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ORIGINAL ARTICLE

Outcomes of Conservative Management of Fingertip Injury in Paediatric Population

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ABSTRACT

In infants and children, the fingertip injuries occur frequently by accident which result causing infliction which ranges from a little cut to a fracture and also the finger amputation thus requires an immediate treatment intervention to avoid deformities. Different therapeutic approaches have been used involving surgical or conservative treatment. The conservative treatment is considered to be superior choice for management of these injuries so this research was designed to evaluate the functional and aesthetic outcomes of conservative approaches for treating fingertip injuries.

Methods: This research consists of 30 children admitted to Ziaudin Hospital, Karachi with Allen's type II and III of fingertip injuries divided into three groups based on the treatment approach including Platelet Gel treatment group (group I), Fucidic acid treatment group (group II), Hyaluronic acid treatment group (group III).

Results: All the conservative treatment approaches showed promising improvement regarding the range of motion, healing time, aesthetic and sensory outcome, complications, and subjective satisfaction. However, the platelet gel group exhibits significantly short healing time (p=0.003) in comparison to Fucidic acid and Hyaluronic acid treatment group

Conclusion: It was concluded that conservative treatment is one of the effective approach in management of fingertip injuries in paediatric population providing better functional, sensory and aesthetic outcomes.

Keywords: Fingertip injuries, Conservative treatment, Outcomes

INTRODUCTION

In children the fingertip injuries are more common. Several studies (Doraiswamy & Baig, 2000; Fetter-Zarzeka & Joseph, 2002) have reported that more than 1.8% to 2% of emergency cases of paediatric are hand injuries, out of which the fingertip injuries accounts for approximately 21%to 46%. The causes of these injuries in paediatric patients are mostly accidents at home and during playing outside. The study by Macgregor and Hiscox concluded that 2% of the children emergency admissions are due to fingertip injuries occur by trapping in the door (Macgregor & Hiscox, 1999). The paediatric emergency departments, account for 2% of fingertip injuries (Macgregor & Hiscox, 1999) involving children under age of 14 years, among which 25% of the injuries are more severe needing surgical treatment. Several therapeutic treatment approaches have been used to manage fingertip injuries like conservative methods or surgical methods depending on the lesion size, type of injury, skills of surgeon skills, culture, patient preference, and available resources (Lemmon et al., 2008). Surgical treatment involves primary closure, or the importation of new tissues (Chang et al., 2006; Kay, 1991; Martin & del Pino, 1998). However, the conservative treatment involves debridement and lavage along with local analgesia. In the past different types of dressing were used such as polyurethane foam, paraffin, bacitracin ointment, and silver sulphadiazine. Nowadays novel dressings are frequently used which includes occlusive dressing leaving a moist environment without debridement reliant to the fluids and enzymes to promote healing around the fingertip (Giesen et al., 2016; Mühldorfer-Fodor et al., 2013). The use of platelet gel is also being employed containing a blood component synthesized using thrombin, platelets, and calcium, which stimulates the repair/healing processes. The major benefits of this approach are ease of synthesis, unlimited availability and cost effectiveness (Balbo et al., 2010). Hyaluronic acid a key component of the extracellular matrix involves in maintaining homeostasis of skin and wound healing (Voinchet et al., 2006).

Illingworth reported that management of fingertip injuries in paediatric population with conservative approach have a good success rate (Boudard et al., 2019; Illingworth, 1974). Various studies (Damert & Altmann, 2012; Doraiswamy & Baig, 2000; Illingworth, 1974) also demonstrated the superiority of the conservative methods of treatment as compared to surgical management approaches. The conservative method also involves the use of sulphadiazine gloves and of occlusive dressings with analgesics of topical creams (Hawken & Giladi, 2021). (İskenderoğlu et al., 2020) reported that fingertips of human regenerate de novo after conservative treatment. Moreover, the use of film dressings to occlude fingertips injuries was also demonstrated with success. So the studies (Ng et al., 2020; Quadlbauer et al., 2017) recommended conservative management methods for all types of fingertip injuries due to the fact that conservative treatment approaches are associated better sensory outcomes along with less joint stiffness and pain, as well as negligible complications (Amer et al., 2010) so, this research was designed to evaluate the outcomes of conservative management of fingertip injuries among paediatric population.

