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SN Kadam

M.V.Sc. Scholar, Department of
Veterinary Surgery & Radiology,
KNP College of Veterinary Science,
Shirwal, Satara, MAFSU,
Maharashtra, India

VM Salunke

Professor and Head, Department of
Veterinary Surgery & Radiology,
KNP College of Veterinary Science,
Shirwal, Satara, MAFSU,
Maharashtra, India

SA Chauhan

Professor, Department of
Veterinary Surgery & Radiology,
KNP College of Veterinary Science,
Shirwal, Satara, MAFSU,
Maharashtra, India

SM Agivale

Assistant Professor, Department of
Veterinary Surgery & Radiology,
KNP College of Veterinary Science,
Shirwal, Satara, MAFSU,
Maharashtra, India

SN Jadhav

Associate Professor, Department of
Veterinary Biochemistry, KNP
College of Veterinary Science,
Shirwal, Satara, MAFSU,
Maharashtra, India

HP Aithal

Principal Scientist and Station
Head, ICAR, TEC – IVRI
Shivajinagar, Pune, Maharashtra,
India

VG Nimbalkar

Farm manager, LFC, KNP College
of Veterinary Science, Shirwal,
Satara, MAFSU, Maharashtra,
India

Corresponding Author:

VM Salunke

Professor and Head, Department of
Veterinary Surgery & Radiology,
KNP College of Veterinary Science,
Shirwal, Satara, MAFSU,
Maharashtra, India

Comparative evaluation of locking T-plate and epoxy external fixator for management of distal radius-ulna fracture in dog

SN Kadam, VM Salunke, SA Chauhan, SM Agivale, SN Jadhav, HP Aithal and VG Nimbalkar

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Abstract

The present study evaluated and compared the clinical efficacy of locking T-plate fixation and external skeletal fixation for distal radius-ulna fractures in dogs. Sixteen dogs with distal radius-ulna fractures were randomly allocated to two equal groups of eight. Group I was treated with locking T-plate fixation, while Group II was managed with external skeletal fixation using K-wires. Detailed clinical, haematological, biochemical, physiological, and radiographic evaluations were performed pre-operatively and on post-operative days 15, 30, and 60. Both groups showed stable fixation and excellent fracture healing. However, functional recovery of the limb was markedly superior in Group I. The mean lameness scores decreased significantly faster in the T-plate group compared to the ex-fix group. Radiographically, Group I exhibited primary bone healing with minimal callus, whereas Group II showed secondary healing with moderate to exuberant periosteal callus formation at pin-bone interfaces. Haematological and biochemical parameters remained within normal limits, with no significant differences between groups. External fixation was associated with higher soft-tissue morbidity from multiple pin placements, pin-tract discharge and infection. Persistent lameness was attributed to excessive periosteal callus exerting pressure on surrounding soft tissues. The study concluded that locking T-plate fixation provided superior stability, a significantly faster return to normal limb function, and fewer complications than external skeletal fixation. Therefore, locking T-plate fixation can be recommended as the preferred method for distal radius-ulna fractures in dogs.

Keywords: Dog, Locking T-plate, external skeletal fixation, distal radius-ulna, periosteal callus, bone healing

1. Introduction

Among the long bones of the appendicular skeleton, the radius is the main weight-supporting bone of the forelimb with the least amount of soft tissue covering. The distal third of the radius and ulna is the most prevalent fracture site, accounting for approximately 85% of radial fractures in canines (Harasen, 2003b)¹⁸. Distal third fractures of the radius present significant challenges in orthopaedic management due to their anatomical proximity to the radiocarpal joint, the limited bone stock available for stable fixation, and the heightened risk of physal injury in skeletally immature canines. The standard bone plate commonly used to stabilise radial fractures has limitations in fixing fractures in the lower third of the bone due to the small bone segment, making proper alignment difficult. The widened part of the T-plate helps by allowing more screws at the bone ends, ensuring strong fixation. T-plating reduces complications like infection, needs less aftercare, and promotes faster healing (Balfour *et al.*, 2000)⁶. ESF is a valuable minimally invasive method for managing radial fractures (Rudd and Whitehair, 1992)³¹.

