

Rehabilitation Of Children After Elbow Injuries

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ABSTRACT

Objectives: To review the efficiency of early physical therapy to achieve successful rehabilitation after elbow injuries in children.

Setting: Tertiary medical institution, Department of Physical Therapy, University Clinical Center of Kosovo, rr. Spitalit pn. 10000 Prishtina, Kosovo.

Methods: We retrospectively reviewed the patients with elbow injuries, (ICD, Rev. 10, Elbow Fractures code) merely as a consequence of trauma, who had undergone rehabilitation program from June 2000 December 2001.

Results: In this study 140 cases with elbow injuries are analyzed. The majority of the injured are with fracture 132 cases (94.29%), whereas only 8 cases or 5.72% are with non displaced fracture or dislocation. Analysis based on the most frequent injury localization in the elbow region, among all fractures, supracondylar fracture is present with 78 cases or 56%. The majority of cases, 49 or 35% have had injuries caused by fall from height, up to 6 cases or 4.3% injured in MVA. Timely initiation of rehabilitation program is influential factor in successful rehabilitation, whereas correlation between time of initiation and rehabilitation success have demonstrated important statistical significance, very high correlation $r = 0.75$ $p < 0.01$.

Conclusion: The children that did not have continuous rehabilitation program, due to huge interruptions during rehabilitation, have not achieved excellent success in rehabilitation. Early start of rehabilitation, since the arm is immobilized, can cause complete regaining of elbow functions, therefore any delay in the beginning of rehabilitation will leave consequences, from the must minor ones up to disability.

Keywords: elbow injuries, children, rehabilitation.

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INTRODUCTION

The elbow is a key joint in the kinematics of all activities that require proper function of the upper extremities¹.

Elbow dislocation as an isolated injury is very rarely and usually occurs concomitantly with condylar fractures².

Elbow fractures in pediatric populations occur frequently^{3,4}. Most common is a supracondylar fracture of

humerus. They comprise about 70% of all fractures in this region.

A frequent complication after an elbow joint fracture is stiffness, which is commonly caused by long term immobilization and insufficient rehabilitation⁵⁻⁹

Rehabilitation objectives after elbow injuries in children are return of motion, strength and alignment⁹

Rehabilitation is a long term process, which should be started as early as possible, provided continuously and follow an organized plan of care established by a multidisciplinary team.

OBJECTIVES

1. Frequency of injuries with post traumatic stiffness of the elbow based on type of injury, location and origin.
2. Efficacy of early Physical Therapy intervention in achieving successful rehabilitation after elbow injuries in children.
3. Analysis of the influence of interruption during rehabilitation in the success rate.

MATERIALS AND METHODS

Retrospective descriptive analysis of the parameters was used for the patients with elbow injuries, treated in the outpatient Physiatric Department of the Orthopedic Physiatric Clinic in Prishtina.

In this study the diagnosed cases with elbow injuries were analyzed, (ICD, Rev. 10, Elbow Fractures code) merely as a consequence of trauma.

Children of age group 0-13 with elbow fractures are included in this study. They received rehabilitation from June 2000 December 2001.

Three comparative groups are created based on Hoyer's Complete Classification to evaluate the degree of rehabilitation.

RESULTS

Patients' rehabilitation results with elbow injuries based on the type of injury are shown in tables I -VI.

In this study 140 cases with elbow injuries are analyzed. Structural distribution of cases based on the type of injury is presented in Tab.I which demonstrates that the majority of the injuries are fractures 132 cases (94.29%), whereas only 8 cases or 5.72% are non displaced fracture or dislocation injuries.

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Tab. I: Type of injury

Type of injury	No.	%
Displaced fracture	132	94
Non displaced fracture	4	3
Dislocation	4	3
Total	140	100

Analysis based on the most frequent injury location in the elbow region, among all fractures, supracondylar fracture is present with 78 cases or 56%, whereas transcondylar fracture, combined fracture and trochlear fracture is present with only 6 cases or 3% (Tab. II).

Tab. II Fracture distribution (injury location)

Diagnosis and location	No.	%
Supracondylar fracture	78	56
Condylar fracture	19	14
Epicondylar fracture	19	14
Radius neck fracture	4	3
Monteggia fracture	3	2
Olecranon fracture	3	2
Transcondylar fracture	2	1
Combined fracture	2	1
Trochlear fracture	2	1
Non displaced fracture	4	3
Dislocation	4	3
Total	140	100

Through conducted analysis with Structural Index, frequency of injuries is presented based on cause of injury in relation with the type of injury. It can be noticed that majority of cases, 49 or 35% resulted from a fall from height, and 6 cases or 4.3% injured from a MVA (Tab.III).

Rehabilitation program success for patients with elbow injuries is based on timely initiation of rehabilitation. Timely initiation of rehabilitation is an influential factor in the successful return of elbow function, whereas correlation between the time of initiation and rehabilitation success demonstrate important statistical significance, very high correlation $r = 0.75$ $p < 0.01$ (Tab. IV).

Significant statistical data was obtained using the linear correlation testing method ($p < 0.01$). This result demonstrates the importance of casting duration as an influential factor in successful rehabilitation program (Tab. V).

