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RESEARCH ARTICLE

"OUTCOME EVALUATION OF SURGICALLY TREATED PROXIMAL HUMERUS FRACTURES USING SHOULDER FUNCTION INDEX SCORING SYSTEM''

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Abstract

Proximal humeral fractures are amongst the most common fractures. Functional recovery is often slow and many people have ongoing disability during activities of daily life. Unidimensional measurement of activity limitations is required to monitor functional progress during rehabilitation. However, current shoulder measures are multidimensional incorporating constructs such as activities, range of motion and pain into a single scale. Psychometric information of these measures is scarce in this population, and indicate measurement issues with reliability. Therefore, the aim was to develop the clinician-observed Shoulder Function Index (SFInX), a unidimensional, interval-level measure of 'shoulder function' based on actual performance of activities, reflecting activity limitations following a proximal humeral fracture.

Introduction:-

Fractures of the proximal humerus are one of the most common limb fractures [1,2] that mainly occur in people over the age of 50 years [3-5]. Because of the aging population, the incidence of the proximal humeral fractures is expected to increase over the next decades [6]. Functional recovery after a proximal humeral fracture is often slow and many patients experience ongoing disability during activities of daily life [7-9]. The first weeks after injury are characterised by reduced arm function and severe pain. Typically, the active phase of rehabilitation commences between 2 and 6 weeks post-fracture [7,10,11]. Functional improvements are expected in the following months with gradual return to self-care and daily activities. Between 3 to 6 months, most people can perform their activities for daily living, but often with a certain degree of difficulty. The ongoing disability after a proximal humeral fracture is often experienced as limitations in performing activities [7-9]. According to the International Classification of Functioning, Disability and Health (ICF) framework, activity limitations are difficulties an individual may have in executing activities or tasks [12]. Patients may be limited in activities such as placing objects into high cupboards, washing their lower back, or carrying items. Such limitations in activities might reduce independence and potentially influence level of participation in normal societal roles.

If activity limitations are important to people with a proximal humeral fracture, it is important to be able to measure this construct, so that appropriate interventions can be chosen for these patients and functional progress can be monitored [13]. This requires a functional out- come measure that is unidimensional (measures the single construct of activity limitations), psychometrically sound, relevant to the patient and clinically feasible.

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Material Methods:-

Observational (Retrospective and prospective) Study which included 30 patient of proximal humerus fracture . Patient was operated with ORIF with Plating .Information of the patient was compiled from clinical details, case files and operation. Theatre records who were followed up for the duration of 6 months

Study plan

After meeting inclusion and exclusion criteria 30 eligible patient were included in the study of proximal humerus fracture ,were admitted and underwent a standard clinical and laboratory evaluation that include briefly information about age, sex address, clinical history and routine investigation which were included pre operatively .Information of the patient was compiled from clinical details and case files. The clinical radiograph data and post operative complication of patient were extracted from their medical record at evaluation session patient were evaluated using SFInXscore and dash score at 6 weeks , 3months,6 months.

Duration of study

18 Months (1 Year for data collection and 6 months for analysis and writing) from 01.04.2021 to 30.09.2022

Result:-

Age :

In our study, there were 11 (36.67%) patients were in the age group < 40years, 10 (33.33%) were in the age group 40-60years and 9 (30%) were in the age more than 60 years. The majority of the patients were in the age group <40 years with a mean age of 48.3 years . The prevalence of proximal humerus fracture increased sharply among people less than 40 years of age this is mainly is due to trauma and road traffic accidents

Sex :

Regarding sex incidence study of literature reveals predominance of proximal humeral fractures in males 14(53.33%) were female among 30 patients 16 (46.67%) were males out of 30 Our study shows that most Proximal humerus fracture are traumatic fractures in men over the age of 45.The prevalence of PHF increases as the population ages

Mode Of Injury:

The mode of injury commonly observed in our series was road traffic accidents accounting for 20 (66.6%) , 9 (30%)patients had an history of fall and1(3.3%) had an history of electric shock. Thus showing high velocity injury as the main mechanism

Neer's Type:

The study of type of fracture in our series revealed 8(40%) were 2 partfractures,1(3.3%)3 part fractures 15 (50%) and 14(46.7%) were a 4part fracture and Neer study shows,31(26.5%) were 2part fractures,43(36.8%) were 3part fractures and43(36.8%) were 4part fractures

Post Op Complication:

In our series 1(3.3%) had shoulder stiffness and 1(3.3%) had post operative day 4 superficial infection.

