

Epidemiology of thumb tendon injury

Dr. Pankaj Pandoor¹, Dr. Sudhir Navadiya², Dr. M.F. Shaikh³,
Dr. Jayesh Sachde⁴, Dr. Manav Suri⁵, Dr. Hiren Rana⁶

¹(Department of Burns & Plastic Surgery, B. J. Medical College, Ahmedabad, India)

²(Department of Burns & Plastic Surgery, B. J. Medical College, Ahmedabad, India)

³(Department of Burns & Plastic Surgery, B. J. Medical College, Ahmedabad, India)

⁴(Department of Burns & Plastic Surgery, B. J. Medical College, Ahmedabad, India)

⁵(Department of Burns & Plastic Surgery, B. J. Medical College, Ahmedabad, India)

⁶(Department of Burns & Plastic Surgery, B. J. Medical College, Ahmedabad, India)

Abstract:

Background: Thumb tendon injuries cause significant morbidity in working-age population. It is evaluated that the loss of the thumb corresponds to a loss of 40% of the hand functions. The epidemiology of these injuries is not well known. The aim of this study was to describe the epidemiology of thumb tendon injuries and its various aspect at our centre Civil Hospital, Ahmedabad.

Materials and Method: All patients with thumb tendon injuries admitted during the period from October 2015, to December 2017 are included in this study. All patients with open thumb tendon injuries included. The incidence of tendon injury as well as the gender-specific incidence rates was calculated. Mechanism of injury, zone of injury, type of tendon involvement, and final outcome was studied.

Result: The incidence rate was higher in men and involving adult age more commonly. Accidental injury mainly at working site was more common. Zone III injury was the commonest location which most commonly involved extensor tendons.

Conclusion: Our study enhances the knowledge of injury patterns and may play a role in the prevention and treatment of future injuries. Open tendon injuries of the thumb are serious injuries that should be treated by a skilled surgeon. In detail knowledge and path-physiology of tendon injuries are essential for an accurate diagnosis, and better management of injuries.

Date of Submission: 04-12-2019

Date of Acceptance: 19-12-2019

I. Introduction

In man and some of the apes, the thumb has the function of a contra-finger. This function is made possible by a great freedom of movement of the first metacarpal and a highly developed and differentiated thumb musculature. The grasp function of the hand is dependent on the oppositional capacity and adductive power of the thumb. The most characteristic and elementary movement of the thumb is opposition. In this movement, the thumb is placed such that its distal volar side is diametrically opposite the distal volar side of one of the other fingers.¹ The thumb provides 40% to 50% of total hand function.² The thumb is the only digit of the hand, which can be opposed to the other four fingers, although it is composed of only two bones: the proximal and distal phalanges. The thumb is the only finger whose IP joint can be bent backward when the digit is fully abducted from the palm (*hitchhacker's thumb*).³ Tendon injuries are the second most common injuries of the hand. Most injuries are open injuries to the flexor or extensor tendons, but less frequent injuries, e.g., damage to the functional system tendon sheath and pulley or dull avulsions, also need to be considered.⁴ Techniques of repair and augmentation, which minimize gap formation, and rehabilitation techniques, which maximize intra-synovial excursion while minimizing force at the repair site, must be understood.⁵

II. Material and Methods

This prospective comparative study was carried out on patients of Department of Burns & Plastic Surgery, Civil Hospital and B. J. Medical College, Ahmedabad, Gujarat, India from October 2015 to December 2017. A total 36 adult subjects (both male and females) of aged ≥ 18 , years were for in this study.

Study Design: Prospective open label observational study

Study Location: This was a tertiary care teaching hospital based study done in Department of Burns & Plastic Surgery, Civil Hospital and B. J. Medical College, Ahmedabad, Gujarat, India

Study Duration: October 2015 to December 2017

Sample size: 36 patients

Inclusion criteria:

1. All patients with thumb tendon injuries admitted during the period from October 2015, to December 2017 are included in this study.
2. All patients with open thumb tendon injuries.
3. Patients with thumb tendon injuries initially treated elsewhere and referred to our hospital for further management are also included in the study.
4. All patients of thumb tendon injury with bony, vascular, nerves and other finger tendon injury.

Exclusion criteria:

1. Patients with injuries involving other finger tendons but no thumb tendon injuries.
2. Patients with Close thumb tendon injuries.
3. Patients with Thumb amputations.
4. Patients with Thumb soft tissue injuries without tendon injury.
5. Patients with crush injuries of thumb.

Procedure methodology

All the patients were managed in our department by surgical management. All patients had thumb injury appropriate history and clinical examination done. Local part x-ray done for suspected bony fracture/ joint dislocation. Colour Doppler ultrasound done in selected cases in which suspected for vascular injury. In Old tendon injury, patient ultrasound of local part and MRI hand done.