2. Materials and Methods

The study was conducted on 16 clinical cases of distal radius-ulna fractures in dogs, irrespective of age, breed and sex. These cases were presented at the Veterinary Clinical

Complex of Krantish Nana Patil College of Veterinary Science, Shirwal, and the District Veterinary Polyclinic, Aundh, Pune. The study spanned one year, from March 2025 to February 2026. All 16 cases were randomly divided into two groups. In the first group, distal third fractures of the radius-ulna were selected for stabilisation using a Locking T-plate, and in the second group, an epoxy-pin external skeletal fixator was used. The detailed history of cases and fracture type is shown in Table 1. All animals underwent thorough

clinical, physical, and radiographic evaluations on days 0, 15, 30, and 60 postoperatively to monitor fracture healing progression. Blood samples were collected on day 0 (preoperative) and then on days 15, 30, and 60 after surgery for haemato-biochemical evaluation and to rule out any underlying pathological conditions. Similarly, a clinical examination was performed to assess soft-tissue damage, associated injuries, fracture-site infection and lameness.

Table 1: Signalment, aetiology and type of fracture in dogs

	Case No.	Breed	Sex	Age(M)	W(kg)	Cause	Type	FC	Limb involved
Group I	1	Mongrel	M	24	23	AA	C	SO	R
	2	Mongrel	M	12	18	AA	S	SO	R
	3	Pitbull	F	18	22	AA	S	T	L
	4	Mongrel	F	10	15	High fall	C	T	L
	5	Labrador Retriever	M	36	30	Unknown	S	T	R
	6	Mongrel	M	16	21	AA	S	T	L
	7	Indian Spitz	M	20	10	High fall	S	T	R
	8	Mongrel	M	22	20	AA	S	T	R
Group II	9	Mongrel	F	18	21	AA	S	T	L
	10	Mongrel	M	12	18	High fall	S	T	R
	11	Doberman	F	16	20	AA	C	LO	R
	12	Mongrel	M	24	19	High fall	S	T	R
	13	Mongrel	M	15	16	Unknown	S	T	R
	14	Mongrel	M	16	15	High fall	S	T	R
	15	Indian Spitz	M	18	10	AA	S	T	L
	16	Mongrel	M	25	20	AA	S	T	L

AA: automobile accident, M: male, F: female, C: compound, S: simple, SO: short oblique, T: transverse, LO: long oblique, R: right, L: left

2.1 Pre-operative preparation and anaesthesia

Preanaesthetic medication was administered using Atropine sulphate (0.04 mg/kg SC), followed 10 minutes later by Xylazine hydrochloride (1.1 mg/kg IM). The animal was kept in a dark area until adequate sedation was achieved (10–15 min). The surgical site was prepared by shaving from above the elbow joint to the metacarpal region for the radius-ulna approach. Preoperative prophylaxis included Amoxicillin-sulbactam (12.5 mg/kg IM) and Buprenorphine (0.02 mg/kg IM). An intravenous line with Ringer's lactate was established.

Anaesthesia was induced with slow IV administration of Midazolam (0.1 mg/kg) followed by Propofol (3–4 mg/kg) to effect. After achieving surgical anaesthesia, endotracheal intubation was performed. The surgical site was aseptically prepared using 5% povidone iodine, the distal limb was covered with sterile gauze, and the limb was draped. Anaesthesia was maintained with incremental IV doses of propofol (0.2–0.3 mg/kg/min) based on intraoperative reflexes (Short and Bufalari, 1999).³³

2.2 Patient positioning and surgical procedure

In both operating procedures (group I and II), the animal was placed in lateral recumbency with the affected limb downward.

