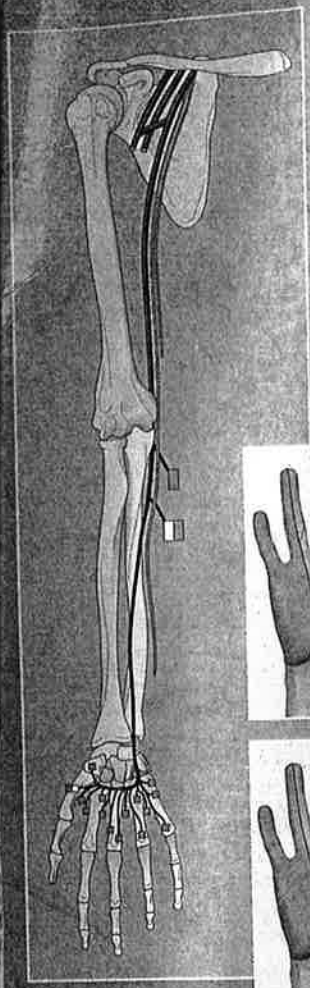
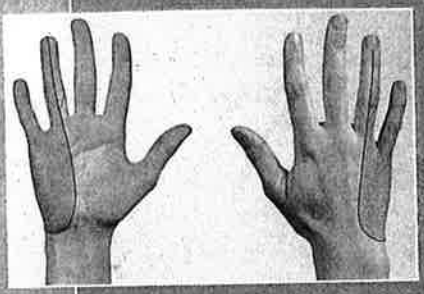
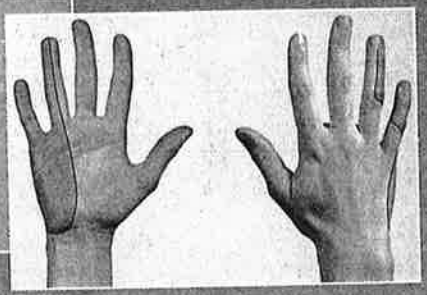
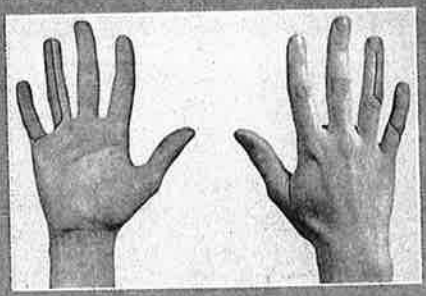
FOURTH EDITION

AIDS TO THE EXAMINATION OF THE PERIPHERAL NERVOUS SYSTEM









W. B. SAUNDERS
On behalf of the Guarantors of *Brain*

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INTRODUCTION

This atlas is intended as a guide to the examination of patients with lesions of peripheral nerves and nerve roots.

These examinations should, if possible, be conducted in a quiet room where patient and examiner will be free from distraction. For both motor and sensory testing it is important that the patient should first be warm. The nature and object of the tests should be explained to the patient so that his interest and co-operation are secured. If either shows signs of fatigue, the session should be discontinued and resumed later.

Motor testing

A muscle may act as a *prime mover,* as a *fixator,* as an *antagonist,* or as a *synergist.* Thus, flexor carpi ulnaris acts as a *prime mover* when it flexes and adducts the wrist; as a *fixator* when it immobilises the pisiform bone during contraction of the adductor digiti minimi; as an *antagonist* when it resists extension of the wrist; and as a *synergist* when the digits, but not the wrists, are extended.

As far as possible the action of each muscle should be observed separately and a note made of those in which power has been retained as well as of those that are weak or paralysed. It is usual to examine the power of a muscle in relation to the movement of a single joint. It has long been customary to use a 0 to 5 scale for recording muscle power, but it is generally recognised that subdivision of grade 4 may be helpful.

0 No contraction
1 Flicker or trace of contraction
2 Active movement, with gravity eliminated
3 Active movement against gravity
4 Active movement against gravity and resistance
5 Normal power

Grades 4–, 4 and 4+, may be used to indicate movement against slight, moderate and strong resistance respectively.

The models employed in this work were not chosen because they showed unusual muscular development; the ease with which the contraction of muscles is identified varies with the build of the patient, and it is essential that the examiner should both look for and endeavour to feel the contraction of an accessible muscle and/or the movement of its tendon. In most of the illustrations the optimum point for palpation has been marked.

