

THE TREATMENT OF DUPUYTREN CONTRACTURE

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INTRODUCTION

THE monograph on Dupuytren contracture written by Dr Tord Skoog of Sweden (1948) has become a classic on the subject and is a magnificent survey of the field of Dupuytren contracture. It is the purpose of the present paper to enlarge upon the technical details of the operation and to describe a method of after-treatment which has been found useful in preventing the complications which may follow operation and which tend to mar the success of the result.

The paper is based on a consecutive series of eighty-eight cases of Dupuytren contracture treated during the last five years. Some of these patients had both hands treated, so that the number of operations exceeds one hundred. Of these cases three only were refused operation on account of advanced arterial degeneration or systemic disease; the remainder have been subjected to operative treatment.

For the purpose of description the cases have been classified as follows :—

First Degree.—To include hands with a nodule in the palmar fascia not yet involving the skin and causing no contracture of the fingers.

Second Degree.—To comprise a nodule in the fascia involving the skin but not causing finger flexion deformity.

Third Degree.—To consist of a nodule in the palm involving the skin and causing flexion contracture of one or more fingers.

Fourth Degree.—To include third-degree cases in which secondary changes have occurred in the tendons or joints of one or more fingers.

Most of the cases which have been operated upon were second or third degree—that is to say, when the condition had begun to involve the skin of the palm or had started to cause a contracture of the fingers. At this time the palmar fascia may be said to be ripe for removal, much in the same way that a cataract in the eye becomes ripe, and the results seem to be better than when an attempt has been made to remove the palmar fascia in its very early stages before the skin has been involved to any extent. At the same time, it is preferable to operate on the hand before tendon and joint changes have occurred which might necessitate amputation of a finger.

OPERATION

Each operation has been performed under tourniquet with the maximum speed consistent with care to avoid damage to the essential structures in the palm. This is advisable, since the shorter the time that the hand is deprived of its blood supply the less is the reactive œdema.

Preparation of the Skin Flaps.—The incision is a single transverse one at the level of the distal crease of the palm. The proximal flap is undermined to a point 1 in. distal to the wrist crease and laterally over the thenar and hypothenar eminences. This reveals the origin of the fan-shaped palmar fascia. The distal flap is then undermined as far as just beyond the proximal finger crease in each finger, whether the fingers are involved in the contracture or not. The undermining is carried superficially into each interdigital web in order that a complete removal of all the transverse bands of palmar fascia may be made from across the base of the fingers. It is believed that should these so-called "natatory" bands be left behind, subsequent contracture in a transverse direction might lead to a "cramping" of the fingers and hold up the movement at the metacarpophalangeal joints.

"Z" Approach to the Fingers.—The fingers involved in the contracture are now opened by means of McIndoe's Z-incision. In each case, the middle limb of the Z is in the midline of the finger over the proximal phalanx. The Z-incision gives two flaps which, when transposed at the time of suture, provide just the elongation required in this situation. The plane of undermining in the finger is linked up with that of the distal flap of the palm, so that the whole of the diseased fascia is freed from the skin and can be removed *en bloc*. The undermining is done, leaving a minimal quantity of subcutaneous fat attached to the skin. A "buttonhole" is to be avoided at all costs, since it might damage the subdermal plexus of vessels and lead to loss of a portion of the flap. The easiest and safest method of judging the depth of undermining these flaps is by inspection through the superficial surface of the skin flap rather than from the deep aspect, determining the level by watching the knife blade through the skin. This is especially important at the base of the fingers and in the webs. Damage to the underlying digital vessels and nerves does not occur provided that the knife blade can always be seen through the skin.

Block Dissection of the Fascia.—It has been found to be a great advantage to have an orderly plan of dissection of the fascia in order to remove it as expeditiously as possible. Skoog describes the opening of each fascial tunnel in turn by means of a longitudinal incision over its centre. The sides of each tunnel consisting of the deep extensions of the palmar fascia which pass down to join the deep fascia of the palm, enclosing tendons, and surrounding the lumbricals and neurovascular bundles, are then excised by him in turn as separate entities. The method used in this series has been that of an excision of the diseased fascia *en bloc* from the palm carrying the block excision into the involved finger. When more than one finger is involved, the block excision is continued to the finger chiefly involved in the contracture. The risk of leaving portions of the extensions of the lateral bands into the fingers, or parts of the natatory ligaments in the interdigital webs, is less when this method is adopted. When the fourth finger only is involved in the contracture, the dissection is begun over the lumbrical muscle of the index finger. The first of the eight compartments of the palm is opened. Retraction of the fascia medially reveals the digital vessel and nerve supplying the radial side of the index finger. The second compartment—namely, that of the tendon to the index finger—is then opened by an incision which is made deep to the plane of the tendon so as to remove the paratendinous bands of fascia, which

might otherwise contract following incomplete removal. Each compartment is then opened in turn under the same plan, progressing towards the ulnar side of the palm as far as the radial side of the fourth finger, which, of course, is the most commonly involved finger. In each case the easiest way to find the neurovascular bundle without damaging it is to incise the prolongation of fascia which surrounds the lumbrical muscle deeply in the palm and to retract this fascia away from the palm, whereupon the bundle springs into view. This method is preferable to a direct onslaught on the bundle itself at its more superficial level in the palm.