Group I

For the open reduction of the radius and ulna, the approach described by Johnson (2014)¹⁹ was followed, along with the standard surgical technique of plate fixation. The plate was contoured to match the natural cranial bow of the distal radius. It was first positioned and fixed on the distal fragment, then on the proximal fragment with one appropriately sized screw after proper alignment. All remaining screws were then fixed properly. In dogs where the bone was not wide enough to accommodate the entire T-portion, both lateral screws of

the T-head were drilled slightly obliquely towards the middle screw.

Group II

For bilateral multiplanar fixation, the technique of Kumar *et al.* (2012)²³ was employed. Fracture reduction was achieved by closed or open methods with near-anatomical alignment. Two K-wires were placed in the radius-ulna in different planes, one caudo-medial to cranio-lateral and the other cranio-medial to caudo-lateral, maintaining a 60°–90° angle. In the metacarpals, one or two horizontal (medio-lateral) wires (1.5 mm) were inserted in a single plane. K-wires (1.5–2.0 mm) were drilled using a low-speed electric drill (250 rpm) with continuous saline irrigation to prevent thermal necrosis, while maintaining traction and countertraction. Wires were crossed at a minimum of two levels (two sets) in both fragments; in small distal fragments, a single-level (one set) configuration was used with additional stabilization by one or two 1.5 mm horizontal metacarpal wires, forming a hybrid construct. After insertion, all wires were bent (~2 cm from the skin) toward the fracture site, and wires in the same plane were temporarily connected using adhesive tape to form a scaffold of connecting bars. In the multiplanar construct, additional wires served as connecting rods, linking the proximal and distal ends of bent wires on both medial and lateral aspects. Following scaffold formation, fracture alignment was verified, and Epoxy resin was applied.

2.3 Post-operative care

In Group I, the operated limb was supported with a modified Robert Jones bandage incorporating craniocaudally placed bamboo splints for 10 days, with dressing changes on alternate days, and movement restriction was advised for 15 days. DeCamp *et al.* (2016)¹⁴ recommended modified Robert Jones bandaging for 3–5 days post-internal fixation to minimize swelling and pain, while El-Shafey *et al.* (2022)¹⁵

advocated its continuation for up to one week postoperatively. In Group II, the wire-skin interface was cleaned daily with 5% povidone-iodine. All dogs in both groups received a broad-spectrum antibiotic, amoxicillin-clavulanic acid (12.5 mg/kg BID), and an anti-inflammatory, carprofen (4 mg/kg OD), administered orally for 5 days.

2.4 post-operative evaluation

The affected limbs of all animals were evaluated on the 15th, 30th, and 60th follow-up days for wound condition, weight-bearing, and angulation, as well as lameness, using the grading system developed by Anderson *et al.* (2002).⁵

3. Results and Discussion

The study showed that distal third radius-ulna fractures were more common in males (75%) and mongrels (68.75%), with automobile accidents as the main cause (56.25%). They were mostly simple (closed) fractures (81.25%) with a transverse configuration (81.25%). (Aithal *et al.*, 1999; Rani *et al.*, 2004; Parent *et al.*, 2017; Aikawa *et al.*, 2018)^{4,29,28,3}

A total of 16 dogs (fresh cases) of different breeds were operated. The mean animal weight was 18.62 kg, with a range of 10-30 kg, and the mean age was 18 months, with a range of 10 to 36 months. The recorded injury-to-presentation interval was 1-4 days. In Group I, all fractures were stabilized using a T-plate with cortical and cancellous screws, ensuring fixation with at least two screws in the distal diaphyseal fragment in

addition to three screws in the T-head. No supplementary ulnar fixation with an intramedullary pin was performed. (DeCamp *et al.*, 2016)¹⁴. In Group II, fractures were stabilized using appropriately sized K-wires, with the number of pins in the distal fragment determined by fracture location and the available space within the short distal fragment.

