TRANSPOSITION OF LATISSIMUS DORSI FOR PARALYSIS
OF TRICEPS BRACHII

Report of a Case

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In most operations for transfer of a muscle's action it is the insertion of the muscle which is detached and reinserted. Clark (1946) detached the costal origin of the pectoralis major muscle and transferred the muscle down the arm for restoration of active flexion of the elbow. Schottstaedt, Larsen and Bost (1955) described twelve cases in which both origin and insertion of various muscles were detached and reinserted. Among other techniques they transposed the pectoralis major muscle in substitution for the paralysed biceps brachii, the latissimus dorsi muscle for the paralysed triceps and the sternocleidomastoid muscle for the paralysed trapezius. This report concerns the case of a man who among other injuries sustained damage to the brachial plexus which left permanent complete paralysis of the triceps muscle.

CASE REPORT

In June 1963 a gold-miner aged forty-four years was injured by the explosion of a box of detonators. In addition to damage to the head and lower limbs there was a partial lesion of the right brachial plexus with fracture of both transverse processes of the seventh cervical vertebra. The paralysis involved mainly the muscles supplied by the seventh cervical nerve—that is, the triceps and the extensor muscles of the wrist and fingers. There was some affection of the sixth cervical nerve, the strength of the posterior part of the deltoid muscle being only of Grade 2. The degenerative nature of the affection of these fibres was confirmed by electromyography. Alteration of sensibility was confined to the lateral side of the arm.

Treatment—The damage to the lower limb was first dealt with and then tendon transfers were done to restore active extension of the wrist and fingers. It was particularly important for this patient that he should have active extension of his elbow, and so experiments were done on the cadaver to explore the feasibility of complete transfer of the latissimus dorsi muscle. With the insertion transferred to the back of the acromion and the costal and iliac origins transferred to the olecranon the shoulder could be abducted without producing undue tension in the pedicle. We found later that Schottstaedt, Larsen and Bost (1955) had reported the case of a patient aged five years in whom total transposition of the latissimus dorsi had been done to replace a triceps almost completely paralysed by poliomyelitis. Active extension against gravity was achieved by their patient.

Operation (January 1964)—The first incision extended along the posterior axillary border down to the crest of the ilium two inches medial to the anterior margin of the latissimus dorsi. The free edge of the muscle was defined and lifted off the chest wall by dividing first the costal origins and then the iliac and fascial origins. The supero-medial margin of the latissimus dorsi, including the slip from the inferior angle of the scapula, was freed. Finally the tendinous origins were detached from the spinous processes of the lower thoracic vertebrae. As the bulky flat latissimus dorsi was raised, the pedicle was defined and mobilised. The upper end of the muscle was defined by blunt dissection, the tendinous portion being divided half an inch from its insertion into the floor of the bicipital groove.

The second incision passed transversely across and behind the acromion. The acromion was exposed and four drill holes were made through it for the re-attachment of the tendon of insertion.
The third incision was made over the posterior aspect of the upper arm and extended from the middle third to three inches beyond the olecranon. The tendinous insertion of the triceps, the olecranon and the deep fascia of the forearm were exposed. The wasted triceps was not removed (Fig. 1).

A tunnel was made beneath the intervening skin and fat to accommodate without tension the bulky latissimus dorsi. The distal three inches of the muscle were discarded to achieve greatest use of muscle substance rather than of tendon. All cut surfaces produced in trimming the muscle bled freely. The latissimus tendon was firmly fixed to the acromion with mattress sutures passing through the drill holes, the periosteum and the deep fascia adherent to the dorsum of the acromion.

With the shoulder extended 20 degrees and the elbow fully extended the latissimus dorsi still extended three inches beyond the olecranon. While tension was maintained distally with multiple Kocher clamps, the trimmed margins of the latissimus were secured to the tendinous portion of the triceps with interrupted chromic catgut sutures. The main portion of the latissimus dorsi was firmly anchored to the roughened surface of the olecranon by passing mattress sutures through two transverse drill holes in the bone. The redundant portion of latissimus dorsi distally was sutured to the deep fascia over the extensor muscles of the forearm. With the elbow extended longitudinal folds appeared in the latissimus dorsi because of the substantial tension under which the suturing was done.

At the end of the operation no part of the transposed muscle appeared ischaemic. Polythene suction tubes were inserted and the wounds were closed.

**Progress**—After ten days a collection of serosanguinous fluid was evacuated by removal of skin sutures from the trunk wound. A low grade pyogenic infection was cleared up by irrigation with a 1 per cent solution of kanamycin.

The shoulder wound broke down after two weeks and discharged thick purulent fluid containing shreds of necrotic tissue. It was feared that portions of the transplanted latissimus dorsi muscle had undergone ischaemic necrosis. However, the low grade infection was again cleared up with kanamycin irrigations. Actual loss of muscle substance in the transplant proved to be minor and healing was satisfactory. Six weeks after the operation quite good active extensor power at the elbow was already manifest.

**Result**—When the patient was examined eight months after the operation there was strong, active extension of the shoulder; the power of extension at the elbow was moderately strong. By bracing the shoulder with the deltoid, spinati, pectoralis major and transplanted latissimus dorsi the patient demonstrated powerful shoulder action in all directions, including extension and adduction. By means of trick movements he was able to give an impression of stronger triceps action than that which he really had, especially when the shoulder was partly flexed. When lying supine he could hold a five-pound weight and push it vertically above his chest, using the new triceps for extension of the elbow. Lying prone he could do two-handed push-ups well. Clearly the combined action of the transplanted latissimus dorsi on the shoulder and elbow joints was of value in this action. The patient could not perform any of these actions before operation.

At further review thirteen months after operation active flexion of the elbow was full and extension was restricted by 4 degrees. The power of extension at the elbow was Grade 4.
Shoulder movements were unrestricted and in full abduction, flexion or extension there appeared to be no undue tension on the neurovascular pedicle of the transplanted muscle. The patient could do push-ups in the prone position very vigorously and could maintain this position without rapid fatigue. When lying supine he was able to lift a nine-pound brick repeatedly with only slight evidence of effort and was able to maintain the extended position of the elbow (Figs. 2 and 3).

**FIG. 2**

The result of transposition. Ability to do push-ups is illustrated. He was also able to lift a nine-pound brick against gravity by extension of the elbow from the fully flexed position.

**FIG. 3**


**SUMMARY**

1. A case is described in which complete transposition of the latissimus dorsi muscle with its neurovascular pedicle was performed to compensate for complete paralysis of the triceps and partial paralysis of the posterior part of the deltoid muscle.
2. Muscle necrosis did not occur to any significant degree.
3. Strong substitute triceps function was achieved.

**REFERENCES**
