Prospective evaluation of quality of life and function after surgical management of femoral neck fractures in elderly patients.

Abstract

Background: The surgical management of femoral neck fractures is primarily done using internal fixation (IF), hemiarthroplasty (HA) or total hip replacement (THR). These surgical procedures effectively improve health-related quality of life (HRQOL) and function in these patients. The present study was conducted to determine quality of life (QOL) and function in elderly patients following operative treatment of fracture of the neck of the femur using known indicators.

Materials and Methods: This was a prospective, longitudinal study conducted on 60 consecutive patients treated surgically for femoral neck fracture with either of the procedures IF, HA and THR. The telephonic interview was conducted at 1, 3 and, 6 months post-operative to evaluate the quality of life using patient-rated outcome measure namely short form – 12 (SF - 12) Health Survey and Health-related quality of life (HRQOL -14 "Healthy Days Measure".

Results: The mean age of the study participants was 75.8± 7.1 years. In this study the physical ($p=0.001$), mental component ($p=0.003$) and, q value ($p=0.001$) of SF-12 scores were significantly improved at 3 and 6 months postoperative as compared to 1 month postoperative. Further, there was significant improvement of HRQOL-14 outcome scores 3 and 6 months postoperative as compared to 1 month postoperative.

Conclusion: The present study concludes with compelling evidence that patients with femoral neck fractures experienced a significant deterioration in health-related quality of life one-month post-surgery and there was marked improvement in the subsequent follow up months.

Keywords: Femoral neck fracture, total hip replacement, quality of life, SF -12, HRQOL-14

1. Introduction

Hip fracture is one of the complicated osteoporotic conditions with substantial morbidity and health issues. It is perhaps the worst complications of osteoporosis in the elderly. (1) Due to worldwide aging, increase in the incidence of hip fractures are on rise. Higher proportion of cases relative to age are noticed especially from the fifth to the eighth decade of life.(2)(3) Each year hip fractures are responsible for the loss of at least 2.35 million disability adjusted life years (DALY). Globally, estimated burden of hip fracture by year 2025 and 2050 is 2.6 and 4.5 million respectively. Thirty seven percent of these hip fractures will be in Asia by 2025 which may further increase to 45% in the year 2050.(4) The population of elderly patients with such fractures comprises several subpopulations, ranging from the lucid, healthy, active and independent patient with a substantial life expectancy, to the institutionalised, cognitively impaired and bedridden patient. (1)(5) Femoral neck fractures is the most prevalent and common condition in hip fractures.

During the management of femoral neck fractures the following clinical factors such as patient age, functional needs and comorbid conditions must be taken into consideration. .Despite of various factors, surgical intervention is the most commonly selected modality to treat hip fractures. Studies indicate that delaying the surgical correction of fracture is associated with mortality, post operative complications, longer hospital stay and delay in time to resume the normal life. (6) A majority of findings concerning QOL in hip fractured elderly patients consists of data collected from the western developed countries.(7,8). In developing countires, only limited studies have been reported with regard to QOL after hip surgery among the elderly patients. (9,10) After hip surgery, the elderly people are prone to long hospital stay and rehabilitation and thus leads to significant morbidity and also affects the QOL. QOL is a multidimensional variable, reflecting physical, social and psychological wellbeing.

Fracture in elderly has a substantial impact on medium to long term abilities, functions and overall QOL. There are different ways to access QOL in literature. (8) Health related QOL based on self-assessment seems to be powerful predictors in short and long-term adverse outcomes among elderly.(11) Community short-form survey (SF-12), and Health Related QOL (HRQOL) based on patient-rated outcome measure have reflects the patient conditions about psychological well-being. SF-12 is a shorter version of SF-36 which along with HRQOL-14 is widely used for monitoring health, disease burden and prediction. (12)(13) Very few studies have assessed the changes in patient conditions on a longitudinal scale. Cross-sectional research studies highlighting QOL of elderly patients with hip fracture were mainly from the high-income countries (HICs). (10) Considering this research gap, we decided to study the QOL of elderly patients following operative treatment of fracture of the femur-neck. In this backdrop, the present study was aimed to evaluate the longitudinal assessment of QOL and function in elderly patients after femoral neck surgery.

