

## Research Article

# Dynamic condylar screw versus supracondylar nail in the management of supracondylar fracture distal femur

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## ABSTRACT

**Background:** Supracondylar femoral fracture poses a considerable therapeutic challenge. Operative treatment has become a standardized procedure. Stabilization has usually been achieved by an osteosynthesis with Dynamic condylar screws or retrograde supracondylar nailing. In this article we are going to compare the results of surgical management of supracondylar nail and dynamic condylar screw.

**Methods:** Prospective study of forty two patients who underwent surgical management for supracondylar fracture of femur between Jan 2011 and Jan 2015. 22 patients underwent retrograde supracondylar nailing and 20 patients underwent DCS fixation. The inclusion criteria were AO type A, C1 and C2 and Gustilo & Anderson Grade I to III B distal femur supracondylar fracture. The exclusion criteria were Patients younger than 19 years, AO type B/C3 and Gustilo & Anderson Grade IIIC. The average age of our patients was 42years. Patients were assessed using Sanders et al scoring system

**Results:** Patients with supracondylar fracture of femur have a good functional outcome following operative treatment. 15 patients (83.3%) treated with DCS had excellent to good functional outcome. 16 patients (80%) treated with retrograde nailing had excellent to good functional outcome.

**Conclusions:** Dynamic condylar screw with plate fixation and retrograde supracondylar nailing provide good functional outcome in supracondylar fracture of femur. However in intra articular fractures of distal femur (Type C1 & C2), DCS with plate provides for better functional outcome compared to supracondylar nail. In extra articular fractures of distal femur (Type A), no significant difference in functional outcome was noticed between the patients treated with DCS & supracondylar nail. However, in view of minimal blood loss & soft tissue dissection required, supracondylar nailing may be a better option in the treatment of extra articular fractures of distal femur.

**Keywords:** Dynamic condylar screw, Supracondylar nailing, Supracondylar femur

## INTRODUCTION

Supracondylar fractures of the femur account for approximately 7% of all femur fractures.<sup>1</sup> They occur just proximal to the knee joint, in the terminal 9 cm of the femur between the metaphyseal-diaphyseal junction and the femoral condyles.<sup>2</sup> Supracondylar femoral fracture

poses a considerable therapeutic challenge. Anatomic reduction, stabilization, early weight bearing and mobilization are the main aims of the fracture management. Operative treatment has become a standardized procedure. Stabilization has usually been achieved by an osteosynthesis with Dynamic condylar screws or retrograde supracondylar nailing.<sup>3</sup> In this article

we are going to compare the results of surgical management of supracondylar nail and dynamic condylar screw.

## METHODS

Prospective study of forty two patients who had sustained supracondylar fracture of femur between Jan 2011 and Jan 2015. Twenty two patients underwent retrograde supracondylar nailing and 20 patients underwent DCS fixation. Two patients in each group were lost to follow up. 38 patients were followed up for a period of 6 months to 3 years. The inclusion criteria were AO type A, C1 & C2<sup>4</sup> and Gustilo & Anderson Grade I to IIIB distal femur supracondylar fracture. The exclusion criteria were patients younger than 19 years, AO type B/C3 and Gustilo & Anderson Grade IIIC.<sup>5</sup> The average age of our patients was 42 years. We had a male predominance of 29 patients. Patients were assessed using Sanders et al. scoring system.<sup>6</sup> In dynamic condylar group 11 were closed fracture, four were grade II compound and three were grade III compound. In supracondylar nail group 17 were closed, one was grade II and two were grade III compound. Nearly two third patients had mode of injury road traffic accident. Eight patients had associated patella fracture, 3 had clavicle fracture, 5 had head injury and 1 had tibia fracture.

Pre-operative X-ray of femur with knee joint was taken in AP and lateral and oblique views. Routine blood investigations like Hb, PCV, TC, DC, blood sugar, and renal profile were done. Evaluation of associated medical problems was done. Patients were either kept on skeletal traction or POP splinting. The average day of surgery from injury for DCS was 4.1 days. The average day of surgery from injury for nailing was 5.8 days. Third generation cephalosporin were given for all patients.

