

SPAGHETTI WRIST- A STUDY ON MANAGEMENT AND POST OPERATIVE OUTCOME IN OUR INSTITUTE

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ABSTRACT

Spaghetti wrist refers to forearm or wrist level volar laceration, in which at least 3 to 10, out of 16 structures including flexor tendons, median and ulnar nerves and radial and ulnar arteries are injured. This complex injury may lead to detrimental effects on hand function and psychosocial and economic consequences.

MATERIALS AND METHODS

The patients who underwent treatment for spaghetti wrist , within 24 hours of injury, in our institute during the period of July 2021 to December 2022 were included. Patient demographics, etiology of the injury, operative technique, post operative rehabilitation protocol and functional outcomes are discussed. Functional recovery was measured in terms of sensation, flexor tendon function, opposition, intrinsic muscle recovery and grip strength.

RESULTS

48 males and 8 females, with a total of 56 patients were included in this study. The mean age was 39 years. The most common etiology was work spot injury and with Right side involvement in 40 patients and left side involvement in 16 patients. Flexor tendon injuries were noted in all the patients. Both median and ulnar nerve injuries were noted in 14 patients. Median nerve injury were noted in 22 patients. Ulnar nerve injury was noted in 20 patients. Ulnar artery was repaired in 22 patients. Radial artery was repaired in 8 patients. During the follow up, hand sensation was excellent in 20% and good in 52% and fair in 18%. Motor recovery of Flexor tendon function in 78%, opposition in 75% and intrinsic function in 30% were excellent.

CONCLUSIONS

Patients have good functional recovery with immediate exploration and primary repair of injured structures in spaghetti wrist. Median nerve recovery is better when compared to ulnar nerve. When ulnar arterial repair is done along with ulnar nerve repair, recovery of the nerve function is better. Secondary procedures like tenolysis and neurolysis are common in patients who have no regular physiotherapy and follow up.

key words- Spaghetti wrist, Flexors, Nerves, Functional outcomes

INTRODUCTION

The flexor tendons, median and ulnar nerve, radial and ulnar artery are superficial in position at distal forearm and wrist level and hence are more prone to injury easily. The term spaghetti wrist was coined by Puckett and Meyer. Though there is no clear definition, Spaghetti wrist refers to volar wrist level injury involving 3 structures including flexor tendons, ulnar nerve and median nerve, radial and ulnar

artery injury up to at least 10 out of 16 structures.

AIM

The aim of the study is to determine the post operative functional outcome of the patients with spaghetti wrist injury, operated in our institute.

MATERIALS AND METHODS

Inclusion criteria

- All patients more than 18 years of age, who had injuries to flexor aspect of forearm or wrist with involvement of tendons, nerves and arteries.

Exclusion criteria

- Patients less than 18 years of age
- Patients with associated other major injuries, multiple level of cut injuries, severely contaminated wounds
- Patients who are mentally unstable
- Patients with previous history of nerve palsy

Operative technique

All patients were taken up for emergency exploration under Regional anesthesia and the procedures were done under pneumatic tourniquet control. Exploration was done after adequate wound exposure. Injured structures were identified. Flexor tenorrhaphy was done from deep to superficial by modified Kessler technique using 3'0 prolene and epitendinous suturing done using 5'0 prolene. Median and ulnar nerve were repaired with epineurial repair using 7'0 prolene. After tourniquet release, radial and ulnar artery repair was done using 8'0 nylon. Arterial repair was not done when it was ligated in the emergency room or elsewhere and the duration was of more than 12 hours. All repairs were done under loupe magnification. Skin closed using 3'0 nylon. All patients were given dorsal POP splint with wrist in neutral position and metacarpophalangeal joints in 70* flexion.

Postoperative rehabilitation protocol

Institutional post operative protocol was followed. Suture removal was done by 2 weeks. All patients were immobilized for 3 weeks. Active mobilization was initiated after POP removal and continued for 2 weeks with night splint. Passive stretching was initiated by 6th week. Patients were reviewed weekly for 3 months for monitoring nerve recovery with progressing Tinel sign. Electrical stimulation was given to intrinsic. All patients were followed up at monthly intervals thereafter for a minimum of 6 months and a maximum of 18 months.

