DOI: 10.7860/JCDR/2025/80159.21462

Original Article

Surgery Section

Early Active Mobilisation Protocol following Six-strand Core Repair for Flexor Tendon Injury: A Prospective Observational Study

NEMICHAND[1], R CHANDAN KUMAR[2], PRASHANT BAHIRANI[3], ITISHA AGRAWAL[4], SUNIL SHARMA[5]

(cc) BY-NC-ND

ABSTRACT

Introduction: Flexor Tendon Injuries (FTIs) in Zones II-V pose significant functional challenges due to adhesion formation and loss of tendon gliding. Early Active Mobilisation (EAM) following six-strand core repair improves outcomes by enhancing tendon healing while minimising complications.

Aim: To evaluate the efficacy of EAM after six-strand flexor tendon repair by assessing functional recovery, grip strength and complications.

Materials and Methods: A prospective observational study was conducted over 18 months at Vardhman Mahavir Medical College (VMMC) and Safdarjung Hospital, New Delhi, India involving 38 patients (aged 18-60 years) with complete flexor tendon lacerations in Zones II-V. All patients underwent a six-strand modified Kessler repair and received postoperative immobilisation in a dorsal splint. EAM was initiated on postoperative day 2, following the Belfast and Sheffield Mobilisation Protocol. Functional outcomes were assessed at 6, 8 and 12 weeks using the Buck-Gramcko II criteria, grip strength was measured using a Jamar dynamometer and pain was evaluated using a Numeric Pain Rating Scale (NPRS). Descriptive statistics were presented as means/standard deviations and medians/Interquartile Ranges (IQRs) for continuous variables, as well as frequencies and percentages for categorical variables. Group comparisons for categorical variables were conducted using the Chi-square test.

Results: The mean age of patients was 26±5.5 years for females and 32±9.9 years for males. The study population comprised 30 males (78.95%) and 8 females (21.05%), with an age range of 18-60 years. The majority of injuries occurred in Zone V, involving 22 patients (57.89%). At 12 weeks, 20 patients (52.63%) achieved excellent outcomes, 13 patients (34.21%) had good outcomes, 3 patients (7.90%) had fair outcomes and 2 patients (5.26%) had poor outcomes. Most patients, i.e., 32 (84.21%), resumed work at six weeks. Grip strength improved to over 56 kg in 84.21% of cases and pain scores progressively decreased. Complications were minimal, with 1 patient (2.63%) experiencing a wound infection and 1 patient (2.63%) with skin necrosis; there were no tendon ruptures.

Conclusion: EAM following six-strand flexor tendon repair is a safe and effective approach that promotes optimal functional recovery, reduces adhesions and facilitates an early return to work.

Keywords: Adhesion prevention, Functional recovery, Grip strength, Tendon healing

INTRODUCTION

The hand is one of the most functionally active parts of the human body, playing a crucial role in daily activities. The integrity of bones, tendons and the neurovascular system is essential for optimal function. Due to its frequent use, the hand is highly susceptible to injuries, accounting for approximately 20% of emergency department cases, with tendon lacerations occurring in 1-2% of patients [1]. These injuries, often caused by sharp objects such as glass or knives, predominantly affect individuals from lower socio-economic backgrounds [2]. Patients with FTIs typically present with pain, swelling and an inability to flex the affected fingers [3]. FTIs are classified based on anatomical zones, with Zone II, often referred to as the "no man's land," posing significant treatment challenges due to the high-risk of adhesion formation, scarring and loss of tendon gliding [4]. Successful repair depends on multiple factors, including the mechanism of injury, extent of soft-tissue involvement and patient-related factors such as age, occupation and co-morbidities [5].

Postoperative management has evolved over time. Traditional immobilisation for 3-4 weeks often led to flexion contractures and adhesions, resulting in functional disability [6]. Advances in repair techniques, including stronger sutures, have facilitated early mobilisation, promoting faster healing and reducing adhesion formation [7]. Early mobilisation strategies include early passive mobilisation, where the tendon is moved by a therapist or dynamic splint and EAM, which is initiated within 48 hours postoperatively through controlled active contractions [8]. While passive motion may lead to inconsistent results and flexion contractures, EAM has been shown to enhance tendon gliding and functional recovery [9]. However, concerns about tendon rupture necessitate a stronger repair technique.

