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UNSTABLE INTER-TROCHANTERIC FRACTURES OF PROXIMAL FEMUR;

EFFECT OF DIFFERENT POSITIONS OF REDUCTION & INTERNAL FIXATION WITH DYNAMIC HIP SCREW ON HIP SCORE (LARSSON'S) & RESUMPTION OF DAILY ACTIVITIES.

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ABSTRACT

A randomized prospective study of Sixty patients having unstable intertrochanteric fractures of proximal femur fixed with Dynamic Hip Screw in four different reduction configurations, In-situ fixation, Anatomical reduction, Medial displacement valgifying Osteotomies (Dimon & Houghston and Sarmiento's Osteotomies) at following hospitals Lahore General Hospital, Lahore, Nishtar Hospital Multan and Rawalpindi General Hospital, Rawalpindi during 1990-to-1994. Effect of early mobilization on hip score and attaining routine normal daily activities by the patients were studied. There were no non-unions, no cutting out of the implant or mechanical failures. Seventy five percent of the patients regained normal pre-fracture activities after 30 weeks. Majority of the patients scored 87 points on Hip Score evaluation. Conclusion, In-Situ fixation gives satisfactory results in management of unstable intertrochanteric fractures of proximal femur.

INTRODUCTION

The unstable intertrochanteric fracture of proximal femur has a deficient medial cortex with extension of the fracture into the intertrochanteric or subtrochanteric region of the femur. In a majority of these fractures, reconstruction of a medial wall is not possible at the time of surgery.

Different methods of reductions and Osteotomies for

stabilizing the fracture fragments are used with a variety of implants such as fixed angled nail plates, Dynamic Hip Screw and recently intramedullary sliding compression screw-nail assemblies. The fixation device allows for controlled impaction and bridging of the fragments with the goal being: healing before failure of hardware, minimal shortening, and ability to ambulate the patient during fracture healing without failure of the fixation device. The preferred treatment of Intertrochanteric fractures is internal fixation and early

mobilization^{15,1,24}.

The Dynamic Hip Screw, by virtue of its ability to allow controlled impaction at the fracture site has decreased the incidences of femoral head perforations, mechanical fixation failure, and fracture non-union seen with fixed angled nail plate devices^{1,15,11}.

Successful rehabilitation is directly and strongly associated with mobility^{14,1,20,4}. Pre-fracture mobility of the patient had the most significant relationship to all the other factors^{2,3,5,20,13}. Patients bear weight to tolerance, using crutches or a walker, beginning the morning after operation^{17,2,3,5,20,13}. Allowing partial weight-bearing during first 6-weeks post-operatively⁴. Acute hospital stay, acute care and aftercare took half the time compared with the earlier patient material^{10,4}. The aim is to compare the effects of different geometric positions of fracture fragment reduction and internal fixation with Dynamic Hip Screw on resumption of normal daily activities and Larsson's Hip Score.

MATERIAL & METHODS

A study group of sixty patient admitted at Lahore General Hospital, Nishtar Hospital and Rawalpindi General Hospital during the period 1990-to-1994 with unstable intertrochanteric fractures of proximal femur fixed with Dynamic Hip Screw in four different reduction positions, In-Situ fixation, Anatomical reduction and Medial displacement with Valgus reductions 8 9 15 22 23 (Dimon & Houghston osteotomy and Sarmiento's osteotomy reduction).

Patients mobilized out of bed the day after operation with Walker or crutches. Weight bearing to pain tolerance was allowed from third day onward. Follow-up at one month, three months, six months and nine months after operation. Time taken to resume normal pre-fracture routine daily activities, and effect of early mobilization and weight bearing of the patients on Hip Score system [Larsson's; adapted from Albright and Weinstein (1975)] are evaluated after nine months post-operatively.

Different factors like age, sex, post operative stay in hospital and pre-operative period after fracture, are also considered. In-situ fixation is taken as a control group, being relatively easy to perform.

Ordinary Least Square Method (OLS)^{12,19} is used to compare different types of reductions by using "back to normal pre-fracture routine daily activities" (BTON) and Larsson's Hip Score as evaluation criteria.

RESULTS

All the patient were assessed in similar conditions regarding resuming normal daily routine activities and hip score at final evaluation at nine months after operation. The average age of patients under study having unstable fracture of proximal femur (inter-trochanteric) is 58 years. Whereas, middle age in our study group is 65 years. Range is 24 years to 80 years. Fracture union was observed on an average by the 13th week (range, 11-16 weeks). No non-union observed. Only one re-operation was performed, due to plate avulsion, patient was in older age group with Singh's index 3. Shortening is more in the In-situ and Anatomical fixation groups as compared to the osteotomy group. An average 1.25cm (range, 0.5cm - 2.5cm) shortening for the operated limb is observed. Only in one case of the Sarmiento's osteotomy group there was leg lengthening of 2 cm.

Seventy five percent of the patients regained normal pre-fracture activities after 30 weeks. The maximum time observed is 40 weeks. With each additional day stay required by patient in the hospital, back to normal pre-fracture activities are delayed by two days. Statistical significance of the coefficient for age shows that for elderly patients resumption of routine daily activities are delayed by one day per year as compared to young patients. Comparison between four type of reduction with back to normal pre-fracture activities shows that Sarmiento's osteotomy reduction group resumed daily routine activities earlier between 24-to-30 Weeks.

