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Repair and rehabilitation concept of a five-day-old radius fracture in a foal

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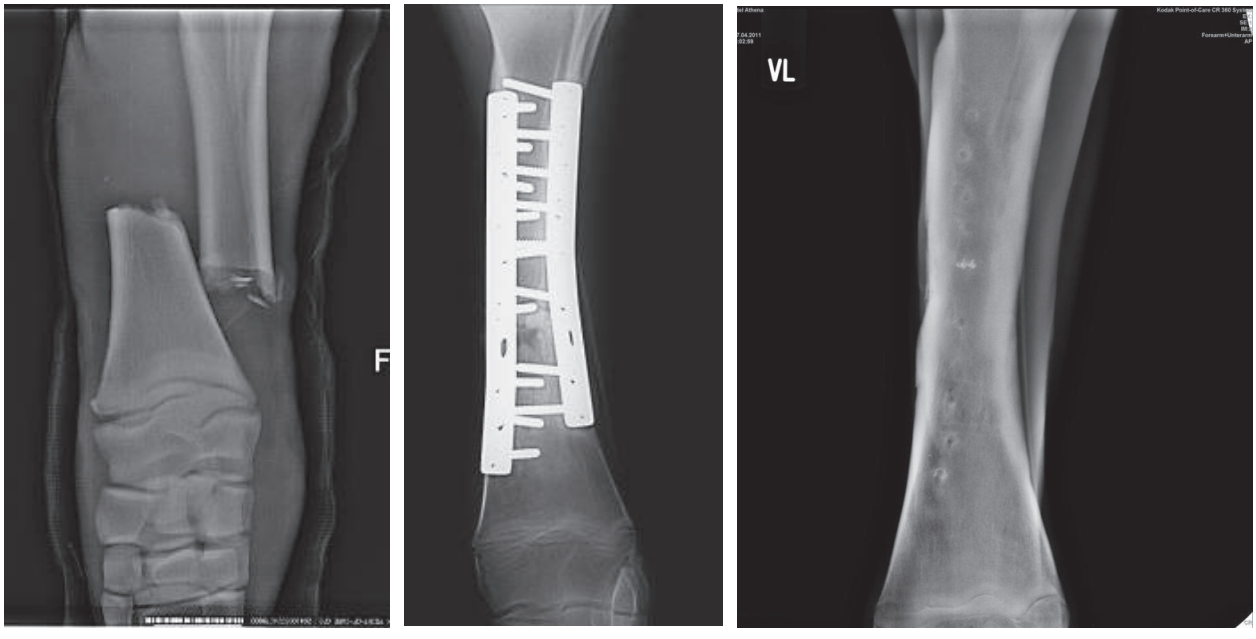
A three-month-old Trakehner filly was referred for a five-day-old fracture of the left radius. On admission, the filly's left forelimb was in a full limb sleeve cast and non-weight bearing. Radiographic examination of the left radius revealed a complete transverse displaced diaphyseal fracture (Fig. 1A). Surgical fracture repair was requested by the owner. The filly received systemic antibiotics, non-steroidal antiphlogistic drugs (NSDs) and gastroprotective drugs. She was put in general anaesthesia and the left forelimb was put in extension with a hoist and fracture reduction was monitored with fluoroscopy. The surgical approach was chosen between the extensor carpi radialis muscle and the common digital extensor muscle. Extensive hematoma and muscle trauma were found at the surgical site. After fracture-end repositioning a cortical bone defect (about 0.5 x 0.4cm) at the fracture site and at the dorsolateral aspect of the radius was visible. A 4.5 bDCP (10 holes) (Synthes GmbH, Umkirch, Germany) was contoured and applied as compression-plate on the cranial aspect of the radius (Fig. 1B). A second 4.5 bDCP (10 holes) was contoured and applied, in a slightly staggered fashion as neutralization plate on the lateral aspect of the radius (Fig. 1B). A cancellous bone graft was obtained from the left tuber coxae and was applied in the cortical bone defect. A Rédon drain was placed in the wound and wound closure was performed in a routine method. A full-limb sleeve cast was applied to the left forelimb in an extended position and the filly recovered from general anaesthesia without complications. The postoperative medication consisted of systemic broad spectrum antibiotics, NSDs and gastroprotectiv drugs. The drain was removed 5 days after surgery. The limb was immobilized with a sleeve-cast and a full limb Robert Jones bandage, respectively, with decreased diameter up



A B C

Figure 1: Radiographic evaluation of the left radius. A) Radius fracture at admission to the Clinic. A closed, complete displaced transverse diaphyseal fracture was noted. B) Internal fracture fixation. The region of the cortical bone defect is less radiodense at 9 weeks post surgery. C) Craniocaudal projection of radius, 7weeks after removal of the cranial plate.

to 3 months after surgery. Foal-shoes with palmar extensions (Dallmer-Durchtrittigkeitsschuh, Dallmer GmbH & Co KG, Salzhausen-Putensen, Germany) were applied to both forelimbs at 3 months post surgery. The lateral DCP was removed 5.5 months and the cranial DCP was removed 7 months after surgery (Fig. 1C). Manual flexion and extension of the left limb was started 8 weeks after surgery. Sixteen weeks after surgery a rehabilitation-programme was started, i.e. swim training (100 m to 500 m) combined with hand-walking and longing-exercise on firm surface (5 to 20 min). The follow-up of 11.5 months revealed a clinically sound filly. Although radius fractures due to kicks and traumas are not uncommon in horses and foals (Sanders-Shamis et al., 1986; Fürst et al., 2008), the prognosis for a successful fracture repair outcome ranges from grave to excellent (Sanders-Shamis et al., 1986). In the described case the radius fracture repair had its challenges as the fracture was 5 days old, was associated with an exacerbated soft tissue trauma and the bone showed a large cortical defect. Retraction of the displaced fracture ends beard a major challenge due to the extended fracture-end displacement and the fracture was reduced with the help of a hoist. Usually transverse mid-diaphyseal fractures of the radius in foals require the application of one plate at the tensile side (Schneider et al., 1982; Sanders-Shamis et al., 1986). In the case described two 10-hole 4.5 bDCPs were used at the cranial and lateral aspect of the radius (Schneider et al., 1982), as fracture reduction seemed unstable with only one cranial plate. The surgical approach chosen in the described case provides a good muscle cover for the plates and might have protected the plates in case of a wound dehiscence. The cortical defect at the craniolateral aspect of the radius was filled with an autologous cancellous bone graft with the aim to enhance osteogenesis at the defect site. It has been shown that a full limb immobilization changes the forces acting on the radius, because the elbow cannot be incorporated into the cast (Schneider et al., 1982), thus a full limb immobilization is contra indicated except for fractures of the distal radius. A Robert-Jones bandage associated «tendon laxity» was initially used with palmar extension shoes and physiotherapy. Massage as well as passive and active movement of the affected limb and shoulder are important to increase the muscle tone. Physiotherapy and swimming improved the flexural limb deformity and the foal was able to walk normally within two weeks after having started the programme. Movement, swimming and controlled weight bearing had positive effects on the bone healing process. Complications, as flexural limb deformity and limited fracture healing could be resolved with controlled mobilization, swim training and physiotherapy. Our case shows that in foals even five-day-old closed complete, displaced transverse diaphyseal radius fractures with a cortical defect have a good prognosis if treated by internal fixation combined with an advanced rehabilitation concept.

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