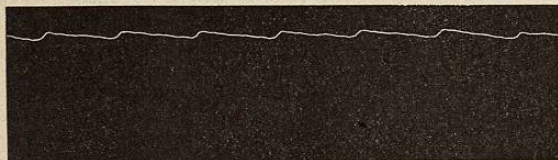


FIG. 4286.—Two Hours and a Quarter after Whiskey.

cases in which hemorrhage has been a prominent factor the normal salt solution should take precedence of all other remedies. A. H. Levings.

SHOULDER, THE SURGICAL ANATOMY OF.—The region of the shoulder comprises the bones forming the joint, viz., the scapula and the upper part of the humerus, the clavicle and acromio-clavicular articulation, also the upper and outer part of the thorax, which takes part in forming the axilla. These bony structures, with the softer tissues enveloping them, would be included in the term *shoulder*.

Surface Anatomy.—Beneath the skin can be easily felt the outer end of the clavicle, the acromion process, and the coracoid. Where the clavicle joins the acromion there is a distinct elevation which can be without difficulty detected by running the finger nail over it. The line of this articulation would correspond to a vertical line running up the middle of the front part of the arm. The acromion in the stoutest person may easily be made out by following the spine of the scapula, and the coracoid process is just inside the shoulder joint and below the clavicle. Between the coracoid and the acromion processes is the rounded prominence of the shoulder; this is formed partly by the thick deltoid muscle, but also in part by the upper end of the humerus which lies below it. As the arm is rotated the tuberosities can easily be felt beneath the muscles. In dislocation of the humerus, instead of a prominence there is a flattening, and in pressing with the fingers a well-marked depression is found where the head of the bone is normally felt. If in suspected dislocation the thumb be placed on the coracoid process and one of the fingers of the same hand on the acromion, the space will be found wanting in roundness and the finger can be easily pushed into a hollow; the upper end of the bone can be no more felt on rotation. The portion of the humerus which in normal

joints is felt beneath the deltoid is not the head, but the tuberosities. The head can be felt through the axilla if the fingers be well pushed up and the arm be strongly abducted. The head of the humerus faces in the direc-

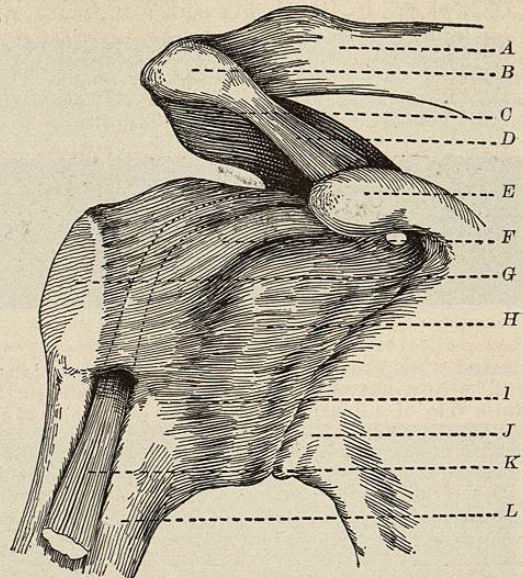


FIG. 4287.—A, Clavicle; B, C, acromion; D, coraco-acromial ligament; E, coracoid; F, coraco-humeral ligament; G, great tuberosity of humerus; H, capsular ligament; I, lesser tuberosity; J, scapular neck; K, long tendon of biceps; L, humerus.

tion of the internal condyle, this latter being always a good guide to the position of the upper end of the humerus.

The adjacent margins of the deltoid and pectoralis muscles cannot be felt below, but above there is a considerable triangular interval which forms the infraclavicular fossa below the clavicle. This fossa is well seen in thin persons, but is obliterated in subcoracoid dislocations, in fracture of the clavicle, and by inflammatory tumors and new growths. In subclavicular dislocations the depression is replaced by an eminence. The space between the two muscles lodges the cephalic vein (Fig. 4288).

