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Case report
Κλινικό περιστατικό

Treatment of Ventral Hip Luxation in a Puppy

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ABSTRAC: A Three months of age, 4.5 kg, female mixed (cross) breed presented to our clinic with complaint of the left hind leg lameness. In the clinical, radiographic and ultrasonographic examination, ventral hip luxation was diagnosed. Based on the examination findings which indicated the case was chronic, surgical treatment was decided. Hip joint was exposed firstly by craniodorsal approach. Flattened and full acetabulum, fractured greater trochanter, ruptured gluteal muscle attachment and irreparably broken joint capsule were determined. Excision arthroplasty was performed by ventral approach. Greater Trochanter was attached to its position by an L shape Steinman pin using craniodorsal approach. Then, a drill hole was created on the greater trochanter, and a screw was inserted to dorsal acetabular rim. A synthetic suture passed through the hole was tied to the screw in a figure of eight mode. Postoperative antibiotics and anti-inflammatory drugs were used. Physiotherapy such as swimming and massage treatments was proposed following skin sutures removal. In the 4th week control postoperatively, the dog began to use the operated leg effectively despite the moderate quadriceps' contracture. The contracture was mostly resolved 12th week by continuing physiotherapy.

Keywords: Hip, luxation, ventral, treatment, dog

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CASE PRESENTATION

An Approximately 3 months of age, 4.5 kg, female mixed breed dog with severe lameness of the left hind leg presented to our clinic. The dog was a stray and just found 4 days ago by its new owner. In the clinical examination of the affected leg, there were moderate muscle contracture manifested by constant abduction and hyperextension, and mild muscle atrophy. Also, a hard swelling palpated mass compatible with femoral head at the level of the obturator foramen was determined. (Figure 1a).

Ultrasonography of the swollen area on the inguinal region clearly showed the femoral head under the skin (Figure 1b). In ventro-dorsal extended radiograph, the superimposed to the acetabulum, femoral head was seen (Figure 1c). On 15° oblique medio-lateral radiograph of the coxofemoral joint, the luxation of femoral head was obvious, and the absence of the greater trochanter which indicated fracture can be seen (Figure 1d). Based on these findings, hip luxation in ventral direction and epiphysiolysis of the greater trochanter was diagnosed and surgical treatment was decided.

