

Surgical management of supracondylar femur fracture using rush pinning technique in dogs

AKSHAY KUMAR[✉], AMIT KUMAR¹, YUDHVIR RANA¹, SARA KAUSHAL¹, ROHIT KUMAR¹, S P TYAGI¹, ADARSH KUMAR¹ and AHAN NAGPAL¹

CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, Himachal Pradesh 176 062 India

Received: 18 January 2023; Accepted: 14 March 2024

Keywords: Femur, Fracture, Rush pin, Supracondylar

Repair of distal metaphyseal fractures of the femur is challenging as their management is difficult (Gilmore 1998). The present study aims to assess the efficacy of rush pins for the stabilisation of supracondylar femur fractures. Mechanically rush pins are superior to other methods as the joint surfaces are not involved and the growth plates are not compressed (Campbell 1976). The study was conducted on twelve client owned dogs diagnosed with supracondylar femur fractures. The average age and body weight of the subjects was 15.75 months (2 months–4 years) and 10.75 kg (3–30 kg). All the animals were subjected to thorough physical, orthopaedic, neurological and radiographic examinations. Computed radiographs were taken in latero-medial and cranio-caudal views to confirm 11 closed, complete distal simple extra articular fractures (AO/ASIF classification 33A2) and 1 closed complete distal metaphyseal wedge extra articular fracture (AO/ASIF classification 33A3). Contra-lateral femur bones were also radiographed to determine the diameter and length of rush pins to be used.

Standard cranio-lateral parapatellar approach to the stifle joint and distal femur as described by Johnson (2014) was adopted in all the cases and pointed reduction forceps were utilised to grasp the small distal bone in majority of the cases. A bone rongeur was used to trim the fracture ends to convert oblique or wedge fractures into transverse fractures and to achieve correct bone apposition. Steinmann pins of the same size as that of the rush pins were used to make pilot holes lateral to the trochlea's distal end. Rush pins, the 3/4th of the size of the total length of the femur were then inserted at an acute angle of 20–30 degrees into the distal segment. Rush pins were then alternately placed into the medullary canal of the proximal segment. In two cases, a full cerclage wire (22G) was used to achieve compression of minor bone fragments of the proximal segments. Simple continuous sutures with 2-0 polyglactin-910 were used to

close the joint capsule and subcutaneous tissue and simple interrupted sutures were used for the skin. The skin suture line was dressed with 5 % povidone iodine ointment. Rush pinning technique was scored based on four intra-operative parameters, based on the Table 1.

Table 1. Scoring for intra-operative observations

Score observations	1	2	3	4
Extent of manipulation and soft tissue damage	Low	Moderate	High	-
Degree of technical difficulty				
Status of fracture reduction	Poor	Fair	Good	Excellent
Status of fracture fixation				

Clinical outcomes and limb functions were scored as suggested by McCartney 1998 and Fox *et al.* 1998 evaluation scales.

Table 2. Clinical outcome scale

Clinical outcome	Description of function
Excellent	No lameness, clinically within normal limits
Good	Mild lameness noted after extensive exercise
Fair	Mild to moderate intermittent lameness but consistent weight-bearing
Poor	Non-weight bearing lameness

Representative Radiographs of some cases is depicted in Figs. 1 and 2. Rush pins with a length of 3/4th of the total length of the femur were sufficient to provides adequate stability to the fracture fragment. The rush pins when introduced at an angle of 20–30 degrees from the long axis of the femur provided good to excellent reduction as well as fixation of the distal femoral fracture fragments as also reported by Zargar (2021). Immediate post-operative radiographs showed good anatomical alignment and reduction of the fracture fragments. The whole procedure required moderate to high soft tissue manipulation with technical difficulty experienced by the surgeon, as moderate to high in all cases. Reappraisals were obtained

Present address: ¹Dr GC Negi College of Veterinary and Animal Sciences, Palampur, Himachal Pradesh. [✉]Corresponding author email: drasingla@gmail.com