Muscles have been arranged in the order of the origin of their motor supply from nerve trunks, which is convenient in many examinations. Usually only one method of testing each muscle is shown but, where necessary, multiple illustrations have been included if a muscle has more than one important action. The examiner should apply the tests as they are illustrated, because the techniques shown will eliminate many of the traps for the inexperienced provided by 'trick' movements. It should be noted that each of the methods used tests, as a rule, the action of muscles at a single joint.

When testing a movement, the limb should be firmly supported proximal to the relevant joint, so that the test is confined to the chosen muscle group and does not require the patient to fix the limb proximally by muscle contraction. In this book, this principle is

illustrated in Figs 12, 18, 28b, 31 and many others. In some illustrations, the examiners supporting hand has been omitted for clarity (for example Figs 30, 34, 48 and 53).

The usual nerve supply to each muscle is stated in the captions, and the spinal segments from which it is derived, the more important of the latter being printed in heavy type. Tables showing limb muscles arranged according to their supply by individual nerve roots and peripheral nerves are to be found on pages 60–61.

A table showing commonly tested movements is on page 62.

Sensory testing

The patient is first asked to outline the area of sensory abnormality; this can be a useful guide to the detailed examination. Light touch should be tested by touches with something soft such as cotton wool or a light finger touch, working from the insensitive towards the normal area. If the area of sensory abnormality is hypersensitive the direction is reversed. For testing superficial pain a sharp pin should be used and again – unless there is apparent hypersensitivity (hyperpathia) – the stimuli are applied first to the analgesic area, working outwards.

It may also be important to test two-point discrimination on the fingers, joint position sense and, on occasion, deep pressure sense.

The area of skin supplied by any one nerve or nerve root varies from patient to patient, peripheral nerve distribution is more reliable and consistent than nerve root supply. The areas shown in the diagrams are the usual ones.

Fig. 1 Trapezius (Spinal accessory nerve and C3, C4)
The patient is elevating the shoulder against resistance.
Arrow: the thick upper part of the muscle can be seen and felt.

Fig. 2 Trapezius (Spinal accessory nerve and C3, C4)
The patient is pushing the palms of the hands hard against a wall with the elbows fully extended. *Arrow:* the lower fibres of trapezius can be seen and felt.

