Case Report

Bilateral radial carpal bone luxation and its treatment in a dog

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Abstract: Radial carpal bone luxation is rarely encountered in dogs. A literature review did not reveal any case of bilateral radial carpal bone luxation or its treatment. In the current case study, the process and result of the treatment of a dog with bilateral radial carpal bone luxation, brought to the İstanbul University Faculty of Veterinary Medicine's Department of Surgery is presented. Treatment of luxation was achieved by using screws and cerclage wire. The long-term follow-up of this patient was limited to only 2 months since the dog was not brought back to the clinic.

Key words: Radial carpal bone, luxation, dog

1. Introduction

The fracture, fissure, or luxation of individual canine carpal bones is relatively rare (1–4). There is a very limited number of radial carpal bone luxation cases in dogs and cats in the literature (3,5–7). The canine carpus comprises 7 bones: 3 in the proximal row, the radial (scaphoid), ulnar, and accessory carpal bone; and 4 in the distal row, os carpi radiale I to IV. The radial carpal bone is the largest of the carpal bones and articulates with the distal end of the radius at the proximal surface and with all of the 4 distal carpal bones at the distal surface and laterally with the ulnar carpal bone (8,9). Luxation of the radial carpal bone generally occurs with the overextension of the carpus during extreme limb loading, as a result of a road accident, or when jumping/falling from a height (2). Carpal hyperextension due to axial loading of the joint commonly results in damage to the ligaments and the palmar fibrocartilaginous pad (10). The radial carpal bone rotates 90° around its dorsopalmar and mediolateral axes, which results in the bone orientating so that the medial aspect is farthest proximal, with the convex proximal articular surface facing dorsally accompanied by a rupture of the short radial collateral ligament and dorsal joint capsule. With the exception of one report, all the clinical studies refer to a palmaromedial luxation of the radial carpal bone (5,6,9). In addition, a cadaver study in the case presentation of a dog with dorsomedial radial carpal bone luxation has shown that this can be achieved by transecting one of the oblique or straight components of the short radial collateral ligament, or in other words, by the rupture of this ligament (5).

Severe lameness is present with abduction of the limb and elbow flexion and with unremarkable swelling in the joint. Pain and crepitus can be elicited upon palpation. Closed or open reduction and fixation are described for the treatment (2).

A literature review did not reveal any cases of bilateral radial carpal bone luxation or its treatment. In the present study, the treatment of a dog with bilateral radial carpal bone luxation has been described.

2. Case history

Micha, a 2-year-old, 22-kg female Greyhound, was brought to the clinic with a history of falling from a height the previous day. The patient displayed difficulty in walking and the front legs were observed to be in hyperextension during forced weight-bearing. On palpation, loss of stabilization, varus, pain, and slight swelling in both carpal joints were present, as well as a depression on the proximal aspect of the carpal rows. In radiographic images, bilateral radial carpal bone luxation in the palmaromedial direction and separation of a small bone fragment from the ulna on the proximomedial side of both radial carpal bones was observed (Figure 1). Following the radiographic examination, surgical treatment was performed 3 days after the luxation occurred. The preoperative blood and biochemical profile of the patient was assessed, after which a general anesthesia protocol was initiated with an induction of propofol at a dose of 6–8 mg/kg IV and continued with inhalation anesthesia.