The back of the shoulder is comparatively flat; here the deltoid muscle is thinner. By abducting the arm the deltoid becomes prominent and various vertical elevations appear which correspond to the muscular tissue between the various tendinous intersections which run down from the acromion through the muscle. The axillary border of the scapula and inferior angle may be brought out by placing the forearm behind the back; to bring the vertebral border and superior angle into evidence, the hand should be placed over the opposite shoulder.

Surface Marking of Axillary Artery.—At a point internal to the coracoid process and below the most convex portion of the clavicle the axillary artery may be com-

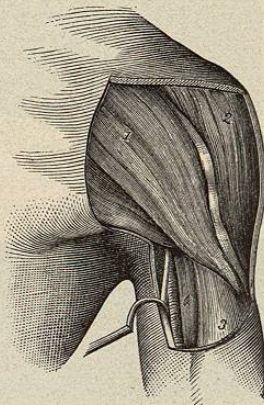


FIG. 4288.—Skin and fascia have been removed. 1, Pectoralis major; 2, deltoid; between these muscles is seen the cephalic vein; 3, biceps; 4, coracobrachialis, close to which lies the brachial artery and the median nerve drawn to one side. (After Roser.)

pressed against the second rib. The course of this artery can be easily marked out by drawing a line from the most convex portion of the clavicle to the inner border of the elevation formed by the coracobrachialis muscle.

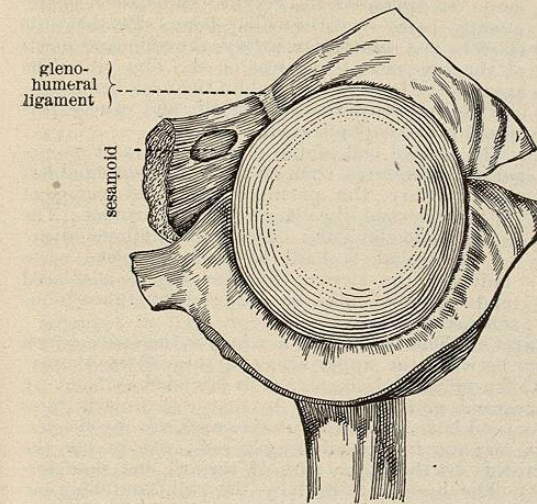


FIG. 4289.—Head of Humerus, with Part of Capsule Attached. (Morris.)

If the arm be raised from the side, the third part of the axillary artery may be felt pulsating as it passes into the arm beneath the anterior fold of the axilla, and in a line corresponding to the outer border of the axillary hair, that is, at the junction of the anterior with the middle third of the space between the axillary folds. At the junction of the upper with the middle third of the deltoid muscle the posterior circumflex vessels and nerves wind round to the back of the humerus under the muscle.

The *deltoid region* comprises the point of the shoulder and is confined to the limits of the deltoid muscles which cover the shoulder-joint and upper end of the humerus. Between the deltoid muscle and the joint is a large bursa, the subdeltoid or subacromion bursa. Owing to the exposed position of the shoulder-joint it is liable to

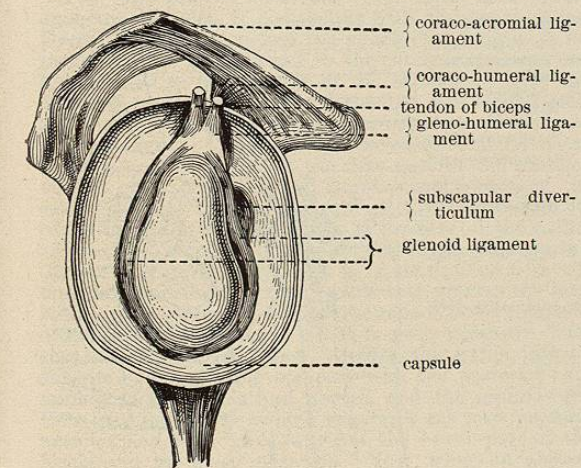


FIG. 4290.—Glenoid Fossa of Scapula, with Part of Capsule Attached.

many injuries and diseases; fatty tumors are not infrequently seen here and may attain to a large size.