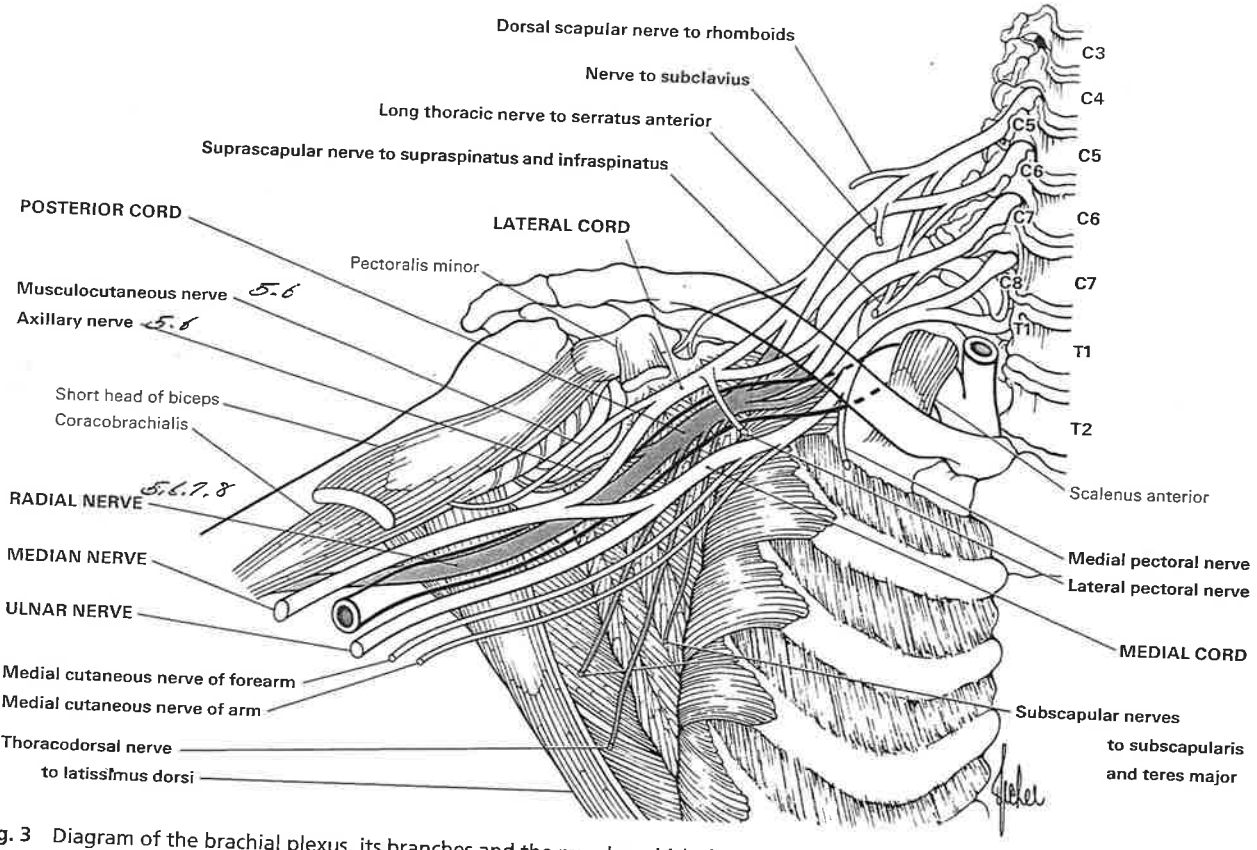

Fig. 3 Diagram of the brachial plexus, its branches and the muscles which they supply.

Fig. 4 The approximate area within which sensory changes may be found in complete lesions of the brachial plexus (C5, C6, C7, C8, T1).

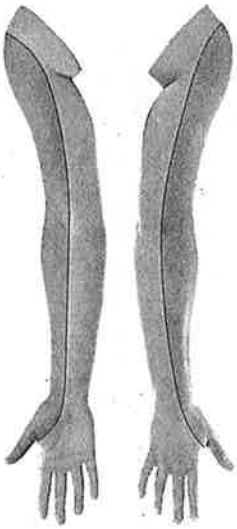

Fig. 5 The approximate area within which sensory changes may be found in lesions of the upper roots (C5,C6) of the brachial plexus.

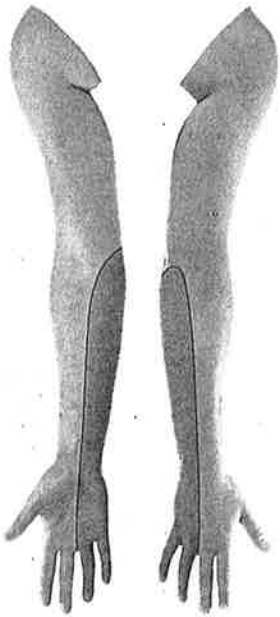

Fig. 6 The approximate area within which sensory changes may be found in lesions of the lower roots (C8, T1) of the brachial plexus.

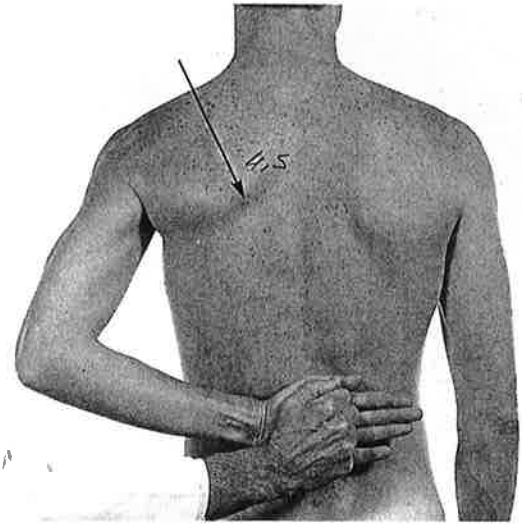

Fig. 7 Rhomboids (Dorsal scapular nerve; C4, C5)
The patient is pressing the palm of his hand backwards against the examiner's hand. *Arrow:* the muscle bellies can be felt and sometimes seen.

Fig. 8 Serratus anterior (Long thoracic nerve; C5, C6, C7)
The patient is pushing against a wall. The left serratus anterior is paralysed and there is winging of the scapula.

