



EXTENSOR TENDON INJURIES OF HAND: RISK ASSESSMENT, ETIOLOGY, TREATMENT AND OUTCOME – A PROSPECTIVE STUDY FROM SOUTH INDIA.

Plastic Surgery

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KEYWORDS

INTRODUCTION

Extensor tendons of hand are superficial, covered only by skin and a thin layer of fascia, and placed close to the underlying bone, thus highly susceptible to injury than flexor tendons by commonly experienced trauma. (1,2). Extensor tendon injuries are very common (61.3%). (3) Workers in Agricultural farms and coffee estates are more susceptible to injuries. The mechanism of injuries was slippage of harvesting tools (sickle) while working leading to, deep cuts of fingers and hand. Major occupational health hazards are farm related injuries. Very little information is available about the type and nature of agricultural injuries on Indian farms. The agricultural injuries incidence rate was 0.8 per thousand workers per year in the study conducted by Patel et al. (4)

Males and older farmers were at a greater risk of agriculture injuries; therefore, the prevention and management of agricultural injuries in this population is required. (5)

Miller's scoring system to evaluate tendons (6) showed that; laceration severity, location of the injury, surgical technique, accompanying trauma, physiotherapy and the patient's cooperation, were important factors in the outcome of these repairs. Of these factors, the location of the injury and post-operative immobilization are the two most important factors. Due to concomitant trauma such as; hand fracture, extensor tendon lacerations at the proximal interphalangeal joint and proximal phalanx levels, these have the worst prognosis, and this was shown in Evans' study (7).

The emergency clinician must understand the anatomy, principles of treatment, repair technique, and post repair care of these injuries to ensure the best possible patient outcome.

Though being a common type of agricultural injuries encountered there is no recent report in literature on the profile of patients with extensor tendon injuries has been documented from the southern part of India, hence this study was conducted. This study was carried out to document our institutional experience in tertiary health care centre as we encounter more number of extensor tendon injuries in workers in coffee plantation.

AIMS & OBJECTIVES

1. To determine the risk factors associated with farm related extensor tendon injury.
2. To determine the etiological factors, presentation, management and outcome of patients with extensor tendon injury involving hand among working population in coffee plantation estates and agricultural lands.

MATERIALS & METHODS

Study Design: Descriptive study conducted prospectively.

Study Duration: 6 months.

Study Subjects: All consecutive patients attending surgery OPD or Casualty of a government medical college hospital with extensor tendon injury, during the study period were included in the study.

Exclusion Criteria: Flexor tendon injury, critically ill patients

Sample Size : 15 to 20

(Based on data collected from previous operated extensor tendon injury in our institute was 15 patients over a period of 6 months)

Study Tool and Data Collection: Proforma will be used to collect the demographic data and operative data and data of follow up in OPD.

All consecutive patients attending the surgical OPD or emergency room were included in study with the inclusion criteria are interviewed by the investigator using the structured questionnaire after taking informed consent from them.

Procedure Details: Tendon repairs were carried out in the operating room under anesthesia using a modified Kessler technique 0 – 3 core stitch and continuous running epitendon suture with 0 - 5 nylon. Primary repairs will be planned in all patients. Following repairs in zones 3, 4, and 5, a volar splint was applied with the wrist at 40° and metacarpophalangeal joints in 15° of flexion. For immobilization in zones 1 and 2, the proximal interphalangeal joint and distal interphalangeal joints of the fingers were fixed by splints at extension. The patients were encouraged to move their fingers. The splint was removed at four weeks, then more daily activities were permitted, but a simple removable splint was applied during the night for two further weeks. Patients were referred for physiotherapy.

Statistical Analysis

Continuous data will be expressed as mean, SD and confidence interval. The categorical data will be presented as frequency and proportions. and will be entered into Microsoft office excel worksheet. P value <0.05 will be considered as statistically significant. Chi square test will be done to compare the variables and analysed using SPSS version 22 software

Implications

This study would give us an opportunity

- 1 To analyse the relationship between gender and agricultural injury
- 2 To analyse the relationship between age and injury
- 3 To analyse the relationship between skill and experience of worker working in farm and injury

Derive some conclusion so as to minimize agricultural injuries, development of interventions and trainings for safety of workers in this part of country. Study will help us to review our results after tendon repair and reduce complications. It will also benefit the patient and the improve health facility by reducing the disability burden due to tendon injury.

