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Timing of tendon-transfer surgery

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Summary Thirty-five leprosy patients who had tendon-transfer surgery recovered nerve function postoperatively. The tendon transfers were performed to correct paralytic deformities resulting from ulnar, median and common peroneal nerve damage. Nerve function recovery was found in 2·8% of the hands that had claw-finger correction for ulnar palsy; in 5·1% of the hands that had opponens replacement for median palsy and in 6–9% of the operated drop-feet.

Analysis of the records showed that none of the patients had been operated on within 6 months after the onset of nerve damage.

Postoperative deformity following nerve function recovery was rare in the hand, but occurred in 5 out of 18 of the feet that showed postoperative recovery.

Introduction

A surgeon engaged in tendon-transfer surgery in leprosy patients will usually only operate on a patient if the pattern of paralysis is 'stable'. The paralytic deformity is considered stable when no further nerve function changes, resulting in increasing paralysis or recovering muscle function, are expected. The general opinion is that tendon-transfer surgery should be postponed for 6 months after the onset of palsy, because it is believed that nerve function recovery is not very likely if a paralytic condition has persisted for 6 months.

Two[1, 2] textbooks on surgery in leprosy do not give any information on the timing of tendon-transfer surgery with regard to the duration of the palsy, but a third[3] states that the paralytic deformity to be corrected should have been present for 6 months.

When reviewing patients who had tendon transfers for their hands and feet at the All Africa Leprosy and Rehabilitation Training Centre (ALERT), we found a number of patients who had recovered nerve function postoperatively. By analysing the patients' files and surgical assessment forms we tried to answer the following questions:

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Had patients been operated on within 6 months from the time of nerve damage, or did nerve function recovery occur after the surgeon had waited for 6 months?

2 Does postoperative nerve function recovery result in deformity because of the apparent upsetting of muscle balance?

Method and material

Voluntary muscle testing (VMT) and sensory testing (ST) as described by Brandsma,[4] and in many instances motor conduction velocity (MCV) assessments were the techniques employed to assess and confirm nerve function recovery. Nerve function recovery was defined as an improvement of at least 2 points in muscle strength of a muscle or muscle group(s) innervated by that nerve using the MRC[5] 0–5 scale. Ulnar nerve function was assessed by testing abduction of the little and index finger. Median nerve function was assessed by testing abduction and opposition of the thumb and common peroneal nerve function was assessed by testing dorsiflexion and eversion of the foot. The two movements that were tested to determine ulnar and median nerve function recovery were totalled, thus giving a maximum score of 10 for full recovery per nerve.

Nerve function recovery was reviewed in 35 patients. The classification of these patients was 20 T/BT, 2B and 13 BL/LL.

We found 13 ulnar recoveries in 12 patients following tendon-transfer surgery for claw-finger correction. Seven patients recovered median nerve function only when operated for claw-fingers and loss of opposition. Three patients recovered ulnar and median function following claw-finger correction and opponens replacement.

The following operations were performed for claw-finger correction: extensor–flexor–many-tailed 8 times, extensor–many-tailed 4 times and Bunnell sublimis transfer once. For opponens replacement the following muscles were employed: flexor digitorum superficialis 8 times, extensor pollicis longus once and extensor indicis once.

We found 18 common peroneal nerve recoveries in 16 patients. The following operations had been performed: tibialis posterior transfer 14 times, anterior transposition of tibialis posterior and peroneus brevis once and the 'Carayon' technique for drop-foot correction 3 times.

Results

Table 1 gives a break down of hands and feet in which we have noticed postoperative nerve function recovery. Unfortunately we were unable to determine exactly how many patients had been reviewed for drop-foot corrective surgery.

Table 1. Postoperative nerve function recovery

	Reviewed	Recovered
Ulnar	356	13 (3·8%)
Median	194	10 (5·1%)
Common per.	200–300	18 (6–9%)

We were able to determine the duration of the palsy in 27 patients. None of the patients had been operated within 6 months after the onset of paralysis except one patient who was operated while the nerve was recovering.

Table 2 gives the duration of the palsy as given by the patient (history) or as determined from the repeated preoperative nerve function assessments (record). The 5 recoveries of palsies that were reported to have been present for more than 12 months were all recoveries of the common peroneal nerve. Recovery of ulnar and median function was confirmed by MCV testing in all cases assessed by this technique, 9 ulnars and 7 medians, after recovery had previously been established by VMT.

The average improvement of the ulnar nerve by VMT was 6·2 points (3–10) and for the median nerve 8·1 (5–10).

Sensory recovery as tested with No. 5 bristle[6] was observed in 7 ulnar and 4 median nerves. Sensory loss remained in 5 ulnar and 2 median nerves. No records were available for the remaining cases.