(6weeks)

SFInX Outcome At 6 WEEKS		Dash Outcome At 6 weeks		Total
		Normal	Not Normal	
Normal	Count	16	2	18
	%	88.9%	15.4%	58.1%
Abnormal	Count	2	10	12
	%	11.1%	84.6%	41.9%
Total	Count	18	12	30
	%	100.0%	100.0%	100.0%
Variable	**Value**	**Df**	**P Value**	**Result**
Chi-Square Tests	16.749[a]	1	0.000	Sig
Sensitivity	84.62%			High
Specificity	88.89%			High

PPV	84.62%	High
NPV	88.89%	High
Accuracy	87.10%	High

(3 Month)

SFInX Outcome At 3 Month		Dash Outcome At 3 Month		Total
		Normal	Not Normal	
Normal	Count	20	1	21
	%	95.2%	10.0%	67.7%
Not Normal	Count	1	8	9
	%	4.8%	90.0%	32.3%
Total	Count	21	9	30
	%	100.0%	100.0%	100.0%
Variable	**Value**	**Df**	**P Value**	**Result**
Chi-Square Tests	22.523	1	0.000	Sig
Sensitivity	90.00%			High
Specificity	95.24%			High
PPV	90.00%			High
NPV	95.24%			High
Accuracy	93.55%			High

(6 Month)

SFInX Outcome At 6 Month		Dash Outcome At 6 Month		Total
		Normal	Not Normal	
Normal	Count	23	0	23
	%	95.8%	0.0%	74.2%
Not Normal	Count	1	6	7
	%	4.2%	100.0%	25.8%
Total	Count	24	6	30
	%	100.0%	100.0%	100.0%
Variable	**Value**	**Df**	**P Value**	**Result**
Chi-Square Tests	25.995	1	0.000	Sig
Sensitivity	100.00%			High
Specificity	95.83%			High
PPV	87.50%			High
NPV	100.00%			High
Accuracy	96.77%			High

SFInX SCORE DISTRIBUTION

SFInX SCORE	POOR	AVERAGE	EXCELLENT
6 WEEKS	**5**	**13**	**12**
3 MONTH	**3**	**11**	**16**
6 MONTH	**1**	**9**	**20**

Discussion:-

In our study there was a statistically association between SFInx score and DASH score, which shows that the outcome is dependent on age,Neer's fracture pattern

The proportion of 36.67% % patients belongs to age group <40 years and 33.33% amongst 40-60 years. Remaining 30% belongs to age group of >60 years. The proportion of 46.67% patients were females and 53.33% patients were males. The proportion of 46.67% patients were with left side involved and 53.33% belongs to patients with right side. The higher proportion of 50% patients belongs to 3-Part and 46.7% 4-Part group each and remaining 3.3% belongs to 2-Part group.

The association between outcome of SFInX score and DASH tool at 6 weeks month duration was determined and the P value < 0.05 shows that there was significant association between the outcomes of two methods. The higher value of sensitivity 84.62% and PPV 84.62%.

The quite higher value of accuracy 87.10% proves that the SFInX score method can be used as an alternate method to DASH tool for correct diagnosis

At 3 month, The higher value of Sensitivity 90% and PPV 90%,value of accuracy 93.55%

Finally, we can conclude that at 3 Month duration we can use the SFInX score method also instead of DASH tool to diagnose the abnormality in the patient.

