TENDON INJURIES OF THE HAND: A STUDY ON PATTERN/EPIDEMIOLOGY OF CASES AT A SUBURBAN TERTIARY HOSPITAL, NIGERIA

ABSTRACT

Background: Tendon injuries of the hand are one of the commonest presentations of hand injuries which itself bears a social and economic burden to the society as the most commonly affected are the active and working age groups. Most of these injuries will require surgical intervention to restore aesthetics, structure and function.

Objective: This study seeks to assess the pattern of these injuries, etiology and reappraise the preventive modalities with the aim of reducing incidence in our immediate environment.

Method: A retrospective study of patients who presented and were managed surgically for tendon injuries of the hand with or without injury to other structures of the hand between January 2017 and December 2021. The operation registers as well as case notes of patients were the sources of the information. Information obtained included patients' biodata, aetiology and pattern of injury, hand involved (whether right or left), collateral injuries as well as surgery offered. The results were analysed using SPSS version 20 and descriptive statistics used to represent frequency distribution.

Results: In the five years under review, a total of 27 patients were managed for hand injuries during the period of study, however, only 21 cases which involved tendon injuries were analyzed making it 77.7% occurrence in hand injuries. There were 17 males [84.2%] and 4 females [15.7%] giving a male to female ratio of 4.25:1. The mean age was 30.3 ± 17.10 years and the highest incidence of tendon injury; 9 (42.8%) occurred within the age range of 21-30 years of age. Industrial accident due to grinding machines, 8(38%) was the commonest cause of tendon associated hand injuries, followed by matchet cut injury to the hand following assault 6(28.6%). The overall most common tendon injury was flexor tendon injury (71.4%) with the right hand being most commonly affected; 16(76.2%). All patients had tendon repair done alongside repair of other associated injuries of the hand.

Conclusion: Our study reveals tendon injuries of the hand as a common occurrence following hand injuries and seen among the economically active groups with crippling implications. In addition to its proper management by a skilled surgeon, preventive measures should be implemented to reduce its occurrence.

Key words*: Tendon, Pattern, Injury, Hand, Suburban, Nigeria*

1. INTRODUCTION

"The hand is a very important part of the body used for exploratory and manipulatory activities"[1]. "Tendon injuries are the second most common injuries of the hand"[2]. "Tendons are strong, dense, connective tissue structures that attach muscles to bones. Injury patterns are differentiated into open or closed, sharp or blunt, traumatic or degenerative lesions. 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"[2]. Proper management of hand tendon injuries requires a good knowledge of the anatomy and physiology of

the hand and forearm. Hand surgeons[3,] agrees that the goal of treatment of hand injury is to restore an aesthetically pleasing, painless, tactile, mobile, stable finger that can sense pain, temperature, pressure, stereogenosis and fine touch.

"Hand injuries are a leading cause of time lost from work and workers compensation claims has been documented by most workers. The United States Bureau of labor statistics reports that hand injuries are the second most common injury resulting in days away from work"[4]. "In a study conducted at the Lagos university teaching hospital Lagos, Nigeria, hand injuries are among the common emergency hand problems that present in the accident and emergency department which demand immediate attention and treatment". [5] Management of hand injury is a teamwork, the team must also involve the nurses, physiotherapist, the patients, their relatives, the hospital administrators with the hand surgeons[6]. Although orthopedic surgeons are involved in the management of hand injuries, however much are managed by plastic surgeons especially with respect to tendon injuries.

In a study carried out in two tertiary hospitals in Delta State, Nigeria[7] between January 2013 and December 2015. The commonest cause of hand injury was due to machete/ knife cuts and stab wounds, followed by road traffic accidents, burn injuries and machinery accidents respectively. On the types of hand injuries sustained, deep lacerations were the commonest and comprised; 15 flexor tendon lacerations, 14 extensor tendon lacerations, 4 combined tendon and nerve lacerations and 1 isolated nerve laceration. The right hand was the most frequently injured hand. Majority of the hand injured patients had tendon repair for both flexor and extensor tendons[7]. In another study carried out in a suburban hospital in Bayelsa,[8] road traffic accidents (RTA) remains the major cause of hand injury affecting more males and manual workers in the productive age group.

