

Post-operative Paralysis of the Brachial Plexus

Several instances of post-operative injury to the brachial plexus have been reported recently by Ewing (1950) and by Kiloh (1950), and it seems reasonable that more publicity should be given to such an avoidable complication of surgical operation. The following two patients received a muscular relaxant, but it is considered a fallacy to associate the rising incidence of this complication entirely with the introduction of these drugs.

CASE REPORTS

Case 1.—A married woman aged 44 had a total hysterectomy performed on March 24, 1949. Anaesthesia was obtained by sodium thiopentone, nitrous oxide, and ether, and relaxation by "flaxedil" given into a right forearm vein, with the arm abducted to 90 degrees. The patient was tilted into a fairly steep Trendelenburg position, with padded shoulder-rests in support. The right arm was abducted for 100 minutes and the Trendelenburg position maintained for 50 minutes. On regaining consciousness the patient complained of generalized weakness of the right arm, with numbness of the right thumb and forefinger. There was a complete paralysis of the right deltoid, biceps brachii, and brachialis. In one month the arm had improved but elbow flexion and forearm supination were still weak, and the patient complained of some dull pain on the outer aspect of the shoulder and arm. She was discharged from hospital on April 28, and at the follow-up on July 26 the arm was quite normal.

Case 2.—A spinster aged 43 had a subtotal hysterectomy performed on July 29, 1949. Anaesthesia was obtained by sodium thiopentone and nitrous oxide, and relaxation by flaxedil given into a right forearm vein. The arm was abducted to 60 degrees, with slight external rotation and slight forearm supination. A fairly steep Trendelenburg position was maintained with padded shoulder-rests in support for some 65 minutes, and the arm was abducted in all for 104 minutes. On recovery from the anaesthetic the patient complained of generalized weakness of the right arm. There was complete paralysis of the right deltoid, biceps brachii, and brachialis, though the spinati were normal and enabled the patient to abduct her arm fully. There was also paresis of the radial nerve. Full normal against resistance being 5, thumb extensors were 4, finger extensors 2, and wrist extensors 2. Median and ulnar nerve supplies were normal, and there was no sensory loss. She was discharged home on August 18, the arm greatly improved with treatment, which she continued as an out-patient, and by mid-September the arm was practically normal.

MECHANISM OF INJURY

The first references to brachial plexus injury occurring at operation suggested a pressure injury when the plexus was nipped between the clavicle and the first rib (Büdinger, 1894), or between the clavicle and transverse processes of the fifth and sixth cervical vertebrae (Krumm, 1895), or by pressure of the plexus on the head of the humerus when the arm was in external rotation and extension (E. Braun, cited by Garrigues, 1897). Later, the theory that the plexus was injured under anaesthesia by traction of the nerves rather than by compression was suggested by Horsley (1899) and Stevens (1934). Clausen (1942) considered that the injury was essentially one of stretch.

Anatomically the nerves are fixed at the transverse processes by invaginations of the prevertebral fascia, and in the arm by the axillary fascia, and any structure tending to increase beyond normal limits the distance between the points of fixation of the nerves will cause injury. An example is the head of the humerus, which becomes more

prominent in the axilla when the arm is in external rotation, abduction, and extension. Normally the head of the humerus is maintained in a neutral position on abduction of the arm by rotation of the scapula and an upward movement of the shoulder girdle. If a shoulder-rest prevents this upward movement of the shoulder, the humeral head is kept low and the neurovascular bundle, passing round this structure, is apt to be stretched. If now a Trendelenburg position is adopted the weight of the patient tends to slide down between the shoulder rests, which in turn push the shoulders towards the feet, and with the arm in abduction the head of the humerus becomes increasingly prominent in the axilla. It seems that abduction of only 60 degrees is enough to cause tension on the nerves in these circumstances (see above).

A conscious patient in this position will probably not suffer injury, provided that the protecting muscles do not tire. Under anaesthesia, however, the musculo-tendinous protection of nerves is partially or entirely absent, and the incidence and degree of injury will depend on the relaxation of the muscles, the steepness and duration of the Trendelenburg position, and to some extent on the weight of the patient. No doubt the relaxant drugs produce great flaccidity in these protecting muscles, but a similar relaxation is produced in deep general anaesthesia by ether (Clausen, 1942).

If the incidence of this unfortunate complication is on the increase it may be due to the more frequent use of this position of abduction of the arm, whether for intravenous anaesthesia or therapy. In particular, this vulnerable position of abduction of the arm should be avoided in the Trendelenburg position.

The injuries described are considered to be due to stretching of the nerves, and Denny-Brown and Doherty (1945) have said that in milder degrees of stretch there occurs damage to the epineurial vessels, with resultant patches of ischaemic changes in nerve fibres. After these ischaemic lesions one can expect efficient regeneration. Although the injuries discussed here are relatively mild, in that complete recovery is the rule, nevertheless they are avoidable and do cause unnecessary prolongation of convalescence.

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The Minister of National Insurance, Dr. Edith Summerskill, has completed the setting up of local advisory committees to advise her on questions relating to the local administration of the National Insurance Act. In all, 230 committees have been set up—186 in England, 26 in Scotland, and 18 in Wales. The committees consist of representatives of employers, employed persons, local authorities, and friendly societies. In addition, persons with special local knowledge likely to be of value to the committees have been appointed as members.