Postoperative evaluation

The postoperative outcome in this study includes assessment of motor recovery using goniometric assessment of flexion of fingers and thumb and opposition and adduction of thumb and intrinsic movements and dynamometer for hand grip assessment at the end of 6 months of follow up. Assessment of sensory function was done using 2 point discrimination. Nerve conduction study was done at 3 and 6 months of follow up period.

Table 1: Evaluation system used in this study

GRADE	FLEXOR TENDON FUNCTION (normal range of motion)	OPPOSITION (Kapandji score)	FROMENT SIGN & INTRINSIC FUNCTION (Finger abduction and adduction)		HAND GRIP	SENSATION (2PD)
EXCELLENT	>85% to full ROM	7-10	Froment sign Negative	Abduction & Adduction Both Present	90%	<10mm
GOOD	70-84%	3-6	Positive	Both Present	75-90%	10-20mm
FAIR	50-69%	1-2	Positive	Either one Present	50-75%	>20mm
POOR	Flexion contracture	Absent	Positive	Both Absent	<50%	Trophic changes



Glass cut injury right forearm showing cut flexor tendons, median and ulnar nerves and radial artery



Primary repair of cut structures and after wound closure

RESULTS

A total of 56 patients were included in this study.

Table 2 : Gender distribution

Gender	Number	Percentage
Male	48	85.7%
Female	8	14.2%

Table 3 : Age distribution

Age group in years	Number	Percentage
18-30	32	57.1%
31-60	20	35.7%
>60	4	7.1%

Table 4 : Side involvement

Side involved	Number	Percentage
Right	40	71.4%
Left	16	28.5%

Table 5 : Etiology

Etiology	Number	Percentage
Work spot injury	28	50%
Self inflicted	12	21.4%
Assault	12	21.4%
Road Traffic Accident	4	7.1%

Table 6 : Structures injured

Structures injured	Number	Percentage
Palmaris Longus	54	96%
Flexor Carpi Radialis	42	75%
Flexor Carpi Ulnaris	38	67%
Flexor Digitorum Superficialis	56	100%

Flexor Digitorum Profundus	48	85.7%
Flexor Pollicis Longus	36	64%
Median nerve	36	64%
Ulnar nerve	34	60.7%
Both Median and Ulnar nerve	14	25%
Radial artery	15	26.7%
Ulnar artery	36	64.2%
Both ulnar nerve and artery	34	60.7%
Both Radial and Ulnar artery	8	14%

Table 7 : Functional outcome at the end of 6 months

6 patients were not on regular physiotherapy and underwent secondary procedures. Tenolysis and neurolysis was done during re exploration as there was scar adherence.

DISCUSSION

Spaghetti wrist is a complex injury that may lead to detrimental effects on hand function and psychosocial and economic consequences. In this study, males were more affected than females. The most common age group affected was in the productive age group of 18 years to 30 years and the etiology was work spot injury. The most common tendons injured were palmaris longus , flexor carpi radialis and

GRADE	FLEXOR TENDON FUNCTION (normal range of motion)	OPPOSITION (Kapandji score)	INTRINSIC FUNCTION	HAND GRIP	SENSATION (2PD)
EXCELLENT	44(78.5%)	42(75%)	17(30%)	12(21.4%)	11(20%)
GOOD	6(10.7%)	5(8.9%)	20(35%)	30(53.5%)	29(52%)
FAIR	4(7%)	6(10%)	13(23%)	9(16%)	10(18%)
POOR	2(3.5%)	3(5.3%)	6(10%)	5(8.9%)	6(10%)

flexor digitorum superficialis. Median nerve motor recovery is better when compared to ulnar nerve. When ulnar arterial repair is done along with ulnar nerve repair, recovery of the nerve function is better. Secondary procedures like tenolysis and neurolysis are common in patients who have no regular physiotherapy and follow up.

CONCLUSION

Patients have good functional recovery with immediate exploration and meticulous primary repair of injured structures in spaghetti wrist. Median nerve recovery is better when compared to ulnar nerve. When ulnar arterial repair is done along with ulnar nerve repair, recovery of the nerve function is better.

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