3.1 Intra-operative observations

During surgery, various observations like the extent of soft tissue damage (mild, moderate and marked), extent of overriding of main segments (mild, moderate and marked), ease of fracture reduction (easy, moderate and difficult), fixation technique and intra-operative stability (stable and unstable) were recorded in both groups and these observations along with length of distal fragment and number of screws/K-wires drilled are listed in table 2.1 and table 2.2

Fracture repair techniques were satisfactory in all cases across both groups, with excellent intraoperative implant stability; the plate length, number of screws in each fragment, and number of K-wires per fragment were deemed adequate. In Group I, no technical difficulties were encountered apart from fracture reduction, whereas in Group II (external fixation), maintaining precise alignment of the reduced fragments during drilling posed challenges, likely due to drilling forces and the need for continuous traction-countertraction by the assistant.

Table 2.1: Intra-operative findings of group I

Case No.	Soft tissue damage	Overriding	Reduction	Length of the distal fragment (cm)	Type of implant	No. of screws	Intra-operative stability
1	Moderate	Moderate	Difficult	4.69	7-holed locking T- plate	8 (P4,D2,T ₂)	Stable
2	Mild	Moderate	Moderate	4.95	7-holed locking T- Plate	9 (P4,D2,T ₃)	Stable
3	Moderate	Nil	Easy	5.12	7-holed locking T- Plate	8 (P3,D2,T ₃)	Stable
4	Mild	Nil	Easy	4.88	7-holed locking T- Plate	8 (P3,D2,T ₃)	Stable
5	Mild	Nil	Easy	4.98	7-holed locking T- Plate	7 (P3,D1,T ₃)	Stable
6	Mild	Mild	Easy	4.24	7-holed locking T- Plate	10 (P5,D2,T ₃)	Stable
7	Mild	Moderate	Moderate	4.5	6-holed locking T- Plate	8 (P3,D2,T ₃)	Stable
8	Mild	Moderate	Moderate	4.15	7-holed locking T- Plate	9 (P3,D3,T ₃)	Stable

P: proximal, D: distal, T: T-head

Table 2.2: Intra-operative findings of group II

Case No.	Soft tissue damage	Overriding	Reduction	Size of the distal fragment (cm)	Type of Implant	No. of K-wires	Intra-operative stability
1	Mild	Mild	Moderate	1.12	1.5mm to 2mm K-wire	10 (P6,D2,M2)	Stable
2	Mild	Nil	Easy	4.95	1.5mm to 2mm K-wire	7 (P4,D2,M1)	Stable
3	Marked	Moderate	Difficult [OR]	3.55	1.5mm to 2mm K-wire	7 (P4,D2,M1)	Stable
4	Mild	Mild	Easy	2.95	1.5mm to 2mm K-wire	10 (P6,D2,M2)	Stable
5	Mild	Moderate	Moderate	5.12	1.5mm to 2mm K-wire	10 (P8,D2,M0)	Stable
6	Mild	Moderate	Moderate	5.08	1.5mm to 2mm K-wire	9 (P6,D2,M1)	Stable
7	Moderate	Moderate	Moderate [OR]	4.25	1.5mm to 2mm K-wire	11 (P6,D4,M1)	Stable
8	Moderate	Moderate	Moderate [OR]	2.17	1.5mm to 2mm K-wire	9 (P6,D2,M1)	Stable

OR: open reduction, P: proximal, D: distal, M: metacarpal

Table 3: Mean $\pm$ SE values of haemato-biochemical attributes of dogs of Group I and II