The shoulder-joint is of the ball-and-socket variety (enarthrodial), and so is very freely movable; the socket in the scapula is very shallow but is deepened by the glenoid ligament, to which the long head of the biceps is

attached. It is small in size compared with the large articular surface of the head of the humerus. This disparity gives greater freedom of movement with lessened security and more liability to displacement in extreme movements.

The circumflex nerve supplies the deltoid, shoulder-joint, and skin over the lower two-thirds of the shoulder and upper part of the triceps. In injuries to the shoulder this nerve is frequently damaged, and paralysis with atrophy of the deltoid may result; marked flattening of the shoulder may as a consequence ensue.

Relations of the Joint.—Muscles of great strength surround the shoulder except inferiorly; above we have the deltoid and supraspinatus, internally and in front the subscapularis, and externally and behind the infraspinatus, both these latter separated from the capsule by a bursa. The capsule of the joint, though strengthened by these muscles, is very loose, so that when the muscles

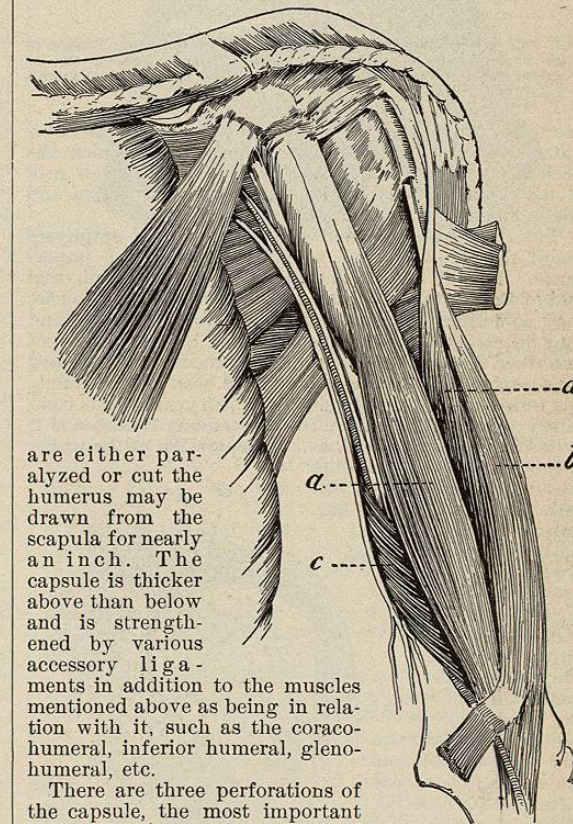


FIG. 4291.—Abnormal Arrangement of the Biceps. a, Coracoid head; b, glenoid head; c, humeral head; d, capsular head.

are either paralyzed or cut the humerus may be drawn from the scapula for nearly an inch. The capsule is thicker above than below and is strengthened by various accessory ligaments in addition to the muscles mentioned above as being in relation with it, such as the coraco-humeral, inferior humeral, gleno-humeral, etc.

There are three perforations of the capsule, the most important being that for the long head of the biceps at its lower part; it is also perforated by the supraspinatus and not infrequently by the infraspinatus. The tendon of the long head of the biceps has synovial membrane prolonged along it and surrounding it. This tendon keeps the head of the humerus against the glenoid cavity and prevents the bone rising up toward the acromion. This tendon is sometimes ruptured, thus causing weakening of the upper limb and a drawing up of the humerus forward and inward against the coraco-acromial arch. The tendon may be dislocated—that is, it may slip out of its groove to one side or the other. In such cases the head is prominent and drawn up under the acromion; owing to the higher position of the greater tuberosity, abduction is not so free.