METHODOLOGY

This was a study retrospective study for the period of one year involving 30 paediatric patients with ages ranged from six months to 17 years, Allen's type II and type III of fingertip injuries intervened and admitted to Ziaudin Hospital, Karachi from November 2020 to November 2021. The data was collected after getting the approval from hospital ethical committee and informed consent from the parents/guardian of children. The patients were evaluated locally and generally using X-ray examination to exclude any other hand injuries. Paediatric with fingertip amputation and candidates for surgery and replantation, impair wound healing medical conditions, using steroids therapy, peripheral ischemic or chronic venous

insufficiency patients were not included in the study. The study population was divided into three groups based on the treatment approach including Platelet Gel treatment group (group I), Fucidic acid treatment group (group II), Hyaluronic acid treatment group (group III).

Sufficient debridement of wound using local analgesia was done followed by wound treatment with Platelet gel (10 cases), fucidic acid (10 cases) and Hyaluronic acid cream (10 cases) and the change of dressing change was done every week till the process of complete healing (14-28 days). The study groups were evaluated in the first 60 days on their follow-up once a week, then monthly for the period of a year. The evaluation of wound complications included infection, hematoma, healing time along

with aesthetic and functional outcome like sensory function, motion range of distal phalanx, cold intolerance using two-point discrimination test, Goniometer. The cold intolerance was examined by given exposure to cold water, air or cold objects to analyse the any discomfort, pain, or other symptoms and subjective satisfaction with conservative treatment approach was also evaluated.

RESULTS

This study included 30 paediatric patients, consisting of 8 females 22 males with fingertip injuries. The ages of children ranged from six months to 17 years, with mean age 15.1□1.32. Patients were treated with conservative treatment i.e. Platelet gel, fucidic acid and Hyaluronic acid cream with 10 cases each

Evaluation of the conservative treatment groups: There was observed no significant difference between different treatment groups in terms of their demographics including the age and gender.

Analysis of the functional outcome: The analysis of functional outcomes was analysed using clinical data of healing time, motion range, sensory outcome, and cold intolerance. The overall healing time of the children ranged from 14 to 28 days with mean time of 21.2□7.03. The children of platelet gel treatment group (group I) showed significantly less time with mean 14.5□2.1 (p=0.003), in comparison to Fucidic acid treatment group (group II) mean 21.6□3.7, and Hyaluronic acid treatment group (group III) mean 21.4□1.8.

There was also observed insignificant difference between different treatment groups concerning sensory outcome, motion range and cold intolerance respectively.

Based on the data of complications associated with treatment approaches there was also no significant difference between platelet gel treatment group (group I) (p=0.439), Fucidic acid treatment group (group II) showed no complications (0%) at all and the Hyaluronic acid treatment group (group III) was associated with (10%) complications.

No significant difference between the treatment groups was found regarding aesthetic outcome, and cold intolerance. The platelet gel treatment group (group I) showed 8 children with excellent outcome (80%) and 2 patients with good outcome (20%) with 10% of cold intolerance, Fucidic acid treatment group (group II) showed 6 patients with excellent outcome (60%) and 4 patients with good outcome (40%) and 30% of cold intolerance, the Hyaluronic acid treatment group (group III) showed 7 patients with excellent outcome (70%) and 3 patients with good outcome (30%) and 20% of cold intolerance. All the treatment groups showed profound satisfaction level showing no significant difference between treatment groups.