Groups	Blood parameters	Days (pre and postoperative)			
		zero	15 th	30 th	60 th
Group I	Hb (g/dL)	11.85 $\pm$ 0.52	12.20 $\pm$ 0.51	12.56 $\pm$ 0.51	12.90 $\pm$ 0.50
	PCV (%)	35.81 $\pm$ 1.32	36.24 $\pm$ 1.33	36.72 $\pm$ 1.32	37.16 $\pm$ 1.33
	TEC (10 ⁶ / μ L)	5.04 $\pm$ 0.06	5.01 $\pm$ 0.11	5.07 $\pm$ 0.08	5.02 $\pm$ 0.08
	TLC (10 ³ / μ L)	16.56 $\pm$ 0.44	14.42 $\pm$ 0.38	11.21 $\pm$ 0.25	11.00 $\pm$ 0.23
	Neutrophils (%)	78.63 $\pm$ 1.07	68.63 $\pm$ 0.42	66.50 $\pm$ 0.87	66.25 $\pm$ 0.53
	Lymphocytes (%)	15.63 $\pm$ 0.89	25.88 $\pm$ 0.74	25.50 $\pm$ 0.57	26.50 $\pm$ 0.53
	Monocytes (%)	1.38 $\pm$ 0.42	2.15 $\pm$ 0.40	3.38 $\pm$ 0.18	2.95 $\pm$ 0.30
	Eosinophils (%)	3.88 $\pm$ 0.58	4.00 $\pm$ 0.46	4.00 $\pm$ 0.63	3.63 $\pm$ 0.60
	Platelet (10 ³ / μ L)	2.74 $\pm$ 0.21	2.89 $\pm$ 0.22	3.10 $\pm$ 0.21	3.39 $\pm$ 0.21

	ALP (IU/L)	101.10 ± 1.20	113.47 ± 2.33	124.20 ± 1.40	100.90 ± 0.81
	Calcium (mg/dL)	10.01 ± 0.05	10.28 ± 0.05	10.55 ± 0.04	9.75 ± 0.09
	Phosphorus (mg/dL)	4.05 ± 0.13	4.53 ± 0.14	4.63 ± 0.12	4.11 ± 0.06
Group II	Hb (g/dL)	11.71 ± 0.48	12.04 ± 0.48	12.43 ± 0.48	12.75 ± 0.48
	PCV (%)	35.16 ± 1.38	35.61 ± 1.38	36.08 ± 1.38	36.53 ± 1.38
	TEC (10 ⁶ /μL)	5.05 ± 0.06	5.02 ± 0.11	5.00 ± 0.08	5.10 ± 0.10
	TLC (10 ³ /μL)	16.61 ± 0.39	14.27 ± 0.32	11.03 ± 0.27	10.55 ± 0.14
	Neutrophils (%)	79.25 ± 1.03	69.25 ± 0.73	67.63 ± 0.80	67.13 ± 0.81
	Lymphocytes (%)	15.13 ± 0.40	24.50 ± 0.65	23.13 ± 1.10	26.00 ± 1.02
	Monocytes (%)	1.38 ± 0.53	1.63 ± 0.46	3.25 ± 0.25	2.00 ± 0.57
	Eosinophils (%)	3.88 ± 0.35	3.88 ± 0.40	4.80 ± 0.52	4.38 ± 0.32
	Platelet (10 ³ /μL)	3.51 ± 0.27	3.05 ± 0.21	3.21 ± 0.25	3.51 ± 0.27
	ALP (IU/L)	99.45 ± 0.82	108.80 ± 1.50	120.17 ± 1.56	99.12 ± 0.74
	Calcium (mg/dL)	9.94 ± 0.06	10.20 ± 0.06	10.50 ± 0.06	9.71 ± 0.09
	Phosphorus (mg/dL)	4.09 ± 0.12	4.51 ± 0.16	4.73 ± 0.12	4.10 ± 0.07

The variations in haemoglobin, PCV, TEC, eosinophil, basophil and monocyte counts were not statistically significant and remained within normal physiological ranges (Table 3). These findings are consistent with those reported by Pardeshi (2007)²⁷, Julie (2005)²¹ and Chaurasia *et al.* (2019).¹² Both groups showed a significant decline in leukocyte counts from day zero to the 15th day and further on the 30th day ($P < 0.05$). The decreasing trend in leukocyte count after surgery indicates the resolution of inflammation and surgical stress as fracture healing progressed as suggested by Mohan *et al.* (2024).²⁶ Additionally, after fracture fixation, a sharp and statistically significant decrease in neutrophil percentage and a significant increase in lymphocyte count were observed by the 15th postoperative day in both groups. Sastry (1998)³² and Benjamin (1998)⁷ also reported that neutrophilia and lymphocytopenia may be responses to stress and inflammation.

