

Hip Dislocation in a Calf - Treatment with Iliofemoral Suture

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ABSTRACT

Background: Coxofemoral dislocation is uncommon in large animals, due to anatomical particularities that provide greater stability to this joint. The most common causes of hip dislocation in large animals are related to hypocalcemia, mount trauma, sudden falls on hard surfaces or dystocia. Treatment can be performed by closed reduction, but the reported results are not satisfactory with complications. Several surgical techniques have already been described and successfully used in small animals in the treatment of hip dislocation. The present work aims to describe the technique and the result of the iliofemoral suture in the treatment of hip dislocation in a Girolando heifer.

Case: A heifer was attended with a history of difficulty in getting up. According to the owner, the clinical manifestation was sudden, after remaining in a paddock with other animals of different age groups. The calf had reduced skin sensitivity on the croup, and it was impossible to remain in the quadrupedal position, often remaining in sternal recumbency with the left pelvic limb in extension. From the clinical examination, spinal cord injury was suspected and clinical treatment was instituted with dexamethasone, vitamins B1, B12 and dimethylsulfoxide. At the end of the clinical treatment, the animal did not show a favorable evolution, so radiographic examination of the coxofemoral region was performed, revealing dislocation of the left femoral head, indicating surgical correction. Xylazine was administered as pre-anesthetic medication, followed by anesthetic induction with midazolam associated with ketamine, followed by orotracheal intubation. Anesthetic maintenance was instituted with isoflurane and monitoring was performed with a multiparameter monitor. An epidural block was performed with bupivacaine and morphine. A craniolateral approach to the left hip joint was performed. After the dislocation was reduced, sutures were used to better stabilize the joint in question. Following the evolution of the surgical procedure, it was possible to confirm that the femoral head remained in place. After 15 days, the skin stitches were removed and the animal was discharged from the hospital and returned to its original property. The calf was asked to remain in the stall for at least 60 days, gradually releasing it into larger spaces and only after 120 days could it remain in the paddock with other animals. During three months, the tutor was consulted about the evolution of the condition, reporting that the animal was clinically well, being able to get up and walk without difficulty and with a mild degree of lameness, thus suggesting the success of the surgical procedure.

Discussion: There are few studies of successful surgical treatments of hip dislocation in large animals, and that number is even smaller when considering cattle alone. It is believed that this is due to difficulties related to the surgical technique and to postoperative handling, given the animal's weight. The iliofemoral suture technique performed on the animal in the present study is commonly employed in small animals, and excellent results have been observed. However, reports on the use of this technique in large animals have not been found. The iliofemoral suture technique has advantages over other reported surgical techniques in cattle. When compared to the femoral head and neck resection, the iliofemoral suture has several advantages, as it allows preservation of the joint and achievement of superior biomechanical results. When compared to the technique of reinforcement of the joint capsule with synthetic material, also reported in cattle, the iliofemoral suture appears to be faster, simpler and more economic, and provides similar stability. We conclude that the iliofemoral suture proved to be a satisfactory alternative for the treatment of hip dislocations in young cattle.

Keywords: claudication, joint stabilization, ruminants, articulation, orthopedics.

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INTRODUCTION

Hip dislocation is uncommon in large animals, given peculiar anatomic features that endow greater stability to that joint. In cattle, besides the femur head ligament and the acetabulum transversal ligament, there is the femur accessory ligament [5]. The most common causes of hip dislocation in large animals are related to hypocalcaemia, traumas caused by moun-ting, abrupt falls onto hard surfaces, and dystocia, when calves that are born tail first are excessively pulled to allow birth [8]. Treatment can be performed by closed reduction, yet the reported results are unsatisfactory, presenting complications such as swelling, severe claudication and osteoarthritis [2].

Several surgical techniques have been described and successfully employed in small animals for treatment of hip dislocation, such as the coupling pin, capsular prosthetics and iliofemoral suture [7,8]. However, little is known about the effectiveness of such techniques in large animals. Colocephalectomy has been one of the surgical procedures indicated for treatment of this disorder in horses and cattle [8]. But this technique may significantly alter the biomechanics of the affected limb. Thus, other techniques that allow preservation of the hip joint are indicated, such as pin coupling, new joint capsule or iliofemoral suture, which produce better results with lower impacts to the life of the animal. That being said, this study is aimed at describing the clinical, diagnostic, and surgical aspects of a hip dislocation case in a calf subjected to the iliofemoral suture technique.

