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Dynamic condylar screw functional outcome in the treatment of unstable proximal femoral fractures in adult patients

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***Abstract*---**Objective: The purpose of this study was to assess the functional outcome of dynamic condylar screw (DCS) fixation in the treatment of unstable proximal femoral fractures in adults. Study Place and Duration: This descriptive study was done from March 2021 to November 2022 at MTI Lady Reading Hospital Peshawar. Methods: A descriptive study, employing dynamic condylar screws to treat proximal femur fractures in all adult patients who met the inclusion criteria, was utilized in this in-depth examination (DCS). The Harris Hip Score was used to determine post-surgery mobility. Results: The average age of patients was 63 having standard deviation of 14. Fracture union took 14.3 +/- 3.8 weeks on the average. At 24 months, the typical HHS was 85.2 +/-12.3, and 78.1% of patients reported adequate or outstanding functional performance. Nonunion,

malunion, or hardware failure occurred in 13.3% of patients. Complications were unaffected by age, gender, or fracture type. Conclusion: Dynamic condylar screw therapy has demonstrated promising functional and radiological benefits with few adverse effects in people with unstable proximal femoral fractures. DCS fixation, an efficient treatment for such fractures, is one of the best treatment for such fractures.

***Keywords*---**Dynamic Condylar Screw, Unstable Proximal Femoral Fractures, Functional Outcome, Harris Hip Score, Adult Patients, Fracture Union are a number of the terms utilized in this study.

Introduction

DHS has been the gold standard for stabilizing proximal femoral fractures since its entry in the market in the 1970s. If treated with DHS alone, some fracture configurations, like AO Type A2 and A3, broken lateral wall of greater trochanter, reverse oblique fractures, sub trochanteric fractures, and comminuted proximal femur fractures, may end up in valgus collapse of the neck, screw cutout, and poor functional outcomes.

Stable fracture fixation is required for proximal femoral fracture healing. The dynamic condylar screw (DCS) could be a new treatment for people with unstable knee and hip fractures. This novel procedure implants a tool into the bone to extend function. The functional effects of DCS implantation in persons with unstable proximal femoral fractures were investigated during this study. We compared DCS to intramedullary nails and plate fixation procedures while also viewing demographics, fracture type, preoperative evaluations, and postoperative care. Finally, we compared our findings to existing research on post-DCS mobility in patients with proximal femoral fractures.

Methods and Materials

This study checked out the functional outcomes of using dynamic condylar screws to treat unstable proximal femoral fractures (DCS). The investigation was conducted by a tertiary care facility between March 2021 and November 2022 for patients aged 18 to 85 years who were having unstable proximal femoral fractures (intertrochanteric, sub trochanteric, or complex fractures involving the femoral neck or shaft). Exclusions were open fractures, pathological fractures, and ipsilateral hip surgery. After being advised of the risks, all individuals agreed to participate during this study, which was approved by an institutional review board.

Calculating Sample size

The sample size was selected employing a power analysis of the literature on functional outcomes after DCS fixation. 120 patients were enough to detect a statistically significant difference in functional outcomes with an estimated effect size of 0.5, power of 80%, and alpha level of 0.05.

Surgical Method and Postoperative Management

Qualified Orthopedic surgeons conducted DCS fixation. Fracture morphology, alignment, and patient characteristics were all evaluated before surgery. Antibiotics, analgesics, and thromboembolism prevention were all standard. When tolerated, rehabilitation professionals started early mobility and weight bearing.

Metrics of Success

The Harris Hip Score (HHS) assessed functional recovery at six, twelve, and twenty-four months after surgery. The HHS's pain, function, range of motion, and lack of deformity measurements have a 0-100 scale and are useful diagnostic instruments. Secondary outcomes included radiological data like fracture union and comorbidities (malunion, nonunion, and hardware failure). In anteroposterior and lateral radiographs, a fracture is repaired when three of 4 cortices have bridging callus.

Statistical Analysis

the info was analyzed using the foremost recent SPSS version. The means and standard deviations for age and gender were computed. Aging and health aren't static. We investigated patient characteristics, fracture type, and functional results using independent samples. Traditionally, p-values but 0.05 were considered significant. Multiple simple regression was wont to independently modify functional findings. The assumptions and biases of every statistical test were examined by the researchers to confirm reliability.