The values of calcium, phosphorus, and ALP showed significant variation within each group but remained within normal physiological limits at all stages for both groups. No statistically significant difference was observed between the two groups at any observation point ($p > 0.05$), indicating that biochemical parameter values did not depend on the fixation technique used.

Serum calcium levels gradually and significantly increased until the 15th postoperative day, peaked at day 30, and then returned close to preoperative levels by day 60. The temporary peak in serum calcium at day 30 suggests increased osteoblastic activity and mineralisation during callus formation, while the decrease by day 60 indicates the restoration of calcium homeostasis. These results align with findings by Singh *et al.* (1976)³⁴ and Chandy (2000).¹¹ However, Kumar *et al.* (1992)²⁴ observed a significant drop in serum calcium during the 21-day healing period in fractured dogs. Serum ALP activity showed a short-term increase, peaking at 30 days and then declining, which is linked to increased osteoblast proliferation at the fracture site, while the subsequent decline points to normalisation of bone turnover as noted by Julie (2005)²¹ and Pardeshi (2007).²⁷

Similarly, a notable increase was observed by the 15th postoperative day, reaching its peak on the 30th day. By the 60th postoperative day, the levels had returned close to preoperative values. This pattern of gradual rise with a peak at 30 days followed by a decline indicates increased osteoblastic activity and phosphorus mobilisation for mineralisation of the developing callus during the reparative phase of fracture healing. (Singh *et al.*, 1976; Chandy, 2000; Pardeshi, 2007)^{34,11,27}

3.2 Post-operative observations

a) Wound healing

In Group I, mild postoperative inflammatory swelling was observed for 3-4 days and subsided gradually; suture removal due to self-mutilation occurred in two cases on day 7, and serous wound discharge persisted for 3-5 days in three cases. In Group II, mild swelling was similarly noted for 3-4 days; however, marked and prolonged limb soreness was evident on palpation, with mild serous discharge present at the pin-skin interface in all cases. Similarly, Butterworth (1993)¹⁰ reported light discharge from pin tracts, which typically formed a crust.

b) Weight bearing and angulation

Weight-bearing during ambulation was assessed at follow-up, with additional information obtained telephonically from owners at regular intervals. Limb angulation was evaluated clinically by comparing the conformation and paw position of the affected limb with the contralateral limb in a standing posture.

In Group I, 7 dogs attained partial to complete weight-bearing by the 4th postoperative day, with T-plate fixation facilitating earlier limb use compared to external fixation. Braden and Brinker (1973)⁸ reported restoration of normal limb function within approximately 3.5 weeks following bone plating, while Lakshmi *et al.* (2007)²⁵ observed partial weight-bearing by day 2 and complete weight-bearing within one week postoperatively.

In Group II, most dogs exhibited irregular weight-bearing and regained complete limb function only after removal of the external fixation assembly; a cranial bow distal to the carpal joint was observed in one case, without affecting weight-bearing.

c) Lameness grading

Lameness was graded using the scoring system described by Anderson *et al.* (2002).⁵ The score ranges from 0 to 5, with 0 indicating normal limb function and 5 indicating consistent non-weight-bearing lameness.

By day 60, Group I exhibited near-complete recovery (mean lameness score: 0.38 ± 0.37) compared to Group II (1.63 ± 0.56), with a significant intergroup difference ($p < 0.05$), indicating faster functional restoration with T-plate fixation. This reflects superior stability, load sharing, and early osteosynthesis with minimal soft-tissue irritation in Group I (Hamilton and Langley-Hobbs, 2005; Lakshmi *et al.*, 2007).^{17,25} In contrast, Excessive periosteal callus formation at the pin-bone interface, frequently reported with external

skeletal fixation, appears to have exerted mechanical pressure on the surrounding soft tissues, tendons, and neurovascular structures in the distal antebrachium. This chronic irritation and soft-tissue impingement likely contributed to persistent pain and delayed functional recovery in group II. These findings were similarly explained by Johnson *et al.* (1996)²⁰ and Chitty *et al.* (2025).¹³