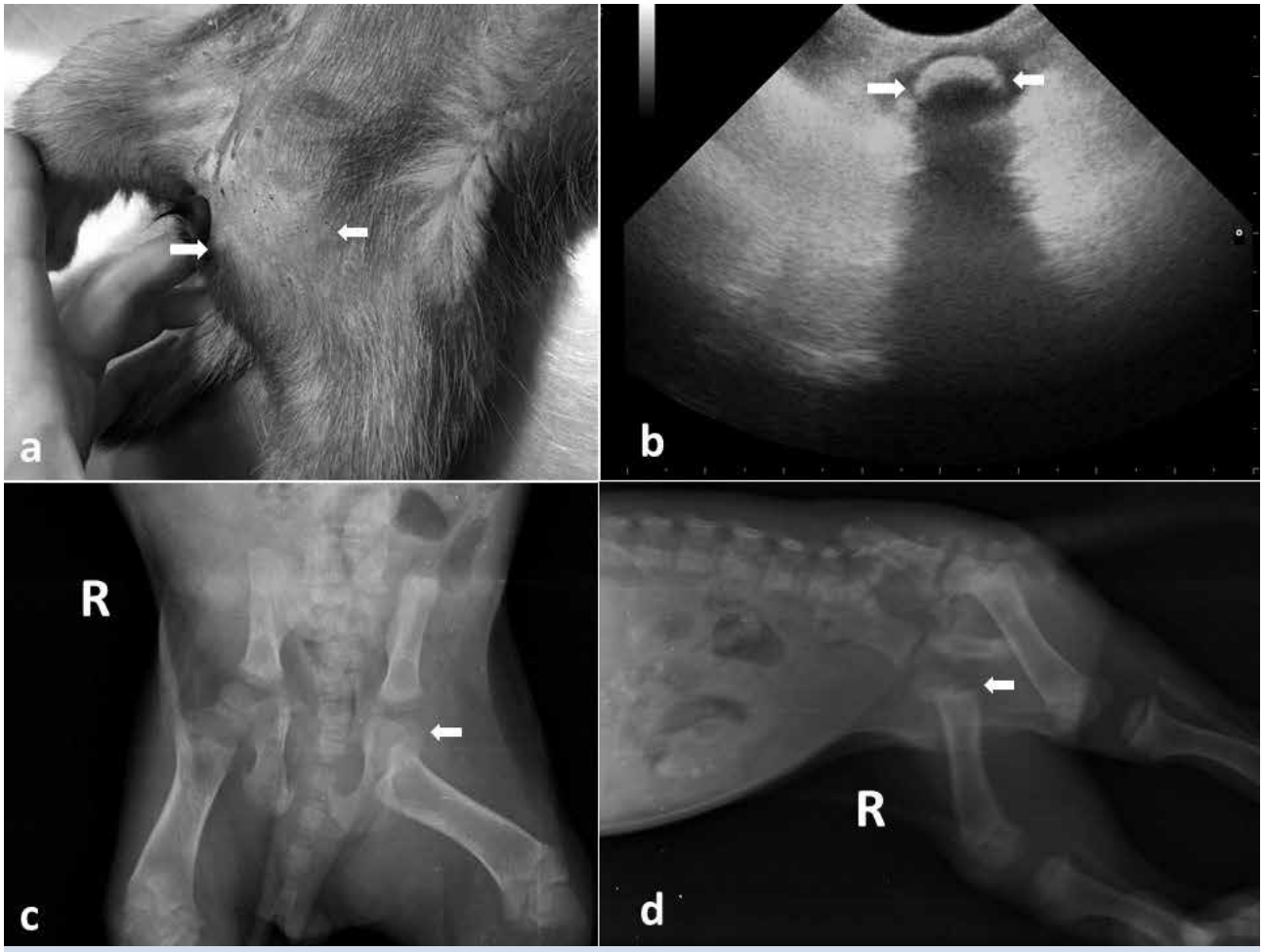

Figure 1. White arrows point out the clinical appearance of the luxated femoral head (between arrows) (a); White arrows indicates ultrasonographic imaging of the femoral head under the skin (b); The luxation pointed by arrow on the ventrodorsal radiograph of the dog (c); The arrow indicates the absence of the greater trochanter on 15° oblique medio-lateral radiograph of the dog (d).

Anesthesia was induced with combination of xylazine HCl (0.5 mg/kg, IM, Alfazyne®, Egevet, Turkey) and ketamine HCl (10 mg/kg, IM, Alfamine®, Egevet, Turkey) and maintained with inhalation of Isoflurane (Forane ®, Abbott, Latina, Italy) at a 2% flow rate.

Hip joint was exposed firstly by craniodorsal approach (Figure 2a). The joint capsule was broken irreparably, and the acetabulum was flattened completely, it was almost even slightly convex (Figure 2b). Also, the fractured greater trochanter diagnosed by the x-ray was seen, and gluteal muscle attachment rupture depending on avulsion fracture was detected during surgery. Because of the condition of the acetabulum and joint capsule, excision arthroplasty was performed. Since, the femoral head could not be reached by craniodorsal approach, excision was performed by ventral approach (Figure 2d, e, f). During this procedure, a small organized piece of the round ligament was seen on the femoral head (Fig 2e). Because of the muscle contraction probably depending on long time elapsed and, gluteal muscle rupture associated with avulsion fracture of the greater trochanter, the leg could not be re- positioned anatomically. Therefore, the greater trochanter was attached to its anatomical position by the use of an L shape Steinman pin. Then, a drill hole was created on the greater trochanter and a screw (2.7 mm Ø) was inserted to the dorsal rim of the acetabulum. A synthetic suture passed through the hole was tied to the screw in a figure of eight mode. (Figure 2c). By support of the figure of eight suture, the leg was pulled to more lateral and more dorsal direction to reach its anatomical position (Figure 2 g, h). Skin and subcutaneous tissues were routinely closed, postoperative antibiotics and anti-inflammatory drugs were applied. Physiotherapy such as swimming and massage treatments was recommended to the owner following removal of the skin stitches on around 10th day.

