

Extremities Fractures and Fixation and their Effects on Patients' Quality of Life

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ABSTRACT

Background: Worldwide extremities fractures is one of the most frequent causes of physical disability and changes in patients' quality of life.

Aim: This study aimed to assess extremities fractures and fixation and their effects on patients' quality of life.

Subjects and methods: A descriptive study that was conducted at the Orthopedic Departments in Tanta University Hospital and Casualty Hospital affiliated to Ministry of Higher Education, Egypt. A convenience sample of 100 adult patients (18-60years) of both sexes, conscious and able to communicate verbally without any neurological problems. The assessment was done four times throughout the period of the study before fixation surgery and one week, one month and three months after fixation surgery.

Three tools were used: **Tool (I)** Structured interview questionnaire that included 2 parts, part (1) Sociodemographic questionnaire and Part (2): Clinical assessment. **Tool (II)** The short musculoskeletal function assessment questionnaires.

Tool (III): Short form 36 (SF-36) health survey questionnaire.

Results: There was a negative impact of extremities fracture on patients' total quality of life. oth extremities and specific lower extremity fracture had the poorest quality of life scores than upper extremity fracture.

Conclusion: Extremities fractures and their surgical management including internal and external fixation have a considerable effect on all dimensions of patients' quality of life.

Keywords: Upper extremity fracture, Lower extremity fracture, Internal fixation, External fixation, Quality of life.

INTRODUCTION

Musculoskeletal fractures are common and are considered the main injuries seen in the emergency department in which the extremity fractures are the most prevalent injuries and are a significant source of illness burden and lost productivity in society ⁽¹⁾. A bone fracture is a breach in the continuity and integrity of the bone caused by the inability of the bone to tolerate external pressures. The management of extremity fracture depends on reduction and immobilization of the fractured site, which include medical, surgical and nursing management. The medical treatment includes examination and inspection for deformity, bruising, effusion, open wounds and then urgent reduction and splinting are performed ⁽²⁾.

Surgical management of fracture include internal and external fixation. Internal fixation refers to the process of joining the bones physically. This technique employs specific screws, plates, wires, or nails to properly align the bones, followed by reduction ⁽³⁾. External fixation is a procedure for fracture stabilisation in which pins or wires are percutaneously inserted into bone and kept in place by an external scaffold ⁽⁴⁾.

Quality of life (QOL) is largely an individual's subjective perception of physical, psychological, social, and spiritual well-being. Physical and mental health, degree of independence, and social engagement with the environment will affect an individual's QOL as also rely on external factors ⁽⁵⁾. The orthopaedic nurses have a distinct role as they provide patient centred care depends on evidence-based researches and practice as well as focused on individualized care using various strategies ⁽⁶⁾.

Significance of the study: Musculoskeletal injury is one of the leading causes of physical disability on a worldwide scale, but nursing appears to lack data on the severity and effect of this hardship on QOL. The mostly affected dimension, and the need for a care plan centered on the provision of complete care for this aspect. This is due, in part, to a lack of consensus over the criteria of impairment and decreased function coupled with bone fracture ⁽⁷⁾. The aim of the study was to determine the effects of extremity fractures and fixation on patient's quality of life.

Research Questions: What is the relation between extremities fractures and quality of life? What is the relation between fracture fixation types and quality of life? and What is the mostly affected dimension of quality of life in need for comprehensive nursing care strategies?

SUBJECT AND METHOD

This descriptive research was conducted at the Orthopedic Departments in Tanta University Hospital and Emergency Hospital affiliated to Ministry of Higher Education, Egypt. A convenience sample of one hundred adults patients (18-60years) of both sexes, conscious and able to communicate verbally without any neurological problems, pathological fracture and without any chronic diseases.

Methodology: Three tools were utilized in this study: **Tool (1) Structured Interview Questionnaire:** This tool has been developed after reviewing of recent relevant literature ⁽⁸⁻⁹⁾. It comprises two components:

Part (one): Sociodemographics: age, sex, marital status, education and work field. **Part (two): Clinical data assessment:** such as types and site of fracture, type of fixation, past medical and surgical history, present medical and surgical history, smoking, current medication use and vital signs (temperature, pulse, respiration and blood pressure).