Edo state is located in the south-south zone of Nigeria and in it are two (2) Teaching Hospitals, with Irrua Specialist Teaching Hospital located in the suburb of the state. The hospital (ISTH) has a well established Plastic and Reconstructive surgery unit. The unit manages cases of hand injuries that present to or referred to the hospital. Looking through the unit records, many patients have been managed for different tendon injuries of the hand. This study was conducted to assess the pattern of these injuries, etiology and reappraise the preventive modalities with the aim of reducing incidence of these injuries in our immediate environment.

2. MATERIALS AND METHODS

This study was conducted at Irrua Specialist Teaching Hospital (ISTH), Edo state. "Irrua Specialist Teaching Hospital (formerly Otibhor Okae Teaching Hospital) was established by decree 92 of 1993 to provide tertiary health services to people of Edo State and beyond[9]. This hospital is a 350-bed tertiary facility servicing the central and northern part of Edo State, Nigeria.
This was a hospital-based five (5) year retrospective study of patients who presented and were managed surgically for tendon injuries to the hand with or without injury to other structures of the hand between January 2017 and December 2021. Patients that were managed conservatively and poorly documented for were excluded. The operation registers as well as case notes of patients were the sources of the information. Information obtained included patients' biodata, aetiology and pattern of injury, hand involved (whether right or left), collateral injuries as well as surgery offered. The results were analysed using SPSS version 20. Descriptive statistics were used to represent frequency distribution.

3. RESULTS

In the five years under review, a total of 27 patients were managed for hand injuries during the period of study, however, only 21 cases which involved tendon injuries were analyzed making it 77.7% occurrence in hand injuries. There were 17 males [81%] and 4 females [19%] females giving a male to female ratio of 4.25:1. Their age ranged from 11 to 60 years with a mean age of 30.3 ± 17.10 years. Most of the patients were machinery operators 8 (38%), followed by trading 6 (28.6%) and commercial cyclists 3 (14.3%).

Table 1. Age and sex distribution of patients

Variable	**Frequency (%)**
Age (years)	**N = 21**
< 10	0 (0)
11 - 20	3 (14.3)
21 - 30	9 (42.8)
31 - 40	6 (28.6)
41 - 50	2 (9.5)
51 - 60	1 (4.8)
Mean ± SD	**= 30.3 ± 17.10 years**
Gender	
Male	17 (81)
Female	4 (19)

The highest incidence, 9 (42.8%) of hand injuries occurred within the age range of 21-30 years of age. Majority 9 (42.9%) of the patients were students, followed by traders 4(19%). Industrial accident due to grinding machines, 8 (38%) was the commonest cause of tendon associated hand injuries, followed by matchet cut injury to the hand 6 (28.6%) following assault. Gun-shot injury and home accident (glass cut) were the least cause of injuries. Other associated hand injuries sustained by our patients, deep lacerations were the commonest (42.9%), followed by nerve injuries (23.8%) and crush injury to the hand (14.3%). Tendon injuries sustained includes 15 flexor tendon injury (71.4%), and 6 extensor tendon injury (28.6%), leaving the most commonly injured to be the flexor tendons. The right hand was the most commonly affected 16 (76.2%). All patients had tendon repair done alongside repair of other associated injuries of the hand.

Table 2. Occupation of patients

Variable	**Frequency (%)**
Occupation	**N = 21**
Machinery operator	8 (38)
Trader	6 (28.6)
Commercial cyclist	3 (14.3)
Student	2 (9.5)
Unemployed (housewife)	1 (4.8)
Others (Artisan)	1 (4.8)

Table 3. Mechanism of injury/Aetiology

Mechanism	Frequency (%) N = 21
Industrial accident (grinding machines)	8 (38)
Matchet cut (following assault)	6 (28.6)
Road traffic accident (RTA)	5 (23.8)
Gun-shot injury	1 (4.8)
Home accident (glass cut)	1 (4.8)

Table 4. Pattern of tendon injury

Variable Injury	Frequency (%) N = 21
Zone V flexor tendon	10 (47.6)
Zone VIII extensor tendon	6 (28.6)
Zone I flexor tendon	3 (14.3)
Zone II flexor tendon	2 (9.5)