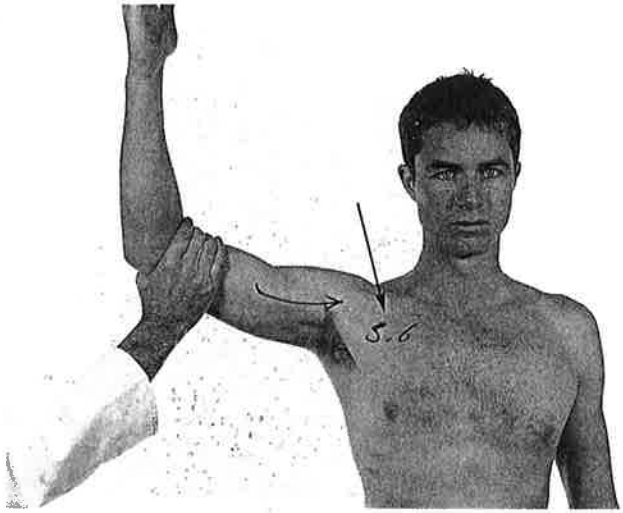

Fig. 9 Pectoralis Major: Clavicular Head (Lateral pectoral nerve; C5, C6)
The upper arm is above the horizontal and the patient is pushing forward against the examiner's hand. *Arrow:* the clavicular head of pectoralis major can be seen and felt.

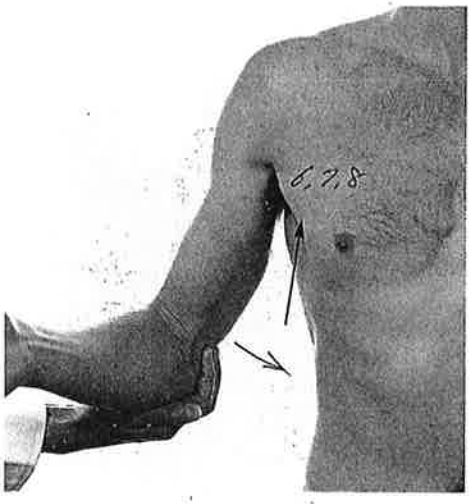

Fig. 10 Pectoralis Major: Sternocostal Head (Lateral and medial pectoral nerves; C6, C7, C8)
The patient is adducting the upper arm against resistance.
Arrow: the sterno-costal head can be seen and felt.

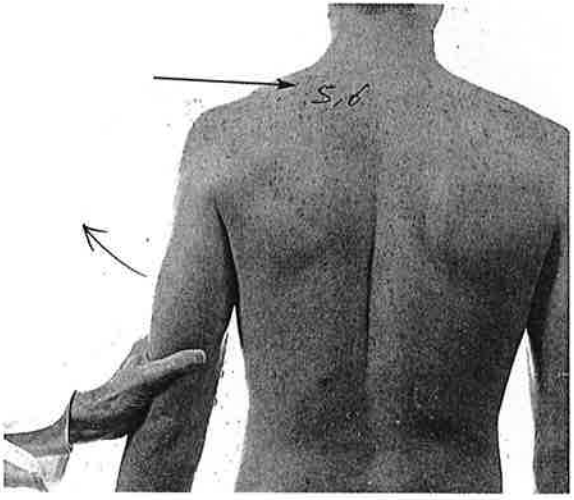

Fig. 11 Supraspinatus (Suprascapular nerve; C5,-C6)
The patient is abducting the upper arm against resistance.
Arrow: the muscle belly can be felt and sometimes seen.

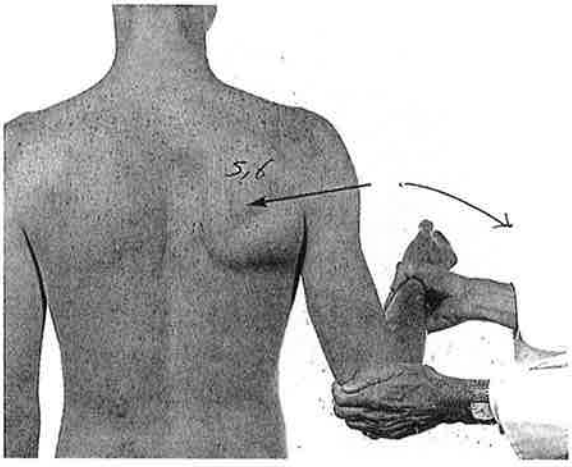

Fig. 12 Infraspinatus (Suprascapular nerve; C5,-C6)
The patient is externally rotating the upper arm at the shoulder against resistance. The examiner's right hand is resisting the movement and supporting the forearm with the elbow at a right angle; his left hand is supporting the elbow and preventing abduction of the arm. *Arrow*: the muscle belly can be seen and felt.