The dissection is then resumed on the ulnar side of the hand. The digital nerve to the ulnar side of the fifth finger is found where it lies in the fat of the hypothenar eminence. This is done at this point because this particular nerve is liable to damage if it is left to the end of the dissection, since it lies in the soft fat and often escapes involvement in the Dupuytren palmar fascia. The dissection on the ulnar side of the palm is taken as far as the digital nerve supplying the ulnar side of the fourth finger.

Up to this point the base of the palmar fascia has not been detached from the heel of the palm, since the tension on it is often of value in making the dissection of the palm, provided that the contracted fingers do not themselves get in the way. The next step in the operation is to detach the base of the palmar fascia as far proximally as retraction of the skin flap will allow. This should be done by means of a bold incision through the palmar fascia, since as soon as the whole thickness of the palmar fascia has been divided, a new layer of areolar tissue springs to view, with as certain an end point as opening the peritoneum. There is little risk of damaging the underlying palmar arch, since the change from fascia to areolar tissue is so certain in a ripe fascia. As a rule this allows the contracted fourth finger to spring out of the way and the dissection of the one remaining compartment of the palm is soon complete. Special care is taken to carry the dissection into each interdigital web in order to remove all the transverse fasciculi.

At this point the whole of the palmar fascia can be passed under the distal flap and through into the involved fourth finger. The central and lateral bands of palmar fascia are then cleared from the tendon and neurovascular bundles of the fourth finger until the finger is released into extension. The diseased fascia has then been completely removed in a single block. The tourniquet is now released, with a hot swab present in the palm, and five minutes by the clock are allowed to elapse before the swab is removed for inspection of the bleeding. Gauze swabbing and ligatures are harmful, and the trauma may delay the return of movement. They are to be avoided unless a large spurting vessel requires to be ligatured. In the vast majority of cases the bleeding will stop by spontaneous retraction of the cut ends of the smaller vessels. The tourniquet is then reapplied, the clots are washed away, and the incisions are sutured.

DRESSING

The dressing is designed to prevent three important complications which prejudice the result :—

1. *Hæmatoma* in the palm leads to subsequent fibrosis and delay in the return of movement. It also invites sepsis, and the resulting tension on the skin flaps may damage their circulation and cause necrosis.

2. *Œdema* arising after the operation is the main cause of delay in the return of finger movements. The œdema fluid if it persists becomes organised into fibrin and scar tissue.

3. *Delayed Healing*.—It is vital to secure dry and primary healing of the skin flaps so that early use of the hand may occur and adequate physiotherapy be employed as soon as possible following the operation. It has been found that crepe bandage and wool pressure dressings do not always prevent œdema. They tend to become loose after twelve hours and no longer exert the pressure required to prevent hæmatoma. Such a dressing does not immobilise the fingers to the extent required, and immobilisation is not complete even if plaster slabs are applied outside the crepe bandage dressing. The heat and moisture inside such a dressing tend to cause a mild infection in the suture line in the palm which is sufficient to delay healing and prevent physiotherapy.

Plaster Slab Method.—Plaster of Paris slabs, however, suitably applied, give complete immobility of the whole hand. Healing under a plaster slab is dry and clean, since the palm is not sweating. The plaster maintains exact apposition of the skin flaps to the remaining structures in the palm and prevents hæmatoma by the obliteration of all the dead space in which a hæmatoma might collect. Many will have experienced the readiness with which a free graft takes on the bridge of the nose with nothing covering it but plaster of Paris. A similar “take” of the skin flaps is assured by the application of plaster directly to the palm. At the same time, a complete plaster of Paris cast is dangerous because it does not allow any expansion for the post-operative œdema which must follow the use of a tourniquet. The present method uses two slabs, one on the palmar aspect and one on the dorsal aspect, separated by strips of jelonet and bound together by a light bandage. This method allows slight expansion to occur, and the slabs can easily be opened, if required, for inspection at forty-eight hours. Œdema does not occur after forty-eight hours when the hand is completely immobilised by the plaster slabs. It sometimes occurs after the slabs are discarded, and seems to coincide with the inception of movement. It is an indication for gentleness in movement and is made worse by over-exercise of the fingers. The treatment of it is wax baths, massage, and elevation. Œdema at this late stage rarely persists. In the absence of adequate post-operative immobilisation, however, œdema may be present for some weeks and delay return of movement.