The post-operative protocols were active and passive range of motion started within 2-3 days, weight bearing on injured limb begun during 2<sup>nd</sup> week for patients who had minimum comminution and good bone contact between fragments depending on pain tolerance. For patients treated with DCS weight bearing was delayed until 6 weeks, all patients were followed up at 6 weeks interval till union & on 3<sup>rd</sup> month, 6<sup>th</sup> month, 12<sup>th</sup> month and 24<sup>th</sup> month. During follow up, patient were clinically assessed for signs of infection, pain, range of movements and limb length variations and radiological evaluation of callus formation. For patients who had comminuted fractures weight bearing was delayed until bridging callus

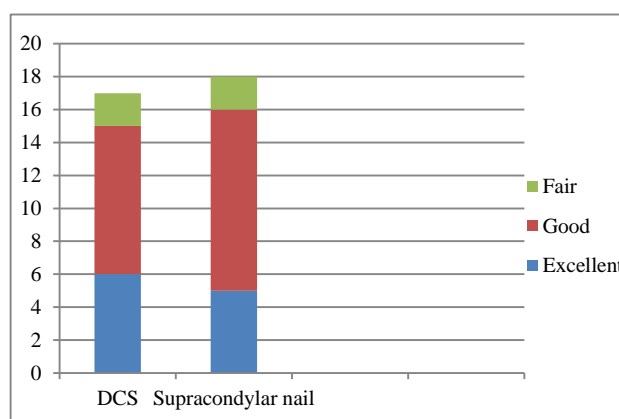
was seen on follow up radiograph. Full weight bearing allowed when bridging of the cortex in the area of callus was radiologic ally evident. Fracture alignment of less than 100 degree varus or valgus is taken as good alignment.

## RESULTS

Patients with supracondylar fracture of femur have a good functional outcome following operative treatment. 15 patients (83.3%) treated with DCS had excellent to good functional outcome. 16 patients (80%) treated with retrograde nailing had excellent to good functional outcome. 3 patients (16.7%) had fair to poor outcome following DCS fixation (Table 1 and Figure 1). 4 patients (20%) had fair to poor outcome following retrograde nailing. 11 (91.5%) patients who had sustained extra articular fracture of distal femur treated with DCS had excellent to good outcome, while 14 (87.5%) patients had excellent to good outcome following retrograde nailing. 4 (66.7%) patients who had undergone DCS fixation for intra articular fracture of distal femur had excellent to good outcome, whereas 2 (50%) patients had excellent to good functional outcome following retrograde nailing as evident from Table 2.

**Table 1: Comparison of DCS results versus supracondylar nail.**

Results	DCS	Supracondylar nail
Excellent	6 (33.3%)	5 (25%)
Good	9 (50.0%)	11 (55%)
Fair	2 (11.1%)	2 (10%)



**Figure 1: Graphical representation of result.**

**Table 2: Result in extraarticular versus intra articular fractures.**

Results	Extra articular fractures	Intra articular fractures
Excellent and Good	DCS: 11 (91.5%) SC NAIL: 14 (87.5%)	DCS: 4 (66.7%) SC NAIL: 2 (50.0%)
Fair and Poor	DCS: 1 (8.5%) SC NAIL: 2 (12.5%)	DCS: 2 (33.3%) SC NAIL: 2 (50.0%)

## DISCUSSION

Dynamic condylar screw and supracondylar nail provide rigid internal fixation for rapid healing of supracondylar fractures with a good functional outcome. In our study 80% excellent to good results were achieved with supracondylar nailing. This is comparable with the study done by Richard Gellman et al. who had 82.7% excellent & good results. We had 20% fair & poor results, whereas they had 17.2% fair to poor results. K. S. Leung et al. reported better results with 94% excellent & good outcome & 6% fair to poor outcome.<sup>7</sup> In our study 83.3% excellent to good results were achieved with DCS fixation. This is comparable with the study of Roby D Mize et al. who had 80% excellent to good results.<sup>8</sup> Ho Jeon et al. reported better results with 81% excellent & 19% good results.<sup>9</sup> He had no fair or poor outcome. In the group treated with supracondylar retrograde nail, the fracture union was achieved in an average time of 14 weeks. The average union time for open fractures was 17 weeks. In the group treated with dynamic condylar screw with plate, the fracture union was achieved in an average time of 16 weeks. The average union time for open fractures in this group was 19 weeks.