III. Result

After studying 36 cases, the observation and results were summarized. And studied in view of Sex, Age, Mode of injury, Associated other finger tendon injury, Associate vascular, nerve injury, Zone of thumb tendon injury, Time of surgery, Complications of surgery, Satisfaction of patients.

In our study, there were 34 males and 2 females involved. It suggests that thumb tendon injury is more common in male compared to female. As per our study, all patients fall in the age between 18 to 60 years. In 31-40 years' age group there were 13 patients, 21-30 years' age group 11 patients, 41-50 years' age group 4 patients, 11-20 and 51-60 years' age group 5. So, data suggested that thumb tendon injuries occur more commonly in age group of 20-30 years and 31-40 years.

Table No.1 shows 21 patients had accidental cut injuries, 07 patients had homicidal cut injuries, 06 patients had road traffic accident and 2 patients had history of suicidal cut injuries. According to our study, accidental injuries are the most common cause of thumb tendon injuries. Out of 21 patients of accidental cut injury, we found that 11 patients had occupational accidental cut injuries whereas 10 patients had accidental cut injuries while doing domestic work, out of which 7 patients had kitchen knife cut injuries and other 3 patients had glass injuries.

Mode of injury	No of patients	Percentage (%)
Road traffic accident	6	17
Accidental cut injury	21	58
Homicidal	7	19
Suicidal	2	6

Table No. 2 shows 10 patients had bone fractures, 12 had vascular injuries, 2 had nerve injuries, and 16 patients had no other associated injury. So, our data suggesting that majority of the patients presented with only thumb tendon injuries without any other associated injuries.

Associated injury	No. of patients	Percentage %
Bony injury	10	28
Vascular injury	12	33
Nerve injury	02	06
No other injury	16	44

In 10 patients of bony injuries, we found 7 patients had metacarpal of thumb fracture, one patient had proximal thumb phalanx fracture, one patient had metacarpal fracture of little finger and one patient had lower end of distal radius and ulnar fracture. In 12 vascular injury patients, we found 11 patients with radial artery cut

injury and one had ulnar artery cut injury. In radial artery cut injury patients, one patient has princeps pollicis artery cut injury and rest 10 patients had cut injury of the main radial artery. In 2 nerve injury patients, one patient had radial nerve injury and another one had ulnar nerve injury.

Table No.3 we recorded zone of tendon injury, in which 17 patients had zone-III injury, 10 patients had zone-V, 7 patients each with zone-II and zone-IV injury and one patient had zone-I thumb tendon injury. In our study, maximum patients had zone-III thumb tendon injuries.

Types of injury	No. of patients	Percentage %
Zone –I	01	03
Zone –II	07	19.44
Zone –III	17	47
Zone – IV	07	19.44
Zone –V	10	28

In our study, we recorded, 19 patients had extensor pollicis longus tendon injury, 18 patients each with abductor pollicis longus and extensor pollicis brevis tendon injury and 11 patients had flexor pollicis longus tendon injury. Additionally, 8 patients had flexor pollicis brevis muscle injury, 7 patients each with adductor pollicis muscle and opponens pollicis muscle injury, 4 patients had abductor pollicis brevis muscle injury and one patient had first dorsal interosseous muscle injury.

In our study, 33 patients had primary thumb tendons injury repair done, 2 patients had delayed primary repair done at 15th and 17th day of thumb tendon injury and one patient had secondary thumb tendon injury at 2 months of thumb tendon injury. Here, maximum patients taken for surgery were within 24 hour.

Table No.4 In our study, 10 patients developed post-operative tendon adhesions, 3 patients had skin flap necrosis, 2 patients had post-operative tendon rupture and 2 patients had infection at suture side, 22 patients had uneventful post-operative period with any complication. Total 5 patients had two post-operative complications simultaneously. Tendon rupture of two patients was identified at post-operative day 3, so early exploration and re-suturing of rupture tendon was done and no further complications noted in these two patients.

Complications	No. Of patients	Percentage %
Adhesion	10	28
Rupture	02	06
Infection	02	06
Flap necrosis	03	8
No complications	22	61

In our study, 26 patients were satisfied after repair of thumb tendon injury, 8 patients were averagely satisfied and 2 patients were unsatisfied. This shows 70% patients were satisfied with our management. In Two patients, skin grafting was done for wound coverage along with tendon repair so long time immobilization was required, so adhesion of tendons occurred and decreased thumb mobility due to infection of skin graft and secondary healing of wound was noted, so these two patients were unsatisfied. Remaining 8 patients who were averagely satisfied had adhesions, so thumb full range of motion was not achieved.

