Dynamic condylar screw (DCS) fixation in treatment of supracondylar fracture of distal femur

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ABSTRACT
Objective
To evaluate the result of dynamic condylar screw in terms of operative time, blood loss, hospital stay, union, range of motion of knee, complication and need for bone grafting, and to compare it with other technique published in literature.

Patients and Methods
This study was conducted in the Department of Orthopedics, Khyber Teaching Hospital, Peshawar from May 2007 to March 2009. It included 33 patients with supracondylar fracture of femur treated by dynamic condylar screw. All fractures were closed and non was pathological. All were operated under General/Spinal anesthesia ans dynamic condylar screw was put as per standard protocol. External protection was given to all patients for two weeks. All were followed for one year, two were lost to follow up and the study was completed on 31 patients.

Results
Out of 31 patients 23 were male, and 8 were Female with male to female ratio 3:1. Average operative time was 80 minutes and average hospital stay was eight days. There were 2 nonunion, 3 infections and 1 implant failure. Two developed stiffness of the knee joint. Functional outcome was assessed using the Neer’s criteria.

Conclusion
Dynamic condylar screw is a still a very good option in our circumstances but we should use it as a bridge plate in comminuted supra condylar fracture of femur to avoid infection and need for bone grafting. (Rawal Med J 2010;35: ).

Key words
Supracondylar, femur, fracture, fixation.

INTRODUCTION
Distal Femur Fractures (DFF) occurs at approximately one tenth the rate of proximal femur fractures and make up 6% of all femur fractures. DFF have a bimodal distribution, a high energy DFF occur in males between 15 and 50 years white most low energy fractures occurs...
in osteoporotic women above 50 years.\(^1\) Road traffic accident is the most common cause of high energy supra-condylar fractures of femur. The treatment of DFF remains a significant surgical challenge.\(^2\) These include osteoporotic bone, open fractures with significant bone loss and fractures with short articular segment.\(^3\) Non operative treatment methods, such is traction, and cast bracing produced better results than operative treatment because of the lack of adequate, internal fixation devices in 1960. With development of improved internal fixation devices, the trend changed towards surgical treatment of supra-condylar fracture of femur in 1980s.\(^4\) - \(^8\)

Multiple options exist for the definitive treatment of DFF and include external fixation, intramedullary nailing and plate osteosynthesis with either open reduction and internal fixation or minimally invasive plate osteosynthesis likewise multiple different plating options are available and include conventional buttress plate, fixed angle devices and locking plates. The goals of operative treatment are anatomical alignment, stable fixation, rapid mobilization and early functional rehabilitation of the knee.\(^9\) - \(^11\) Dynamic Condylar Screw (DCS) is a better implant to achieve these goals, as this shares many of the features of a compression hip screw making it familiar to most surgeons. Other advantages include its ability to apply interfragmentary compression across the femoral condyles, better purchase in osteoporotic bone and the need for only two plane alignment. The major disadvantage of DCS is bulky size of the implant at the screw plate junction that requires removal of a considerable amount of bone from the lateral femoral condyle.\(^12\) Other method of fixation like retrograde intramedullary supracondylar nail (RIMSN), locking plates, less invasive stabilization system (LISS) are becoming popular lately because of biological osteosynthesis, preserving blood supply and decreases need for bone grafting. The purpose of this study was to evaluate the result of DCS in terms of operative time, blood loss, period of hospital stay, union, range of motion of knee, complication and need for bone grafting, and to compare it with others technique available.

**MATERIALS AND METHODS**

From May 2007 to March 2009, 33 patients with supracondylar femur fracture were treated by DCS in Khyber Teaching Hospital Peshawar. The average age was 41 years (range 17 to 75) and there were 25 males and 8 females. All fractures were closed and non pathological. All were classified according to AO/OTA classification and consisted of 11 type-A, 13 type-A\(_2\) and 11 type-A\(_3\) fractures. All patients received prophylactic antibiotic (IV cefazolin) and the same antibiotic was given intravenously for three days postoperatively, followed by oral form and analgesia as per ward protocol. All patients were operated under General/Spinal
anesthesia and DCS (Local made) was put as per standard protocol. External protection was given to all patients for two weeks. All patients were started on passive, followed by active range of knee movement at 14 days after removal of sutures, partial weight bearing was permitted in all patients at 6 weeks followed by full weight bearing. All patients were followed up for one year, two were lost to follow up and the study was completed on 31 patients.

