"BUTTONHOLED" EXTENSOR EXPANSION

BY

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Injuries to the tendons which govern the delicate movements of the fingers are all potentially serious as regards subsequent function, and each particular injury demands its own appropriate treatment. Certain of these injuries are rare, and therefore when they occur may not be recognized. Delay in their treatment frequently leads to disability, which may be avoided, or at least minimized, by immediate repair.

It is because of the rarity of "buttonholed" extensor expansion, and the necessity for operative repair, that we wish to draw attention to the condition. During the last year we have seen three cases of this injury amongst a large number of conditions of the hand and fingers.

The extensor tendon to a finger as it reaches the metacarpo-phalangeal joint spreads out into an aponeurotic sheet, which covers the proximal phalanx and divides into a central and two lateral bands. The central band is inserted with the dorsal ligament of the proximal interphalangeal joint into the base of the middle phalanx. The lateral bands pass distally, one on each side of the proximal interphalangeal joint, and then converge to be inserted with the capsule of the distal interphalangeal joint into the base of the distal phalanx. The interosseous and lumbrical tendons pass from a more volar plane to fuse with these lateral bands just distal to the metacarpo-phalangeal joint.

Aetiology

"Buttonholed" extensor expansion is an injury which consists essentially of a rupture of the central band of the tendinous expansion as it passes over the proximal interphalangeal joint. The two lateral bands are thereby deprived of their supporting intercommunication, and when flexion occurs at this joint they dislocate volarwards one on either side of the joint, the displacement being increased by the pull of the lumbrical and interosseous tendons. At the same time the head of the proximal phalanx protrudes through the rent in the central band and capsule (see figure).

The injury may be caused by either direct or indirect types of trauma:

A. Direct Trauma.—(i) A cut wound over the flexed proximal interphalangeal joint may divide the central band of the expansion, the lateral bands being protected by the convexity of the bone (Case 1). (ii) A sharp blow over the flexed knuckle may be sufficient to divide the central band by nipping it against the head of the proximal phalanx (Case 2).

B. Indirect Trauma.—Sudden forced passive flexion occurring in an actively extended finger with the extensor tendon taut may rupture the central band just proximal to its insertion into the base of the middle phalanx (Case 3).

Clinical Features

The clinical features of these cases are easily recognized. There is a history of trauma. The proximal interphalangeal joint is swollen and tender, and the finger assumes the characteristic attitude of extension at the distal, and flexion at the proximal, interphalangeal joint. If extension of the finger is attempted hyperextension of the distal phalanx occurs, but, as the lateral bands have passed forwards to the volar side of the axis of the joint and the central band has completely lost its purchase on the middle phalanx, slight increase in flexion takes place at the proximal interphalangeal joint. Passive extension is usually almost complete, and the position can be maintained, but not against resistance, and as soon as flexion occurs the finger becomes once more fixed in the position of the deformity.

Treatment

The treatment is straightforward and should be undertaken immediately. Delay leads to lengthening of the central band by fibrous tissue, and liability to the subsequent loss of full extension. Under a local anaesthetic the tendon is exposed through an L-shaped incision. The head of the proximal phalanx presents through the tear in the central band, and the displacement of the two lateral bands is obvious. The finger is straightened and the metacarpo-phalangeal joint flexed, and after approximating the torn edges of the central band with fine interrupted sutures the two lateral bands are splinted back with one or two transverse sutures passing from one to the other across the central band. This counteracts the pull of the lumbricals and interossei and prevents the forward displacement. The wound is closed and the finger fixed in full extension in a light plaster for four weeks. Thereafter a short course of active exercises soon re-establishes mobility.

Case Histories

Case 1 (male aged 15).—While sharpening a scythe the patient received a small cut over the proximal interphalangeal joint of his right index finger. The finger became flexed and he was unable to straighten it. Ten weeks later he was seen because of persistent deformity and loss of extension. Operation revealed a rent in the central band and dislocation forwards of the lateral bands, the gap being filled with scar tissue. This was dissected out and the tendon repaired with waxed silk thread. The finger was splinted in extension for sixteen days, and then active movements were started. Six months later there is still 45 degrees limitation of extension, though movements through the rest of the range are free. The disability is no doubt due to an insufficiently long period of immobilization after operation, with subsequent stretching of the suture lines. The result is not satisfactory, and further repair has been advised.

Case 2 (male aged 81).—This patient was knocked down by a motor car and received among other minor injuries a sharp blow across the knuckles of his right hand. The skin was not broken, but he found he was unable to straighten the index finger, which presented the typical features described. Operative treatment was carried out three days after the injury, and fixation of the finger was maintained for four weeks. Two weeks later extension was limited by only 10 degrees, while flexion was limited by about 15 degrees. As there was considerable disability from arthritis in the other fingers the result was considered good.