IV. Discussion

The spectrum of traumatic hand injuries includes minor soft tissue injuries and fractures to complex injuries requiring nerve, tendon, or artery repair. Within this spectrum, tendon injuries are quite common and it is important for the treating surgeon to recognize that even a small laceration to the hand may involve the flexor or extensor mechanism.⁷

There are varying statistics about the epidemiology of traumatic thumb tendon injuries in different parts of the world. Our results were compared and variation in our population was noted.

Epidemiology of Tendon Injuries of the Hand in a Northern Finnish Population, Oulu University Hospital, Oulu, FINLAND” that study show 106 patients, 88 males (83%) and 18 females (17%), with flexor tendon injuries between the years 2004 and 2010.

“Incidence of Acute Traumatic Tendon Injuries in the Hand and Wrist, Mayo Clinic, Rochester, MN, USA” shows the incidence rates for males and females from 2001 to 2010. Here 385 (84.1%) males and 73 (15.9%). In our study, 34 (94%) male and 2(6%) female patients, this shows tendon injuries of thumb commonly seen in male patients.⁶⁻⁷

In Finland study, Majority of the injuries were inflicted by a knife (41/106, 39%), broken glass (15/106, 14%), or other sharp object (26/106, 25%) and 13% injuries were work-related. In Mayo Clinic study, A variety of mechanisms accounted for acute traumatic tendon injuries and included: knife 31% (n = 129), glass or mirror 17% (n = 71), any kind of saw 16% (n = 68), crush injury 6.46% (n = 27), 1.2% degloving injury (n = 5), and bite injury 0.72% (n = 3). Here, 24.9% (n = 104) had Work-related injuries and 4.5% (n=19) had history of suicidal cut injuries.

In our study, 21(58%) patients had accidental cut injuries, 07(19%) patients had homicidal cut injuries, 06 (17%) patients had road traffic accident and 2(6%) patients had history of suicidal cut injuries. Out of 21(58%) patients of accidental cut injury, we found that 11(53%) patients had occupational accidental cut injuries whereas 10(47%) patients had accidental cut injuries while doing domestic work out of which 7(33%) patients had kitchen knife cut injuries and other 3(14%) patients had glass injuries.⁶⁻⁷

In Mayo Clinic study, most common zone of injury was zone-III, in flexor tendon injury of thumb, zone III (5.4%) and extensor tendon injury of thumb, zone III (3.3%). In our study, 17 (47%) patients had zone III injury and 10 (28%) patients had zone V injury. This also shows zone III tendon injuries are common in thumb.⁶⁻⁷

In Finland study, incidence of complications was 20% noted. The most common complication was adhesions in 11%, followed by a rupture of a repaired tendon in 5.4%, incidence of infections in 1.8% and limited motion due to scar contracture in 1.8%. In our study, 14 (39%) patients had complications. Most common complication was development of adhesion in 10 (28%) patients followed by skin flap necrosis in 3(8%) patients, post-operative tendon rupture in 2(5.55%) patients and 2(5.55%) patients had infection at suture side. Here, 8(22%) patients had some limitation of range of thumb motion and 2(6%) had severe limitation of thumb movements. This also shows adhesion is common complication after thumb tendon repair.⁶⁻⁷

In the last decade, the increase in costs has drawn more attention to economic considerations of healthcare, and in a recent study by de Putter et al, hand and wrist injuries were ranked the most expensive types of injuries. Increased knowledge of the epidemiology of this injury type provided by our study helps to estimate the resources needed for the repair and rehabilitation of flexor tendon injuries.⁸ Our study provides much needed knowledge of persons at risk and the causes of injury. The treatment, especially of complications, is expensive.⁹ Consequently, in addition to optimizing the surgical repair, a future aim should be to identify ways to prevent these injuries. Open tendon injuries of the thumb are serious injuries that should be treated by a skilled surgeon. Without adequate epidemiologic data, it is difficult for one to predict the economic burden of these injuries on society, which is of particular relevance in the current setting of growing healthcare costs and limited available economic resources.⁴

This study provides information for optimizing the national surgical and rehabilitation services for caring of tendon injuries of the hand including thumb. Ideally all the tendon injuries of thumb should be repaired as early as possible preferably within 24hrs to achieve the best results.¹⁰ The results of delayed primary repairs and secondary repairs are inferior. Physiotherapy is an integrated part of managements. Post-operative early active motion should be started after 3days after detailed discussion with physiotherapist and occupational therapist.¹¹

V. Conclusion

In conclusion, an improved and updated understanding of the epidemiology of acute tendon injuries will hopefully stimulate additional investigation into the prevention and treatment of these injuries. It enhances the knowledge of injury patterns and may play a role in the prevention and treatment of future injuries within end result of reducing lost work time and economic burden. Open tendon injuries of the thumb are serious injuries that should be treated by a skilled surgeon. In detail knowledge and path-physiology of tendon injuries are essential for an accurate diagnosis, because these lesions are complex and commonly observed in clinical practise.

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