**RESULTS**

Out of 31 patients 23 (74.2%) were male, and 8 (25.8%) were female, with male to female ratio 3:1. The age range was from 17 years to 75 years (Mean 41 years). Average operative time was 80 minutes (range from 50 to 110 min), average blood loss was 400 ml (range 150-550ml) and average hospital stay was 8 days (range 4-15 days).

<table>
<thead>
<tr>
<th>Complication</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Superficial Infection</td>
<td>1</td>
<td>3.2%</td>
</tr>
<tr>
<td>Deep Infection</td>
<td>2</td>
<td>6.4%</td>
</tr>
<tr>
<td>Non union</td>
<td>2</td>
<td>6.4%</td>
</tr>
<tr>
<td>Implant Failure</td>
<td>1</td>
<td>3.2%</td>
</tr>
<tr>
<td>Stiffness (Flexion &lt; 90°)</td>
<td>2</td>
<td>6.4%</td>
</tr>
</tbody>
</table>

**Table 1. Complications.**

Two patients had nonunion and were grafted twice, three infections (1 superficial infection and 2 deep infections) were encountered, and one implant failure (Table 1). As a whole, 13 patients were grafted. The overall functional outcome was assessed using the criteria used by Neer et al\textsuperscript{13} where functional, anatomical and radiological evaluation was used (Table 2).

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Cases</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Excellent</td>
<td>18</td>
<td>(58%)</td>
</tr>
<tr>
<td>Good</td>
<td>6</td>
<td>(19.3%)</td>
</tr>
<tr>
<td>Fair</td>
<td>4</td>
<td>(12.9%)</td>
</tr>
<tr>
<td>Poor</td>
<td>3</td>
<td>(9.6%)</td>
</tr>
</tbody>
</table>

**Table 2. Outcome according to Neer criteria.**

Union was achieved in 93.5% of patients and the average time for union was 19.05 weeks. Range of motion achieved was 10°-130°.

**DISCUSSION**

Fractures of the distal femur demands superb skill and sound judgment on the part of the surgeon.\textsuperscript{11} The surgical principles outlined and popularized by AO/ASIF group in the
treatment of these fractures has improved the operative results significantly and these include anatomical reduction, stable internal fixation with restoration of axial alignment, minimal soft tissue stripping and early active mobilization. Most of the DFF are treated surgically but controversy remains regarding the optimum fixation device. All the accepted methods of treatment have their pros and cons and no single method of treatment can overcome all the problems associated with the management of DFF. The DCS is an effective method of treating supra condylar fracture of the femur with a wide range of advantages. However, extensive soft tissue dissection can lead to infection and frequent need for bone grafting. Indirect reduction and bridge plating with DCS can produce favorable results in complex distal femur fracture.

In our study the union rate was 93.5% which is comparable to Dar et al and Khan et al. Union was achieved in 29 cases, 2 nonunion occurred because of deep infection and were grafted twice. Implant failure occurred in one case, this patient was having deep infection and nonunion followed by implant failure. In our series, 9 patients were grafted and two were grafted twice, same as reported by others. Bone grafting increased operative time, blood loss and donor site morbidity. We compared the number of bone grafting in our series to close methods like retrograde nailing and biological osteosynthesis. In a series of Retrograde nailing of 23 patients by El-Kawy and of 68 patients by Dar a comparative study of RIMSN and bridge plate Osteosynthesis using DCS, no bone grafting was used in any of these patients.

**CONCLUSION**

Dynamic condylar screw is a still a very good option in our circumstances but we should use it as a bridge plate in comminuted supra condylar fracture femur to avoid infection and need of bone grafting.

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