

Reconstructive Surgical Correction of Paralytic Claw Fingers In Leprosy by Lasso Procedure

Deepak Nadkarni^A, D R Galfat^B, Raghvendra Sadh^C

^A- Associate Professor; Department of Orthopaedics, Chirayu Medical College, Bhopal.

^B- Professor & Head, Department of Orthopaedics, Chirayu Medical College, Bhopal.

^C- Medical officer, LRP unit Gandhi Medical College, Bhopal.

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Name and addresses of corresponding author:
Dr. D. R. Galfat
Professor & Head, Deptt. of Orthopaedics,
Chirayu Medical College, Bhopal (M.P)
Email: drgalfat@gmail.com
Mobile: 7772014400

Abstract:

In a multicentric study paralytic claw finger deformity in Leprosy was corrected in 18 patients, 11 males and 7 females between the age group of 20 to 42 years by lasso procedure. In 8 males clawing of unilateral hand fingers & in 3 males clawing of fingers of both hands were operated .out of 7 females 5 had clawing of fingers in unilateral hand and in 2 females clawing was present bilaterally. Out of 18 patients 15 had ulnar (partial) claw hand 3 had total or complete claw hand. 9 male patients had ulnar clawing and 2 had complete clawing 6 female patients had ulnar claw hand & 1 female patient had complete claw hand. 22 hands of 18 patients were operated. Results were analyzed after follow up of one to three years. Results were analyzed after one to 3 years follow up. The results observed were excellent in 5 hands (22.7%) (n=22), good in 15 hand (68.2%)and fair in 2 hands (9.1%)

Keywords: Lepromatous, Clawing, Lasso, Pulley, reconstruction.

Introduction:

Claw deformity is the most common paralytic deformity is caused by ulnar nerve paralysis. In most of the cases ring and little finger are affected due to paralysis of ulnar nerve as all the intrinsic muscles (lumbricals, interossei and hypothenar muscles) of these fingers are supplied by the ulnar nerve and all of them have become paralyzed. Lumbricals of middle finger are usually not supplied by ulnar nerve but in Martin-Gruber anastomosis lumbricals of these two fingers are also involved and in these cases all four fingers are equally affected. Interosseous muscles of all the four fingers & adductors pollicis is paralysed in ulnar nerve paralysis. In minority of cases median nerve is also affected in leprosy [1].

Patho Biomechanics of Intrinsic Minus Deformity:

During Prehension the main function of intrinsic muscles is flexion of metacarpophalangeal joint and extension of proximal & distal interphalangeal joints of the fingers. Brand stated that these are the only muscles which have a prime flexor effect on the metacarpophalangeal joint [2]. In the normal action of the grasp, when the fingers reach out to surround an object the most important muscles are the intrinsic, the long extensors and long flexors have very little action at this stage. If the intrinsic are missing the long flexors take up the task but they fold the finger onto themselves rather than allowing them to reach out to surround the object. When the intrinsic muscles are paralysed, because of loss of flexor force, the metacarpophalangeal joint goes in to hyperextension. This creates the mechanical disadvantage which incapacitates the the long

extensors of the finger from extending the interphalangeal joints, which are then flexed by the unopposed action of the long flexors. The result is claw deformity [3].

Aims and objectives:

To restore balance of force moments acting on the finger joints in order to correct claw deformity and improving the intrinsic minus disability.

Prerequisite for surgical correction

1. Patient must be stabilized by complete anti leprotic multidrug therapy regime at least for 12 months with noticeable clinical response.
2. The skin smear must be negative [4-6,7,8,9-11] and patient must be sufficiently motivated and understand what surgery can accomplish and its limitations [4-6, 7,8,9,11]
3. Patient should be given anti leprotic multidrug therapy regime at least for 12 months with noticeable clinical response.
4. Pre-operative therapy is mandatory to make the stiff hand joints supple.
5. Strengthening the muscles identified for transfer and releasing myostatic and capsular contracture[9-13] in order to restore the assisted angles in claw hands[11,14] to zero status [4-6, 7,8,9-14].

Materials and Methods:

- 18 patients, 11 males and 7 females with 22 claw hands are operated by lasso procedure (pulley insertion shah's procedure).
- Ethilon 5-0 & 2-0 are used for tendon insertion and skin suturing respectively.
- Pop slab applied post operatively for 3 weeks .physiotherapy started after removal of slab.

Methods used for correction of finger clawing are as under:

1. Restriction of MCP joint hyper extension

- a. Volar capsuloplasty and flexor pulley advancement.
- b. Dermodesis
- c. Extensor diversion graft.