CASE

A 2-month-old Girolando calf, weighing 50 kg, was admitted to the Uberaba City Veterinarian Hospital, with a condition of difficulty in standing up. The guardian reported that the animal suddenly showed the observed clinical symptom, after remaining in a picket with animals of different age groups. Upon physical examination, the animal presented Level 3 bodily score, docile behavior, and absence of alterations in physiological parameters. The calf also showed reduced skin sensitivity on the croup and could not stand in quadrupedal position without aid, often remaining in sternal decubitus position, with the left pelvic limb extended.

Clinical examination raised suspicion of spinal cord injury, so clinical treatment was dexamethasone¹ [Cortvet[®] - 2.5 mg/100 kg, IM, SID, during 3 days],

B12 vitamin² [Monovin B12[®] - 2 mL IM, SID, during 3 days], B1 vitamin² [Monovin B1[®] - 1 mL IM, SID, during 3 days] and dimethylsulfoxide³ [Dimesol[®] - 1 mL/kg diluted in 1 L of NaCl 0,9% IV, SID, during 3 days]. Since the animal did not present favorable evolution at the end of the treatment, radiographic examination of the hip area was requested.

The imagery examination revealed cranial-dorsal dislocation of the left femur head, requiring surgical correction. Being aware of the indicated prognostic, the guardian authorized the surgical procedure.

The animal underwent solid and liquid fasting for 12 h. As pre-anesthetic medication was applied xylazine 2%⁴ [Xilazin[®] - 0.1 mg/kg IV] and then anesthetic induction was accomplished with midazolam⁵ [Midazolam[®] - 0.1 mg/kg IV] associated with ketamine 10%⁴ [Cetamin[®] - 2 mg/kg IV], followed by oral-tracheal intubation with no. 12 tracheal tube. Anesthesia was sustained with isoflurane at minimum alveolar concentration (MAC) of 0.5%, diluted in 1 L/min 100% oxygen in circular valve system, maintained in spontaneous ventilation. Monitoring was performed with multiparameter DL 1000 monitor⁵ (Delta life), observing electrocardiogram, pulse oximetry, and central temperature with esophagus thermometer throughout the anesthesia. Catheterizing of the facial artery was done to gauge the average invasive arterial blood pressure, obtaining average arterial pressure values. The lumbosacral space was identified by palpation, and the epidural block was performed with bupivacaine 0.5%⁶ [Neocaina[®] - 0.1 mL/kg] and morphine⁷ [Dimorf[®] - 0.1 mg/kg].

The patient was placed in right lateral decubitus position, and trichotomy was performed along the left pelvic limb, from the shank to the dorsal part of the pelvis. Antisepsis of the operative field was prepared with 2% degerming⁸ and 0.5% alcoholic chlorexidine⁸. Lateral cranial approach was performed to the left hip joint. The skin was incised from dorsal ventral direction at the cranial lateral portion of the right great trochanter. The subcutaneous tissue was divulsed and the fascia lata was incised in the same direction as the skin. The femoral biceps was pushed towards the tail (Figure 1B), the gluteus muscles dorsally (Figure 1A), and the fascia tensor, cranially (Figure 1C), exposing the acetabulum cranial area and the femoral head and neck. Two perforations were made to the bone with the aid of a drill and a 2.5 mm bit (Figure 2): one in dorsal ventral direction in the acetabulum cranial area

(Figure 2A) and the other from head to tail in the proximal portion of the left femoral metaphysis, at the midpoint between the medial and lateral cortical, at the height of the greater trochanter (Figure 2B and 2C). The dislocation was reduced, and two 60 nylon threads were passed through the acetabulum cranial hole (Figure 2D). The dorsal ends of the threads were passed through the hole drilled in the femur proximal portion, in cranial tail direction (Figure 2E). The ventral ends were passed medially to the greater trochanter and also in the cranial tail direction (Figure 2F). The limb was rotated internally, and the thread ends were tied with a double knot, followed by four simple knots (Figure 1). Four simple sutures were performed with 25 0 poliglecaprone thread⁹, to bring the cranial dorsal portion closer to the joint capsule. The dead space and the subcutaneous tissue were brought closer at 2 planes with 25 2-0 poliglecaprone thread⁹ in a simple continuous pattern. Dermorrhaphy was performed with 2-0 nylon thread⁹ in a simple separate pattern.