Data Gathering

Demographics (age, gender, and comorbidities), fracture characteristics (type, side, and displacement), surgical specifics (implant size, operation time, blood loss), and postoperative care. To eliminate bias, blinded observers examined radiological and functional outcomes prospectively.

We collected demographic data (age, gender, and comorbidities), fracture parameters (type, side, and displacement), surgical specifics (implant size, operating time, blood loss), and postoperative treatment (hospital stay, rehabilitation protocol). the info was collected prospectively by a professional research assistant, ensuring accuracy and completeness. Independent, blinded observers evaluated radiological and functional outcomes.

Subgroup Analysis

To analyze the impact of patient and fracture variables on functional outcomes, subgroup analyses were done supported age (65 years vs. > 65 years), gender, fracture type (intertrochanteric, subtrochanteric, or complicated), and comorbidity presence. As previously indicated, the variations in functional outcomes among subgroups were examined using suitable statistical tests.

Sensitivity Analysis

A sensitivity analysis was performed to check the robustness of our findings and adjust for potential confounding factors. Patients with incomplete follow-up or missing data were eliminated from the analysis, and also the findings were compared to the first analysis to assess consistency.

Ethical Considerations

This study followed the principles of the Helsinki Declaration and also the International Conference on Harmonization Good Clinical Practice standards. Throughout the study, patient privacy and confidentiality were respected, and each attempt was made to attenuate potential dangers and discomforts related to participation. The findings of this study are provided in a very fair and unbiased manner, ensuring the research's integrity and reliability.

Results

Demographic and clinical features

The study included 120 adult patients with unstable proximal femoral fractures, with 68 (56.7%) being male and 52 (43.3%) being female. The patients ranged in age from 18 to 85 years old, with a mean age of 63.4 14.6 years. 70 (58.3%) were intertrochanteric fractures, 40 (33.3%) were sub trochanteric fractures, and 10 (8.3%) were complicated fractures involving the femoral neck or shaft. The demographic and clinical features at baseline were equivalent across fracture types ($p > 0.05$).

Table: Demographic and Clinical Characteristics of Patients with Unstable Proximal Femoral Fractures

Characteristic	Total (N=120)	Male (N=68)	Female (N=52)	Intertrochanteric (N=70)	Subtrochanteric (N=40)	Complex (N=10)
Number of Patients (%)	100%	56.7%	43.3%	58.3%	33.3%	8.3%
Mean Age (years) ± SD	63.4 ± 14.6	-	-	-	-	-
Age Range (years)	18 - 85	-	-	-	-	-
Fracture Types (%)	-	-	-	-	-	-
- Intertrochanteric	-	-	-	58.3%	-	-
- Subtrochanteric	-	-	-	-	33.3%	-
- Complex	-	-	-	-	-	8.3%
Comparable Characteristics (p)	-	-	-	$p > 0.05$	$p > 0.05$	$p > 0.05$

Functional Outcomes

At 6, 12, and 24 months postoperatively, the mean HHS was 65.4 11.7, 78.6 10.5, and 85.2 12.3, demonstrating progressive improvement in functional outcomes over time. 78.3% of patients reported good or outstanding functional results at the 24-month follow-up (HHS 80). there have been no significant variations in functional outcomes supported age, gender, fracture type, or presence of comorbidities ($p > 0.05$).

Table: Functional Outcomes at 6, 12, and 24 Months Postoperatively

Time Point	Mean HHS ± SD	Good or Excellent Outcomes (HHS ≥ 80)
6 Months	65.4 ± 11.7	-
12 Months	78.6 ± 10.5	-
24 Months	85.2 ± 12.3	78.3%

Abbreviations: HHS, Harris Hip Score; SD, Standard Deviation

Table: Radiological Outcomes - Time to Fracture Union and Union Rates

Outcome	Value
Mean Time to Fracture Union (weeks) ± SD	14.3 ± 3.8
Union Rate by 6 Months Postoperatively	92.5%
Union Rates Across Fracture Types (p)	$p > 0.05$

Abbreviations: HHS is for Harris Hip Score; SD stands for traditional Deviation.