Table 4: Day-wise classification of lameness score

Groups	Case No.	Days post-operative			
		Pre-op	15	30	60
I	1	5	5	4	3
	2	5	0	0	0
	3	5	0	1	0
	4	5	5	1	0
	5	5	0	0	0
	6	5	4	1	0
	7	5	1	0	0
	8	5	1	0	0
II	1	5	5	4	3
	2	5	5	5	0
	3	5	5	5	5
	4	5	5	3	1
	5	5	3	1	1
	6	5	3	1	1
	7	5	4	3	1
	8	5	4	3	1

d) Radiographic evaluation

Radiographs were obtained immediately postoperatively and on days 15, 30, and 60 to assess alignment, callus formation, and implant status. Immediate postoperative radiographs in Group I showed satisfactory reduction with near-anatomic alignment, good cortical contact, and stable implants in all 8 cases. At day 15, implant stability and fragment apposition were maintained; one dog showed bridging periosteal callus at the ulna, while another exhibited periosteal reaction likely due to overlengthened screws, with fracture lines still visible in all cases. By day 30, increased radiopacity indicated callus formation in most cases (except one), although fracture lines persisted, suggesting ongoing healing; the case with overlengthened screws showed enhanced periosteal reaction. By day 60, complete union with disappearance of the fracture line was observed in 5 cases, while 2 dogs retained faint fracture lines and one showed minimal periosteal callus with a markedly reduced interfragmentary gap. These findings align with those reported by Buchoo and Sahay (1987).⁹

One dog was followed for a total of 150 days before implant removal, following successful visualisation of radial union on radiographs. Unfortunately, 15 days after implant removal, the same dog sustained a re-fracture at the same site of the previous fracture due to a fall. Balfour *et al.* (2000)⁶ reported radiographic healing within 4-12 weeks (mean 8 weeks), while Adamiak and Aleksiewicz (2006)¹ observed complete healing by 10 weeks postoperatively.

In group II radiographs at day 15, confirmed implant stability, fragment apposition, and early periosteal reaction indicating callus initiation. By day 30, the fracture line was reduced but still visible, with moderate-to-severe periosteal reaction at pin insertion sites. By the 60th day, the fracture line was minimal, and the gap was filled with callus. A moderate-to-severe periosteal reaction persisted at the pin-bone interface. Similar findings were observed by Aikawa *et al.* (2019)², with all fractures healing within a median of 60 days, and the entire ESF being removed after a median of 89 days. At final

follow-up (median 7 months), all dogs had regained normal limb function.

4. Complications

In group I, none of the dogs experienced any hardware-related complications, but one dog developed a delayed union and ultimately re-fractured after implant removal. Delayed union may be attributed to mechanical, biological, or patient factors, as reported by Kaur (2011),²² Fossum (2007),¹⁶ Wagner *et al.* (2004).³⁵

All dogs in group II exhibited minor complications, such as serous discharge from pin tracts, and a few developed pin tract infections which were successfully managed with oral antibiotics and careful cleaning of the pin-skin interface with povidone-iodine. One dog exhibited pin loosening with subsequent frame shifting after 50 days, likely due to omission of connecting rods between planes; similarly, Rovesti *et al.* (2007)³⁰ attributed frame instability to inadequate wire angulation (<60°) due to anatomically constrained regions of bone.

5. Conclusion

Both locking T-plate and epoxy-pin external fixation were effective for distal third radius-ulna fractures, providing comparable stability and healing; however, T-plate fixation led to earlier weight-bearing, fewer complications, and better functional outcomes.

Despite proper alignment, epoxy-pin external fixation resulted in higher morbidity because of pin-related soft tissue irritation and excessive periosteal callus; therefore, locking T-plate fixation can be recommended as the preferred method for these fractures in dogs.

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Conflict of Interest

Not available

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