Effects of Non-steroidal Anti-Inflammatory Drugs on Flexor Tendon Rehabilitation after Laceration Repair

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Abstract: Introduction: Peritendinous adhesions after repair of an injury to the digital flexor tendons are a major problem in hand surgery. Non-steroidal anti-inflammatory drug therapy may affect tendon healing and the development of peritendinous adhesions. Aim of this study evaluation of Ibuprofen effect in patients function after flexor tendon surgical repair. **Methods:** In Clinical trail study, 35 patients with sharp laceration in zone 2 underwent flexor tendon repair were evaluated. These patients were randomly divided in two groups and matched with together according to sex, age and size of laceration. Patients in control group were received placebo in same shape and size. In interventional groups patients were received Ibuprofen with high dose (2400mg per day). **Results:** Measurement of range of motion in involved finger joint in two time of follow up were significant difference between two group (p=0.04). There was no complication. The nerve damage along the flexor tendons groups was similar. **Conclusion:** Our findings reveal that Ibuprofen with anti- inflammatory dose was effective in improving range of motion of involved finger joints after flexor tendon injury.

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1. Introduction

Hand is a member of the exclusive and elegance. It has been known to human performance (Strickland, 1998). The most common complications after flexor tendon repair are rupture, joint contracture, and tendon adherence Flexor tendon healing is complicated by soft tissue adhesions to the surrounding sheath (Hagen and Schumacher Nick, 2008). Adhesions between the tendon and sheath impair the gliding mechanism of the tendons and result in poor finger range of motion (ROM) (Strickland, 1998; Hagen and Schumacher Nick, 2008). Non steroidal anti-inflammatory drugs (NSAIDs) are common analgesic used to treat the swelling and pain (Tan, 2010). NSAIDs inhibit cyclooxygenase activity so induced reduce proinflammatory prostaglandinproduction and hyperalgesia(Tan, 2010). Ibuprofen is one of the most common NSAID used in patients for pain control (Rockwell and Ehrlich, 1999).

It is a potent cyclooxygenase inhibitor known to reduce the production of arachidonic acid metabolites (Rockwell and Ehrlich, 1999). Ibuprofen also has been shown to improve several aspects of wound healing ranging from wound edema to adhesion formation to vascular obstruction (Rockwell and Ehrlich, 1999).

The aim of this study was evaluation of NSAID especially Ibuprofen effects on flexor tendon rehabilitation in patients who underwent flexor tendon repair.

2. Material and Methods

In Clinical Trial study in our educational Trauma center, 37 patients with acute laceration in volar hand (Zone 2) with flexor tendon injury according to physical examination were selected. Those meeting the inclusion criteria were invited to participate and provided informed consent. The excluded patients were those with history of volar hand injury or laceration, flexor tendon disorder, patients under 18 years old and patients with systemic disease like that cardiopulmonary, diabetes, renal disease or malignancy. Patients were divided in two groups and matched together according to sex, age and size or shape of laceration. Lesions were selected with sharp edge without crash. All lesions were in volar hand in Zone 2. In intervention group patients were received Ibuprofen with high dose(2400 mg/day) for a month and compared with control group only received placebo with same shape

and size was prepared from Zahravi Pharmacy, Tabriz, Iran.

Surgical Procedure:

All patients were operated by a surgeon at the same time and location. All patents were operated with single and same method of flexor tendon repair (Standard Modified stickl and four strand technique with running lock suture). Method of rehabilitation in all patients was active place hold protocols.

Patients were followed for a month and hand joint range of motion was evaluated in two and four weeks after operation. Written informed consent was obtained from all the patients. An Ethics Committee of Tabriz Medical University approved the study. This study was registered with IRCT201301189857N2 in Iranian Registry of Clinical Trials (IRCT).

Statistical analysis:

The data are shown as Mean ± SD. Repeat measure test was used to compare of range of motion change between groups in time of following. Chi-square and Fisher's exact test were used to determine statistical difference in qualitative variables. P value less than 0.05 was considered statistically significant.

3. Results

Thirty-five patients, including 12(34.3%) women and 23(65.7%) men with a mean age of 49.3 years, completed the study. They were 21 patients in the intervention group were treated with high dose ibuprofen (2400 mg/day) and 14 patients in the control group. Demographical characteristics of the patients in the intervention and control groups are shown in Table 1. There were no significant differences between the two groups in age, gender and digital nerve injury. There was significant difference in range of motion between two groups. Range of motion improvement was better in the intervention group than the control group. There was not observed any complication due to ibuprofen in intervention group.

Table 1. Characteristics of Patients and findings of intervention and control group.

Variable	Intervention group N= 21	Control group N=14	P
Sex (male/female)	16/5(66.7%/53.3%)	9/5(64.3%/35.7%)	0.5
Age(year)	33.4±12.5	34.2±11.2	0.8
Range of motion(degree) after 2 week	151.9±7.6	142.6±5.5	0.03
Range of motion(degree) after 4 week	164.8±6.9	158.3±6.4	0.03
Nerve Injury (%)	6 (42.9%)	5(23.8%)	0.07

4. Discussions

The effects of NSAIDs on soft tissue healing are poorly understood (Hagen and Schumacher Nick, 2008). Alexander et al, found a significant reduction in rat burn wound edema with ibuprofen therapy (Alexander, 1984). Decreased wound edema and decreased production of inflammatory mediators would presumably improve wound healing (Rockwell and Ehrlich, 1999; Alexander, 1984). Thus important role of ibuprofen in the wound healing process is reducing edema and reduced inflammatory mediator (Rockwell and Ehrlich, 1999; Alexander, 1984). Non steroidal anti-inflammatory drugs (NSAID), is one of the most important classes of drugs may play a key role in inflammatory diseases (Rockwell and Ehrlich, 1999). The formation of adhesions is an area of concern to all surgeons. I animal study by Tan et al. Ibuprofen has a more important effect in limiting adhesion formation compared with Rofecoxib after flexor tendon repair (Tan, 2010). Because ibuprofen inhibits both COX-1 and COX-2, where as Rofecoxib only inhibits COX-2, they suggest that ibuprofen therapy appears to offer a greater beneficial effect on tendon repair by reducing formation of adhesions (Tan, 2010). In other animal study showed that Dexamethasone and ibuprofen were equally effective inhibitors of the for mation of significant adhesions after fallopian tube injury in rabbits(Siegler, 1980; Nishimura, 1984; DeLeon, 1986; O'Brien, 1982). Kulick et al, showed in animal models orally administered ibuprofen is increases the gliding mechanism of flexor tendon after surgical repair (Kulick, 1986). Our study is the first study is performed in human. Because of were not similar human study, comparing our results is faced to the problems. In this study, we tried treatment groups were same in terms of affected variables as much as possible to achieve maximum reliability. According to our findings administration of high-dose ibuprofen with anti-inflammatory effects had significant effect on range of motion improvement after operation and flexor tendon repair. Our results are in agreement with the findings of other studies in animal models. Also no adverse reactions to the medication were observed. In other study showed that the animals treated with Indomethacin had a greater tendon

excursion and angular rotation of the joint than the control animals, implying a suppression of adhesions (Robert, 1990).It seems that non-steroidal anti-inflammatory drugs play an important role in improving flexor tendon function after repair. Studies in animal models also confirmed our findings.

Conclusion:

We conclude that the use of non-steroidal anti-inflammatory drugs especially ibuprofen with high dose (2400mg/day) is well tolerated and have a positive effect at least on the improvement of flexor tendon function after operative repair.

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