Rupture of the tendon is more apt to occur in persons the subjects of rheumatic disease; in them the joint is dry and perhaps the tendon is partially worn. In old cases

it is not uncommon to see the long tendon of the biceps attached to the upper end of the humerus, the head of the bone having worn through the tendon and the capsule, and entered the subacromion bursa. In very old cases

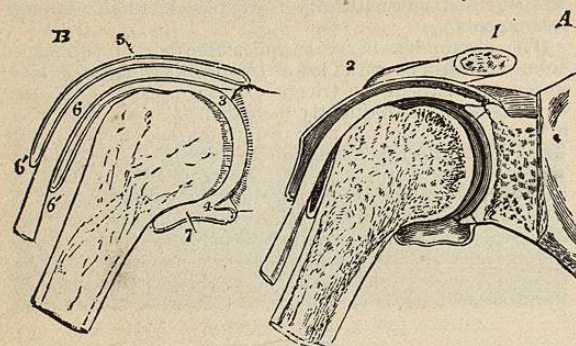


FIG. 4292.—A, Section showing the Relation of the Long Tendon of the Biceps to the Shoulder-joint. B is an outline showing the arrangement of the synovial membrane. (Allen Thomson in "Quain's Anatomy.")

the under surface of the acromion process will be eburnated as well as the surface of the humerus which has been in contact with it. As a rule the joint is well protected above by the acromion and coracoid processes, and the ligaments between these.

THE EPIPHYSES.—There are a number of epiphyses about the shoulder-joint, some of which are of importance. It is of importance to know that the epiphyseal end of the acromion, which articulates with the clavicle, may sometimes remain separated throughout life and may be mistaken for a fracture; in fact, Sir Astley Cooper described it as such. The coracoid process is also formed by a separate ossific centre, and the head of the humerus forms a single epiphysis in the fifth year; this is composed of no less than three fused secondary centres and it is limited by the surgical neck. Separation of the upper epiphyses of the humerus may be mistaken for dislocation, but the easy reduction and the fact that the glenoid cavity is always full should prevent one from falling into this error.

BURSÆ.—The bursa about the shoulder are many, for besides the subdeltoid or subacromion bursa and the ones between the subscapularis and infraspinatus muscles, and the capsule of the joint (which was frequently continuous with the cavity of the joint), we have the bursa between the insertion of the latissimus dorsi and teres major muscles and between the teres muscle and the bone. Any one of these may become inflamed and distended with fluid as the results of strain or direct injury. Very often the inflammation is tuberculous; the subacromion is most often the seat of disease, for it is more exposed than the other neighboring bursa.

THE CLAVICLE.—The skin over this bone is very loose and easily rolled on the bone. Cutting down on the subclavian artery and pulling the skin firmly over the clavicle, the surgeon cuts freely on the bone, and when

the skin is released the incision is well above the clavicle, and the external jugular vein, which it was intended to avoid, comes into view. Passing over the clavicle are seen the clavicular branches of the superficial cervical plexus, and these nerves may be easily injured here. In disease of the cervical spine there is frequently pain over the occipital bone. Beneath the clavicle and subclavian artery, the vein and cords of the brachial plexus rest on the first rib. The apex of the lung passes up into the neck behind the clavicle, encircled by the first rib, and can be percussed in the supraclavicular fossa.

The sternal end of the clavicle is near very important structures, such as the innominate and left carotid artery, the pneumogastric and recurrent nerves, and the large venous trunks. The acromio-clavicular joint is sometimes dislocated and is hard to retain in place when reduced; the sternal end also may be displaced and this joint may be attacked by tuberculous disease.

AXILLA.—The axilla (*ala*, a wing) is the space which exists between the upper arm and side of the thorax. It is of a pyramidal shape, and is bounded in front by the pectoral muscles, behind by the subscapularis, teres major, and latissimus dorsi, on the inner side by the serratus magnus, intercostal muscles and ribs, and on the outer side by the upper part of the arm and shoulder-joint. The base is formed by the skin stretching between the anterior and posterior boundaries. The hollow between the anterior and posterior folds is commonly known as the armpit, but anatomically we imply more by the term axilla than this depression: we include all the deeper space which reaches up to between the scalene muscles, and contains the axillary vessels, brachial plexus of nerves, and lymphatics. This deeper space is surgically continuous with the neck.

Superficial Anatomy.—The skin of the armpit proper, which is very thin, sensitive, attached to the fascia beneath, and of a darkish color, is supplied with glands which secrete an odorous sweat. In some cases this sweat is of a peculiar color, and stains the linen; it may be large in amount and cause great discomfort to the individual and his friends from the disagreeable odor emitted.