Postoperative deformity was noticed in one ulnar correction which resulted in hyperextension of the proximal interphalangeal joints and in one median correction which resulted in luxation of the metacarpo phalangeal joint. There were 10 recoveries of the deep peroneal nerve, 7 of the deep and superficial

Table 2. Duration of palsy in months at time of surgery

Months	Record	History
6	1	1
7	4	3
8	2	3
9	2	0
10	3	1
11	0	1
12	1	0
More than a year	0	5

peroneal nerve and one of the superficial peroneal nerve. The peroneal muscles recovered 5 times from total paralysis and 3 times from partial paralysis.

In 4 feet, postoperative inverted foot deformity had developed, In 3 of these only the pretibial muscle group had recovered. An everted foot deformity was seen in one patient in which only the peroneal muscles had recovered.

Discussion

Considering the number of hands and feet reviewed in this study it seems to be relatively rare for nerve function to recover 6 months after the onset of a palsy. It seems advisable in the case of foot-drop corrective surgery to wait for 1 year as postoperative recovery may upset the balance of muscle forces in the ankle and subtalar joints. Patients should of course use a foot-drop strap or ankle orthoses when waiting for surgery.

No MCV assessments had been done for the common peroneal nerve to confirm recovery. Postoperative muscle grading of the pretibial muscles is difficult because the transferred muscle-tendon unit will contribute to the strength of dorsiflexion. Also the transferred tendon in many of our cases was attached to the toe extensors. Recovery of the pretibial muscle group was judged by palpation and measurement of circumference of the lower leg. These problems are not encountered in the testing of the peroneal muscles.

A contributing factor to the development of inverted foot deformity may have been a now abandoned technique. In this technique 2 slips were created out of the posterior tibial tendon after the tendon had been withdrawn in the lower leg. The slips were then tunnelled separately to the medial and laterial side of the foot. It is our observation that tension adjustment in this technique is difficult and that the medial tendon slip usually acts more strongly.

The 6-months' waiting time for corrective hand surgery seems justified. Postoperative deformity was only encountered once after claw-finger correction and once after opponens replacement. The dangers, however, for secondary deformities to develop in the hand when waiting for surgery are much greater than for the foot. Hands, therefore, should preferably be operated on as soon as conditions permit. A surgeon may decide to operate early for social reasons such as a patient in danger of losing his job.

Muscle grading of the abduction of the little finger and index finger is still possible postoperatively. The movements tested do not interfere much with the surgical technique employed for correction of the ulnar motor deficit and the muscle bellies can also be easily palpated. In median nerve recovery the transferred muscle-tendon unit will contribute to the testing. In these cases, however, the development of the thenar eminence will be indicative for recovery of nerve function. We found 8 median nerve recoveries in hands in which the

EFMT operation was performed for claw-finger correction. In these cases the median nerve had recovered with an extra tendon in the carpal tunnel.

Twelve of the 19 patients operated on for ulnar or combined ulnar and median palsy showed preoperative recovery of nerve function other than the one whose paralytic deformity was to be corrected.

This study also demonstrated that in all the cases reviewed median nerve damage was accompanied by ulnar nerve damage. Isolated median nerve damage, however, does occur in leprosy patients and we have reported on this in another communication.

Median nerve function recovery always preceded ulnar recovery when both nerves recovered. In the foot common peroneal nerve damage was in all but one case accompanied by posterior tibial nerve damage. Recovery of peroneal muscle preceded recovery of the pretibial muscle group if both the deep and superficial peroneal nerves were affected. This study also emphasizes the importance of regular nerve function testing and the importance of careful history-taking as we were often unable to determine from the patient's records the duration of the palsy.

An important finding from this study seems to be that patients should not be operated on when nerve functions are still changing. All the patients received antileprosy treatment and most patients had also received prednisolone suggesting that nerve function recovery was anticipated in the months preceding surgery. Nerve function recovery, however, without the use of prednisolone was observed 8 times in the hand and 10 times in the foot.

Conclusions

1 Nerve function recovery does occasionally happen 6 months after the onset of a palsy.
2 Patients should preferably not be operated on when nerve functions are still changing.
3 Six months' waiting time to allow for possible recovery of ulnar and median nerve function, after the onset of a palsy, seems reasonable.
4 In the case of foot-drop, corrective surgery usually should be postponed for 1 year after the onset of the palsy.
5 Postoperative deformity due to recovery of nerve function in the hand occurs rarely. However, the possibility should always be considered in foot-drop surgery.
6 Selection of surgical technique is important in those cases in which nerve function could be anticipated. For example, if a patient has to be operated on early for claw-finger correction and the fingers are fully mobile, the least powerful corrective tendon transfer should be selected.

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