Original Article

Flexor tend on injury of hand at zone II Early or delayed suture ?

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Summary:

Background: *The healing of a sutured tendon in the hand usually occur with an unwanted amount of scarring that defeat good results. Many variables has been studied over many decades; timing of repair was a matter of debate. Zone II is the area where those variables mostly affect the results of treatment.*

Objective: *To study and evaluate the results of early or delayed repair under the effects of our local variables.*

Method: *Prospective study of 85 patients, which had flexor tendon repair at zone II by primary repair, delayed primary repair and tendon graft.*

Results: *Results showed a primary repair ended with better functional results than those with delayed repair and than those with tendon graft. Excellent & good results were 83.7% in the early repaired group versus 43.8% in the delayed groups; these results were statically significant; P=<0.0002.*

Conclusion: *We conclude that early suture is better than delayed suture and call on casualty doctors to refer patients to hand surgery unites to have better end results in this difficult area of treatment.*

Introduction:

Flexor tendon injuries are common due to various human activities long time ago. The first person to write about the suture of divided tendons was the tenth century Arab Avicenna, who taught that (A cut or ruptured tendon must be sewn together) (Gratz-C.M.1928) (1). Avicenna's writings ran counter to medical teaching of Galan the 2nd century Greek physician, who stated to avoid touching tendons, nerves and ligaments (Sarton G1954)(2). One of the most baffling problem in surgery are to restore normal function to a finer in which the tendons has been injured (Bunnell 1944)(3). This fact is due to the inevitable scarring that accompany process of healing especially in zone II. Surgeons in many decades has been changing method of handling, suturing and rehabilitation programs trying to reach an optimum method; resecting FDS tendon to improve gliding (6), using microsurgical techniques (7) using different suture to start early active rehabilitation (8)(9)(10), using autogenous dorsal tendon graft to reinforce the repair (11), experiments are going on recently to use amniotic membrane to decrease scar formation around tendon repair (12), also using tissue engineering to carry and implant fibroblasts at repair site to enhance good healing (13). Timing of repair was for longtime a matter of debate, recently it is settling towards early repair (14)(15) and even repair is treated as emergency (16) .To study the effect of this factor on outcome of tendon repair in zone II on our environment; analysis of the results

Of 85 patients sustained tendon injury and had repair was done.

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Patients and Methods:

Prospective study included 85 patients diagnosed having flexor tendon injury of the hand in zone II, at Rasheed ,Hammad Shihab and Al Furat Hospitals in the years 1990-2000, age range was from 18-46,most of the patients (75) were in the second and third decades of life. Causes of injuries were: cut by sharp objects, patients which have untidy wounds and associated gross lesions of bones or neurovascular tissues were excluded from the study.

According to their time of presentation and surgical intervention patients were divided into three groups:

Group A: patients who had early arrival and primary repair within 48 hours were 37.

Group B: patients who had delayed arrival and repair within 3 weeks were 31.

Group C: patients who had arrived later than 3 weeks and had tendon graft were 17.

Location of injury:

Thumb	8
Index	27
Middle finger	32
Ring finger	22
Little finger	17
Total fingers	106 patients, 21 patients had more than one finger affected.

Surgical Technique :

Zigzag volar inscicion used, small window through the sheath opened to do the repair, both tendons were repaired, four O prolene monofilament thread on round needle used to apply modified Kessler suture one or double on the volar half of the tendon and six O prolene thread to run around the sutured ends, tendon sheath not repaired, skin closed by three O prolene thread on fine tube drain for 48 hours.

Rigid below elbow dorsal splint applied to keep the wrist in 60 deg., MPJ 90 deg. with elevation of the hand on the bed.

Post Operative Program:

Mild passive movements to the fingers started on the third postoperative day, Klienert dynamic exercises adopted for more cooperative understanding patients, by the end of the third week active flexion exercises started gradually, by the end of t he sixth week the dorsal splint removed and more powerful flexion movements continued.

Follow up on 2-3 weeks basis continued for 6-8 months.

Results:

The patients were evaluated and resulted registered following the Strickland method by measuring the total active movements (TAM) which is the sum of angled of flexion minus the extension lag angles of a finger as reported by the (End result committee of American society for surgery of the Hand) (6): those method considered preferable for scientific and clinical purposes (7).

Strickland method grading

Grades of results	TAM
Excellent	= or>220 degrees
Good	=or>220 =
Fair	=or>180 =
Poor	=>170 =

Our patients scored the following results:

Type of repair	No.Pat.	Excel Good	Fair	Poor
Primary	37	25(67%) 6(16%)	4(0>8%)	2(5.4%)
Delayed	31	7(23%) 9(29%)	12(38%)	3(10%)
Graft	17	0 5(30%)	7(40%)	5(30%)
	85	32 20	23	10

Comparing the sum of the excellent and good results of the primary repaired tendons with the excellent and good reults of the delayed and graft repair showed great difference.

Type of repair	No. of Pat.	Excellent +Good results
Early	37	31 (83.7 %)
Delayed	48	21 (43.8%)

The difference was statistically highly significant (P=<0.002)

Complications

1. Stiffness of joints due to adhesions in the fair and poor results in 33 patients.
2. Bowstring of tendons in 2 patients.
3. Pressure necrosis from prosthetic siliastic tendon spacer in 2 patients
4. Rupture tendon in 1 patient.
5. Infection superficial ended by removal of stitches in 4 patients.

Discussion

A prospective study to the analysis of the outcome results of 85 patients had flexor tendon repairs according to the time of their presentation and repair; those included in the study had simple open injuries due to sharp objects. Our results of functional outcome after six months of follow up and rehabilitation showed that patients received earlier surgical intervention had better results than delayed group and also better than the group which had late reconstruction by tendon graft operations .In the literature the debate of timing of repair was almost towards earlier intervention since Claude Verdan and other pioneers had demonstrated that primary tendon suture within the former (No man's land) is even more successful than secondary tendon grafting (Pfieffer-K.M)(19),many other studies favor the primary repair and declare better results (Brug-E 1997)(20), (Cervenkova H (14)(Kato H.Minami A)(15),Thomazeau-H:Attali-JY : et al 1996 stated that flexor pollicis longus and other structures of the thumb must be done in emergency(12), Dubert T. also advocated emergency repair for all tendons (16) ,Tottenham-VM et al in 1995 showed 100% excellent and good results in early intervention while delayed intervention showed 75% excellent plus good results with 25% of fair and poor results which needed further surgical procedures (22),Kato H . et al and CervenKova H. also advocated primary repair (15)(14); however ; there are few authors showed that timing was not a significant factor in the outcome (Stone-JF ;Davidson-JS,1988)(23)who stated that no mandatory to immediate repair .Most of the literatures stated excellent and good results around 85-90% in zone II (Chow J.A 1987)(24)(Burg-E 11997)(20)(Tottenham-VM et al 1995)(22). Our excellent and good results are 83% slightly less favorable and this is probably due to less experienced team of surgery and rehabilitation, besides patients compliance to follow instruction is

far from ideal as communications and attendance is not regular in many cases.

Conclusion:

From this study considering the local environmental factors we believe that earlier surgical intervention as primary repair in hand surgery centers will provide the best functional results of repaired flexor tendons in zone II .We call on casualty doctors to refer the patients as soon as possible to the appropriate hospital.

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