Influence of interruptions made during rehabilitation program on successful rehabilitation outcomes for patients after elbow injuries are shown in table VI Significant statistical values are generated using the arithmetic median T-test for $p < 0.01$, this result demonstrates that interruptions during rehabilitation program are very influential for overall rehabilitation success.

Tab. III: Mechanism of injury by type

Cause of Injury	Type of Injury							
	Fracture		Non Displaced Fracture		Dislocation		Total	
	N	%	N	%	N	%	N	%
Fall from a height	46	34.8			3	75.0	49	35.0
Fall from bike	40	30.0					40	28.6
Fall during play	31	23.5	3	75.0	1	25.0	35	25.0
Fall in school yard	9	6.8	1	25.0			10	7.1
MVA	6	4.5					6	4.3
Total	132	100.0	4	100.0	4	100.0	140	100.0

Tab. IV: Rehabilitation of patients

Rehabilitated patients	Success			Total
	Poor	Good	Excellent	
	27	21	92	140
Average successes of rehabilitation coefficient	53.33	18.57	2.80	14.91
Starting point of rehabilitation (days post injury))	69.19	45.48	31.78	41.05
Correlation between success and the initiation of rehabilitation	R = 0.75	P < 0.01	Very High	

Tab. V: Correlation between casting duration and rehabilitation program success for patients with elbow injury.

Parameters		Success Grade			Grand Total
		Poor	Good	Excellent	
Treatment success	N	27	21	92	140
	Xb	53.33	18.57	2.80	14.91
	SD	20.43	2.31	3.49	21.74
Casting duration	N	27	21	92	140
	Xb	31.89	28.00	22.14	24.90
	SD	8.54	5.42	3.78	6.57
t =		5.03	7.33	36.03	5.02
p =		P < 0.01	P < 0.01	P < 0.01	P < 0.01

Tab. VI

Interruptions During Rehabilitation	Parameters	Success			Total	
		Poor	Good	Excellent	No.	%
No	No.		12	13	92	11783.57
	Average success	60.42	18.46	2.80	10.45	-
	No.	15	8		23	16.43
Yes	Average success	47.67	18.75		37.61	-
	No.	27	21	92	140	100.00
Total	Average success	53.33	18.57	2.08	14.91	-

P < 0.01

DISCUSSION

Injuries to the elbow frequently result in serious consequences to joint function. Therefore it is necessary to provide delicate treatment techniques¹⁰.

Elbow fractures in the pediatric populations are not uncommon because when a child is falling, tendency of both arms is to stretch with an intention to protect themselves^{3,9,11-13}.

From 140 presented cases in this study, the majority, 132 cases or 94.29% are fractures,

4 cases (2.86%) are fissure and 4 cases (2.86%) are luxation.

Boyd and Altenberg⁶ during their research of elbow fractures in children have presented these results: from 713 fractures in children age group 0-12, supracondylar fracture of humerus was the most frequent which includes about 64.4%, condylar fracture 25.3%, radial neck fracture 4.7%, Monteggia fracture 2.2%, olecranon fracture 1.6% and transcondylar fracture 0.8%.

Based on acquired results, after statistical analysis of all the cases, the most frequent elbow injury is fracture; lead by supracondylar fracture of humerus with 78 cases (55.71%) followed by epicondylar and condylar fractures of the humerus with 19 cases (13.57%).

In the majority of cases (70%), the mechanism of injury is falling from a height^{9,11,12,14,15}.

The children that did not have a continuous rehabilitation program, due to huge interruptions during rehabilitation, did not achieve excellent success in rehabilitation.

Early initiation of rehabilitation, after immobilization, may result in complete return of elbow function. Therefore any delay in the onset rehabilitation can have detrimental consequences, including loss of ROM, strength and function. Early Physical Therapy intervention demonstrates significant differences in the complete healing of the injured elbow².

After data analysis it can be concluded that the correlation between the success and the timely onset of rehabilitation is very high ($R=0.75$ $P<0.01$). From the total number of injured 140, excellent success is achieved for 92 patients; rehabilitation initiated approximately 31.78 days after injury. Insufficient success is achieved by 27 patients, whose rehabilitation did not start for approximately 69.19 days after injury.

Long term immobilization has a large impact in the development of elbow contractures and deleteriously impacts the outcome of rehabilitation¹⁹.

Timely planned starting point of rehabilitation after elbow injuries can reduce contractures and pain, which are the leading cause of disability in these injuries (8, 9, and 18).

Elbow contracture is the most recurrent complication after distal fractures of humerus^{2,5-9,16-18}.

Elbow contractures are in direct correlation with: late request for hospital treatment after injury, previously unsuccessful manipulation, post surgical casting for a prolonged period of time and an inadequate rehabilitation program¹⁵.

CONCLUSION

The frequency of cases treated in the Physiatric Department with post traumatic elbow contractures is higher among the patients with displaced elbow fractures compared to non-displaced fractures. The most frequent mechanism of injury of the children treated in our department is a fall from a height, represented with 49 cases. Early onset of physical therapy is proven as important predictor in successful return of function. Injured children with short term immobilization have achieved better rehabilitation success. Intermittent interruptions during rehabilitation have a negative impact on treatment duration and rehabilitation success. A basic therapeutic

procedure in rehabilitation of children with elbow injuries is kinesiotherapy, with which satisfactory results can be achieved.

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