Method of Application.—The palmar slab is applied first, stretching from 2 in. below the elbow to beyond the finger tips. It is applied while the tourniquet is still in position and is moulded carefully over the whole palm and between the digital webs just short of full extension. A single layer of gauze only is applied over the sutures to prevent them becoming embedded in the plaster. In no case has there been any sepsis of the suture line resulting from the plaster in contact with the recent wound. When the palmar slab is dry, jelonet is applied to each edge and the elbow flexed to 90°. Pronation of the forearm is not allowed to occur, since this alters the snug fit of the palmar slab. The back slab is then applied and moulded carefully to meet the palmar slab in the digital webs. When dry, a single cotton bandage is wound round to unite the two slabs and the tourniquet is released.

As a rule there is a dull ache in the palm during the first forty-eight hours, but no embarrassment of circulation to the finger tips occurs. If there is pain,

or swelling, or blueness of the fingers, this indicates a hæmatoma in the palm. Failing this, the dressing is left entirely untouched for two weeks. The hand is elevated to a post beside the bed for forty-eight hours following operation, and carried in a sling when the patient gets up and leaves hospital.

First Dressing.—Two weeks following the operation the bandage is removed and the slabs are split apart. The sutures are removed. A new slab dressing is then applied, stretching this time only to the level of the neck of the proximal phalanges of the fingers. In this way the metacarpo-phalangeal joints are immobilised, but free movement can occur at the interphalangeal joints. Voluntary movement is then encouraged at the interphalangeal joints during the third week, but a further week of immobilisation of the metacarpo-phalangeal joints is maintained, since earlier movement at these joints tends to interfere with sound healing of the palmar wound.

Second Dressing.—At the third week all slabs and dressings are discarded, and the patient is encouraged to move all the joints in the hand and wrist. Physiotherapy begins at this point and consists of active exercises to each finger joint, massage to the palm and dorsum of the hand, and paraffin wax baths which are given daily for the first week and three times a week up to six weeks. It is found that the metacarpo-phalangeal joints always recover their full range of movement even when they are immobilised completely for four weeks. The proximal interphalangeal joint is the one which tends to be the slowest in the recovery of movements. If no hæmatoma is present and œdema does not occur, full return of all movement of the hand can be expected in six weeks to three months, but if œdema persists the interphalangeal joints will be slow in regaining full function and may take three to six months. If a hæmatoma occurs *and is disregarded*, full movement of the fingers may not occur for six months to two years ; and if, in addition, a portion of the palmar flap becomes necrotic as a result of the hæmatoma, full return of movement may never occur. This emphasises the overriding importance of primary healing and the prevention of hæmatoma and œdema for an early return of good function.

Following a successful operation many patients can return to light work in six weeks from the operation, and most of them are back at full work, including manual work, in three months' time.

If a hæmatoma occurs, the dressings are removed at once for inspection. A further anæsthetic is given, the flaps are reopened under tourniquet, and the clots washed away. Hæmostasis is attempted once again and a similar plaster dressing is applied.

If a portion of the skin flaps fails to survive, this portion is excised as soon as it is discovered and a dermatome graft applied in its place, over the early granulations.

The three weeks' immobilisation in no way limits the return of function, provided that œdema of the hand has been prevented. The early sound healing which follows this method allows physiotherapy to begin in earnest at the third week, and more than repays the three weeks' delay in starting active movement. The complete immobilisation by plaster of Paris prevents œdema and hæmatoma, and promotes dry primary healing without scar tissue by obliterating all dead space in the palm.

It may be stated in criticism of this regime of complete immobilisation of the fingers in an extended position for two weeks, followed by a further week of partial immobilisation, that contraction of the collateral ligaments in their relaxed position will occur and prevent the return of flexion. In practice the return of movement is not delayed by this method. The reason for this appears to be that the ligaments are undamaged and are not embarrassed by infiltration of œdema or infection. They return quickly to a supple condition. This is in sharp contrast to immobilisation of joints in extension in the burnt or infected hand which leads to a long-standing and crippling deformity.

SUMMARY

The operation for Dupuytren contracture by means of a radical block excision of the palmar fascia is described in some detail.

A method of post-operative immobilisation of the hand by plaster slabs is recommended with a view to minimising the incidence of the main complications of hæmatoma, œdema, and delayed healing of the palm.

I wish to express my thanks to Sir Archibald McIndoe, who aroused my interest in Dupuytren contracture during a flying visit to the Middle East. I am grateful to the orthopædic surgeons in Leeds who have entrusted me with the treatment of their cases, and to the Department of Medical Photography, St James's Hospital, Leeds, for the film which illustrates the points I have mentioned.

(This paper was read at the clinical meeting of the British Association of Plastic Surgeons at London on 1st June 1951. The author will be pleased to lend the film.)

REFERENCE

SKOOG, TORD (1948). *Acta chir. scand.*, **96**, Suppl. 139.