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In the operation, a longitudinal skin incision was made in the interval between os carpi II and III on the frontal surface of both carpal joints. Care was taken to avoid any damage to the accessory branch of v. cephalica antebrachii and superficial branches of the radial nerve during the incision. The dorsomedial aspect of the carpal rows was exposed via blunt dissection. When the carpal rows were palpated proximally, it was seen that the radial carpal bone on either side was not in the correct anatomical position. When palpation was continued in the palmar direction, it was discovered that the radial carpal bone on either side had become wedged in the palmaromedial direction. The joint space in both extended legs was widened using an automatic retractor and the wedged radial carpal bones were returned to their normal anatomical positions using a Hohmann retractor and by moving them dorsally. Fixation was achieved by placing two 3.5-mm-diameter cortical screws approximately 1 cm apart into the distal radius and a 0.3-mm-diameter cerclage wire around a 2.7-mm-diameter cortical screw placed centrally into the radial carpal bone (Figure 2). Surgical wounds in both legs were closed routinely and the front legs were bandaged using synthetic plaster material to remain over a period of 45 days. Postoperatively, ceftriaxone was administered once at a dose of 40 mg/kg IV and meloxicam was given at a dose of 0.2 mg/kg daily on day 1, followed by 0.1 mg/kg daily for
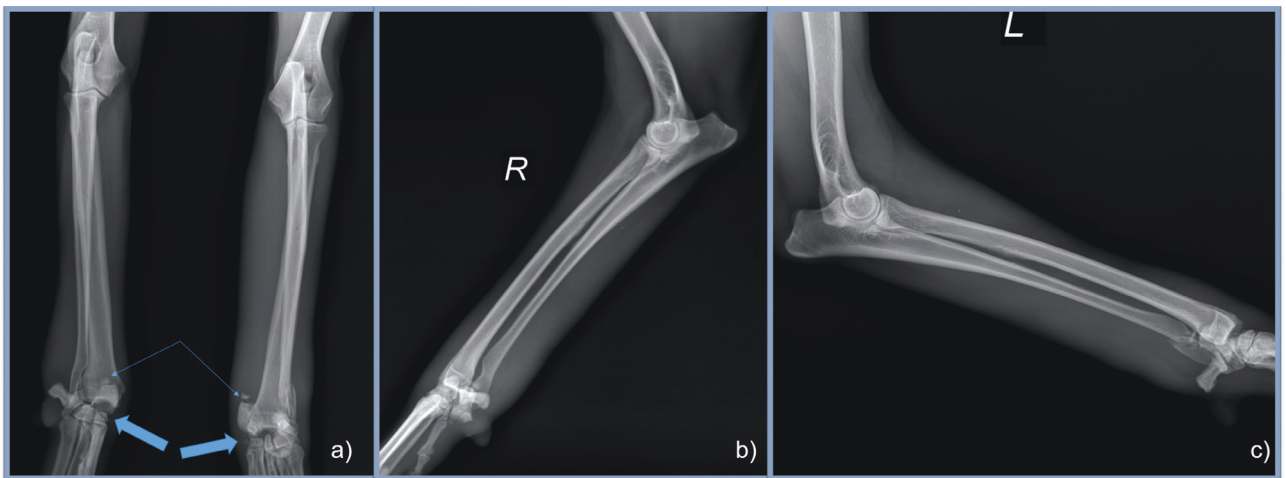

Figure 1. Radiographs taken at the first physical examination: a, Craniocaudal view of bilateral carpal joints. Thin arrows, small fragments from ulna; bold arrows, luxated radial carpal bone. b and c, Mediolateral view of bilateral carpal joints.
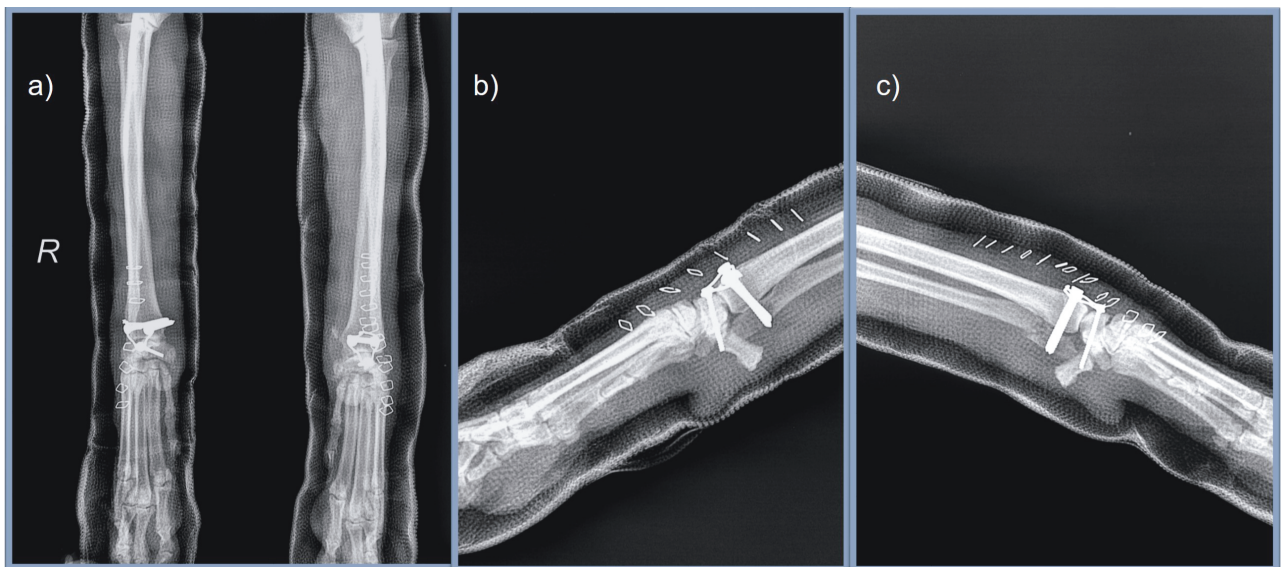

Figure 2. Postoperative: a, craniocaudal; b and c, bilateral mediolateral radiographic views of the carpal joints.

7 days. The patient's owner was advised to bring the dog back to the clinic 10 days after the bandage application for a check-up, suture removal, and bandage renewal. However, the patient was brought back to the clinic 2 months later (Figure 3). In the radiograph taken at 2 months, no deformation was observed in the screws and cerclage wire and there was no loss of stability. Once the bandage was removed, minimal muscle atrophy and extension was observed. The patient was able to comfortably bear weight on both front legs and walked with no problem. Long-term follow-up of this patient was not possible since the dog was not brought back to the clinic.

