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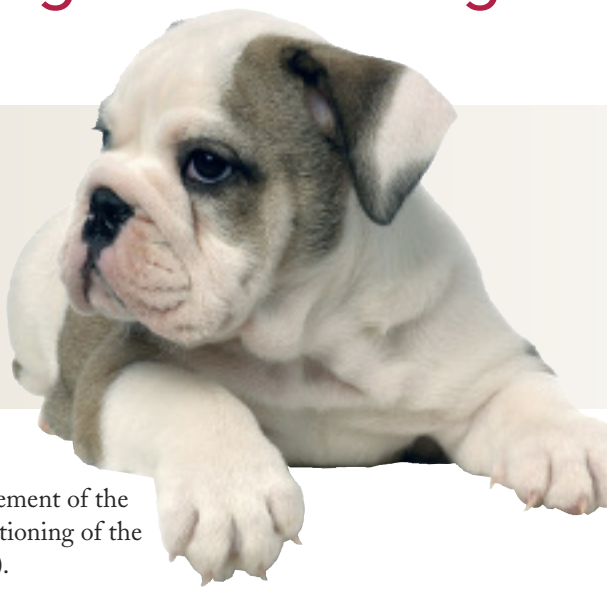
Elbow Pain in a Young English Bulldog



A 3-month-old, 12.4-kg intact male English bulldog was presented for a 2-week history of left forelimb lameness.

HISTORY

The lameness had been present when the puppy was purchased from the breeder 2 weeks prior. The breeder's young daughter had fallen on the dog the night before the owners acquired him; the timing of this event appeared to coincide with the first observed sign of lameness. Over the ensuing 2 weeks, the lameness was persistent but never considered non–weight-bearing. The puppy was reportedly otherwise healthy.

PHYSICAL EXAMINATION

The young dog was alert and responsive despite moderate, weight-bearing lameness of the left forelimb. The left distal antebrachium appeared to possess external torsion and mild valgus. Palpation of the left elbow revealed hard swelling distal to the left humeral epicondyle and elbow effusion. Manipulation of the elbow elicited mild discomfort during both hyperextension and hyperflexion, and decreased range of motion was noted. Physical and neurologic examinations revealed no other abnormalities.

IMAGING

The puppy was sedated with xylazine, glycopyrrolate, and nalbuphine intravenously, and orthogonal radiographs of the left and right antebrachii were obtained. Radiographs of the right radius and ulna were normal. However, radiographs of the left antebrachium revealed caudolateral displacement of the radial head with normal positioning of the humeroulnar joint (**Figure 1**).

CONTINUES

1

Orthogonal radiographs of the left antebrachium showing caudolateral displacement of the radial head

ASK YOURSELF...

- What are the diagnostic differentials for a 3-month-old dog with forelimb lameness associated with elbow pain?
- Is the displacement of the radial head in this case most likely congenital or traumatic in nature?

DIAGNOSIS:
Congenital luxation of the radial head

DIAGNOSIS

Examination of the radiographs suggests congenital caudolateral radial head luxation. Nontraumatic, congenital elbow luxations can be classified into 3 subcategories, depending on which bones are malpositioned.

This case represents a type 1 luxation, in which the radial head is displaced caudolaterally in the absence of humeroulnar incongruity. Types II and III are characterized by luxations of the ulna or of both the radius and the ulna, respectively.

The apex of the deformity, or the center of rotation of angulation (CORA), is at the approximate midpoint of the diaphysis of the radius. The radial head is slightly misshapen from the contact pressure of the humeral capitulum (**Figure 2**).

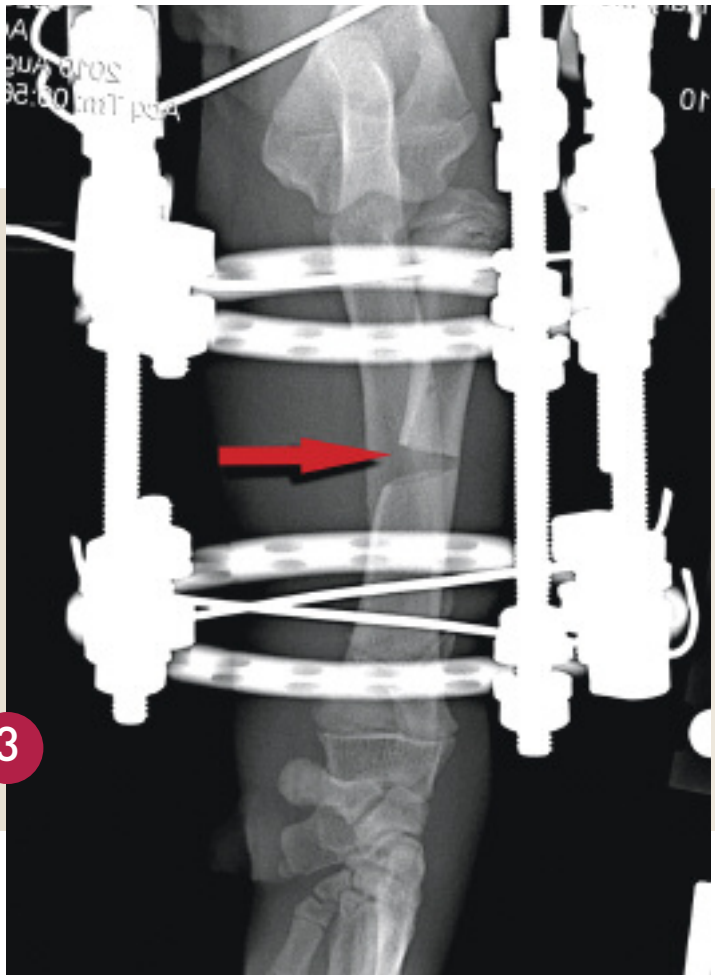
TREATMENT

A variety of treatment options have been described for congenital radial head luxations, including radial head resection, corrective osteotomies, radial head transposition, transarticular fixation, and conservative management.