2. Methods

This was a prospective, longitudinal study conducted conducted in Department of Orthopaedic Surgery, Multispeciality Hospital, Mumbai. The study was conducted on sixty consecutive elderly patients of either gender who were treated surgically for the fracture with either of the procedures mentioned namely internal fixation (IF), hemiarthroplasty and total hip replacement (THR). The study was performed during the period starting from September 1st, 2017 to February 28th 2019.

Patients having inter-trochanteric or femur neck fracture and who were willing to participate by giving informed consent were included in the study.

Patients less than 60 years of age, having fractures treated non-operatively, with fractures of the acetabulum and pelvis and open fractures were excluded from the study.

The patientsdemographics details like age, gender, educational attainment, socioeconomic status, BMI, type of family and the clinical details such as type and site of surgery and other required clinical details were accessed from the Hospital Information System. For remaining details periodic assessment was done for Quality of life (QOL) with the follow-up questionnaire at three fixed intervals. For follow-up assessment, patients were contacted by the telephonic interview at one, three and six months of the surgical management of the fracture.

At preoperative evaluation and follow-ups, patients were evaluated with the help of structured case record form which analysed the quality of life using patient-rated outcome measure which were mentioned below.

3.OUTCOME MEASURES

The quality of life was assessed using patient-rated outcome measures namely short form twelve item questionnaire (SF-12) and health related 14 points questionnaires for QOL (HRQOL-14). Both of these instruments are validated to assess mental health, life participation, negative/positive affect, pain and quality of life. Patient reported scores calculated from standard treatment were compared over three different points of time. Within themselves and across patient demographics details data were compared. Primary variable of interest was overall QOL of patient at three different time points.

3.1.Statistical analysis

Data was collected and tabulated in a pre-designed excel spreadsheet. Analysis was done using Statistical Package for Social Sciences Version 25 (SPSS-25, IBM Inc., NY US)(14). Qualitative variables were presented using frequency and percentages of the groups. Quantitative variables like age, SF-12 and HRQOL-14, scores were presented by means (standard deviation (SD)) or median (inter-quartile-deviation (IQD)). We performed a data normality test using the Shapiro Wilk Test. Normally distributed variables were analysed using parametric one-way ANOVA test. Non-

normally distributed variables were analysed using non-parametric Friedman test. P value below five percent was considered to be statistically significant.

4.RESULTS

Total 60 elderly patients were interviewed to assess the QOL after the surgical intervention of the femoral neck fractures. The majority of patients were female (62%). Half of the patients were from the age group 70-79 years. The mean age of the patients was 75.75 ± 7.11 years (Range 60-91 years). Mean duration of time from admission to surgery was 3 days. Among the 60 patients. 6 had lost the follow up during the first month, and 1 patient had lost follow up during the second stage due to mortality or other some reason and thus excluded from the study. Thirty-one patients (51.67%) had the neck of femur (NOF) fracture whereas 29 patients(48.33%) sustained an Intertrochanteric (IT) fracture. Only nine females (15%) were having thehistory of previous fracture. Five out of six participants were having either normal BMI or overweight status. 85 percent of the patients reported that they have any form of comorbidity. (Table 1)

Table 1: Patient Characteristics

Narration	Female n (r%)	Male n (r%)	Total n (c%)
Overall	37 (62%)	23 (38%)	60
Age group			
60-69	8 (57%)	6 (43%)	14 (23%)
70-79	17 (57%)	13 (43%)	30 (50%)
>=80	12 (75%)	4 (25%)	16 (27%)
Obesity Status			
Normal	8 (50%)	8 (50%)	16 (27%)
Pre-Obese	21 (62%)	13 (38%)	34 (57%)
Obese	8 (80%)	2 (20%)	10 (17%)
Location of Injury			
Home	33 (67%)	16 (33%)	49 (82%)
Outside	4 (36%)	7 (64%)	11 (18%)
Living with			
Extended Family	34 (65%)	18 (35%)	52 (87%)
Alone / With Spouse	3 (37%)	5 (63%)	8 (13%)
History of Previous Fracture			
Yes	9 (100%)	(0%)	9 (15%)
No	28 (56%)	23 (46%)	50 (83%)

Type of fracture			
LIT	6 (60%)	4 (40%)	10 (17%)
LNOF	12 (80%)	3 (20%)	15 (25%)
RIT	11 (58%)	8 (42%)	19 (32%)
RNOF	8 (53%)	7 (47%)	15 (25%)
Co-morbidity status			
Yes	30 (59%)	21 (41%)	51 (85%)
No	7 (78%)	2 (22%)	9 (15%)
Family type			
Extended Family	34 (65%)	18 (35%)	52 (87%)
Living Alone	3 (50%)	5 (50%)	8 (13%)