At 6 month, value of sensitivity 100% and PPV 87.5%,higher value of accuracy 96.77%

Therefore , we can assess that the association between the two score kept and increasing and has near similar results.

At 6 weeks the mean DASH score of male 63.13 was non significantly more than mean score 62.53 of females. (P>0.05)

At 3 Month the mean DASH score of male 41.88 was non significantly less than mean score 45.07 of females. (P>0.05)

At 6 Month the mean DASH score of male 33.63 was non significantly less than mean score 39.60 of females. (P>0.05)

In addition to current shoulder outcome measures having a multidimensional structure, there is little and limited psychometric information for these measures in people with a proximal humeral fracture, particularly during the active phase of rehabilitation [14,18-21]. Also, the information that is available suggests that existing scales may have problems with relatively wide limits of agreement (for example, ±15% of total scores for the DASH) and structural validity (for example, inclusion of multiple constructs and redundant items) [11,15-18].

None of the currently used outcome measures in people with a proximal humeral fracture [14] measure the single construct of activity limitations. For example, the clinician-administered Constant Score and American Shoulder Elbow Surgeons (ASES) Shoulder Score [15] assess components of pain, 'function' or activities, range of motion and strength and combine these in a single score. The Disabilities of the Arm, Shoulder and Hand (DASH) [16] and Oxford Shoulder Score [17] questionnaires partly assess activity limitations, but also include items related to pain/sensation and psychological factors. Incorporating multiple constructs in one outcome measure and summing their sub scores into one total score may obscure outcomes in the different domains. Although clinicians may look at the individual items to determine this for in-dividual patients, this reduces the utility of the instrument for clinical and research purposes. To measure activity limitations in people recovering from a proximal humeral fracture, a unidimensional outcome measure is required.

Therefore, there is a need to develop a unidimensional outcome measure with sound psychometric properties that can evaluate activity limitations in people with a proximal humeral fracture. The main aim of this study was to develop the Shoulder Function Index (SFInX). During its development, it underwent Rasch analysis, ensuring it is unidimensional, measuring the construct of 'shoulder function' which is scored on a linear, interval-level scale.

Conclusion:-

1. The incidence of proximal humeral fractures has increased in last few years due to changes in lifestyle and increase in road traffic accidents. In younger patients, proximal humeral fractures usually are caused by high-energy trauma(65%).In older patients with osteoporosis ,even less severe trauma(falling 35%) can produce significant injury.
2. The best management is early open reduction and internal fixation which prevents complications like Frozen shoulder, malunion and late osteoarthritis .There is direct relationship between displaced proximal humeral fractures ,between fractures severity (i.e. greater displacement, communition) and eventual results. The more the initial insult, worse the prognosis.

3. Rehabilitation is the key to success. After the fracture is stabilized by whatever means , continuous active followed by passive motion should be started. On discharge, the patients must be instructed regarding physiotheraphy exercises to bed one several times a day.
4. SFInX contains 13 items and has the response categories: 'unable', 'partially able' and 'able'. It is unidimensional measuring 'shoulder function', and can measure from early functional use (drinking from a cup) to independence around the house (lifting items above head, carrying heavy items).
5. Results assessed with Shoulder Function Index ScoringSystem 66.67% have achieved excellent and satisfactory results, 30% average and 3.33% poor results.
6. So, we can conclude that from our study that SFInX measures shoulder function by judgement of actual ability to perform daily tasks in which the shoulder is involved. It is a unidimensional, interval-level scale, It has content relevant to patients and clinicians ,feasible for use in clinical and home settings This study comprehensively evaluated the measurement properties of the SFInX in people recovering from a proximal humeral fracture.
7. SFInX system has near similar significance as compared to that of gold standard DASH score In its current form, the SFInX is ready for further psychometric evaluation, and for subsequent use in clinical settings and research.
8. There are some limitation in the study like small sample size, follow up duration is less, therefore we could not assess the score improved or not after 1 year of surgery.

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