Table-I. The effect of various factors on retur to normal activity. (Multi-variable regression analysis)

S#.	Factors	Co-efficient	Standard Error	P. Value (significant at alpha level of)
1	Age	0.0686	.0398	10%

Table-I. The effect of various factors on return to normal activity. (Multi-variable regression analysis)

S#.	Factors	Co-efficient	Standard Error	P. Value (significant at alpha level of)
2	Sex	-0.9023	1.3790	Insignificant
3	Post-Operative hospital stay	0.2552	.0861	5%
4	Anatomical Reduction	0.6006	1.6080	Insignificant
5	Dimon & Houghston	-1.8870	1.8996	Insignificant
6	Sarmiento	-5.9546	1.7603	5%

R² = 0.435. R² (adjusted) = 0.367. F-statistic = 6.424 (significant at Alpha Level of 5%) (Statistical significance of the variables (Factors) with a positive sign shows that they have perform better than control group, whereas negative sign shows that they have performed worse then control group. Non statistical significance for any one or all shows that operation type is/are comparable with control group results.)

Table-I. The effect of various factors on return to normal activity. (Multi-variable regression analysis)

S#.	Factors	Co-efficient	Standard Error	P. Value (significant at alpha level of)
1	Age	- 0.0686	.081	Insignificant
2	Sex	1.0859	2.808	Insignificant
3	Post-Operative Hospital stay	- 0.45978	.175	1%
4	Anatomical Reduction	0.3360	3.274	Insignificant
5	Dimon & Houghston	- 4.3300	3.868	Insignificant
6	Sarmeinto	- 11.0715	3.584	1%

R² = 0.298. R² (adjusted) = 0.214. F-statistic = 3.548 (significant at Alpha Level of 1%)

Hip score evaluation shows majority of the patient scored 87 points, whereas, middle is 90 points. About 50% of the patients score remained within the range of seven points. Further, results show age and sex has no effect on the outcome of the Hip Score evaluation. Additional post operative stay in hospital shows a reduction in Hip Score by half point per day of over stay from average post-operative stay. Inter-group Hip Score comparison shows that Sarmiento's osteotomy reduction group is lower by 11 points as compared to 95 -to- 99 points for other three type of reductions.

DISCUSSION

Male and female are physiologically different. In old age repair process takes longer time to recover the normal / near normal structure from the injury. Relationship of age shows that for elderly patient

resumption of normal daily routine activities are delayed by one day per year as compared to younger group patients irrespective of the type of reduction used. Ceder et al. also determined that age is the factor linked most closely to general medical condition, affecting the overall outcome. Cedar et al, Bannister et al, and Parker and Palmer determined after statistical analysis that Pre-fracture mobility of the patients was the single most important determinant signifying patients return to his/her home environment. Whereas all our patients were mobile and active at their homes before fracture. They were also returned back to their home environment after operation. Previous studies had 65% of their patients at home after one year of operation. Whereas all of our patients were at home after one year. The differences in out come between these studies may reflect dissimilar patient characteristics or differences in standards of care. The post operative stay of patient in

hospital, is found to have a negative effect on the hip score results. Results show that each additional day in the hospital, decreases the hip score by a half point and a delay of two days in resuming routine daily activities..

Hip score for In-situ, Anatomical and Dimon & Houghston type of reductions remain high within the range of 95 to 99 points. While hip score for Sarmiento's reduction type is lower by 10 points as compared to other reduction types. Although the Sarmiento's osteotomy group patients had resumed routine daily activities earlier by four to six weeks. Both the reduction groups of In-situ fixation and Dimon & Houghston osteotomy performed equally good regarding routine activities and points scored on Hip Score evaluation. In-situ fixation is a relatively easier operation to perform than the Dimon & Houghston osteotomy. Anatomically reduced patient's overall performance regarding routine activities and Hip Score achieved were in an acceptable average range compared to other reduction types except patients treated by Sarmiento's osteotomy. Good results were observed in this type of reduction as compared to Sarmiento's osteotomy group. The Sarmiento's osteotomy group of patients performed worst as compared to other reduction types. It remained 10 points (Hip score) below the combined average of all other reduction types.

Average hospital stay related to operation was 8 days, lower than the average general hospital stay of 11 days. Effective control of post-operative complications can save up-to 6 days of hospital bed occupancy. The study reveals that age and post-operative stay in hospital has a significant effect on back to normal activities and Hip score. Shorter post-operative stay in hospital increases the probability of earlier resumption of normal routine activities supported by the reduction in Hip score due to prolonged stay. No significance with regards to sex seen. Early discharge from the hospital coupled with proper guidance to the patient about his routine exercise, mobility and precautions to be observed had a

very positive effect on the final outcome, as also reported by Cedar et al and Kenzora et al.

Of all the four reduction types In-situ reduction is the easiest and the least complication prone reduction followed by Anatomical and Dimon & Houghston osteotomy reductions in order of performance. Least favorable reduction is Sarmiento's osteotomy reduction. Considering all the above facts we have come to the conclusion, "for the benefit of the patients In-Situ fixation (minimal anatomical reduction without additional measures) with a Dynamic Hip Screw is a more appropriate fixation regarding early resumption of daily routine activities and achieving good Hip Score, in majority of the patients treated for unstable intertrochanteric fractures of the proximal femur of any age and bone strength.

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