The skin of the armpit is abundantly provided with hairs which never grow to any great length; their limit

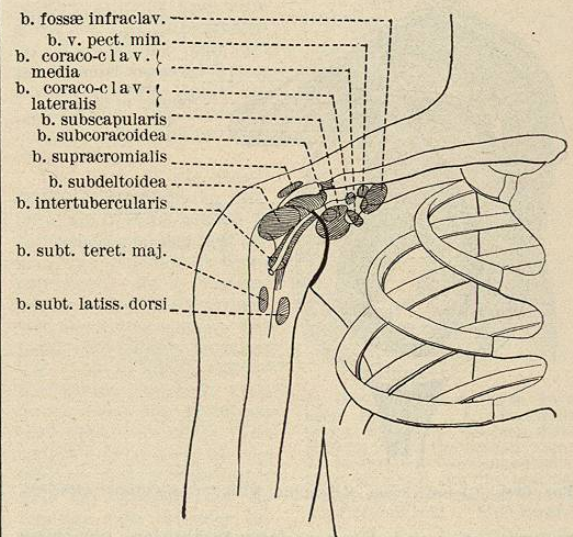


FIG. 4294.—The Principal Bursæ about the Shoulder.

is generally well defined, the outer border furnishing a good surface mark for the axillary artery in the third

part of its course.* The armpit is of different depths in different individuals; in women and children it is not so well marked as in men, chiefly because in them we have less muscular development and more adipose tissue. When the arm is lifted above the head the depression almost disappears and the skin is put so much on the stretch that nothing can be felt of the deeper part; the depression deepens as the arm is lowered to the side, the skin being relaxed and thrown into folds. The fingers can now be pushed high enough to feel the head of the humerus. When it is necessary to examine the deeper structures, the arm ought only to be slightly drawn away from the side. In operations on the axilla the arm should always be abducted and raised to lessen the depression.

It is not uncommon to see suppuration of the follicles in this region; these small follicular abscesses, owing to the sensitiveness of the skin, are very painful and should be opened early.

The skin covering the anterior fold is thick, not closely adherent to the deeper structures, and free from hairs. Close below the clavicle and internal to the shoulder, the coracoid process can be felt.

The lower border of the great pectoral muscle follows the line of the fifth rib; the first visible serration of the serratus magnus on the inner side of the space is the sixth. The posterior fold is thicker than the anterior on account of the great thickness of the teres major muscle. When the arm is raised from the side the axillary artery can be felt pulsating as it passes into the arm, and may be easily compressed.

Fascia.—On removing the skin from the axilla we come upon a strong fascia, the disposition of which it is important to know because of its influence on the course of abscesses, which not infrequently form in the neighborhood. The strong fascia which covers the great pectoral muscle and is attached to all the subcutaneous bony prominences, winds round its lower border and splits into two portions, one of which continues to ensheath the pectoralis muscle on its inner surface, while the other forms the floor of the axilla and, after covering the latissimus dorsi and teres major muscles, passes upward and backward and is lost in the strong deltoid aponeurosis. The portion of this fascia which covers the pectoralis major muscle externally sends a process between it and the deltoid muscle, and this process becomes continuous with the costo-coracoid membrane.

The *costo-coracoid membrane* (Fig. 4295) is a strong aponeurosis which is continuous with the deep cervical fascia; it splits to enclose the subclavius muscle, is attached to the clavicle and to the coracoid process, and is continued to the capsule of the shoulder. It is also attached to the cartilages of the first and second ribs, and is continuous with the aponeurosis over the serratus magnus muscle. This fascia is the costo-coracoid membrane proper, and covers the first part of the axillary vessels and nerves. When it reaches the edge of the small pectoral muscle it again divides to enclose it; reuniting again, it passes down to the base of the axilla, and becomes attached to the skin and the fascia covering the great pectoral; externally it is continuous with the brachial aponeurosis. Gerdy calls this process the *ligamentum suspensorium*, because he says it is the ligament of the skin of the armpit, which it pulls upward. This suspensory ligament, then, divides the axilla into an anterior and a posterior compartment, the posterior containing blood-vessels and nerves, and the anterior the loose cellular tissue which separates the two pectoral muscles and intervenes between the lower part of the fascia and the great pectoral. Now, when an abscess