The six-strand core suture repair provides a more robust and gap-resistant repair, allowing for safe EAM [10]. The strength of a repair is directly proportional to the number of suture strands crossing the repair site, with multiple studies indicating that six-strand repairs enhance repair integrity [11], facilitate early mobilisation and minimise adhesion formation [12,13]. This study aimed to evaluate the efficacy and safety of EAM following six-strand core flexor tendon repair in Zones II-V by assessing functional outcomes, tendon integrity and potential complications.

MATERIALS AND METHODS

This prospective observational study was conducted at the Department of Burns, Plastic and Maxillofacial Surgery, VMMC, from June 2021 to December 2022. Ethical clearance was obtained (IEC/VMMC/SJH/Thesis/2021-05/CC-06) and informed consent was obtained from all participants.

Inclusion criteria: Patients aged between 18 and 60 years with FTIs involving Zones II to V were included in the study.

Exclusion criteria: Patients if they had incomplete tendon lacerations, segmental lacerations, crush injuries, burn injuries, or associated injuries such as extensor tendon damage, nerve injury, bony fractures, or vascular injury were excluded from the study.

Sample size estimation: The formula used for sample size estimation was:

$$N=(Za/2)^2 \times p \times q/L^2$$

Where, a equal to 0.05, confidence interval taken as 95%. According to parent study of Rajappa S et al., early active motion protocol [13] following triple Kessler repair for FTI p equals to 92 and q equals to 8.

L is absolute error which is equal to 10%

After applying all values in formula=1.96×1.96×92×8/102=28.2

If we take 10% loss to follow-up final sample size comes 36.

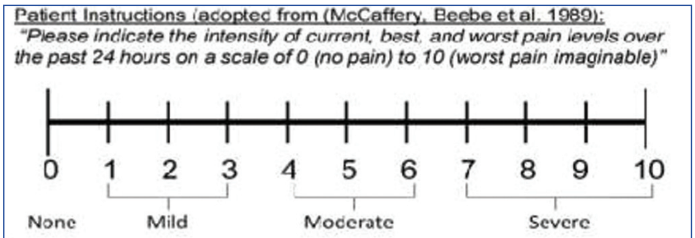
Study Procedure

All patients underwent flexor tendon repair using the modified Kessler six-strand core suture technique with 4-0 nylon. Following the repair, tendon excursion was assessed intraoperatively by gently tugging on the tendon proximal to the repair site to ensure adequate gliding [13]. The wound was closed primarily and the hand was immobilised postoperatively in a dorsal resting splint.

Postoperative management: Postoperatively, the hand was placed in a dorsal resting splint for 4-6 weeks, maintaining the wrist in 20° flexion, the Metacarpophalangeal (MCP) joints in 80-90° flexion and the Interphalangeal (IP) joints in full extension. EAM was initiated according to the Belfast and Sheffield Mobilisation Protocol [14].

Postoperative rehabilitation protocol: From postoperative day 2 to week 6, patients underwent two-hourly exercise sessions consisting of two active flexion movements into the air (Proximal Interphalangeal (PIP) at 30° and Distal Interphalangeal (DIP) at 5-10°), two passive flexion movements into the palm and two active extension movements back into the splint. At six weeks, the splint was discontinued and active flexion exercises, along with differential gliding exercises, were initiated. At eight weeks, strengthening and passive extension exercises were introduced as needed. By 12 weeks, patients were permitted to resume work and engage in unrestricted activities.

Outcome measures: The range of motion of the operated fingers was assessed using the Buck-Gramcko II criteria [15] and measured with a finger goniometer. Grip strength was evaluated using the Jamar dynamometer, while individual tendon strength was assessed with the Jamar Pinch Gauge and compared with the contralateral hand [14]. Functional outcomes, including range of motion, grip strength and return to work, were evaluated at the 8th and 12th postoperative weeks. Postoperative pain was assessed using the Numeric Pain Rating Scale (NPRS) [16] at the 4th, 8th and 12th weeks [Table/Fig-1]. Patients were asked to rate their current pain, the best pain over the past 24 hours and the worst pain over the past 24 hours. The average of these three ratings was used as the final pain score. Any complications were recorded.