Tool (II) The Short Musculoskeletal Function Assessment Questionnaires (SMFA): Initially created by Swiontkowski *et al.* ⁽¹⁰⁾ and modified by Reininga *et al.* ⁽¹¹⁾. It had been adopted by researchers and translated into Arabic by English specialist to assess functional status of musculoskeletal system. This instrument consists of 46 items and is divided into two parts: the dysfunction index and the bother index. The dysfunction index is comprised of twenty-five items to assess the severity of functional difficulty as perceived by fractured patients when performing activities of daily living and the remaining nine items are used to assess the frequency with which they experience difficulties in performing these activities. The second component was the bother index, which consists of 12 measures designed to determine the degree to which patients are disturbed by issues in various functional domains.

Scoring system 1 (excellent function/not disturbed) to 5 (bad function/greatly upset) on a five-point Likert scale. The scores for the two components are computed by summing the scores of the individual items and converting them such that they range from 0 to 100, with higher scores indicating a less effective function.

Tool (III) Short Form 36 (SF-36) Health Survey Questionnaires:

This tool was developed by Ware, ⁽¹²⁾ and was modified by Lins *et al.* ⁽¹³⁾. It had been translated into Arabic by Sabri *et al.* ⁽¹⁴⁾. Researchers adapted this method to evaluate the quality of life of patients with upper and lower extremity fractures. It comprises eight distinct scales. Physical functioning (10 items), role limitations due to physical problems (4 items), role limitations due to emotional problems (3 items), bodily pain (2 items), social functioning (2 items), mental health (6 items), vitality (4 items), and general health perceptions make up the 36 items in the SF-36 (5 items). The response options were graded on a three- to six-point category scale. For each question, the raw scores were encoded, totaled, and translated to a scale ranging from 0 to 100, with 0 being the worst possible health status, with higher disability, and 100 representing the greatest possible health state, with a high QOL.

Ethical Approval:

The study was approved by the Ethics Board of Tanta University and the patients were given all the information they need about the trial. An informed written consent was taken from each participant in the study. This work has been carried out in

accordance with The Code of Ethics of the World Medical Association (Declaration of Helsinki) for studies involving humans.

Methods of data collection: Authorization to conduct the research was received at the Faculty of Nursing and the director of the Orthopedic Department, Tanta University Hospital and Casualty Hospital associated with the Ministry of Higher Education. The nature of the study did not cause any damage or discomfort to any of the participants. Complete privacy and confidentiality were taken into account during data gathering and analysis. Instead of names, code numbers were utilized. Five experts in the fields of medical surgical nursing and orthopaedic specialist evaluated the questionnaire for content validity and clarity. A pilot study was conducted where the practicality and applicability of the tools were evaluated on 10% of the total number of patients and improvements were made accordingly. It was eliminated from the first sample of the research. The reliability of the research tools was determined using Cronbach's alpha test; test (I) had an alpha of 0.804, test (II) had an alpha of 0.886, test (II) part A had an alpha of 0.839, and test (II) part B had an alpha of 0.848. In addition, alpha one for instrument (III) was 0.854%. Alpha two for test (II) was 0.843, whereas test (II) part A was 0.805 and test (II) part B was 0.821. While test's second alpha was 0.819.

Evaluation of the data:

The data collection period spanned six months, beginning in January 2022 and ending in July 2022. The researcher started the interview by introducing herself before providing an explanation for the purpose and the nature of the study. Each patient was individually interviewed in Orthopedic Department to fulfill the sheet questions. The interview of the patients lasted for about 40-60 min in order to assess effect of upper, lower or both upper and lower extremities fractures and their management including either internal or external fixation on patient's total quality of life.