Case 3 (male aged 31).—The middle finger of this man's right hand was caught in the fastening of a sack of oats as it

fell from his back, and was suddenly forcibly flexed. Examination showed flexion deformity at the proximal interphalangeal joint, with marked prominence of the head of the proximal phalanx on the dorsal aspect, and as the finger was passively straightened the middle phalanx became dislocated volarwards. X-ray examination verified the subluxation of the joint. The displacement was reduced under gas, and the finger fixed on a Böhler's splint in moderate flexion. Three weeks later, on removing the splint, the subluxation immediately recurred and the joint again assumed the flexed position. Operation revealed the typical buttonhole tear in the central band, but in this case the distal tag of tendon attached to the base of the middle phalanx had become turned in between the articular surfaces and was responsible for the persistence of the subluxation. Repair was carried out as described and immobilization maintained for four weeks. Three months later he has 20 degrees limitation of extension with full flexion and free active movements in both directions. There is no disability in his work as a tractor driver, but the result might have been better had the true nature of the lesion been recognized at once.

We wish to express our thanks to Mr. D. S. Middleton for allowing us to treat these cases under his supervision, and for permission to report them.

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PROTECTION OF THE SKIN AGAINST LIME

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In the last two years I have had occasion to try various remedies and preventive measures for dealing with burns of the skin and eyes caused by lime. The workers in our local industry are engaged in the quarrying of limestone, which is burnt in kilns adjacent to the quarries, various grades and qualities of lime being produced. The kilns are fed at the top with limestone, coke, and coal, and the finished lime and debris is withdrawn from apertures at the bottom of the kilns by hand and also with the aid of rakes. The lime appears in fragments of all shapes and sizes up to pieces perhaps nine inches through the long diameter and weighing several pounds. Skilled workmen are able to detect and remove partly burnt pieces of stone which are known as "bullheads." These latter and the "smalls" are dealt with separately, while properly burnt large pieces are sold at the best prices.

The various products described are loaded into small trucks, which are later emptied into lorries or railway wagons. It is clear that in such procedures large quantities of lime dust and small fragments will be cast into the air. These will settle on the clothes and skin and in the eyes of the workmen, and will be both mechanically and chemically irritating. In addition, wherever lime comes into contact with moisture the exothermic reaction whereby it is slaked may be sufficiently violent to cause considerable burning. I propose at a later date to describe the methods devised for dealing with lime in the eye. I will here confine myself to the treatment of the skin.

Protective Methods

In the past, various methods have been tried to mitigate the damage caused, and protection against wind and

weather has been provided wherever possible. Masks are worn to protect the nose, and goggles are available for the eyes. Some of the workers, after an initial period of distress, appear to acquire a certain tolerance to the lime, both in the eyes and in other exposed parts, whilst others need protection most of the time. A piece of material tied loosely over the mouth and nose satisfies many. The protection of the skin itself presents a difficult problem. The handling of lime both dries and hardens the skin to a marked degree, and any perspiration inevitably causes a brisk reaction and local burning. This risk is also present on wet days when gusts of wind blow rain into the loading platforms.

I discovered that many remedies of a fatty nature, such as tallow, lanoline, and olive oil, had been applied to the skin as a protection. These are unsuitable, since they cause lime dust to adhere where previously it would have brushed off, and, in addition, they act somewhat as does theatrical grease paint, by checking the cooling of the skin by insensible perspiration. As a result small collections of sweat are formed which later react suddenly and violently with the lime. In considering these facts I was struck by one factor that appears to have been insufficiently stressed: the rate of evolution of heat when lime meets water. It is clear that if this reaction can be slowed down sufficiently no burning will occur. By a large-scale slaking of lime a temperature of 300° C. may easily be attained. So far as the skin is concerned the most common lesions, apart from a general hardening, thickening, and fissure formation, are small scattered superficial ulcers and more definite burns of larger extent. These, particularly if on the hands and fingers, are very crippling and make work difficult or impossible. Infection may be superadded on the original lesions with an impetiginous picture and perhaps more gross and deep-seated infection, particularly if a fissure has been the portal of entry. The men employed are reasonably clean and healthy, but even if they wash their hands on leaving work these are probably as contaminated as ever by the time they have removed their lime-impregnated clothes at home.

Use of Talc Powder

Though attention to washing facilities helps considerably, it is yet no protection against the burns and sores caused by the lime. To prevent these or diminish their severity I have introduced the use of plain talc powder, which is shaken on the exposed parts from canisters with "pepper-pot" tops. This may be repeated several times a day if necessary.

Before starting this procedure I envisaged the following results:

1. By its well-recognized cooling power talc would reduce the temperature of the skin, thus diminishing sweating.
2. Any rain or sweat would mix with the powder and form a paste, thus reducing the moisture available for reaction with any lime present.
3. The paste, when dried, might form a protective film which would permit lime to make but gradual contact with the skin and its moisture.

The three effects described all serve to slow down the reaction between lime and water so that the heat developed is evolved gradually and burning does not occur. I have even advised the use of powder for the treatment of the scattered sores already described, and this has often healed them without any other remedy. This holds good particularly for the early and relatively uninfected