

Flexor Carpi Ulnaris Transfer Successfully used to Gain Strengthening of Flexor Digitorum Superficialis Tendons

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Abstract

Transfer of the Flexor Carpi Ulnaris (FCU) to replace the power of the paralysed Extensor Digitorum Communis and Extensor Pollicis Longus has been described in the literature. However the use of FCU for strengthening Flexor Digitorum Superficialis (FDS) is relatively not widely known. In this report the use of the technique is discussed to successfully restore the strength of the fingers of a leprosy patient with considerable partial high median palsy to this patient's urgent need and at his request. This surgical procedure and results of a single case are shown as a preliminary report.

Key words: FCU transfer, FDS tendons, Leprosy.

Introduction

It is not very common, that patients who have need for surgical thumb correction need also a surgical procedure for strengthening the action of the sublimis tendons. In 2002 one leprosy patient of the Referral Hospital at Sivananda Rehabilitation Home, who had successfully undergone on 13/8/02 Abductor Pollicis Longus Deviation Graft Operation for his right hand (Beine 2005), asked for such an operation as he could not write for a prolonged time as needed for his coming examination due to weakness of finger flexion. This weakness was due to severe Partial High Median Palsy (Fig.1). This figure shows (besides thumb related

problems) the pre-operative condition of the fingers of ® hand. It is seen that ulnar palsy, which causes claw fingers deformities due to the paralysis of the lumbrical muscles shows a lesser visible clawing of the fingers, when additional high partial median palsy with weakness of the Fl. dig. superficialis is present.

As these matters are not commonly known, it may be also desirable to have an additional paper published on pre- and post-operative physiotherapy regarding such cases of partial high median palsy, which are fit for special Reconstructive Surgery using methods beyond commonly known procedures. To give these matters here with

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full details will be beyond the scope of this paper. In this case under report the thumb related problems had priority for the patient and in this regard already a further scientific paper is under preparation, in which more details of clinical history, previous treatment and more findings of pre-operative clinical examination including more details of strength in MRC scale of the muscles of ® hand are given. These items in full also would exceed the scope of this paper, where details have to be restricted to the FCU transfer to the FDS tendons and the details are given following the Hony. Editor's request.

Pre-operative History and Assessment:

The patient was originally referred to the hospital of Sivananda Rehabilitation Home by a leprosy control unit of a neighbouring district, where he took MDT from June 12, 2000 to Dec. 2000 and then and there RFT was started. On June 11, 2002 he was declared a Polineuritic Hansen Disease case by the leprosy control unit and referred to us to care for his needs as he (a student) had become unable to hold a pen.

His general condition was good. Regarding Cardio Vascular System, Respiratory System & Gastrointestinal System; NAD

ESR: 4 mm, Hb: 14.5 g%,

WBC, DC, S-Bilirubin, Blood Urea, Urine - & Motion - test all normal or in normal limits. RI. (in Jan 2002) negative. At time of admission at our leprosy institution clinically a Partial Triple Paralysis of ® hand was found and all three trunc nerves of ® arm were

found thickened 1 +, the high median nerve found + and tender. Straight away treatment of Tab. Prednisolone 30mg /d was started and Prednisolone continued practically for 6 month tapering the daily dose down every month by 5 mg/d. Yet in order to keep Neuritis under check the dose of Tab.Prednisolone 10mg/d was being continued as maintenance dose until end of January 2003. The first successful operation, Abductor Pollicis Longus Deviation Graft Operation (Fig. 1) was done already after a period of 2 months of Corticoid Therapy; at that time the Partial High Radial Nerve Palsy had shown some improvement, all Radial