[Table/Fig-1]: Numeric Pain Rating Scale (NPRS) [16].

STATISTICAL ANALYSIS

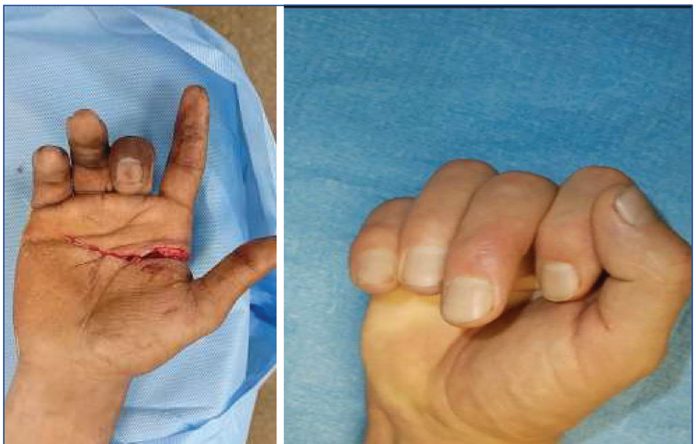
Data were coded and recorded in an MS Excel spreadsheet program. Statistical Package for the Social Sciences (SPSS) version 23.0 (IBM Corp.) was used for data analysis. Descriptive statistics were presented as means/standard deviations and medians/Interquartile Ranges (IQRs) for continuous variables, along with frequencies and percentages for categorical variables. Group comparisons for categorical variables were conducted using the Chi-square test. Statistical significance was set at (p-value <0.05).

RESULTS

The study population comprised 30 males (78.95%) and 8 females (21.05%), with an age range of 18 to 60 years. The mean age of patients in this study was 26±5.5 years for females and 32±9.9 years for males. The most common mode of injury was machine cuts, affecting 14 patients (36.84%), followed by glass cut injuries in 10 patients (26.31%), knife injuries in 8 patients (21.05%), road traffic accidents in 3 patients (7.8%) and cuts from other sharp objects in 3 patients (7.8%). Left hand involvement was noted in 23 patients (60.52%), while the right hand was affected in 15 patients (39.58%). The majority of injuries were in Zone V, with 22 patients (57.89%), followed by Zone II in 10 patients (26.32%), Zone III in 4 patients (10.52%) and Zone IV in 2 patients (5.27%) [Table/Fig-2,3,4,5].

[Table/Fig-2]: Preoperative photos: Zone II injury of ring and little finger and zone II injury of little finger.

[Table/Fig-3]: Postoperative photos: Postoperative picture of ring finger and little finger zone II injury and postoperative picture of little finger of zone II injury.



[Table/Fig-4]: Preoperative and postoperative picture of zone III injury.

Zone	n (%)
Zone II	10 (26.32)
Zone III	4 (10.52)
Zone IV	2 (5.27)
Zone V	22 (57.89)
Total	38 (100.0)

[Table/Fig-5]: Distribution of study population according to zone of injury.

A total of 145 tendons were involved, with the most frequently affected being the Flexor Digitorum Superficialis (FDS) of the middle finger (15.86%) and the FDS of the ring finger (15.17%) [Table/Fig-6]. At 12 weeks, functional outcomes were assessed using the Buck-Gramcko II criteria, with 52.63% of patients achieving excellent outcomes, 34.21% demonstrating good outcomes, 7.90% showing fair results and 5.26% having poor outcomes. The zone of injury did not show a statistically significant association with the final outcome (p-value=0.233) [Table/Fig-7]. Most patients, i.e., 32 (84.21%), were able to return to work at six weeks, while 4 patients (10.52%) resumed work at eight weeks and the remaining 2 patients (5.26%) took more than 12 weeks to return to work.