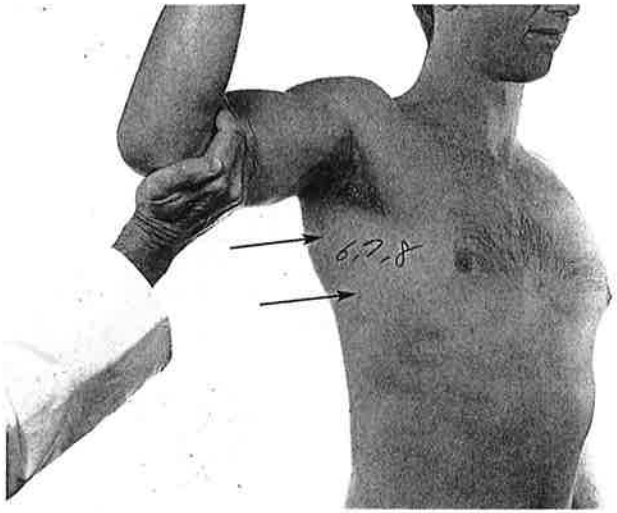

Fig. 13 Latissimus Dorsi (Thoracodorsal nerve; C6, C7, C8)
The upper arm is horizontal and the patient is adducting it against resistance. *Lower arrow:* the muscle belly can be seen and felt. The *upper arrow* points to teres major.

Fig. 14 Latissimus Dorsi (Thoracodorsal nerve; C6, C7, C8)
The Muscle bellies can be felt to contract when the patient coughs.

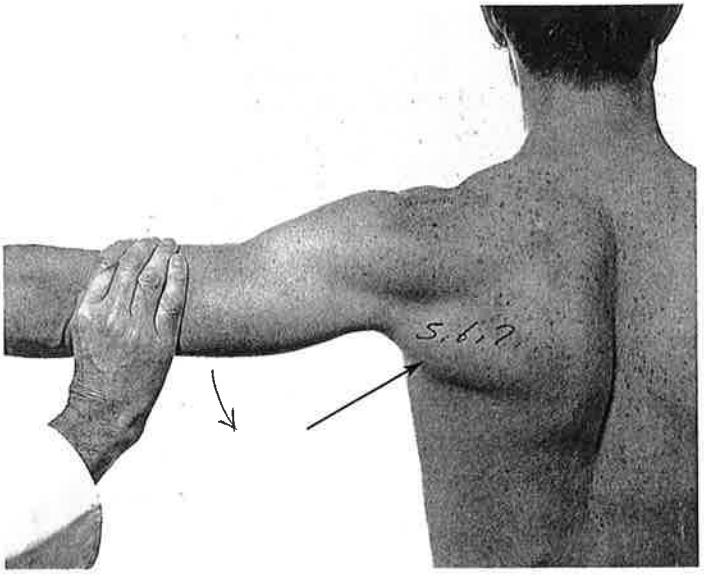

Fig. 15 Teres Major (Subscapular nerve; C5, C6, C7)
The patient is adducting the elevated upper arm against resistance.
Arrow: the muscle belly can be seen and felt.

