Original Research Article

A study of surgical repair and outcome of tendon injury in hand

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Abstract

Introduction: Flexor tendon injuries were already treated in antiquity by Hippocrates, Galien and Avicenne. Since the Renaissance, other surgeons have attempted to repair flexor tendon injuries, but without success due to problems related to unsuitable materials and ignorance of the basic rules of asepsis and the absence of antiseptics until the second half of the 19th century[1]. In 1886 Peyrot reported a case "transplantation in man of the tendon of a dog" to replace the flexor tendon of a middle finger" which has been destroyed"; this resulted in "good healing with partial functional recovery". **Aims and Objective:** To Study the Surgical repair and outcome of Tendon injury in hand **Methodology:** Prospective study, All patients of tendon injuries of hand treated at Assam Medical College and Hospital, Dibrugarh from 1st August 2014-31st July 2015, either as outpatient or admitted patients.Delayed primary repair was performed in most of the patients. Other operative procedures followed were a primary repair, secondary repair, end to end repair, tendon graft and tendon repair graft with pulley reconstruction. Results: For flexor tendons, 50 % fingers showed excellent results whereas 28.57% showed good results, 14.28% showed fair and the same number showed poor results. On comparing the results zone-wise, it was observed that zone II results were excellent in 42.85% cases, good in 28.57% cases, poor in 14.28% cases and fair in equal number, whereas in zones III and IV, 60–70% excellent to good results were seen. Excellent to good results were seen in 100% cases in zone V. **Conclusion:** In the postoperative course of tendon injuries, the principle of early passive movement is important to trigger an "intrinsic" tendon healing to guarantee a good outcome

Key Words: Flexor tendon injury, Extensor tendon injury, Zones of Hand.

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INTRODUCTION

Flexor tendon injuries were already treated in antiquity by Hippocrates, Galien and Avicenne. Since the Renaissance, other surgeons have attempted to repair flexor tendon injuries, but without success due to problems related to unsuitable materials and ignorance of the basic rules of asepsis and the absence of antiseptics until the second half of the 19th century[1]. In 1886 Peyrot reported a case "transplantation in man of the tendon of a dog" to replace the flexor tendon of a middle finger" which has been destroyed"; this resulted in "good healing with partial functional recovery"[2]. With the change of our society from a industrial society to a service-based society, surprisingly, an assumed decrease in hand injuries has not been detected, probably due to an increase in private activities, such as sports and do-it-yourself work[3]Based on 272 injured persons, Angermann and Lohmann[4]showed that 28.6% of treated patients in emergency care were caused by hand injuries, a risk of 3.7 injuries in 100000 individuals of the Danish population. On average, hand injuries count for 14% to 30% of all treated patients in emergency care. Tendon lesions are in 2nd position (29%), whereas fractures are 1st (42%) and skin lesions 3rd of all patients treated for hand injuries. Ashish Gupta *et al* (2013) found associated vascular injury in 39.34 % patients in hand injury patients. Injury to the median, ulnar, and digital nerves was to a tune of 27.05 %, [5].The decision to repair a tendon needs to take into account many variables. Primary surgical repair results in better functional outcome compared with secondary tendon repair (more than 3 weeks after the primary injury) or tendon graft surgery for repairing flexor tendon injuries[6]. External devices have been used to stimulate tendon healing

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including electrical simulation by direct current, capacitive coupling and pulsed electromagnetic stimulation [7,8,9]. Laser therapy on tendon healing has also been studied as it increases collagen production in rabbit after tenotomy but in flexor tendon repairs there was no improvement in grip strength or functional results of controls [10]. The use of growth factors and cytokines to enhance tendon healing still remains restricted to animal and *in vitro* studies [11,12]. According to anatomical features, the flexor tendons in the hand and forearm are divided into five zones, which provides the fundamental nomenclature for flexor tendon anatomy and surgical repairs[13].

AIMS AND OBJECTIVE

To Study the Surgical repair and outcome of Tendon injury in hand.