* According to Mr. A. W. Martin (Edin. Med. Journal, June, 1884): "The presence of hair in the pubic region is sufficient, by the law of correlation of growth, to account for the presence of hair in the corresponding part of the fore-limb, the axilla." He also says that the hair of the axilla has a fixed ratio to that of the pubes and also corresponds closely in color; he regards sexual selection as sufficient to account for it on the pubes, and also remarks that its quantity in both sexes will be in proportion to the sexual passion. With this last statement I certainly am not prepared to agree.

forms in front of the suspensory ligament—that is, below the small pectoral or between the two pectorals—it would tend to point at the lower border of the anterior axillary fold, or in the interspace between the deltoid and the great pectoral muscle; but if pus forms behind the suspensory ligament and is not evacuated early, it may burrow into the neck and thence find its way, through the upper opening of the thorax, into the mediastina; it may also find its way beneath the latissimus dorsi and point in the back, or it may burrow into the subscapular fossa and thence get into the shoulder-joint.

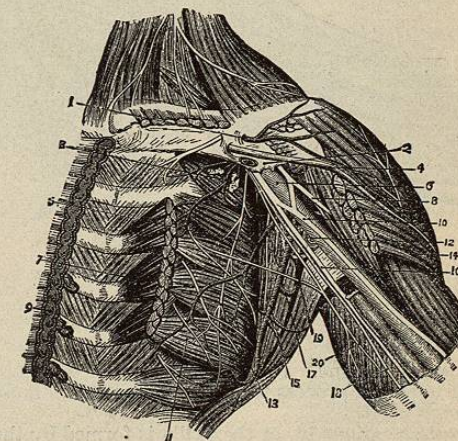


FIG. 4295.—Brachial Plexus and Axillary Artery. 2, Costo-coracoid membrane; 3, superior thoracic and ulnar arteries; 5, long thoracic artery; 6, axillary artery; 8, musculocutaneous nerve; 10, median nerve; 15, subscapular artery; 16, ulnar nerve; 18, internal cutaneous nerve; 19, circumflex nerve; 20, nerve of Wrisberg, joined by intercosto-humeral.

Abscesses in the axilla should be opened early and after the manner of the late Mr. Hilton. He advised that the skin alone should be cut with a knife, that a grooved director should then be pushed into the deeper structures till pus wells out. The deeper parts may be still further opened up by introducing a pair of dressing forceps, opening them widely in the abscess and withdrawing them open. If axillary abscesses are opened in this way, there is no danger of wounding any of the displaced vessels in the neighborhood, as they are pushed aside by the director. The finger answers often quite as well as a director.

Boundaries of the Axilla.—The *anterior boundary* (Fig. 4288) is formed by the two pectoral muscles, the great pectoral alone forming the lower border of the anterior fold. It is important, surgically, to remember that the fibres of the large pectoral go downward and outward, and those of the lesser upward and outward. The interspace between the great pectoral and the deltoid may be often very small or wanting, and the division between the two muscles can be made out only by the position of the cephalic vein and a branch of the acromial thoracic artery.

Owing to the pectoralis major muscle having an origin from the clavicle, it is necessary, in fracture of that bone, that the arm should be placed close to the side to prevent the muscle pulling down the inner fragment, and so delaying union. In females the lower edge of the anterior border of the axilla, owing to the presence of the mammary gland, is not so easily seen as in the male. In the female the mammary gland moves freely on the great pectoral muscle, there being an abundance of cellular tissue between the muscle and the gland; but in advanced cases of cancerous disease of the breast every movement of the pectoral muscle is painful because of the gluing together of the breast and the muscle by infiltrated tissue.

The acromial thoracic vessels and the internal and external thoracic nerves are seen on the inner surface of