Tendons	n (%)
Index finger Flexor Digitorum Superficialis (FDS)	14 (9.65)
Middle finger FDS	23 (15.86)
Ring finger FDS	22 (15.17)
Little finger FDS	15 (10.34)
Index finger Flexor Digitorum Profundus (FDP)	11 (7.58)
Middle finger FDP	12 (8.27)
Ring finger FDP	10 (6.89)
Little finger FDP	10 (6.89)
Palmaris Longus (PL)	9 (6.20)
Flexor Carpi Radialis (FCR)	5 (3.44)
Flexor Carpi Ulnaris (FCU)	13 (8.96)
Flexor pollicis longus	1 (0.68)
Total	145 (100)

[Table/Fig-6]: Distribution of study population according to tendon involved.

Zone of injury		Outcome at 12 weeks				Total
		Excellent	Good	Fair	Poor	
Zone II	N	3	6	1	0	10
	%	30.0%	60.0%	10.0%	0.0%	100.0%
Zone III	N	0	3	1	0	4
	%	0.0%	75.0%	25.0%	0.0%	100.0%
Zone IV	N	0	1	1	0	2
	%	0.0%	50.0%	50.0%	0.0%	100.0%
Zone V	N	17	3	0	2	22
	%	77.27%	13.63%	0.0%	9.09%	100.0%
Total	N	20	13	3	2	38
	%	52.63%	34.21%	7.90%	5.26%	100.0%
p-value						0.233

[Table/Fig-7]: Distribution of study population according to total active motion grade (outcome) at week 12.

Grip strength assessment using the Jamar dynamometer showed that by six weeks, most patients demonstrated grip strength between 36-56 kg, which improved to over 56 kg by 12 weeks in 84.21% of cases [Table/Fig-8]. Postoperative pain scores progressively decreased [Table/Fig-9]. The incidence of complications was low, with one case (2.63%) of skin necrosis, which was managed by debridement and groin flap coverage and one case (2.63%) of wound infection, which was managed with antibiotics and regular dressing changes. No cases of tendon rupture were reported.

Grip strength at 12 weeks (in kg)	Frequency (%)
>56	32 (84.21)
>36	4 (10.52)
>30	2 (5.26)

[Table/Fig-8]: Distribution of study population according to mean grip strength.

Time	Postoperative pain score (Average of all patients)
4 weeks	3.97±1.34
8 weeks	3.63±1.1
12 weeks	3.39±1.08

[Table/Fig-9]: Postoperative pain score.

DISCUSSION

In present study, 78.95% of patients were male, which was consistent with findings from Sreenivas S et al., where 80% of cases were male and Saini N et al., who reported a similar male predominance [17,18]. This gender disparity can be attributed to occupational hazards, as most injuries in present study resulted from machine or sharp object accidents, commonly encountered in labour-intensive jobs.

Regarding age distribution, the mean age of patients in present study was 32±9.9 years for males and 26±5.5 years for females. Similar findings were observed in the study by Saini N et al., where 72% of patients were below 30 years old and Gupta A and Gupta AK who reported that the economically productive 21-55 years age group was predominantly affected [18,19]. This reflects the higher vulnerability of younger individuals engaged in manual labour.

The laterality of hand involvement in present study showed that 60.52% of injuries occurred in the left hand, while 39.48% were in the right hand, which aligns with Sreenivas S et al., who found 56.67% left-hand injuries and Saleh MR et al., who reported 54% left-hand injuries [17,20]. This can be explained by right-hand dominance, as most right-handed individuals use their left hand to stabilise objects while working with machines or tools, making them more susceptible to injury.

In terms of zone-wise distribution of injuries, present study found that 57.89% of injuries were in Zone V, followed by 26.32% in Zone II, 10.52% in Zone III and 5.27% in Zone IV. These findings are comparable to those of Sreenivas S et al., where Zone V was the most affected (42.85%) and Saini N et al., who reported that 64% of injuries were in Zones IV and V [17,18]. Zone V is particularly prone to injuries due to its larger anatomical area and increased exposure to mechanical trauma.