Statistics:

All data were gathered, encoded, tabulated, and analyzed statistically. SPSS version 26 was used to do statistical analysis, and data were reported as numbers and percentages. Using the t-test, the significance of a numeric variable was established. A probability level of $p\text{-value} \leq 0.05$ was considered significant.

RESULTS

Regarding sociodemographic data, it was found that above half of the subjects (53%) were in the age group from 18 to < 30 years, slightly less than two third (64%) were male, and (51%) of them were married. In relation to residence slightly fewer than two third (63%) were living in rural areas, and above one third of them (39%) had secondary education. Moreover, this table showed

that above half (58%) of the subjects had manual work (Table 1).

It was found that **before fixation surgery**, 92.9%, 100.0% and 100.0% of the subjects were with upper, lower and both extremity fractures with internal fixation and all (100.0%) of the subjects with upper and lower extremity fractures with external fixation had poor level of bodily pain respectively.

But **after one week of fixation surgery**, 85.7%, 97.7%, 100.0% and 100.0% of the subjects with upper, lower and both extremity fractures with internal fixation and patients with upper and lower extremity fractures with external fixation had poor level of bodily pain respectively.

Moreover, **after three months** of fixation surgery, 39.3%, 23.3% and 20.0% of the subjects with upper, lower and both extremity fractures with internal fixation and 11.8% of the subjects with lower extremity fractures with external fixation had good level of bodily pain respectively. Additionally, no statistically significant difference existed among the subjects (P

value = 0.483- 0.842) for patients with internal and external fixation respectively three month of external fixation surgery. It was noticed that **before fixation** majority (96.3%) and all (100%) of the subjects with extremity fractures undergoing internal fixation and external fixation had poor total quality of life score respectively.

After one week of fixation surgery majority, 81.7% and 84.2% of the subjects with extremity fractures undergoing internal fixation and external fixation had poor total quality of life respectively.

Moreover, **after three months of fixation surgery**, slightly above half (53.1%) of the subjects with extremity fractures undergoing internal fixation had good total quality of life, while about one quarter (21.1%) of the subjects with external fixation had good total quality of life score. Finally, after three months of fixation surgery, there was statistically significant difference among subjects (P =0.038*) as shown in table (2) and figure (1).

Table (1): Sociodemographic characters of all research subjects

Socio demographic characteristics		N n=100	%
Age	18 - < 30	53	53
	30 - < 40	20	20
	40 - < 50	17	17
	50 – 60	10	10
Sex	Male	64	64
	Female	36	36
Marital status	Single	40	40
	Married	51	51
	Divorced	4	4
	Widow	5	5
Residence	Urban	37	37
	Rural	63	63
Education	Illiterate	14	14
	Read and write	14	14
	Primary education	8	8
	Secondary education	39	39
	University education	25	25
Occupation	Employee	7	7
	Worker	5	5
	Manual work	58	58
	Farmer	21	21
	Driver	17	17
	Hard work	02	02
	House wife	30	30

Table 2: Classification of study subjects with internal and external fixation regarding bodily pain of 36 quality of life questionnaire(n=81)

Bodily pain Dimension	Internal fixation (n=81)						χ^2 P	External fixation (n=19)				χ^2 P
	Upper (n=28)		Lower (n=43)		Both (n=10)			Upper (n=2)		Lower (n=17)		
	N	%	N	%	N	%		N	%	N	%	
Before												
Poor	26	92.9	43	100.0	10	100.0	3.879	2	100.0	17	100.0	-
Fair	2	7.1	0	.0	0	.0	0.144	0	.0	0	.0	-
Good	0	.0	0	.0	0	.0		0	.0	0	.0	
After 1 Week												
Poor	24	85.7	42	97.7	10	100.0	5.581	2	100.0	17	100.0	-
Fair	2	7.1	1	2.3	0	.0	0.233	0	.0	0	.0	-
Good	2	7.1	0	.0	0	.0		0	.0	0	.0	
After 3 Months												
Poor	10	35.7	19	44.2	6	60.0	3.472	1	50.0	9	52.9	0.342
Fair	7	25	14	32.6	2	20.0	0.483	1	50.0	6	35.3	0.842
Good	11	39.3	10	23.3	2	20.0		0	.0	2	11.8	

* Significant at p value < 0.05.