In this case, the treatment chosen was a partial closing wedge osteotomy (based on the CORA) and a gradual angular correction of the proximal radius via tensioning of a single olive wire positioned within a circular ring fixator, without the performance of an arthrotomy (**Figure 3**).

This procedure first required temporary proximal distraction of the humerus using a transarticular extension of the fixator to provide clearance for

2 Frontal plane radiograph of the left antebrachium. Green lines represent joint orientation lines; red lines represent the anatomic axes of the proximal and distal segments of the radius. Whereas a normal canine radius should possess a single anatomic axis in the frontal plane, the intersection of these 2 axes demonstrates the location of the apex of the deformity, also referred to as the center of rotation of angulation. Note the misshapen radial head that is caudolaterally displaced (**white arrow**).



3 Frontal plane radiograph of the left antebrachium immediately after surgery showing the placement of the circular ring fixator on the limb with a single olive wire engaging the proximal radial segment. A closing wedge ostectomy has been completed at the level of the CORA (**red arrow**).

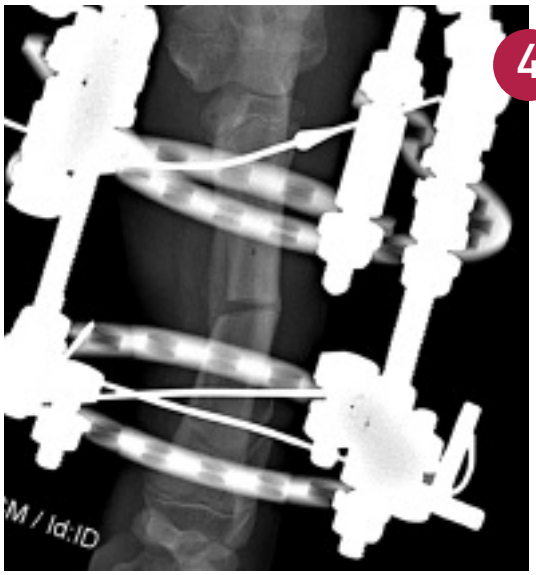
CORA = center of rotation of angulation

the radial head. Once the radial head was repositioned under the humeral condyle, the distraction of the humerus was discontinued and the transarticular component of the fixator removed (**Figure 4**). The fixator was maintained for 4 weeks until clinical union was achieved. At that point the fixator was removed.

REHABILITATION

Physical therapy is a critical part of optimizing success with this treatment modality because the contact surfaces of the elbow joint are being surgically altered, which may cause joint stiffness and loss of mobility.

During the postoperative period, passive range-of-motion exercises were executed for 10-minute



4

Frontal plane radiograph of the antebrachium after reduction of the radial head and removal of the transarticular component of the circular external fixator frame

CONTINUES

DID YOU ANSWER...

- Diagnostic differentials would include:
  - Any fracture of the distal humerus or proximal radius or ulna due to the potential history of trauma; other possible differentials include Salter-Harris fractures (due to patient's young age; most common are humeral condylar fractures), proximal radial physeal fractures, and olecranon apophyseal avulsions
  - Blunt trauma, which can cause hemarthrosis, resulting in pain, effusion, and loss of range of motion
  - Septic monoarthropathy
  - Elbow luxations or subluxations, both traumatic and congenital
  - Strains, sprains, or rupture of any of the periarticular ligaments and tendons
  - Trauma to the joint capsule
  - Components of elbow dysplasia, including fragmented medial coronoid disease and ununited anconeal process (less likely in this case, though, because these conditions tend to cause clinical signs in slightly older dogs).
- Caudolateral luxation of the radial head alone secondary to trauma is unlikely, but traumatic physeal injuries to the distal radial or ulnar physis can affect antebrachial development. Such injuries can, in turn, cause incongruity at the level of the elbow. In most cases of congenital radial head luxation, however, the CORA of the radial deformity is middiaphyseal, as seen here. Such angulation, paired with laxity of the lateral collateral and annular ligaments in the postnatal puppy, has been postulated to result in luxation, although the cause is probably multifactorial.

periods 4 to 5 times daily; the limb was held in full extension and flexion for 30-second periods or until the dog started showing discomfort. These exercises help improve elbow range of motion and most likely help promote early remodeling of the radial head cartilage. This cartilage must undergo some degree of plastic deformation to conform to the humeral condyle.

OUTCOME

At a follow-up appointment 4 weeks after fixator removal, the puppy remained slightly lame in the left forelimb but showed subjective improvement from the preoperative level of discomfort. The diminished range of motion remained unchanged. Still evident were antebrachial valgus and external torsion; it was noted that these issues may need to be surgically addressed in the future. Radiographs confirmed maintenance of reduction of the radial head but also showed remodeling and osteoarthritis (**Figure 5**).

Two months after surgery, the owner reported that the dog had full and comfortable function of the limb, with occasional (2–3 times a week) episodes of intermittent weight-bearing lameness associated with periods of heavy exercise.

See Aids & Resources, back page, for references & suggested reading.

5

Orthogonal radiographs of the affected antebrachium 4 weeks after removal of the external fixator. Note remodeling of the radial head despite the maintenance of its reduced positioning. Also noteworthy are the persistent angulation and torsion, which this technique does not address.

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