Review of Literature

The extensor tendons are smooth cord that connects the muscles of forearm and hand to the bones in the fingers and thumb. An extensor tendon injury occurs when the tendon is torn, cut or detached. The extensor tendons are just under the skin and are easily injured by any small cut across the back of the wrist, hand or fingers.

Anatomy

The extensor mechanism of the hand can be divided into eight zones (Fig. 1) to aid in the evaluation and treatment of acute injuries (8). Zone I refers to the area from the Distal interP joint to the fingertip; zone II encompasses the middle phalanx; zone III refers to the PIP joint; zone IV is over the proximal phalanx; zone V refers to the MP joint; zone VI encompasses the metacarpal, zone VII is over the wrist and zone VIII is proximal wrist.



Fig. 1: The Eight Extensor Tendon Zone, T=Thumb

Presentation

Extensor tendon injuries can result from various mechanisms. The most common among them are direct object (machete, sickle, crow bar etc) direct laceration, crush injuries, Animal or human bites, burns etc. In most of the cases the cut of the tendon can be seen directly with manipulation of overlying skin. In some injuries exhibits loss of extensor function, decrease in extension strength.

Evaluation

A careful evaluation of the injured hand, including a thorough neurovascular examination is essential in the treatment of extensor tendon injuries. Flexor tendon function should be assessed, and appropriate radiographs obtained. The wound should be thoroughly inspected, with adjunctive use of local or regional block anesthesia as necessary. Injuries near a joint must be carefully inspected for violation of the capsule sterile saline should be injected into the joint for verification if any doubt exists. For injuries in zones V through VIII, careful testing of MCP extension should be performed with the wrist held in neutral and the interphalangeal joints extended. Extension of the interphalangeal joints, produced by the intrinsic, should not be interpreted as representing extrinsic extensor integrity. The patient is asked to fully extend each finger at the MCP joint against gentle resistance. A complete injury of the extensor tendon will prevent full MCP extension. A partial extensor tendon injury may be painful or may demonstrate incomplete MCP extension. Partial injury should be directly visualized to determine whether repair is necessary. Although no studies have been performed to determine the amount of partial injury that requires repair, I believe that a tendon injured over 50% of its width should be repaired to ensure adequate balance and to prevent further disruption. Injuries proximal to the zone VI require special attention. A finger may fully extend even though its extensor tendon is completely injured. This can be evaluated by asking the patient to extend each finger individually while holding all others flexed at the MCP joints, thereby blocking the pull of the juncturae. If the extensor tendon is intact, the patient will be capable of at least some extension, which should be comparable to that of the contralateral finger of the noninjured hand.

History of the Tendon Repair

The history of tendon repair can be tracked back to the times of Hippocrates and Galen. Interestingly Galen (131-201 AD) in his *Ars Parva*, stated that tendons were composed of both ligaments and nerves. He warned that placing the sutures in tendons can cause pain, twitching, and eventual convulsions, but in 1682 when Meekren observed that tendons are insensitive and described the successful repair of incompletely severed tendons. Modern tendon repair surgery was promoted by Kirchmayr, who in 1917 published a method of 'locking' suture in tendon repair which are still in use today (9).

TREATMENT

Treatment of extensor tendon injuries requires operative interventions, depending upon complexity and zone of the hand involved (10).

Severely contaminated wounds, open fractures, and joint capsule lacerations require emergent and thorough irrigation and debridement. Fractures and skin loss should be treated in the initial procedure when feasible. Fractures should be fixed rigidly enough to allow early dynamic splinting or active motion. For tendon injuries without other

associated injury, the extensor tendon can be repaired emergently or in a delayed primary fashion after irrigation, debridement, and loose closure of the wound. If the repair is delayed, it should be performed within 7 days, before the tendon ends retract or soften.

All repairs are best performed with adequate anesthesia, lighting, and exposure in the operating room using a modified Kessler technique 0-3 core stitch and continuous running epitendon suture with 0-5 nylon. Primary repairs will be planned in all patients. Following repairs in zones 3, 4, and 5, a volar splint was applied with the wrist at 40° and metacarpophalangeal joints in 15° of flexion. For immobilization in zones 1 and 2, the proximal interphalangeal joint and distal interphalangeal joints of the fingers were fixed by splints at extension. The patients were encouraged to move their fingers. The splint was removed at four weeks, then more daily activities were permitted, but a simple removable splint was applied during the night for two further weeks. Patients were referred for physiotherapy.