The functional outcomes were assessed using the Buck-Gramcko II criteria and in present study, 52.63% of patients achieved excellent results, 34.21% had good results, 7.90% had fair results and 5.26% had poor outcomes. Present study results are similar to those of Saini N et al., where 63% of patients showed excellent outcomes, 19% had good results and 9% had fair outcomes. Similarly, Sreenivas S et al., found that 62.3% of cases had good scores, while 17.4% achieved excellent scores [17]. A study by Kumar LLS, reported that 81% of patients had good to excellent results and Riaz M et al., found that 70-80% of patients had excellent or good results, with 94% regaining good grip strength over ten years [21,22]. These studies emphasise that EAM leads to favourable functional outcomes, provided that strong repair techniques are used.

In present study, by six weeks, most patients achieved a grip strength of 36-56 kg, which improved to over 56 kg by 12 weeks in 84.21% of cases. Hung LK et al., demonstrated that 75% of patients regained good to excellent hand strength following EAM [23]. The strength recovery seen in present study supports the notion that active mobilisation enhances neural adaptation, improves coordination and prevents tendon adhesions.

The return-to-work timeline was also a critical measure of functional success. In present study, 84.21% of patients resumed work by six weeks, 10.52% by eight weeks and 5.26% required more than 12 weeks. This aligns with previous findings by Riaz M et al., where most patients were able to return to work between six and eight weeks and Trumble TE et al., who emphasised that EAM promotes faster rehabilitation and return to function [22,24]. Postoperative pain scores progressively decreased by 12 weeks. This was comparable to studies by Bircan C et al., which demonstrated that pain gradually decreases over time with active mobilisation due to improved tendon excursion and reduced adhesion formation [25]. Complications were minimal in present study, with only one case (2.63%) of skin necrosis and one case (2.63%) of wound infection. Importantly, no cases of tendon rupture were reported. In contrast, Saini N et al., reported two cases of tendon rupture and Trumble TE et al., found a rupture rate of 4.4% in active mobilisation groups and 4.5% in passive mobilisation groups [18,24]. The absence of tendon ruptures in present study can be attributed to the six-strand core repair technique, which offers superior tensile strength compared to conventional suture methods.

One of the key reasons for the success of EAM in present study was patient compliance. The modified six-core Kessler suture repair, combined with early mobilisation, surgeon-monitored physiotherapy and patient motivation, significantly contributed to the high success rate. Additionally, digital communication through WhatsApp groups helped improve compliance and follow-up. It has been well established that tendon excursion is essential to prevent adhesions and maintain function. Duran R et al., suggested that 3-5 mm of excursion is sufficient to prevent restrictive adhesions, whereas Silfverskiöld KL and May EJ later concluded that 6-9 mm of excursion is the optimal range for postoperative mobilisation [26,27]. The strength of a repaired tendon is directly proportional to the number of core sutures crossing the repair site. The nature of injury also plays a crucial role in outcomes. Patients with clean-cut injuries, such as those from glass or knife cuts, had significantly better results than those with crush injuries due to reduced scar formation and adhesion risk. Most patients in present study had clean lacerations, which likely contributed to the high success rate. The duration of follow-up in present study was 12 weeks, whereas other studies have assessed outcomes over longer periods. Studies such as Ntsiea MV et al., [28] demonstrated that range of motion continues to improve up to six months postoperatively, with maximal functional gains seen after one year.

Another study by Savvidou C and Tsai TM, showed that six-strand repair is clinically effective and allows for early postoperative active rehabilitation [29]. Osada D et al., conducted a study on flexor tendon repair in Zone II using six-strand techniques and EAM, concluding that the six-strand flexor tendon suture technique followed by controlled active mobilisation, protected with a dorsal splint, is safe, produces no ruptures and achieves very good results in Zone II flexor tendon laceration repair [30].

A longer follow-up period may provide further insight into the long-term functional outcomes of EAM. Present study reinforces that EAM following six-strand flexor tendon repair is safe and effective, producing superior functional outcomes while minimising complications. These results emphasise the importance of strong tendon repair techniques, structured rehabilitation, patient compliance and close monitoring for optimal recovery. Future studies with longer follow-up durations and larger sample sizes may provide more comprehensive data on long-term outcomes.