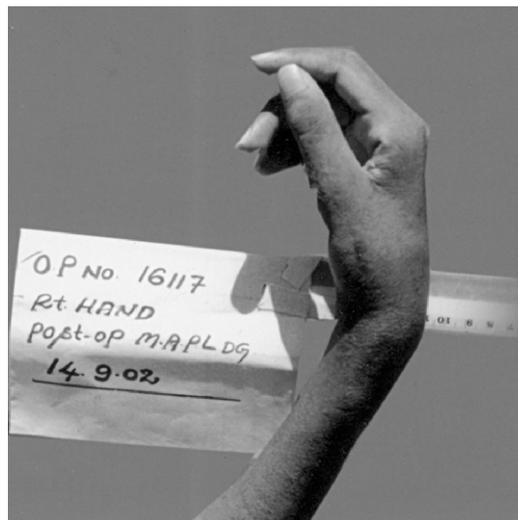


Fig. 1 : Right Hand pre-operatively to transfer of Flexor Carpi Ulnaris to Flexor Digitorum Superficialis Tendons (status after modified Abductor Pollicis Longus Deviation Graft Operation, corrected Retroposition of Intrinsic minus thumb achieved.)

Table 1. Muscle Assessment According To MRC Scale

Kind of muscle	17/6/02	27/9/02	8/11/02	5/2/03	26/2/03	21/7/03	22/8/03
Index Finger Sublimis	1	1	1	2	3	3+	4
Middle Finger "	1+	2	2	2	3+	3+	4
Ring Finger "	0	2	2	2	3	3	3+
Little Finger "	0	1	1	2	3	3	4

Nerve supplied muscles became better than strength 3 in MRC scale, and we got by that time more convinced, that the case was not a case of DDS-toxicity.

Besides the clinical findings also checking of the muscle strength of the Flexor Dig. Superficialis in MRC scale was repeatedly done pre-operatively (and also post-operatively).

When it was noted that the strength of the sublimis had started improving by September 2002, it was decided to wait with the strengthening operation hoping for more improvement. But it was in vain and after 6 months of Corticoid Therapy the requested surgical procedure was done, i.e. on Nov. 27, 2002.

Regarding the pre-operative physiotherapy it was to be mentioned that the patient was taught insolated action of the Flex. Carpi Ulnaris (FCU). This was done by asking him actively to perform ulnar deviation of ® hand followed by active wrist flexion.

During pre-operative physiotherapy the patient is also to be trained to keep both hands relaxed on request so that the described suture technique can be performed, tension of related tendons intra operatively checked thus attempting to get a successful result.

Procedure

In local anaesthesia an 1.5cm long transverse incision is done over the tendon of the FCU of the right hand at the level of the wrist crease. The tendon is identified and its insertion at the pisiform resected. Freeing the tendon from its surrounding paratendinous tissues is done carefully towards proximal avoiding to hurt vessels and the supplying nerve fibers of its distal muscular portion. The tendon is then withdrawn to another

transverse 2 cm long incision done parallel to the previous one about 4.5 cm proximal (Fig. 2 & Fig. 3). Up to this the new procedure is identical with our way to do the beginning part of "Kleine Perthes Plastik" (Le. in English:small Perthes plasty).



Fig. 2 : Transverse incision over the tendon of FCU at wrist crease – tendon under preparation

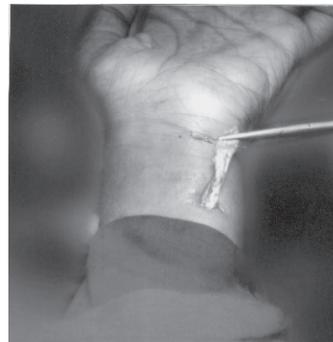


Fig. 3 : Withdrawn tendon with a part of distal muscle of FCU reaching from the proximal transverse incision to the sutured distal incision

The FCU is then transferred to strengthen the four sublimis tendons (Flexor Dig. Superficialis Tendons) doing a 2.5cm long transverse incision about 3cm proximal the wrist crease over the tract of these tendons (Fig. 4). After deepening the incision and

slitting open the antebrachial fascia the named tendons are prepared for suturing, tunnelling of the split donor tendon is performed and suturing (with usually NoAO cotton) done using the suture technique shown by Schink (1960) (Fig.5). With the kind permission granted by Springer - Verlag Heidelberg, this suture technique is described here very briefly (according to the request of a hand surgeon) for English language readers, who may not be aware of / or have access to German sources. Schink



Fig. 4 : Showing the scars (dotted lines) of the three incisions of the surgical procedure done for strengthening the four sublimis (FDS) tendons