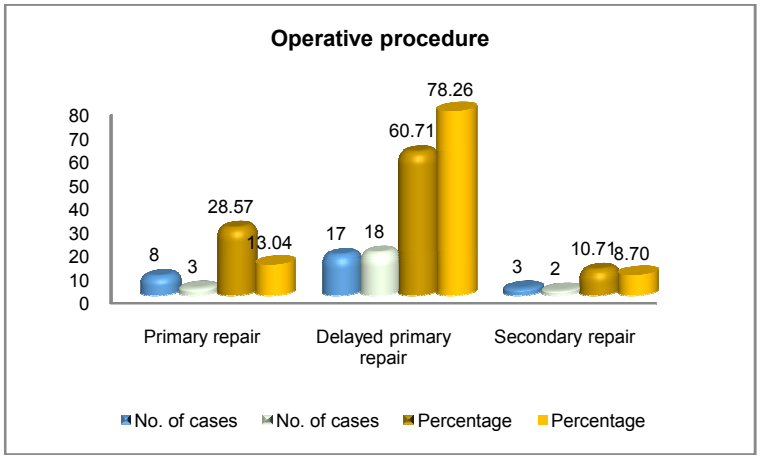
METHODOLOGY

A Prospective study of all patients of tendon injuries of hand treated at Assam Medical College and Hospital, Dibrugarh during 1st August 2014 – 31st July 2015, either as outpatient or admitted patients. Patients with associated bony injuries of hand, with vascular injuries leading to vascular impairment of the hand or fingers, patients who did not come for follow up (1 month) after accident and patients not willing to participate were excluded from the study. In most of the patients delayed primary repair operative procedures were used. Other operative procedures followed were a primary repair, secondary repair, end to end repair, tendon graft and tendon repair graft with pulley reconstruction. Results for flexor tendons were based on Strickland formula by measuring (a) total active motion of pip & dip (b) flexion and extension deficit. Strickland's Adjusted System: (PIP + DIP) flexion − extension deficit × 100/175 degrees = %normal; expressed as Excellent : 75−100%, Good : 50−74%, Fair : 25−49% and Poor : <25.For extensor tendons results , Miller's criteria was used; expressed as Excellent: No extension lag or flexion loss, Good: ≤ 10 extension lag, ≤ 20 flexion loss, Fair:11-45 extension lag, 21-45 flexion loss and Poor: ≥45 extension lag, ≥45 flexion loss.

RESULT

Table 1: Showing operative procedure execute

Operative procedure	No. of cases		Percentage	
	Flexor	Extensor	Flexor	Extensor
Primary repair	8	3	28.57	13.04
Delayed primary repair	17	18	60.71	78.26
Secondary repair	3	2	10.71	8.70



From **Table 1**. In The Operative procedure most of the time delayed primary repair operative procedure were used 28.57 % Flexor, 13.04% Extensor repaired by Primary repair technique. While 60.71% Flexor,78.26 Extensor repaired by Delayed Primary repair technique and 10.71% Flexors and 8.70% Extensors were repaired Secondary repair technique.

Table 2: Showing surgical procedures Flexor Tendon

Surgical procedure	No. of cases	Percentage
End to end repair	22	78.57
Repair with tendon graft	4	14.25
Tendon repair/graft with pulley reconstruction	2	7.14

From **Table 2**: Shows 78.57% Flexor tendons were repaired by end to end repair, 14.25% with Tendon graft, 7.14% tendon repair graft with pulley reconstruction.

Table 3: Showing surgical procedures Extensor Tendon

Surgical procedure	No. of cases	Percentage
End to end repair	20	86.95
Repair with tendon graft		
Tendon repair/graft with pulley reconstruction		
Tendon repair/graft with retinacular reconstruction		
Functional muscles transfer	1	4.35
Extensor expansion repair	2	8.69

From **Table 3**: Surgical procedure used for Extensor Tendon repair was End to End repair(86.95%).Functional muscles transfer (4.35)Extensor expansion repair (8.69).

Table 4: Showing functional result of flexor tendon repair at 8 weeks postop

	Zone Ii	Zone Iii	Zone Iv	Zone V
Excellent	3(42.85%)	2(28.57)	5(62.50%)	4(66.66%)
Good	2(28.57%)	3(42.85%)	1(12.50%)	2(33.33%)
Fair	1(14.28%)	2(28.57%)	1(12.50%)	
Poor	1(14.28%)		1(12.50%)	

From **Table 4:** For flexor tendons, 50 % (14/28) fingers showed excellent results whereas good results were seen in 28.57% (8/28) digits. 14.28% (4/28) digits showed fair and the same number showed poor results. On comparing the results zone-wise, it was observed that zone II results were excellent in 42.85% cases, good in 28.57% cases, poor in 14.28% cases and fair in equal number, whereas in zones III and IV, 60–70% excellent to good results were seen Excellent to good results were seen in 100% cases in zone V.

Table 5: Showing functional result of extensor tendon repair at 8 weeks post op

	Zone Iii	Zone Iv	Zone V	Zone Vi	Zone Vii	Zone Tiii
Excellent	2(66.66%)		2(66.66%)	4(50%)	1(50%)	4(66.66%)
Good	1(33.33%)		1(33.33%)	3(37.50%)	1(50%)	2(33.33%)
Fair		1(100%)		1(12.50%)		
Poor						

From **Table 5:** The functional result as Excellent, Good, Fair and Poor in the decreasing orders were in Zone V,ZONE VIII , Zone VI ,Zone III ,Zone IV.

DISCUSSION

Tendon injuries are the second most common injuries of the hand and therefore an important topic in trauma and orthopaedic patients. 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. Tendon injuries mostly require surgical repair, dull avulsions of the distal phalanges extensor tendon can receive conservative therapy. Injuries of the flexor tendon sheath or single pulley injuries are treated conservatively and multiple pulley injuries receive surgical repair. In the postoperative course of tendon injuries, the principle of early passive movement is important to trigger an "intrinsic" tendon healing to guarantee a good outcome. In an era of evidence based practice more research needs to work out the optimal approach to tendon injuries and rate of complications after different approaches.

CONCLUSION

In the postoperative course of tendon injuries, the principle of early passive movement is important to trigger an "intrinsic" tendon healing to guarantee a good outcome.

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