MUSCULOCUTANEOUS NERVE

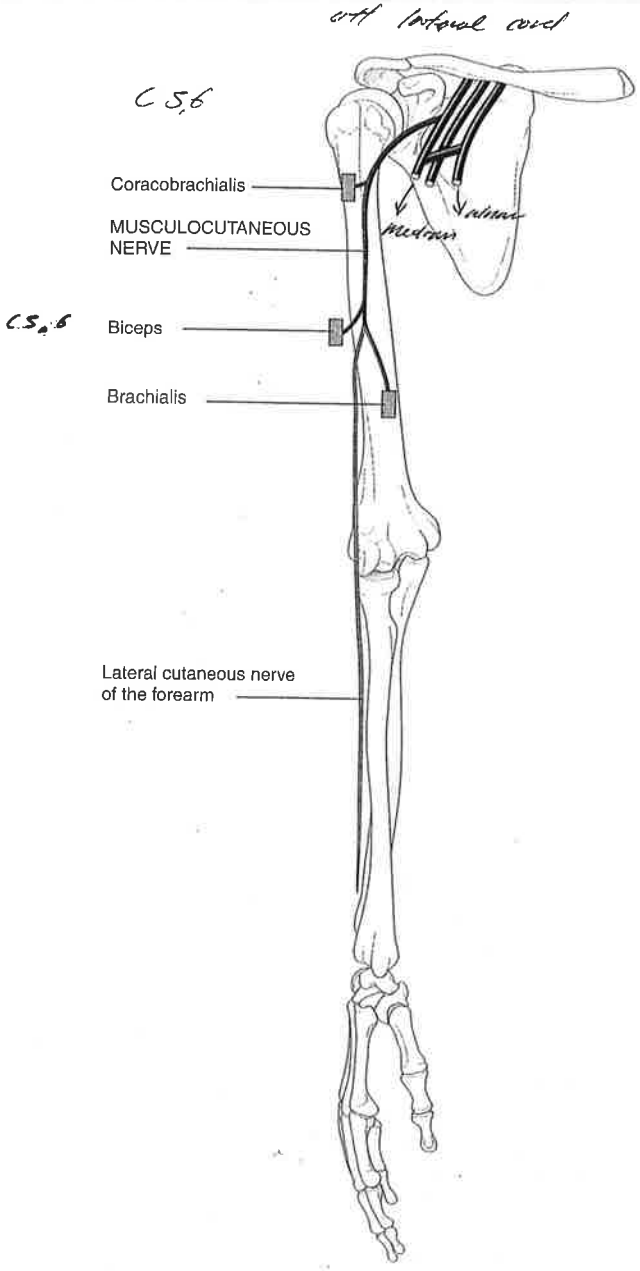

Fig. 16 Diagram of the musculocutaneous nerve, its major cutaneous branch and the muscles which it supplies.

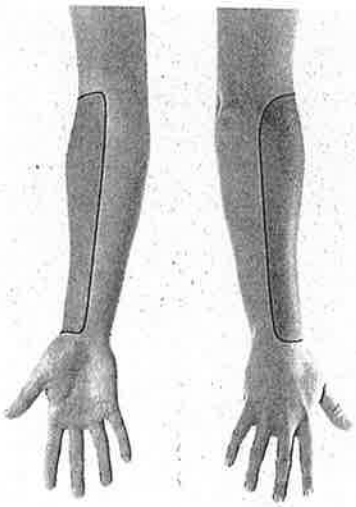

Fig. 17 The approximate area within which sensory changes may be found in lesions of the musculocutaneous nerve. (The distribution of the lateral cutaneous nerve of the forearm.)

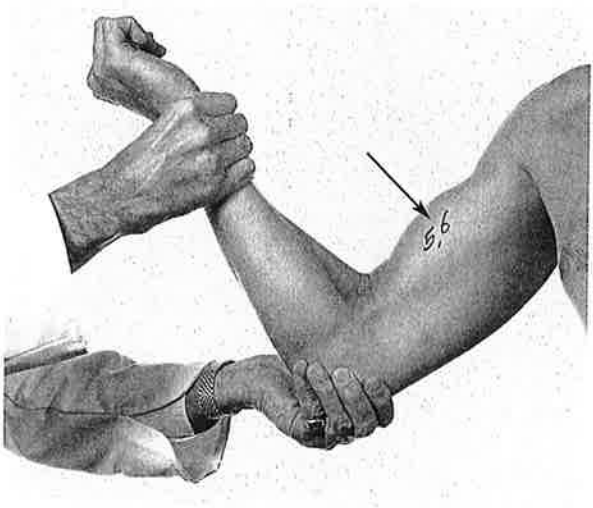

Fig. 18 Biceps (Musculocutaneous nerve; C5, C6)
The patient is flexing the supinated forearm against resistance.
Arrow: the muscle belly can be seen and felt.