3. Results and discussion

Based on the studies carried out on cadavers, the palmaroradial luxation mechanism of the os carpi radiale was determined. Palmaromedial luxation occurs as a result of the short radial collateral ligament separating from the joint capsule due to trauma, rupture of the radioulnaris intercarpal ligament, or hyperextension of the carpal joint. These cause the os carpi radiale to create a 90° angle around the dorsopalmar and mediolateral axes and settle palmaromedially. In this position, the luxated os carpi radiale restricts the flexion motion of the carpus and produces carpal varus deviation (2,5,10,11). Loss of stability of the carpal joint to the medial was clearly observed in our case.

In dogs with short radial collateral ligament damage leading to palmaromedial radial carpal bone luxation and given subsequent surgical stabilization, it has been reported that secondary osteoarthritis develops 6–8 weeks after the stabilization, which is thought to be related to subchondral bone or cartilage damage at the time of injury. In this report, there was also a fracture in the ulnar styloid

or ulnar carpal bone due to trauma (6). The fact that small bone fragments had separated from the ulna in both cases suggests that the trauma was of the same kind. Despite the fact that no findings were observed relating to either soft tissue mineralization or secondary degenerative changes in the radiographs obtained 8 weeks postoperatively, due to lack of long-term follow-up of the patients, the authors were in doubt regarding the development of secondary arthritis in the joint.

Among the treatment options, open and closed reduction procedures can be considered since these allow joint movement and successful reduction can be achieved especially within 48–72 h of the trauma (2,5,12). However, following closed reduction, secondary osteoarthritis was observed to develop due to either insufficient soft tissue healing or presence of residual joint instability (5). Even though our patient was operated on within 72 h of the trauma, closed reduction was not considered due to the luxation being bilateral and, therefore, fixation was performed.

Depending on the severity of the osteocartilaginous and soft tissue lesions, total arthrodesis in the carpal joint is considered (5,7). There are internal and external techniques for total arthrodesis to instigate fusion in the radiocarpal, intercarpal, and carpometacarpal joints. In particular, carpal arthrodesis performed using a dynamic compression plate (DCP) is an appropriate choice for the treatment of radial carpal bone luxation (5,13). However, due to financial reasons, arthrodesis was not carried out in either case. In our case, internal fixation using screws and cerclage wire was successful.

It has been concluded that bandage application after surgical stabilization is essential in the treatment of os carpi radiale luxations.
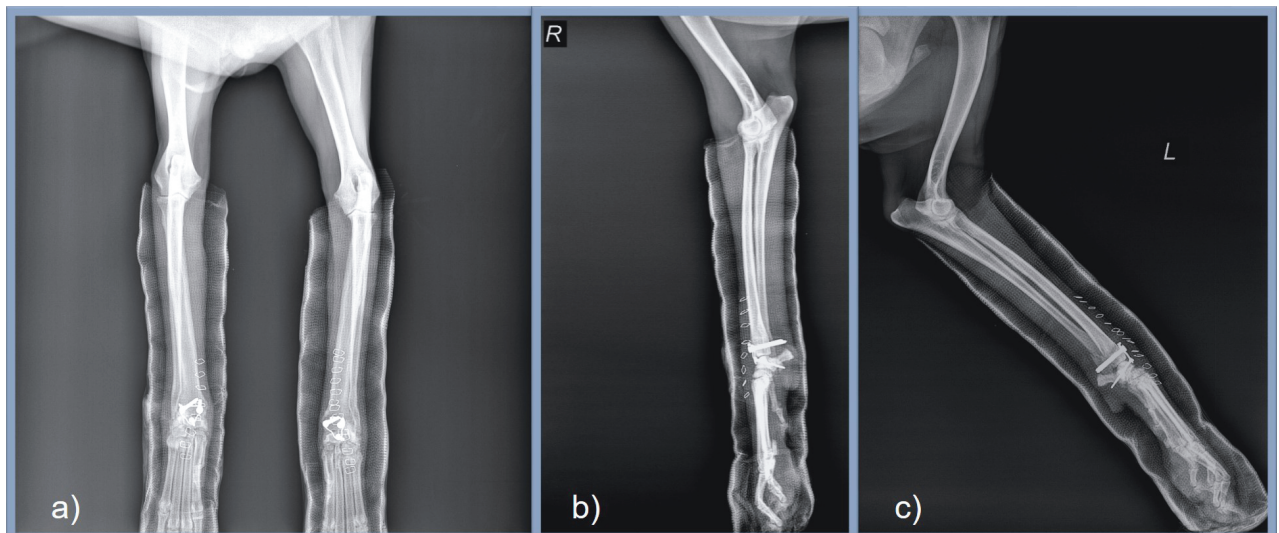

Figure 3. Radiographic view of a, craniocaudal; b and c, bilateral mediolateral carpal joints obtained 2 months after the operation.

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