Complications

The average time to fracture union was 14.3 3.8 weeks, with 92.5% of patients reaching union by 6 months postoperatively. The rates of fracture union were comparable among fracture types ($p > 0.05$). there have been no significant relationships discovered between patient variables and time to fracture union. COMPLICATIONS: In 16 (13.3%) of the patients, complications were noted, including 5 (4.2%) cases of nonunion, 6 (5%) cases of malunion, and 5 (4.1%) cases of hardware failure. the full complication rate didn't differ substantially between fracture types ($p > 0.05$). there have been no significant relationships ($p > 0.05$) between patient age, gender, fracture type, or comorbidities and therefore the occurrence of sequelae. p, p-value are abbreviations for probability.

Table: Complications and Their Distribution Among Patients

Complication	Number of Cases (N=120)	Percentage (%)	Complications by Fracture Types (p)
Nonunion	5	4.2%	p > 0.05
Malunion	6	5.0%	p > 0.05
Hardware Failure	5	4.1%	p > 0.05
Total	16	13.3%	p > 0.05

Abbreviations: p, p-value

Multiple statistical regression Analysis

Age, gender, fracture type, and presence of comorbidities weren't independently linked with functional outcomes at 24 months postoperatively ($p > 0.05$), per the results of the multiple simple regression analysis. The adjusted R-squared value for the regression model was 0.063, indicating that the included predictor factors could only explain atiny low percentage of the variability in functional outcomes.

Sensitivity Analysis

Removing patients with incomplete follow-up or missing data from the study had no significant effect on the results, indicating the findings' robustness and consistency. In summary, this study found that DCS fixation resulted in good functional and radiological outcomes in adult patients with unstable proximal femoral fractures, with a coffee rate of sequelae. there have been no significant relationships between patient characteristics, fracture type, and functional outcomes, indicating that DCS fixation is also a reliable therapeutic choice for a large range of patient populations.

Discussion

The care of unstable proximal femoral fractures continues to be a problem in orthopedic practice, with the rummage around for a perfect fixation strategy ongoing. during this context, our work sheds information on the functional results and possible benefits of dynamic condylar screw (DCS) fixation within the treatment of adult patients with unstable proximal femoral fractures. This study provides a replacement viewpoint on DCS as a possible therapeutic option by capturing the intricacies of functional recovery, fracture union, and comorbidities. The functional outcomes found in our study are noteworthy, with the mean Harris Hip Score (HHS) improving steadily over time and a major proportion of patients having good or exceptional outcomes at the 24-month follow-up. This conclusion is in step with a growing body of evidence showing the efficacy of DCS fixation in improving hip function and quality of life. the dearth of considerable relationships between patient characteristics, fracture type, and functional outcomes suggests that DCS could also be applicable to a good range of patient populations.

Our research also indicated favorable radiological findings, including a high union rate and a fast time to fracture union. DCS's sliding mechanism provides for regulated compression at the fracture site, promoting biological healing and maybe lowering the likelihood of nonunion or malunion. This design, together with the angled blade plate, provides stability and load-sharing, which can contribute to the positive results seen in our study.

Regardless of the possible benefits of DCS, problems must be considered. the general complication rate in our study was modest, with no significant variations between fracture types or patient subgroups. This finding suggests that DCS is also a secure and dependable treatment option for unstable proximal femoral fractures. Nonetheless, good surgical technique, implant selection, and postoperative care are critical in decreasing the danger of problems.

The intriguing findings of our study must be understood in light of its limitations. Because this was a single-center study, our findings might not be applicable to all or any contexts or groups. Furthermore, the study's observational character limits any causal inferences, and also the possibility of residual confounding can't be completely ruled out. Yet, the findings are credible because of our thorough approach, prospective data collecting, and extensive assessment of outcomes.

Conclusion

In this prospective observational study, dynamic condylar screw (DCS) fixation exhibited satisfactory functional and radiological outcomes within the treatment of unstable proximal femoral fractures in adult patients, with a coffee complication rate. Our findings imply that DCS may be a secure and effective therapeutic option for a good range of patient populations, irrespective of age, gender, fracture type, or comorbidities. Since the worldwide healthcare community tries to boost patient treatment and outcomes, the findings of this study provide essential evidence to influence clinical decision-making and drive future orthopedic trauma research. Nonetheless, it's critical to underline that excellent surgical technique, suitable implant selection, and rigorous postoperative care are critical to the success of DCS fixation and will be the inspiration of any therapeutic approach.

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