AXILLARY NERVE

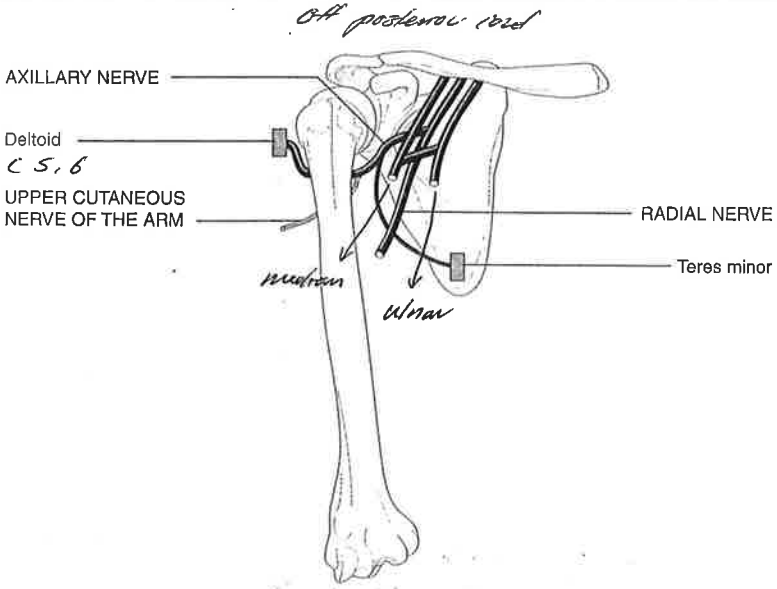

Fig. 19 Diagram of the axillary nerve, its major cutaneous branch and the muscles which it supplies.

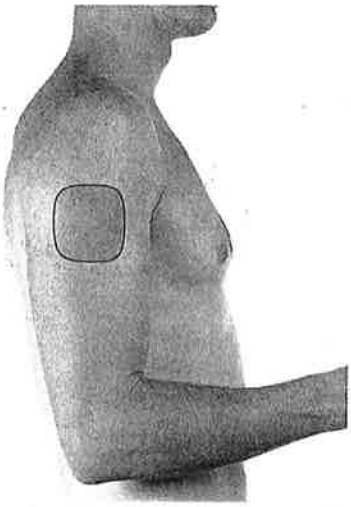

Fig. 20 The approximate area within which sensory changes may be found in lesions of the axillary nerve.

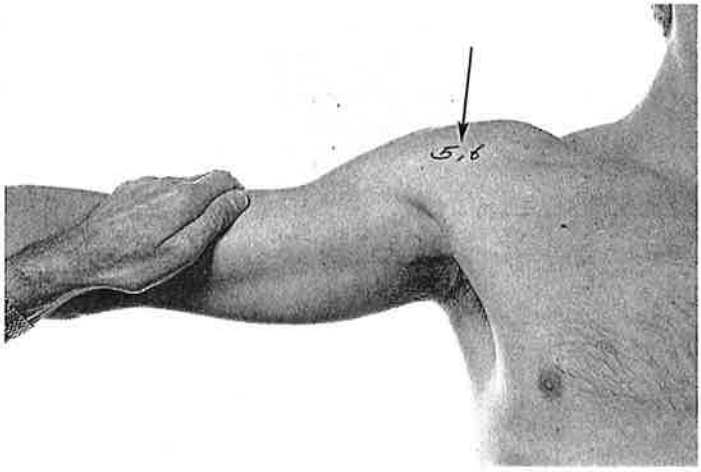

Fig. 21 Deltoid (Axillary nerve; C5, C6)
The patient is abducting the upper arm against resistance.
Arrow: the anterior and middle fibres of the muscle can be seen and felt.

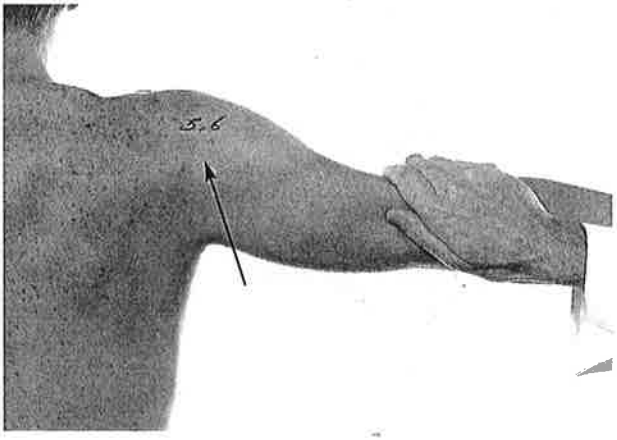

Fig. 22 Deltoid (Axillary nerve; C5, C6)
The patient is retracting the abducted upper arm against resistance.
Arrow: the posterior fibres of deltoid can be seen and felt.