Limitation(s)

This study was limited by its short follow-up duration. A comparative study evaluating EAM and early controlled mobilisation with different splint designs on a larger sample over an extended period would provide a more comprehensive understanding of the effectiveness of EAM as a postoperative rehabilitation strategy following six-strand core flexor tendon repair in clinical settings.

CONCLUSION(S)

EAM following six-strand core repair of Flexor Tendon Injuries (FTI) in Zones II-V proved to be a safe and effective rehabilitation strategy. The majority of patients achieved excellent to good outcomes, with significant improvements in total active motion, grip strength and early return to work. The six-strand core repair technique provides sufficient tensile strength to support early mobilisation, reducing adhesions without increasing the risk of tendon rupture. The study further reinforces the benefits of early mobilisation in optimising functional recovery while minimising complications.

REFERENCES

[1] Schöffl V. Tendon injuries of the hand. World J Orthop. 2012;3(6):62-69.
[2] Nasab NSAM, Seyes RS, Saeidian H, Emami. Functional outcome of flexor tendon repair of the hand at Zone 5 and postoperative early mobilization of the fingers. Pak J Med Sci. 2013;29(1):43-46.
[3] Lexer E. Die Verwerthung der freien Sehnentransplantation [The utilization of the free tendon transplant]. Arch Klin Chir. 1912;98:818.
[4] Frazier WH, Miller M, Fox RS, Brand D, Finseth F. Hand injuries: Incidence and epidemiology in an emergency service. J Am Coll Emerg Physicians. 1978;7(7):265-68.
[5] Griffin M, Hindocha S, Jordan D, Saleh M, Khan W. An overview of the management of flexor tendon injuries. Orthop J. 2012;6(1):28-35.
[6] Gelberman RH, Amifl D, Gonsalves M, Woo S, Akeson WH. The influence of protected passive mobilization on the healing of flexor tendon: A biomechanics and microangiographic study. Hand. 1981;13:120-28.
[7] Gelberman RH, Nunley JA, Osterman AL, Breen TF, Dimick MP, Woo SL. Influence of protected passive mobilization interval on flexor tendon healing. Clin Orthop Relat Res. 1991;264:189-96.
[8] Gelberman RH, Woo SC, Lothringer K, Aleson WH, Amiel D. Effects of early intermittent passive mobilization on healing canine flexor tendon. J Hand Surg Am. 1982;7(2):170.
[9] Woo SCY, Gelberman RH, Cobb NG, Amiel D, Lothringer K, Akeson WH. The importance of controlled passive mobilization on flexor tendon healing. Acta Orthop Scand. 1981;52:615-22.
[10] Starr HM, Snoddy M, Hammond KE, Seiler JG 3rd. Flexor tendon repair rehabilitation protocols: A systematic review. J Hand Surg Am. 2013;38(8):1712-17.
[11] Harmer TW. Tendon suture. Boston Med Surg J. 1917;177:808-10.
[12] Kirchmayr L. Zur Technik der Sehnennaht [On the technique of tendon suturing]. Zentralbl Chir. 1917;40:906-07.
[13] Rajappa S, Menon PG, Kumar MM, Raj DG. Early active motion protocol following triple Kessler repair for flexor tendon injury. J Orthop Surg (Hong Kong). 2014;22(1):96-99.
[14] Gratton P. Early active mobilization after tendon repairs. J Hand Ther. 1993;6(4):285-89.
[15] Buck-Gramcko D. A new method for evaluation of results in flexor tendon repair. Handchirurgie. 1976;8(2):65-69.
[16] McCaffery M, Beebe A. Pain: Clinical manual for nursing practice. Mosby, St. Louis (1989).
[17] Sreenivas S, Kumar SR, Kasturi A. Outcome of active mobilization after tendon repair: A study in a tertiary care centre. Indian J Orthop Surg. 2020;6(3):242-46.
[18] Saini N, Kundnani V, Patni P, Gupta SP. Outcome of early active mobilization after flexor tendon repair in Zones II–V in hand. Indian J Orthop. 2010;44(3):314-21.
[19] Gupta A, Gupta AK. Demographic profile of hand injuries in an industrial town of North India: A review of 436 patients. Indian J Surg. 2013;75(6):454-61.
[20] Saleh MR, Yurianto H, Halim K, Fahmi S, Putra LT. Long-term follow-up of functional outcome after flexor tendon injury Zone II repaired using Unhas suture: A cross-sectional study. Int J Surg Open. 2021;35:100391.
[21] Kumar LLS. Early mobilization after flexor tendon repair of injuries in hand: A prospective study. Int Surg J. 2016;3(2):649-52.
[22] Riaz M, Hill C, Khan K, Small JO. Long-term outcome of early active mobilization following flexor tendon repair in Zone 2. J Hand Surg Am. 1999;24(2):157-60.
[23] Hung LK, Pang KW, Yeung P, Cheung L, Wong J, Chan P. Active mobilization after flexor tendon repair: Comparison of results following injuries in Zone 2 and other zones. J Orthop Surg (Hong Kong). 2005;13(2):158-63.
[24] Trumble TE, Vedder NB, Seiler JG, Hanel DP, Diao E, Pettrone S. Zone-II flexor tendon repair: A randomized prospective trial of active place-and-hold therapy compared with passive motion therapy. J Bone Joint Surg Am. 2010;92(6):1381-89.
[25] Bircan C, El O, Akalin E, Bacakoglu AK, Gulbahar S, Sahin E, et al. Functional outcome in patients with Zone V flexor tendon injuries. Arch Orthop Trauma Surg. 2005;125(6):405-09.
[26] Duran RJ, Houser RG, Coleman CR. A preliminary report in the use of controlled passive motion following flexor tendon repair in Zones II and III. J Hand Surg Am. 1976;1:79.
[27] Silfverskiold KL, May EJ. Gap formation after flexor tendon repair in Zone II: Results with a new controlled motion programme. Scand J Plast Reconstr Surg Hand Surg. 1993;27:263-68.