**Table 3: Comparison of DCS versus supracondylar retrograde nailing.**

	DCS	Supracondylar retrograde nailing
Average union time for closed fracture	16 weeks	14 weeks
Average union time for open fracture	19 weeks	17 weeks
Average knee flexion	109 degree	105 degrees
Blood loss	850 ml	450 ml
Infection	2	1
Shortening	2	1

Average flexion in patients treated with DCS was 109 degree Extensor lag was noticed in 8 patients treated with DCS (Table 3). Average flexion in patients with SC Nail was 105 degree Extensor lag was noticed in 10 patients treated with supracondylar nail. 1 patient treated with DCS & 2 patients treated with SC Nail had knee stiffness, however these patients came to us after native treatment. No significant difference in post op functional outcome was noticed in patients with associated injuries. Two patients with DCS and 1 patient with retrograde nail developed infection. All three patients had open fracture. These patients were treated with wound lavage and antibiotics as per culture & sensitivity result. Infection settled in all patients and none had features of osteomyelitis. All 3 patients had fracture union. The average intra operative blood loss for DCS fixation was 850 ml. The average blood loss for supracondylar retrograde nailing was 450 ml. The reduced blood loss and less soft tissue dissection in supracondylar nailing is an important advantage to be taken into consideration

while deciding about the treatment modality. More than 2 cm shortening was noticed in 1 patient with supracondylar nail and 2 patients treated with DCS. In the DCS group, the shortening was due to compression achieved at the fracture site intraoperatively. Lateralization was noticed in the post-operative radiograph of 7 patients treated with dynamic condylar screw; however this did not produce any deformity clinically.

## CONCLUSION

Dynamic condylar screw with plate fixation & retrograde supracondylar nailing provide good functional outcome in supracondylar fracture of femur. However in intra articular fractures of distal femur (Type C1 & C2), DCS with plate provides for better functional outcome compared to supracondylar nail. In extra articular fractures of distal femur (Type A), no significant difference in functional outcome was noticed between the patients treated with DCS & supracondylar nail. However, in view of minimal blood loss & soft tissue dissection required, supracondylar nailing may be a better option in the treatment of extra articular fractures of distal femur.

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## REFERENCES

1. Bucholz R, Heckman J, Court-brown C. Rockwood and Green's fractures in adults. In: Bucholz R, Heckman J, Court-brown C, eds. A Book. 6th ed. Philadelphia: Lippincott Williams & Wilkins; 2009.
2. Albert MJ. Supracondylar fractures of the femur. J Am Acad Orthop Surg. 1997 May;5(3):163-71.
3. Lauri Handolin, Jarkko Pajarinen, Jan Lindahl, Eero Hirvensalo. Retrograde intramedullary nailing in supracondylar femoral fractures - The Töölö hospital experience. J Blood SOT. 2002;25:46-51.
4. Gurkan V, Orhun H, Doganay M, Salioğlu F, Ercan T, Dursun M, et al. Retrograde intramedullary interlocking nailing in fractures of the distal femur. Acta Orthop Traumatol Turc. 2009 May-Jul;43(3):199-205.
5. Kim PH, Leopold SS. In brief: Gustilo-Anderson classification. Clin Orthop Relat Res. 2012 Nov;470(11):3270-4.
6. Sanders R, Regazzoni P, Ruedi TP. Treatment of supracondylar-intracondylar fractures of the femur using the dynamic condylar screw. J Orthop Trauma. 1989;3:214-22.
7. Leung KS, Shen WY, So WS, Mui LT, Grosse A. Interlocking intramedullary nailing for supracondylar and intercondylar fractures of the distal part of the femur. J Bone Joint Surg Am. 1991 Mar;73(3):332-40.

8. Mize RD, Buchloz RW, Grogan DP. Surgical treatment of displaced comminuted fractures of the distal end of the femur. *J Bone Joint Surg.* 1982;64A:871-9.
9. Jeon IH, Oh CW, Kim SJ, Park BC, Kyung HS, Ihn JC. Minimally invasive percutaneous plating of

distal femoral fractures using the dynamic condylar screw. *J Trauma.* 2004 Nov;57(5):1048-52.

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