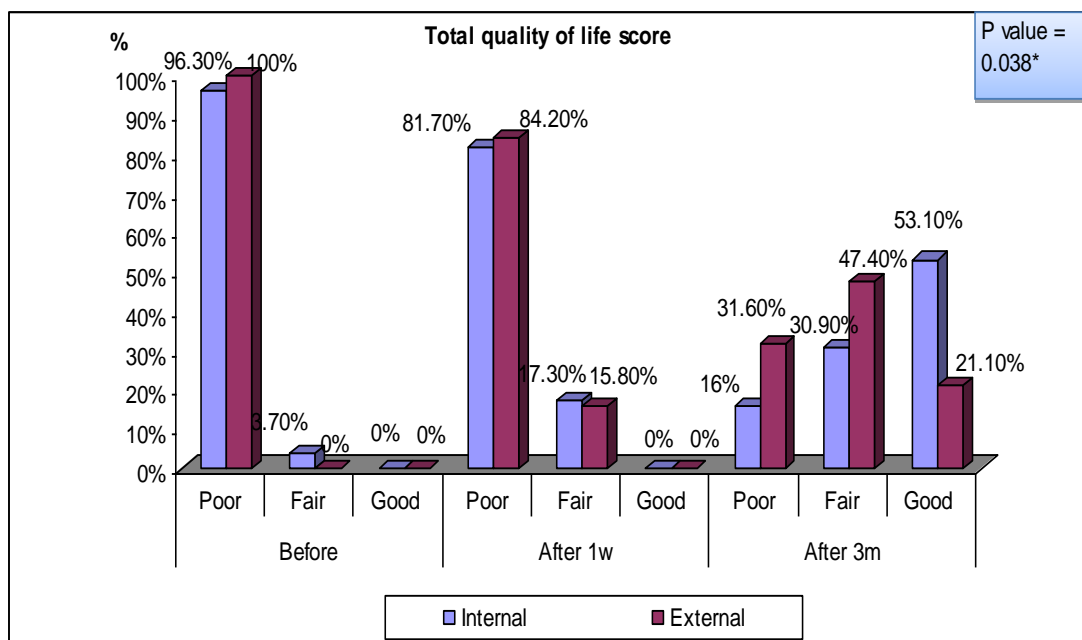


Figure 1: Classification of study subjects regarding total quality of life score of extremity fracture with internal fixation versus external fixation surgery (n=100).

DISCUSSION

Worldwide upper and lower extremities fractures are a common daily acute health issue and pose a significant and increasing challenge to healthcare systems. Extremities fractures and their surgical management including internal and external fixation have a considerable effect on many sides of a patient's life as after fixation surgery the patient require period of immobility of the affected limb, which in turn results in decreased functional mobility that require long term use of assistive devices. This limits previously normal social interactions and pre-injury functioning⁽¹⁵⁾.

In the current study the findings of sociodemographic data showed that majority of the studied patient were in age group from eighteen to less than thirty years old. This observation is in the same line with **Frouzan et al.**⁽¹⁶⁾ and **Mahdian,**⁽¹⁷⁾ who reported that majority of the studied patients were between eighteen to less than thirty years old. On the other hand, this observation was in contrast with research made by **Vasanad et al.**⁽¹⁸⁾ who mentioned that majority the studied patients were in age group forty to fifty years. The possible reason for this observation may be due to the fact that these age groups constitute the most productive and reproducible age group, making them economically and socially active and more likely to engage in high-risk activities. In addition, the present study's sociodemographic observations indicated that the majority of patients with extremities fractures were male. This conclusion is similar to that of **Janmohammadi et al.**⁽¹⁹⁾, who discovered that the majority of patients with extremities fractures were male. In contrast, research done by **Ngoie et al.**⁽²⁰⁾ showed that the majority of the patients evaluated were female. In addition, the results of the present investigation indicated that the majority of the patients evaluated were married. This conclusion is corroborated by **Singh et al.**⁽²¹⁾ and **Alamneh et al.**⁽²²⁾, who noted that the majority of patients evaluated were married. This conclusion contradicts the observations of **Chen et al.**⁽²³⁾, who reported that majority the examined patients were single.