[28] Ntsiea MV, Godlwana L, Spark T. Range of movement, power and pinch grip strength post flexor tendon repair. SA Orthop J. 2018;17(1):47-54.
[29] Savvidou C, Tsai TM. Clinical results of flexor tendon repair in Zone II using a six strand double loop technique. J Hand Microsurg. 2015;7(1):25-29.
[30] Osada D, Fujita S, Tamai K, Yamaguchi T, Iwamoto A, Saotome K. Flexor tendon repair in Zone II with 6-strand techniques and early active mobilization. J Hand Surg Am. 2006;31(6):987-92.

PARTICULARS OF CONTRIBUTORS:
1. Assistant Professor, Department of Plastic Surgery, Dr. Sampurnanand Medical College, Jodpur, Rajasthan, India.
2. Senior Resident, Department of Plastic Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India.
3. Senior Resident, Department of Plastic Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India.
4. Senior Resident, Department of Plastic Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India.
5. Director and Professor, Department of Plastic Surgery, Vardhman Mahavir Medical College and Safdarjung Hospital, New Delhi, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:
Dr. Sunil Sharma,
L-11B, GF, Rajouri Garden, New Delhi-110027, India.
E-mail: s65sharma@hotmail.com

PLAGIARISM CHECKING METHODS: [Jain H et al.]
- Plagiarism X-checker: Apr 25, 2025
- Manual Googling: Jul 24, 2025
- iThenticate Software: Jul 26, 2025 (2%)

ETYMOLOGY: Author Origin

EMENDATIONS: 6

AUTHOR DECLARATION:
- Financial or Other Competing Interests: None
- Was Ethics Committee Approval obtained for this study? Yes
- Was informed consent obtained from the subjects involved in the study? Yes
- For any images presented appropriate consent has been obtained from the subjects. Yes

Date of Submission: **Apr 24, 2025**
Date of Peer Review: **Jun 11, 2025**
Date of Acceptance: **Jul 28, 2025**
Date of Publishing: **Sep 01, 2025**