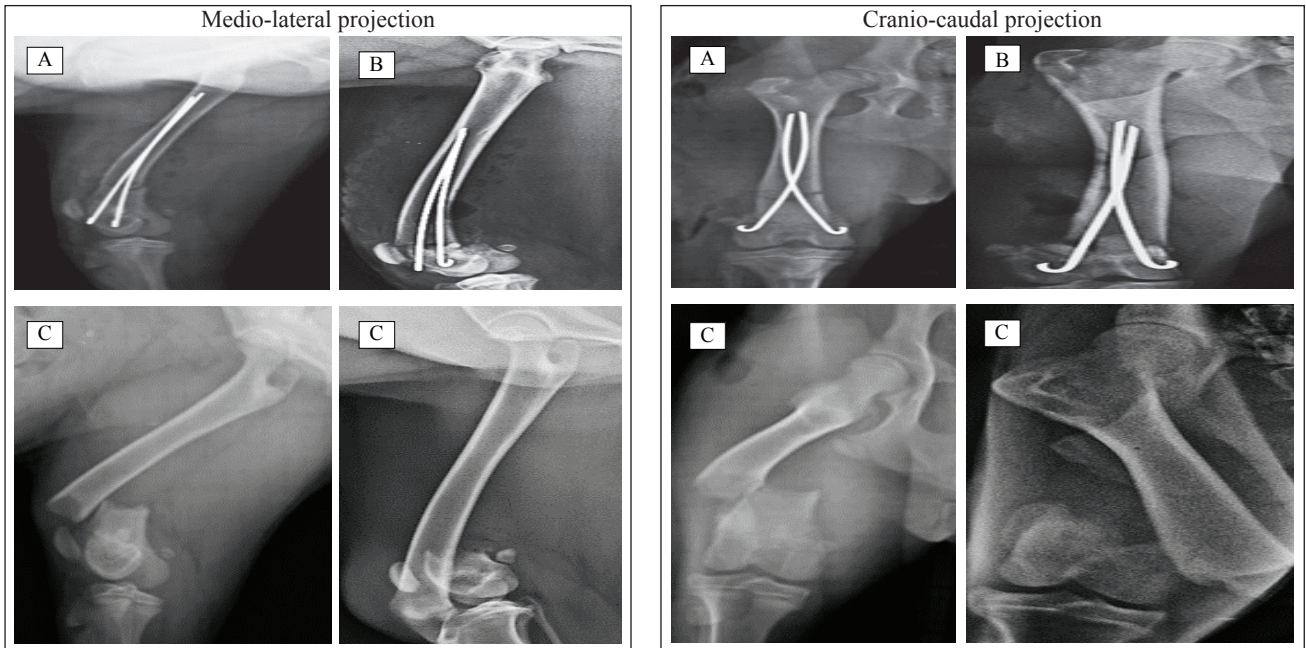


Fig. 1. Representative Radiographs of some cases. A. Fracture repaired by rush pin 2.0×100 mm (Lost to follow up); B. Fracture repaired by rush pin 2.0×110 mm; C. Closed complete distal simple extra-articular fracture (two cases).