According to the conclusions of this survey, almost two-thirds of the population lived in rural areas. This conclusion is similar to **Lv et al.**⁽²⁴⁾ observations that majority of the case investigated reside in rural regions. This conclusion contradicts the observations of **Asefa et al.**⁽²⁵⁾ research, which indicated that majority of the case evaluated resided in urban areas.

In the current study the findings of educational level of the studied patients showed that more than one third of patients had secondary education. This conclusion is reinforced by **Pouramin et al.**⁽²⁶⁾, who observed that almost a third of the patients evaluated

had completed secondary school. This conclusion is similar to the observations of **Zuccarino et al.**⁽²⁷⁾ research, which indicated that over half of the patients had a high level of education. **Furthermore,** majority of the studied patients had manual work and about one quarter of them were farmers. This result is similar to **Wang et al.**⁽²⁸⁾ who reported that majority of the studied patients had manual work. This result contradicts with observation of study was done by **Manwana et al.**⁽²⁹⁾ who mentioned that more than one third of the patients were employee.

This study showed that majority and all of the subjects had high level of bodily pain before and after one week of fixation surgery. This observation is similar to the conclusion of the research made by **Baharuddin et al.**⁽³⁰⁾ who pointed out that above two thirds of patients with lower extremity fracture with fixation surgery had poor bodily pain dimension. Also, **Sluys et al.**⁽³¹⁾ mentioned that majority of patient with upper extremity fracture with fixation surgery had poor bodily pain. Moreover, after three months of fixation surgery, this research showed that above one third and about one quarter of patients with upper and lower and both internally fixated extremity fracture and patients with lower externally fixated extremity fracture had good bodily pain dimension respectively. This is in agreement with **Dale et al.**⁽³²⁾. This is the mostly affected dimension, which meet the third research question that was, what is the mostly affected dimension of quality of life that need comprehensive nursing care strategies?

This research revealed that majority and all of the subjects with internally and externally fixated extremity fracture had poor total quality of life before fixation surgery and after one week respectively. This observation is similar to the conclusion of the research made by **Meng et al.**⁽³³⁾ who reported that all of patients with extremity fracture and external fixation surgery had poor total quality of life before and after one week of fixation surgery while these observations are in contrast with **Reitan et al.**⁽³⁴⁾ who reported that nearly thirty percent of patients with upper extremity fracture with fixation surgery had fair total quality of life.

Finally, after three months after surgical fixation, this research indicated a statistically significant difference between internal and external fixation as above half of patients with internally fixated extremity fracture had good total quality of life, while near one third of patients with externally fixated extremity fracture had poor total quality of life. This observation is similar to **Abulaiti et al.**⁽³⁵⁾. This observation meets the first and second research question, as extremities fracture had a profound effect on patient's total quality of life and that external fixation had the poorest quality of life score.

CONCLUSION

Extremities fractures and their surgical management including internal and external fixation have a considerable effect on all dimensions of patient's quality of life. Internal and external fixation causes long-term functional impairments, thereby restricting patients in their daily life and patients with the right side of lower and both upper and lower extremities fracture had the poorest QOL. The bodily pain dimension is the mostly affected dimension and needs for comprehensive care plane.

RECOMMENDATIONS

-Nursing care should be designed based on a full assessment and patients with right side extremities fractures require priority of care. Provide comprehensive care plan to manage bodily pain dimension.

DECLARATIONS

- **Consent for publication:** I attest that all authors have agreed to submit the work.
- **Availability of data and material:** Available
- **Competing interests:** None
- **Funding:** No fund
- **Conflicts of interest:** no conflicts of interest.

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