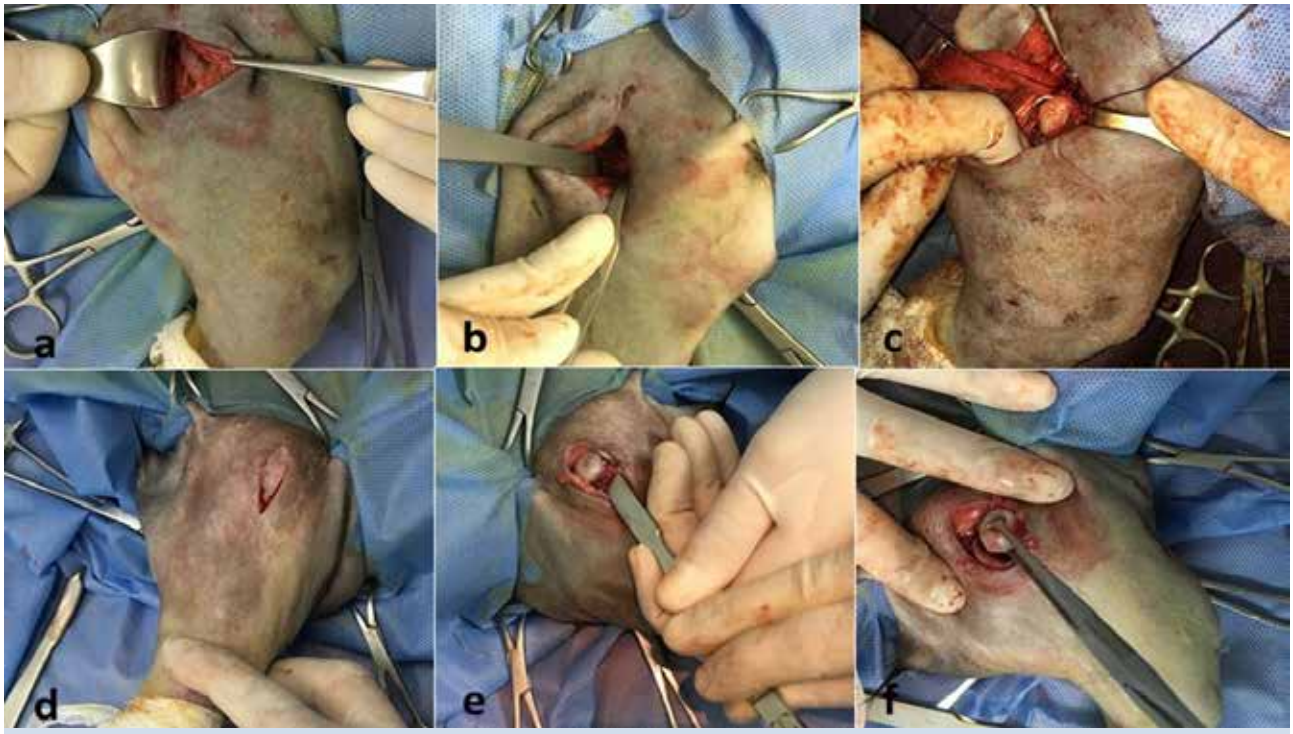

Figure 2. Intraoperative procedures. Dorsolateral approach to the articulatio coxae (a), Apperance of the flattened acetabulum (b); Attaching of the greater trochanter in its position by using L shape Steinman pin and, placing eight-shape synthetic suture material (c); Excision of the femoral head by ventral approach (d, e, f); Postoperative x-rays in ventrodorsal (g) and mediolateral (h) direction.