The quality of life of a patient was measured by SF-12 questionnaire through physical health composite summary (PCS), mental health composite summary (MCS) and Q value. One way ANOVA was used to assess the QOL at four different time points. The PCS and Q-value scores are statistically different (p value < 0.001). The mean score of PCS and Q-value is significantly low at one month after the surgery (27.87 ± 8.78 and 0.62 ± 0.08 respectively), whereas means score for MCS is low at one month after surgery but it is not significant (p-value 0.215). (Table 2)

Table 2: Quality of Life using SF-12 Score

Descriptive	Pre-OP	1-Month	3-Month	6-Month	p-value
PCS	42.1 (10.74)	27.87 (8.78)	40.18 (9.7)	41.14 (9.83)	<0.001
MCS	44.24 (10.57)	40.62 (8.85)	44.11 (11.09)	43.75 (10.82)	0.215
Q-Value	0.78 (0.14)	0.62 (0.08)	0.76 (0.14)	0.77 (0.14)	<0.001

Values represented as Mean (SD), PCS: Physical health composite summary, MCS: Mental health composite summary

Health related quality of life (HRQOL-14) outcome measure is assessed using three major modules namely healthy days core module, activity limitation module, and healthy days symptom module. To assess this health-related quality of life at four points, FriedMan's test was used. The HRQOL-14 score for all three domains (healthy days core module, activity limitation module and healthy

days symptom module) are significantly low at one month after the surgery (p-value <0.05). The median score for all these three modules were 49, 8 and 81 respectively. (Table 3)

Table 3: Comparison of quality of life using HRQOL-14

	Pre-operative	Post-Operative			
		1 Month	3 Months	6 Months	p-value
Healthy days core module					
Unhealthy Days – Values: Median (IQD)	2 (0 - 19)	30 (20 - 30)	4 (0 - 20)	2 (0 - 17.5)	<0.001#
Frequent Mental Distress – Values: Freq(% Total Patient)	14 (23.33%)	29 (48.33%)	13 (21.67%)	10 (16.67%)	<0.001*
Activity Limitations Module (Freq (% Total)) *					
Limitation in the activities because of any impairment or health problem	28 (46.7%)	50 (94.3%)	31 (58.5%)	30 (56.6%)	<0.001
Need of personal care because of any impairment or health problem	22 (84.6%)	50 (98%)	24 (92.3%)	23 (92%)	0.044
Need in routine work because of any impairment or health problem	20 (76.9%)	48 (94.1%)	22 (84.6%)	21 (84%)	0.044
Major impairment or health problem that limits activities	25 (41.67%)	51 (85%)	26 (43.33%)	25 (41.67%)	<0.001
Healthy Days Symptoms Module (Median, (IQR),n) #					
Pain Days	15 (7.5 - 30), 18	30 (20 - 30), 51	20 (7.5 - 25), 23	15 (6 - 25), 22	<0.001
Sad Days	10 (2 - 27.5), 22	25 (20 - 30), 51	17.5 (5 - 23.75), 24	10 (2 - 23.75), 23	<0.001
Tense Days	15 (5 - 30), 21	30 (17.5 - 30), 51	20 (7.5 - 25), 24	10 (7.5 - 25), 23	0.001
No Sleep Days	17.5 (12.25 - 30), 17	25 (11.5 - 30), 43	20 (8 - 30), 17	15 (4.25 - 30), 14	0.061
Healthy / Energy Days	30 (30 - 30), 49	2 (2 - 4), 38	30 (20 - 30), 41	30 (30 - 30), 38	<0.001

*#: Friedman's test, *: Cochran's Q test for dichotomousvariable*
Healthy days and Activity limitations modules, majority of patients responded to questions, hence 'n' values are not given

5.DISCUSSION

The present study documents the assessment of quality of life (QoL) followed by surgical treatment of neck of the femur fracture in the elderly. Study recorded significant drop in physical composite health score (PCS) one-month post-surgery, which improved over the period of three to six months. These changes in PCS show the improvement due to surgical intervention which was evident longitudinally. Systematic review on long-term disability outcome following hip-fracture concluded the mixed results, with majority of the individuals achieving pre-fracture levels of functioning and some may not able to achieve the same. (9)An institutional study among Singapore population have endorsed the surgical management of hip-fracture without drastic effect into patient's QoL.(15)