Table 5. Associated hand injuries

Injury	Frequency (%) N = 21
Laceration	9 (42.9)
Nerve injury	5 (23.8)
Crush injury	3 (14.3)
Amputation	2 (9.5)
Vascular injury	2 (9.5)

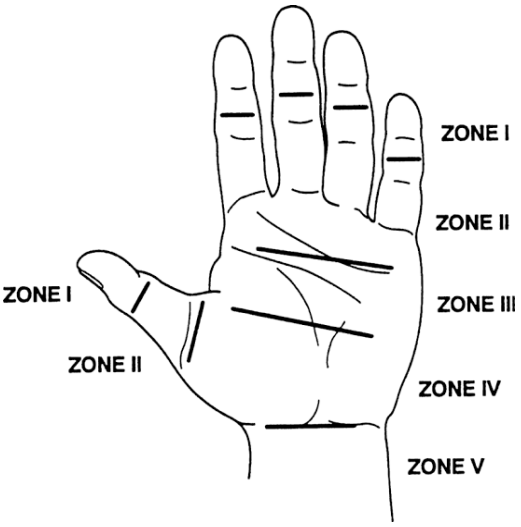

Figure 1; Zones of the flexor tendons of the hand (figure with permission of Bal et al)

- **zone I** - Contains flexor digitorum profundus only
- **zone II** "*No Man's Land"* - Extends from insertion of flexor digitorium superficialis (FDS) to proximal edge of A1 pulley
- **Zone III** - Extends from the proximal end of A1 to the distal edge of of carpal tunnel
- **zone IV** - Lies within the carpal tunnel
- **zone V** - Lies proximal to the carpal tunnel

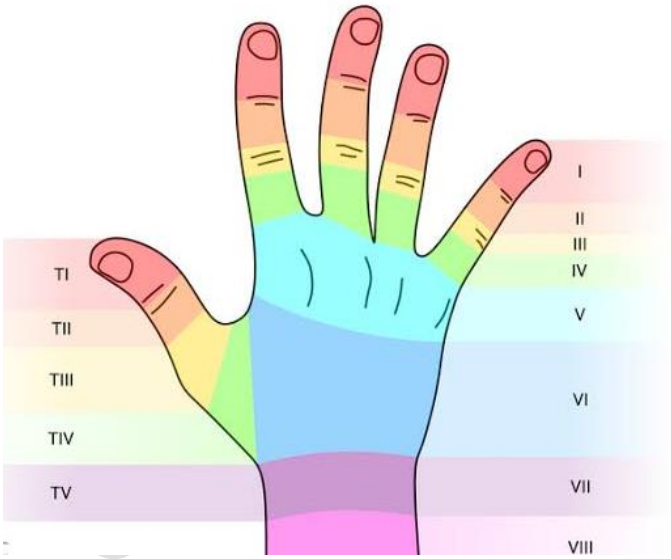

Figure 2; Zones of the extensor tendons of the hand (figure with permission of Lustosa L)

- **zone I:** distal to the DIP joint
- **zone II:** over the middle phalanx
- **zone III:** over the PIP joint
- **zone IV:** over the proximal phalanx
- **zone V:** over the MCP joint

- **zone VI:** over the metacarpal
- **zone VII:** over the wrist
- **zone VIII:** distal forearm