In the 4th week control postoperatively, despite the moderate quadriceps' contracture, it was seen that the dog began to use the operated leg effectively, and it was recommended to continue the physiotherapy (Figure 3). At week 12 postoperatively, the owner declared that the dog's leg condition is much better and she can use it as much as the opposite one.

Figure 3. Clinical appearance of the dog at postoperative 4th week

DISCUSSION

Luxation of the hip in small animals, with a rate of %39-90, is the most common one among all luxations (Johnson and Dunning, 2005; Piermattei et al., 2006). It is generally the result of trauma and various degree soft tissue damages (Piermattei, 1993; Piermattei et al., 2006). Hip luxations occur usually in the cranial direction due to pulling force of gluteal and iliopsoas muscles (Duff and Bennett, 1982; Fox, 1991). However, luxations of the femoral head in caudo-dorsal or ventral direction are rarely encountered (Piermattei et al., 2006; Fox, 1991; Harasen, 2005)

Following hip joint luxation, closed reduction is only possible within 48-72 hours because of inward folding of joint capsule, hypertrophy of the round ligament, inflammation and fibrosis within the acetabulum (Piermatte, 1993; Piermattei et al., 2006). There are different extracapsular methods such as capsulorrhaphy (Bone et al., 1984; Piermattei et al., 2006), synthetic capsule technique or its modifications (Denny and Butterworth, 2000; Piermattei et al., 2006), the greater trochanter transposition (Basher et al., 1986; Denny and Butterworth, 2000), and intracapsular techniques such as Toggle pin/rod fixation (Piermattei et al., 2006; Cetinkaya and Olcay, 2010), trans-acetabular pinning (Hunt and Henry, 1985; Denny and Butterworth, 2000) sacrotuberous ligament transposition (Kılıc et al., 2002; Ozaydın et al., 2003), for surgical treatments of hip luxation.

In our case, the exact time elapsed following the luxation was not known, because the owner found the limping dog in the street. Clinical findings implied that it was a chronic case, closed reduction was not an option. Also, intraoperatively it was seen the acetabulum was completely flattened and there was no trace of the acetabular cavity. In this condition, reposition of the femoral head was impossible. Therefore, femoral head and neck excision was performed.

The hip luxation of this case was complicated with an avulsion fracture of the greater trochanter and quadriceps contracture. Greater trochanter was attached to where it was separated from, by using an L shape Steinmann pin. A tension band wire would be the best option for uncomplicated avulsion fracture of the greater trochanter. But the hole created just below the fracture line of the greater trochanter was kept as small as possible considering the size of the suture material, to avoid another fracture. Also, an adequate support to keep it in its position was provided by using the L shape pin. However, the leg could not reach its anatomical position just by restoring by of the greater trochanter. For simple and new luxation cases, repairing of the joint capsule is usually recommended as a way of treatment and also highly recommended following femoral head and neck excision to support joint position (Basher et al., 1986; Piermattei et al., 2006; Off and Matis, 2010). Because of the excessive damage of the joint capsule, a figure of eight suture (inspired by synthetic capsule technique) between a drilled hole on the greater trochanter and a screw inserted to the dorsal acetabular rim was used to restore the anatomical position of the joint and support the capsule. Originally, synthetic capsule technique is performed by placing two screws on the dorsal acetabular rim, drilling femoral neck and placing a figure of eight suture between screws and drilled hole (Holsworth and De Camp, 2003; Johnson and Dunning, 2005). In this case, the hole was drilled on the greater trochanter as described by some studies which modified synthetic capsule technique (Belge et al, 2014), and one screw was placed on the dorsal acetabular wall because the dog was too small.

The flattening of the acetabular cavity in our case suggests that presence of the femoral head in the acetabulum contributes in the development of acetabular depth during growth of the dog, as also theoretically known for the patellar groove. (Piermattei et al., 2006). In this case report, physical consequences of prolonged duration of the hip luxation in very young aged (1-2 month-old) animals, such as complete flattening of the acetabulum, and successful results obtained by combining different treatment methods for a rare case of chronic and complicated ventral hip luxation was documented.

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