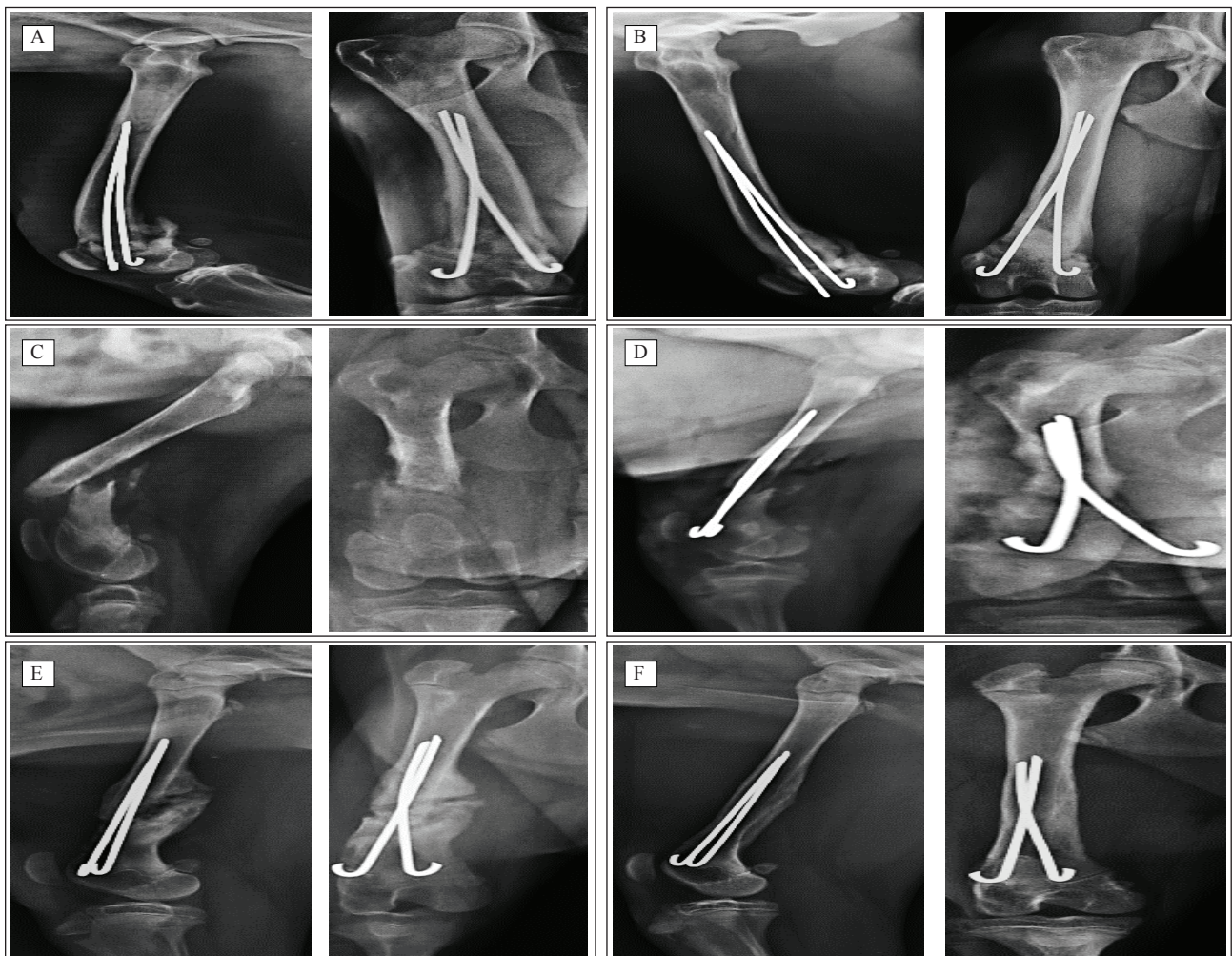


Fig. 2. Representative Radiographs of some cases. A. Callus formation in progress (22nd-day PO); B. Bridging callus at the fracture site (60th day PO); C. Closed complete distal simple extra-articular fracture; D. Fracture repaired by rush pin 2.0×110 mm; E. Callus formation in progress (22nd-day PO); F. Clinical fracture healing and cortical union attained (56th PO).