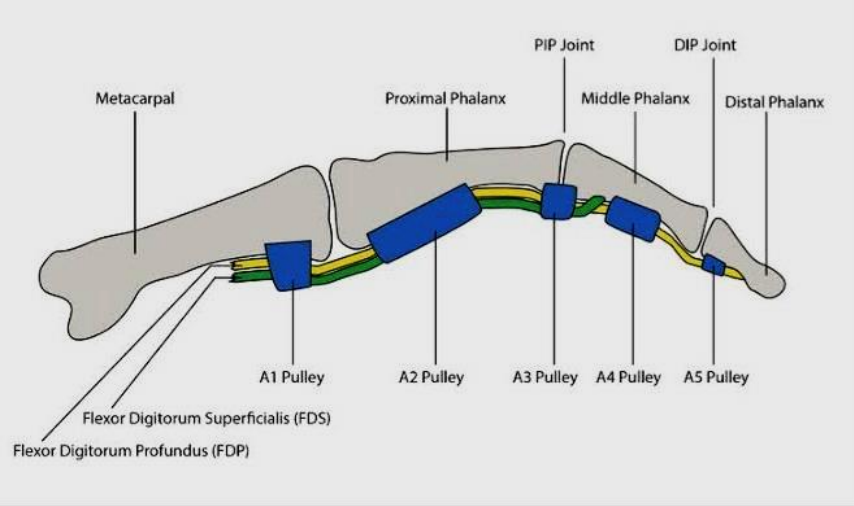

Figure 3; Pulley and flexor tendon anatomy (figure with permission of Dr Jared Vagy DPT: Will Anglin).

4. DISCUSSION

The Hand plays a major role in our daily activities, contributing immensely to our productivity and functioning. It is also the part of the body that is commonly injured. When treatment is delayed, or inadequate, injuries may result in crippling complications especially when they become infected.

The results from our study showed more males sustaining tendon related hand injuries with the peak incidence in the 3rd and 4th decades of life. This is the age of active physical activities and productivity which again portrays the negative effect it will have in the life of the individual, family and society at large. In a study conducted in the United states by Chah SS et al[10] and Laren et al[11] "Netherlands and Denmark hand injuries were commoner in males than in females and are more frequent among individuals aged above 18 years". In another study conducted in Nigeria by Inyang U C et al[12] "hand injuries occurred more also in males than in females in the ratio of 8:1, and the peak age incidence of these injuries was between 20-40 years". This can be explained by most manual work being carried out by men in the society and also the predilection towards employment of males for high risk manual jobs.

The commonest cause of tendon related hand injuries recorded from our study was occupational accidents from grinding machines followed by matchet cuts following assault. This contrasts a similar study in Delta state, where the leading cause of hand injuries resulted from assaults and fights involving use of machetes and knives followed closely by hand injuries from road traffic accidents (RTA). This disparity could be explained by the prevalence of low scale industries such as cassava processors, bakeries and local grinders in our study area being a semi-urban center. Most patients were right handed which could explain the reason why the right hand was most commonly injured. This could mean loss of productivity especially the machinery operators, farmers and others who relied a lot on their hands to earn a living, and inevitably affect the economic potential of the individual, family and country at large. This can be seen in a study in

Mulago, Uganda[13] where “half of the participants were unable to fully use the injured hand for work for at least a month following hand injury. In this study, deep lacerations were the commonest injuries sustained and so a lot of tendon injuries, both flexors and extensors, as well as nerve and bone injuries were sustained. Consequently, the commonest surgical procedures performed were tendon repairs (flexors more than extensors)”[13].

In line with our findings, most of the injuries are completely preventable (occupational accidents, matchet cuts and RTA’s rank high in the aetiology of tendon related hand injuries). It has been noted by David S. S. and Goel K., that “hand injuries are as preventable as the other bodily traumas”[14]. It was the belief of Makobore et al, that targeted campaigns to sensitize workplaces and reduce accidents on the road may contribute to prevention of hand injuries[13] this also holds true from our findings in this study. Furthermore, gangsterism and violence in communities can be eradicated or brought to the barest minimum, at least, by appropriate legislation and also law enforcement by the relevant security agencies. There should also be measures applied to road users and industrial organizations and their workers, as well as education of the populace.

5. CONCLUSION

Tendon injuries of the hand are common following injury to the hand and seen among the economically active groups with economic, cosmetic, psychological and social implications. In addition to management by a skilled surgeon, measures should be put in place to prevent its occurrence as most of its etiology is preventable.

Ethical approval

Ethical approval for this study was obtained from the Health Research Ethics Committee of Irrua Specialist Teaching Hospital, Irrua, Edo state.

ABBREVIATION;

DIP; distal interphalangeal joint, ISTH; rrua Specialist Teaching Hospital, MCP; metarcarpophalangeal joint, PIP; proximal interphalangeal joint, RTA; road traffic accident.

LIMITATIONS

This study was carried out in our study setting, thus caution should be exercised in generalizing the findings to the general population.

COMPETING INTERESTS:

Authors have declared that they have no known competing financial interests OR non-financial interests OR personal relationships that could have appeared to influence the work reported in this paper.

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