Overall, in study population shows difficulty in different areas of HRQoLthe first month after surgery and shows further improvement during subsequent period. In present study population for all domain compared to pre-operative level much better improvement was recorded at six-month operative. Study in Thai patients, shows below pre-operative improvement at the end of three months. However, subgroup of younger patients shows relative improvement therein.(16) Results of this study indicated that most dimensions of HRQOL-14 for hip fractured elderly patients were relatively low at 1 month, with physical related functioning being the lowest that improved till 6 months. In need of personal care and activity limitation some assistance needs to report by the patients. Spanish hip-fracture surgery patients reported to have attained significant improvement in these domains. (17)

Baseline patient characteristics in study population stated that three out of four patients were elderly from age group of more than seventy years. Female (3:2) patients in the study groups slightly higher than males. Comparatively, baseline patient characteristics, age group, sexand the number of comorbidities have an effect in the change in QoL score. Similar kind of changing aspects in QoL score were recorded in one year follow-up study post-surgery of hip fracture in Japan. They concluded no influence of serum vitamin-D level, comorbidities, and level of admission of

patients.(16) Studies however, have reported improvement in QoL score of patients with the supplement of calcium and vitamin-D. Hence, it is combined into standard treatment regimen. (18)(19) As seen towards the effect of patient's characteristic, in present study, female patients have shown slightly less improvement in terms of HRQoL domain score compared to male. Review have shown negative association of females, and comorbid conditions.(20) While, correlation between age, depression, surgery intervention, reported in Spanish individuals. (17)

In this study, sustained hip fractures due to falls, and reported commonest location being at home. Educating the elderly about precautions measures to avoid falls at familiar or surrounding places may serve up to some extend prevent fractures. Practice of fall precautions was more in the educated patients compared to those who were not educated. (18) In this study, the level of education did not correlate to the waxing and waningexperience on the quality of life and practice of fall precautions. In a previous study done by Chen et al. patients with first-incident hip fractures had a significantly lower level of education, multivariate logistic regression analysis revealed that the level of education is the significant risk factors for first-incident hip fractures.(21) Colon-Emeric et al. (22) also observed a positive association between the level of educational and the risk of hip fracture among ambulatory non-Hispanic white men. Recent analysis demonstrated that low socioeconomic status was associated with an increased incidence of hip fracture.(23) The use of patient-rated outcomes in this study namely SF- 12 and HRQOL -14 provides a holistic view of the effect post-surgical management of fracture neck of femur. With an excellent follow-up our results showed clearly the deterioration in the quality of life after hip fracture in the first month but improvement in subsequent period. All the patients who were interviewed were coherent in their understanding of their owns expectations and health condition.

Summarily, present study attempts to systematically look QoL aspects of patient going through surgical of femur neck fractures. There are some limitationsof study, that it's a single institution and with the relatively small sample size. Comparison between patients operated with THR and

hemiarthroplasty in terms of functional outcome was not done. Factors affecting to the quality of life and related confounding variables are not under the purview of the study. However, complete follow-up of subject longitudinal period of time and validated instruments of survey covers the research gap in the domain from Indian settings. Studies with larger sample size from multicentre settings in similar context will be effective. Present study draws the foundation for the same.

6.CONCLUSION

Hip fractures can be treated surgically, and pre-operative levels or improved quality of life was recorded at six-months post-surgery. The present study provides compelling evidence that hip fracture patients experienced a significant deterioration in health-related quality of life with a substantial decrease in the activities of daily living across all domains after 1 month post hip fracture surgery on both the SF-12 and HRQOL-14 outcome scores improving subsequently over the next few months to achieve a near preoperative status at 6 months. There exists a need to pay attention to all these aspects of HRQOL by healthcare professional. Development and evaluation of post-operative intervention programs should be conducted to determine its usefulness in improving physical, mental function and other HRQOL aspects. Moreover, HRQOL should be part of a comprehensive assessment of fracture-associated morbidity.

Ethical approval

Study was approved by the institutional ethics committee of the hospital with IRB number

Consent

As per international standard or university standard, patients' written consent has been collected and preserved by the author(s).

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