The animal remained in hospital for 15 days, with periodic radiographic follow-up and daily bandages to the surgical incisions, with antiseptic iodopovidine 7 [Iodopovidona Topico[®] - BID, during 15 days], silver spray⁹ [Aerocid Spray Prata[®] - SID, during 15 days]. In the postoperative period the animal was medicated with meloxicam¹⁰ [Maxicam 2%[®] - 0.6 mg/kg IM, SID, for 5 days] and pentabiotic¹¹ [Pentabiotico Reforcado[®] - 40,000.00 UI/kg IM, SID, single dose]. Following up the evolution of the surgical procedure, it was possible to confirm that the femur head remained in place during that period of time. After 15 days the skin stitches were removed and the animal was released from hospital, returning to its original property. Request was made for the calf to remain in bay for at least 60 days, being gradually released into larger spaces, and only after 120 days could it remain in picket with other animals. During 3 months the guardian was argued about the calf status evolution. He reported that the animal was clinically well, it could stand up and wander without any difficulty, with a slight degree of claudication, which demonstrated the success of the surgical procedure.

DISCUSSION

There are few studies of successful surgical treatments of hip dislocation in large animals [1,3,9], and that number is even smaller when considering cattle

alone [3,9]. It is believed that this is due to difficulties related to the surgical technique and to postoperative handling, given the animal's weight.

Unlike what was observed in the present report, hip dislocation in cattle is often associated to the periparturient period, given the laxity of ligaments and neurologic and ionic alterations, such as bonnet injury and hypocalcaemia, and to the mating season, due to traumas occurring during mounting [2]. Severe trauma, such as slips, falls and strikes may have been the cause of the dislocation of the animal studied in this report, as it coexisted with larger and more domineering animals that competed for food and space. Anatomic alterations of the hip joint, such as dysplasia, are another cause of hip dislocation in cattle, even though it was not diagnosed in the presented case [2].

Knowledge of regular anatomy is of fundamental importance for the clinical diagnosis of hip dislocation. In the presence of cranial dorsal hip dislocation, there is flattening of the triangle formed by the union of the spots referring to the ilium wing, greater trochanter and ischiatic tuberosity, shortening of the affected limb and lateral rotation of the knee [9]. In the present report, such alterations were not observed at first, the diagnosis being concluded after the radiogra-

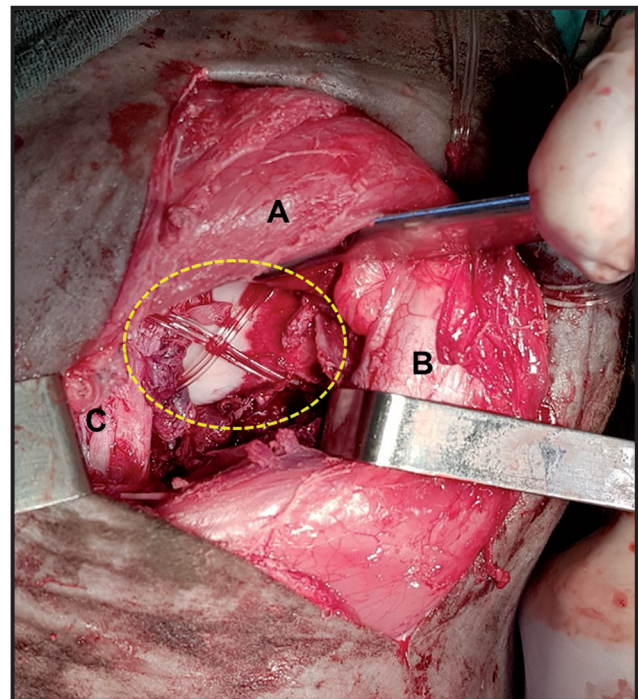


Figure 1. Transoperative image of the surgery for reduction and stabilization of hip dislocation in a calf, applying the ileofemoral suture technique. Note: A- The cranial lateral access to the hip joint with the dorsal pushing of the gluteus. B- Tail pushing of the femoral biceps. C- Cranial pushing of the fascia lata tensor muscle. Also note the nylon threads used in the iliofemoral suture (yellow circle).