Table 1:

Point of comparison	Platelet gel group (n=10)	Fucidic acid group (n=10)	Hyaluronic acid group (n=10)	F	p
Healing time (days) Mean ± S.D Range	 14.5 2.1 15-20	 21.6 3.7 22-26	 21.4 1.8 21-24	15.94	0.003*
Complications Absent Present	 0% (0) 0% (0)	 0% (0) 0% (0)	 90% (9) 10 %(1)	4.24	0.439
Range of motion (scale): Mean ± S.D Range	 4.58 0.01 4-5	 5.20 0.12 3-4	 4.88 0.24 3-4	3.99	0.674
Cold intolerance Present Absent	 10% (1) 90% (9)	 30% (3) 70% (7)	 20% (2) 80% (8)	2.94	0.428
Aesthetic outcome Excellent Good	 80% (8) 20% (2)	 60% (6) 40% (4)	 70% (7) 30% (3)	1.69	0.519
Subjective satisfaction Mean ± S.D Range	 7.9 2.5 8.0-10.0	 5.99 3.01 6.0-8.0	 6.95 1.9 7.0-8.0	2.08	0.204

*: Statistically significant, F: One way ANOVA

Table 1: Healing time, complications, Range of motion, Cold intolerance, aesthetic outcome and subjective satisfaction among study groups.

DISCUSSION

In children, the fingertip injuries are most frequently seen in the age of two years or more which is due to the fact that this phase has an imbalance between cognitive development and gross motor capabilities. Children move around randomly with curiosity to get involved in activity without any awareness of danger (Satku et al., 2015). The results of this study have clearly shown that fingertip injuries are more common in boys, in comparison to girls analogous to the Haggerty study who also reported that boys were involved in accidents, indicating that personality, motor activity, and rearing of boys may be the cause of these injuries (Haggerty, 1996). The management approaches of fingertip injuries had improved greatly with the passage of time. Nowadays various treatment options are being available, but without any standard reference (Peterson et al., 2014). The conservative treatment method is one of the oldest and significant management approach of fingertip injuries. The study by Ipsen et al. also analysed the conservative approach to treat patients with fingertip injuries and reported that the conservative treatment took average healing time of approximately 25 days, ranging from 8 days to maximum 42 days which is in consistent with the findings of this research which found the average healing time of 14 to 28 days (Ipsen et al., 1987). Although, it must be noted that the healing time in conservative management highly depends on the wound size, however the standard healing time ranges from 2 weeks to 12 weeks11 with the longer time required for treating amputations of fingertip (Champagne et al., 2016; Kawaiah et al., 2020). The retrospective study by Weichman et al. concluded that the patients treated with surgical intervention took longer healing time of 4.33 weeks as compared to the conservative approach which took 2.98 weeks (p<0.001) (Weichman et al., 2013) supporting our findings. Intolerance to cold is a common problem observed after fingertip injury. The rate of cold intolerance associated with cold intolerance is 30% to 70%25 supporting our results 20% showing a mild intolerance (van den Berg et al., 2012). The study by Ipsen et al. evaluated the complications associated with conservative treatment found that only 4 patients out of 53 patients developed superficial infection complication (Ipsen et al., 1987) which also support the results of our findings shoeing negligible complications associated with different conservative treatment approaches. The aesthetic outcome is one of the component in the fingertip injuries

management, thus this research showed profound subjective satisfaction after conservatively healing of finger, these findings are in accordance with the findings of (Mennen & Wiese, 1993) and (Quell et al., 1998) who also reported the excellent aesthetic outcome and patients satisfaction after given the conservative treatment for management of fingertip injuries with good quality skin quality, normal cold sensation, retained motion supporting the findings of our research that conservative treatments of fingertip injuries in paediatric population with conservative approach have a good results (Boudard et al., 2019) implying the benefits of the conservative methods of treating fingertip injuries.

CONCLUSION

Conservative approach in treatment of fingertip injuries in paediatrics involve usage of wound dressings with different local analgesics and this management approach has been proved to be effective, less healing time, excellent sensory and aesthetic outcomes, negligible complications, excellent compliance, acceptance and subjective satisfaction. Therefore, the use of conservative treatment for fingertip injuries can be considered to be the most preferable and effective management approach for the fingertip injuries based on the type, nature and extent of the injury.

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