Indications

- Tendon injuries greater than 50%
- Tendon injuries less than 50% significantly decreased strength in comparison with noninjured hand/finger
- Tendon injuries associated with significant overlying skin loss, joint penetration, or fracture

Contraindications

- Contaminated injuries, particularly open zone 1, 3 and 5
- Presence of associated bony fracture penetrating joint injury
- Injury proximal to zone 6 with the

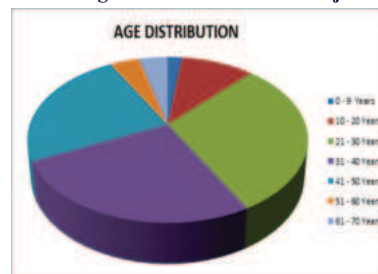


Fig. 2: Four Commonly Used Repair Techniques For Extensor Tendon Injury Repair

OBSERVATION AND RESULTS

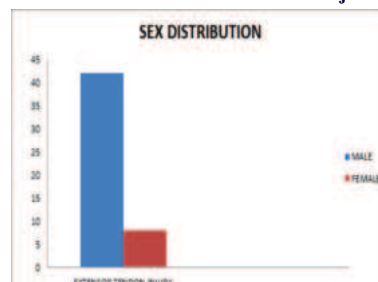
The present study included 50 subjects (42 male and 8 female) in the age group of 08-70 years.

I. Relation Between Age and Extensor Tendon Injuries



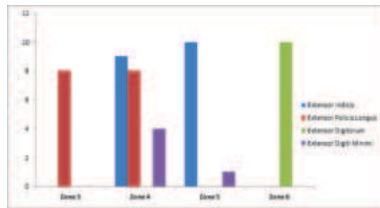
The above Chart represents the age distribution of extensor tendon injuries, the Highest age group affected is between 21-40 years with 27 cases out of 50 and the lowest being 0-9 years being 1 out of 50.

II. Relation Between Sex and Extensor Tendon Injuries



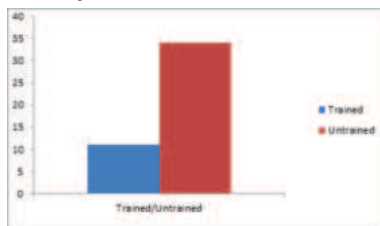
The above chart represents the sex distribution of the extensor tendon injuries. The male sex is commonly affected reflecting the male predominance in manual labour.

III. Relation Between Zone of Injury and Extensor Tendon Injuries



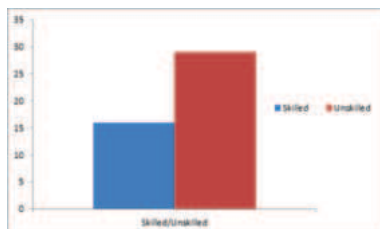
The above chart shows that the extensor pollicis longus tendon is commonly affected in zone 3 and injuries to the zone 4 tend to affect the extensor indicis and extensor pollicis longus and zone 5 and zone 6 injuries tend to affect the extensor indicis and extensor digitorum respectively owing to the anatomical positions of the respective tendons in the hand and the type of injury which is likely to cause the tendon damage.

IV. Relation Between Trained and Untrained Workers in Case of Extensor Tendon Injuries.



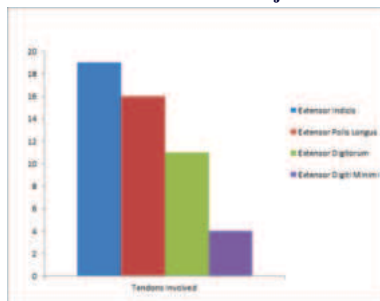
The above chart shows that the untrained work personnel tend to get more injuries than the trained personnel.

V. Relation Between Skill of the Workers and Extensor Tendon Injuries.



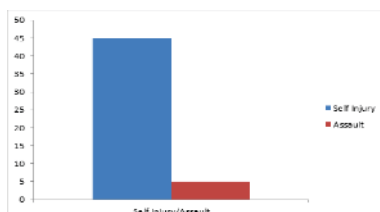
The above chart shows that the unskilled work personnel are more affected than the skilled work personnel.

VI. Comparison of Tendons Involved in Injuries.



The extensor indicis is the most common tendon to be injured followed by extensor pollicis longus, extensor digitorum, extensor digiti minimi respectively in the extensor compartment.

VII. Comparison of Type of Injury Involved in Extensor Tendon Injuries.



The most common type of injury implicated to the extensor tendon injuries is self injury.

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