Tibial Plateau Fractures Treatment by Closed Reduction, Close Pinning Fixation and Cast Brace

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***Abstract*—**Fracture that involves the tibial articular surface in the absence of proper treatment can cause complications such as organ dysfunction along, restriction of movement, early arthritis, pain, infection and eventually lead to impaired function and disability. This study investigated the plateau tibial fractures treatment by closed reduction and close pinning fixation and cast brace. In this randomized clinical trial study 27 (20 male and 7 female) patients with plateau tibial fractures were selected randomly. After explaining the treatment process to the patients, closed reduction was performed by stretching and clamping. Then desired reduction, the pin percutaneous fracture fixation and casting was carried out according to textbooks criteria. After two weeks, cast brace was taken and knee ROM was started. Finally, after the end of treatment, the final assessment was carried out according to the VAS scale. Data were analyzed using SPSS software and descriptive statistics. The average duration of research plan was 2.09 months. The mean length of hospitalization was 4 (range, 2–6) days. The mean Rasmussen score was 27.05 for all patients; it was also 29.4 for type I, 28.2 for type II, 26.3 for type III, and 24.3 for type IV fractures. Knee ROM mean score was 105.88. Infection, thromboembolism and arthrosis were not observed in patients during 12 months. Our findings indicated that treatment of plateau tibial fractures with close pinning and cast brace results in minimized dislocation inside cast brace and early mobilization and reduced hospitalization cost for patient, and also reduced thromboembolism risk to zero and also reduced infection risk.

***Index Terms*—**Plateau Tibial Fracture, Closed Reduction, Close Pinning Fixation, Cast Brace.

I. Introduction

The epidemiology of adult fractures is changing quickly. An analysis of 5953 fractures reviewed in a single orthopaedic trauma unit in 2000 showed that there are eight different fracture distribution curves into which all fractures can be placed. It is popularly assumed that osteoporotic fractures are mainly seen in the thoracolumbar spine, proximal femur, proximal humerus and distal radius, but analysis of the data indicates that 14 different fractures should now be considered to be potentially osteoporotic. About 30% of fractures in men, 66% of fractures in women and 70% of inpatient fractures are potentially osteoporotic. The studies show that fixation of comminuted distal tibia and fibular fractures with tibial pro fibular fixation in selective cases with osteoporosis or poor skin condition is a useful technique [1], [2] The research have reported that the single most important factor in predicting outcome in a patient with a tibial plateau fracture was the adequacy of reduction. [3]

In a study Monticelli-Spinelli small pin circular external fixator was used in five cases, in combination with closed reduction or limited open reduction internal fixation, to salvage a satisfactory result in juxtaarticular, intraarticular fractures of the proximal tibia, when associated soft tissue compromise prevented standard fixation with plates and screws. The results have shown that small pin circular fixator allows juxtaarticular placement of the small pins, enhancing stabilization of the comminuted fractures, allowing early range of motion of the joint and early patient mobilization. [4] Clinical observations also show that treatment of distal tibial fractures has always been a challenge. Distal tibia is more superficial, with less soft tissue coverage and blood supply. Therefore, operative treatment can lead to complications. [5] The evidences of clinical trials also show that fne-wire fixation with limited internal fixation is a satisfactory method of managing complex high-energy fractures of the tibial plateau where soft tissue injury and bony comminution make traditional techniques of open reduction and internal fixation unsuitable. [6] However, severely depressed or comminuted fractures or fractures with significant metaphyseal diaphyseal extension may not be suitable for this technique and require the addition of an external fixation device or buttress plate to maintain the reduction and allow for early range of motion. [7]

Functional fracture bracing, described in 1967, was inspired by the patellar-tendon bearing prosthesis which had recently been developed for below-knee amputees. This prosthesis had eliminated the traditional thigh corset and allowed the transfer of weight-bearing stresses from the soft tissues of the thigh to the patellar tendon and condyles of the proximal tibia. [8]

This study investigated the plateau tibial fractures treatment by closed reduction and close pinning fixation and cast brace.

II. Material And Methods

In this randomized clinical trial study 27 (20 male and 7 female) patients with plateau tibial fractures were selected randomly. After explaining the treatment process to the patients,

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closed reduction was performed by stretching and clamping. Then desired reduction, the pin percutaneous fracture fixation and casting was carried out according to textbooks criteria. After two weeks, cast brace was taken and knee ROM was started. Finally, after the end of treatment, the final assessment was carried out according to the VAS scale. Data were analyzed using SPSS software and descriptive statistics. The average duration of research plan was 2.09 months.

III. Results

The average duration of research plan was 2.09 months. The mean length of hospitalization was 4 (range, 2–6) days. The mean Rasmussen score was 27.05 for all patients; it was also 29.4 for type I, 28.2 for type II, 26.3 for type III, and 24.3 for type IV fractures. Knee ROM mean score was 105.88. Infection, thromboembolism and arthrosis were not observed in patients during 12 months.

IV. Discussion

Our findings indicated that treatment of plateau tibial fractures with close pinning and cast brace results in minimized dislocation inside cast brace and early mobilization and reduced hospitalization cost for patient, and also reduced thromboembolism risk to zero and also reduced infection risk. In line with our findings, it has been shown that closed reduction and percutaneous screw fixation for tibial plateau fractures is minimally invasive. It reduces the length of hospital stay and costs, enables early mobilization with minimal instrumentation, and achieves satisfactory outcomes. [9] The use of combination internal fixation and hybrid external fixation in severe proximal tibia fractures shows that this treatment method is associated with a high percentage of good and excellent results. Combined internal and external fixation combines the advantages of anatomic, stable fixation with less soft-tissue dissection and eliminates the need for large implants. [10]. Ilizarov circular fixation is also an ideal method of treatment for these fractures when extensive dissection and internal fixation are contraindicated due to trauma to the soft tissue, deficiency of bone stock, and bony comminution. [11] In a study tibial plateau fractures in were treated with the less invasive stabilisation system (LISS). The results showed that LISS system could be considered for the management of tibial plateau fractures. [12] Studies reveal that comminuted tibial plateau fractures present a surgical challenge to the orthopaedic surgeon. Over the years, treatment has ranged from traction to cast immobilization to open reduction and internal fixation. More recently, indirect reduction techniques with external fixation have been used. The results have shown that according to advantages of minimal to no soft tissue stripping and early knee range of motion, this technique is recommended for treatment of these difficult fractures. [13].

V. Conclusion

Treatment of plateau tibial fractures with close pinning and cast brace results in minimized dislocation inside cast brace and early mobilization and reduced hospitalization cost for patient, and also reduced thromboembolism risk to zero and also reduced infection risk.

Acknowledgment

We appreciate all patients and personnel - in Ayatolah Kashani hospital, Tehran, Iran - who helped us to exert this study. This research with the reference number 388159 has been carried out in Ayatolah Kashani hospital.

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