Table 3. Case details of fracture management in 12 dogs

Case no	Signalment	Type of fracture	Implant used	Size of callus (days)	Clinical outcome
1	Non-descript 4 years Male 18 kgs	Closed complete distal transverse extraarticular fracture	2.0×120mm + 1 full cerclage wiring (22G)	Lost to follow up	
2	Husky 3 months Male 9 kgs	Closed complete distal metaphyseal wedge extraarticular fracture	1.5×70 mm + 1 full cerclage wiring (22G)	Large (21)	Good
3	Pitbull 4 years Female 30 kgs	Closed complete distal simple extraarticular fracture	2.5×120 mm	Minimal (90)	Good
4	German Shephard 8 months Female 17 kgs	Closed complete distal simple extraarticular fracture	2.0×110 mm	Minimal (60)	Excellent
5	Non-descript 4.5 months Male 14 kgs	Closed complete distal simple extraarticular fracture	2.0×120 mm	Lost to follow up	
6	German Shephard 3 months Female 5.4 kgs	Closed complete distal simple extraarticular fracture	1.5×80 mm	Moderate (44)	Excellent
7	Pomerian 3months Male 5.4 kgs	Closed complete distal simple extraarticular fracture	1.5×60 mm	Minimal (56)	Excellent
8	Non-descript 7 months Male 8 kgs	Closed complete distal simple extraarticular fracture	2.0×90 mm	Lost to follow up	
9	Non-descript 5 months Female 4.1 kgs	Closed complete distal simple extraarticular fracture	1.5×60 mm	Minimal (63)	Good
10	Non-descript 2 months Female 3 kgs	Closed complete distal simple extraarticular fracture	1.5×50 mm	Lost to follow up	
11	Pitbull 5 months Female 9.8 kgs	Closed complete distal simple extraarticular fracture	2.0×100mm	Large (25)	Excellent
12	Non-descript 3 months Female 5.4 kgs	Closed complete distal simple extraarticular fracture	1.5×50mm	Moderate (63)	Excellent

Note: Level of fixation was good exception case no.3 where it was fair.

for 8 out of 12 cases at different time intervals. Case details of fracture management in 12 dogs is given in Table 3. The radiographs taken on the final day of reappraisal (Mean days=52.75) showed good to excellent fracture fixation with no change in implant position at the fracture site in any of the cases.

Large amount of callus formation was seen around 21-25th day PO, which minimised with time at an interval of around 44 – 63rd post-operative day in most of the cases. By day 21st postoperatively, 6 animals showed normal weight bearing on the affected limb and normal gait. Two cases showed normal weight bearing on the affected limb but walked with a slight limp. All the 8 dogs showed normal gait without any limping by their last reappraisal day. Present results also correspond to that of Libardoni *et al.* (2018). Banimehdi *et al.* (2022) compared 3 methods for the management of femur fractures and reported earlier clinical fracture union and normal weight bearing on the affected limb when rush pins were used. There was no implant related complication noticed throughout the present study.

SUMMARY

Supracondylar femur fracture in twelve dogs were managed using rush pinning technique. Post-operative radiographs displayed good anatomical alignment and reduction of fracture fragments without any pin migration. All the eight dogs showed normal gait without any limp on last reappraisal day. Rush pinning yielded good clinical outcomes in the management of supracondylar femur fractures with minimum complications.

REFERENCES

- Banimehdi P, Nourbakhsh M, Ahmadi M and Dehkordi R S. 2022. Comparison of three methods of fixing femur in Salter harris fracture in dog. In: The 2nd Regional Conference on Cow Comfort & Lameness, 18-20 July 2022, University of Tehran, Iran P. 270.
- Campbell J R. 1976. The technique of fixation of fractures of the distal femur using Rush pins. *Journal of Small Animal Practice* 17(5): 323–29.
- Fox S M, Bray J C, Guerin S R and Burbridge H M. 1998. Antebrachial deformities in the dog: Treatment with external fixation. *Journal of Small Animal Practice* 36: 315–20.

- Gilmore D R. 1998. Application of lag screw. *Compendium on Continuing Education for the Practising Veterinarian* **5**: 217.
- Johnson K A. 2014. *Piermattei's atlas of surgical approaches to the bones and joints of the dog and cat*. Saunders, Philadelphia. pp 304–07.
- Libardoni R D N, Costa D D, Menezes F B, Cavalli L G, Pedrotti L F, Kohlrausch P R and Silva M A M. 2018. Classification, fixation techniques, complications and outcomes of femur fractures in dogs and cats: 61 cases (2015-2016). *Ciência Rural* **48**.
- McCartney W T. 1998. Use of modified acrylic external fixator in 54 dogs and 28 cats. *Veterinary Record* **143**: 330–34
- Zargar M I. 2021. 'Clinical appraisal of condylar and supracondylar fracture management in dogs'. 'M.V.Sc. Thesis.' Department of Veterinary Surgery and Radiology, CSK Himachal Pradesh Krishi Vishvavidyalaya, Palampur, India.