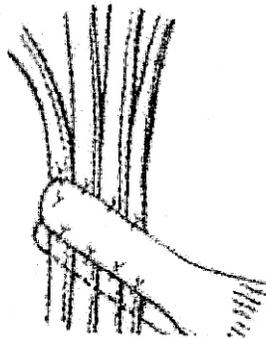


Fig. 5 : Drawing showing the suture technique of Schink (Schink W (1960)/part F of Schink's Fig. 139 with kind permission by Springer-Verlag Heidelberg)

says: We prefer in case of a strong donor tendon to envelop the receiving tendons into the split donor tendon suturing one by one of them with single sutures to the underlying and covering donor tendon part. So far the translation of Schink's explanation. (I may add to it that Schink's given brilliant suture technique suits various surgical procedures (see also Discussion).

In order to give the right tension during suturing, the right lower arm and hand of the patient were kept in neutral position between pronation and supination and the patient was asked to keep relaxed. His (normal) left hand was also kept in similar position for proper comparison. The assistant had to keep the wrist of right and left hand about 30° flexed and the MCP-joints about 60° flexed, and then request the patient to relax his hands and fingers. A position of 15° wrist flexion, 60° MCP-joints Flexion, 30° PIP-joints Flexion & 15° DIP-joints Flexion as suturing position should result. The tension of the sutures was then so adjusted that the same PIP-joint flexion was given to each of the fingers of right hand as the healthy left hand showed it checking each suture after doing the first knot giving no additional tension. After skin wire sutures and sterile dressing the right hand was postoperatively kept with a POP in lumbrical position for 3 weeks.

Results

Post-operative Physiotherapy was started as usual and no complications occurred also not when doing the described exercises similarly as used for pre-operative training. It was observed that the patient could pinch well, use his pinch much more powerfully and could hold his pen with more ease routinely. For his coming exams he requested his early discharge from hospital,

which could be granted. During early follow up he reported that he had been able to write all exam papers with his right hand. On March 30, 2007 he again reported for follow-up. The good result is maintained for more than 4 years. (Fig.6.1 and 6.2 show this very well and show the transfer action below the s.c. tissue level). He is doing apprenticeship.

Regarding Physiotherapy for the follow-up period it is to be said that assisted extension of the fingers is to be done by the



Fig. 6.1 : Finger position at relaxation of FCU transfer



Fig. 6.2 : The action of the transfer results in proper flexion of fingers

patient now most regularly every day and also a night splint in lumbrical position of the hand to be used to maintain fitness for future claw-finger correction.

Discussion

It is to be clarified that Schink described the mentioned suture technique, when doing a small Perthes plasty for Polio cases, where the Extensor tendons of the fingers were to be strengthened using FCU. In our case there was no need to strengthen the Extensors, but as said need to strengthen the 4 sublimis tendons using FCU. To do the latter is easier to perform, and gaining by this transfer a good result appears also more promising. This was in fact confirmed in our reported case. It might be that using FCU for strengthening the sublimis tendons is not found in the literature, which is dealing with reconstructive surgery in leprosy. Yet it is described in the teaching of general surgery (Brandt 1974, Breitner 1959, Huber 1920). As in leprosy occurrence of High Median Palsy usually goes along with partial radial & partial ulnar palsy the described procedure using Schink's suture technique may be percentage wise less often indicated in leprosy than in general cases of high median palsy.

Yet the absolute number of Partial High Median Palsy among leprosy cases may be higher and the decision for reconstructive surgery as shown more difficult. We wish to underline that we prefer smaller incisions (Fig.2 and Fig.3) than those shown in the literature in order to reduce the stigma, which cases of reconstructive surgery in leprosy have to face. If unforeseen complications would occur then the original skin incision shown in the literature (see References under 7, Schink 1960) should be known by the surgeon, as then these may be helpful.

Conclusion

In partial triple palsy of the hand in leprosy with prominent partial High median palsy and not severe partial radial palsy this procedure can be very helpful provided the FCU is intact. The procedure also might help in such cases the recovery of the Flexor Dig. Profundus provided the same is not totally paralysed for long time. We definitely shall continue to use this procedure, whenever it is indicated and a request for it made.

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