2. For intrinsic substitution

a. Volar route procedure-

- i. Tendon transfers using ECRL,FDS,PL
- ii. Intrinsic reactivation
- iii. Tenodesis

b. Dorsal route procedures

- i. Brands EF4T transfer of ECRB
- ii. Fowler –Riordan transfer
- iii. Riordan tenodesis

3. For stabilization of proximal phalynx with proper flexor-

a. Tendon tranfers-

- i. Bone insertion procedures
- ii. Pulley insertion procedures

1. Direct lasso (FDS)
2. Indirect lasso(FDS,ECRL.PL)

Lasso has an edge over the tendon transfer & tenodesis procedure because the main advantages of the procedure are:-

1. It do not add to the extending procedure acting on the PIP joint.
2. It can be safely used for correction of Asian hands having thin, long fingers with hypermobile PIP joints.
3. It corrects the deformity well and the interaction of finger movements, co-ordination of fingers and finger closure patterns are also restored satisfactorily.
4. It is technically non demanding & reproducible method and can be performed in ordinary set up.

Procedure:

(Shah's Lasso)[15]:

After cleaning and draping the part under all aseptic precaution & tourniquet application A1 & A2 pulley of all fingers are exposed through a transverse skin incision along the distal palmar crease and vertical incision in subcutaneous fat layer. FDS tendon insertion at the middle finger is detached retrieved in the palm. Two slips are divided into 4 slips. Each slip is passed through A1 & middle of A2 pulley & folded back on itself over the flexor sheath and pulled to create tension to flex the MCP joint by about 60 degree. At this tension two parts of slip are tied together with 5-0 Ethilon suture. The skin wound is closed in single layer with 2-0 Ethilon. The limb is immobilized with pop slab keeping the wrist 30 degree flexion, MCP joint in 70 degree & IP joints are left free to move, Post operative physiotherapy was started after removal of slab.



Pre Operative



Intra-operative



Post-Operative

Results:

Post operative results were evaluated after 1 to 3 years follow up. Post operatively patients were called for follow-

up after 3 weeks, 6 weeks, 12 weeks, 6 months & then at yearly interval. The results were assessed on the basis of criteria of functional outcome & patients own satisfaction.

Excellent : patient can open his hand keeping all the joints perfectly straight, could flex the metacarpophalangeal joints to 90 deg keeping interphalangeal joint straight and has a normal mechanism of closing the fist, the strength of grip & function of hand is nearly normal. In 5 hands out of n=22 (22.7%) results were excellent.

Good : patients who could extend their fingers to at least 150 degree at the interphalangeal joint with metacarpophalangeal joint remaining neutral and mechanism of closing showed that metacarpophalangeal joint could be flexed 90 degree before interphalangeal joint begin to flex in 15 hands (n=22) (68.2%) the results were good.

Fair: fingers showed improvement over preoperative stage. There was more than 30 deg of flexion at interphalangeal joint in open hand mechanism of closing is nearly normal but patients is unable to extend interphalangeal joints sufficiently to grasp the glass. In 2 hands 9.1% results were poor.

Discussion:

22 hands of 18 patients with claw hand deformity due to intrinsic muscle paralysis caused by Hansen's disease were operated to correct the claw hand deformity by Shah's lasso procedure. 13 patients (8 males and 3 females) had unilateral claw hand & 5 patients (3 males 2 females) had bilateral claw hands deformity. 15 patients (9 males and 5 females) had ulnar claw hand & 3 patients (2 males & 1 female) had complete claw hand. Pre-operative physiotherapy with olive oil massage & wax bath was given to make the joints supple in patients who were having stiffness & contracture of fingers.

Various methods are devised to correct the claw hand deformity of leprosy, Bunnel, Brand, Riordan, Fowler, Zancolli capsulorrhaphy, Zacolli lasso and modified lasso by Shah procedure.

In all the procedure principles are the same with little modification. We have adopted Shah Lasso procedure as it is effective for better functional outcome, technically non demanding and reproducible methods.

Post –operative complications and recurrence of deformity was not observed in our study.

In Brand's [10] study conducted in 1961, 71% patients showed excellent and good results in extensor flexor many fail operation. Shrinivasan [16] in 1973 found 80% good and excellent results in his services.

Shrivastav in 1973 reported 60% good results with Zancolli's capsulorrhaphy.

In our study excellent & good result are found in 90% cases .the results of our study are comparable to the other studies & there are no chances are recurrence and complications if performed meticulously with proper technical considerations.

Conclusion:

Shah's lasso modification procedure is safe, effective, reproducible and technically non- demanding procedure for reconstructive surgical correction of claw hand deformity of leprosy caused by intrinsic paralysis.

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