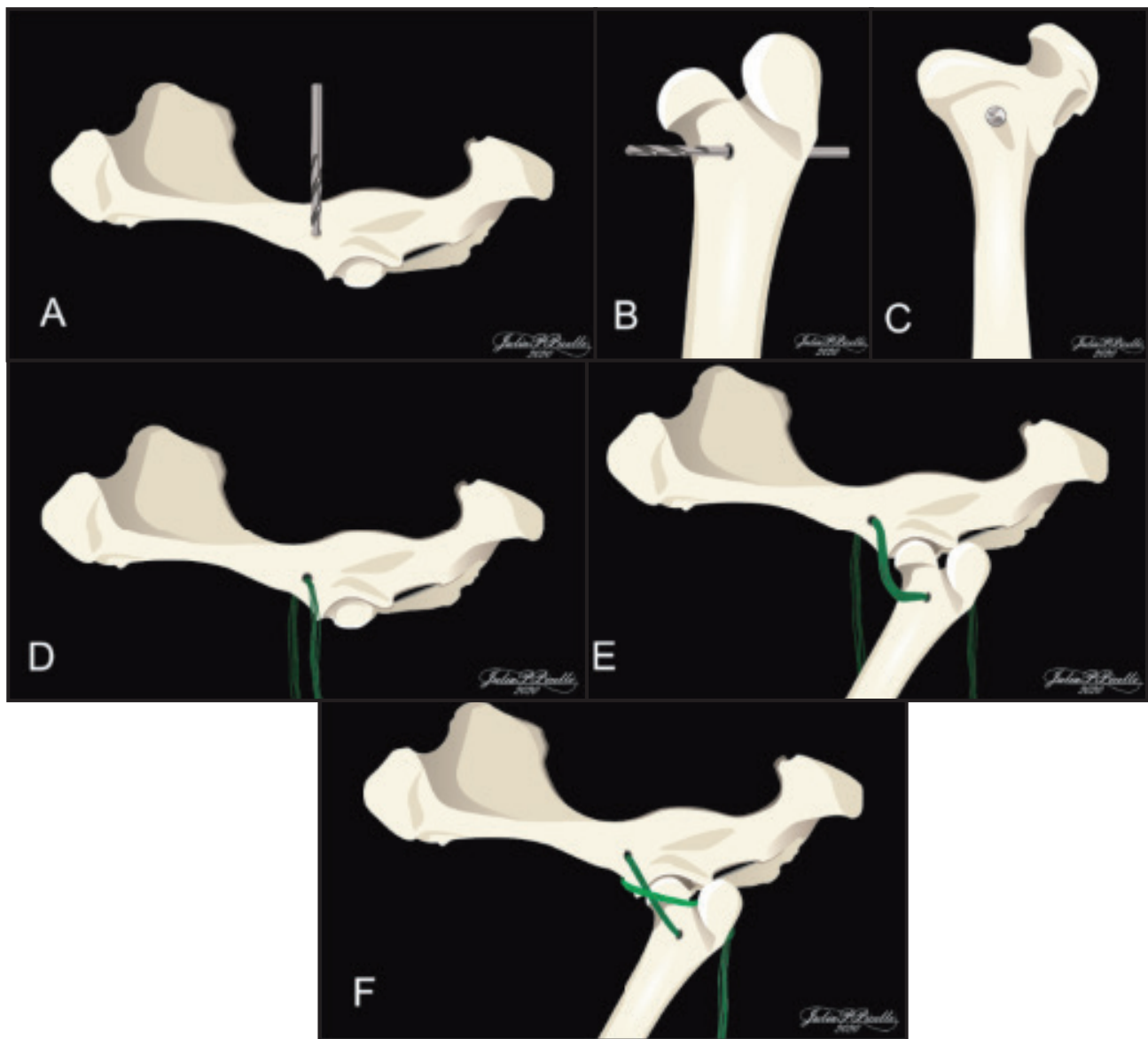


Figure 2. Schematic drawing of the iliofemoral suture technique for treatment of hip dislocation in cattle. A- Image shows the perforation of the acetabulum cranial portion. B & C- Images show the perforation of the proximal portion of the femoral metaphysis. D- Image illustrates the passage of the thread through the cranial perforation in the acetabulum. E & F- Images respectively show the passage of the dorsal thread end through the femoral perforation, and the passage of the ventral thread end medially to the greater trochanter.

phic examination. The radiographic examination is the best way to complete a diagnosis, but it can be hard to accomplish in large and indocile animals. In such case, an ultrasonography of the hip joint is an interesting alternative that can be performed with the animal in quadrupedal position closed in the working chute [8].

The iliofemoral suture technique performed on the animal in the present study is commonly employed in small animals, and excellent results have been observed. However, reports on the use of this technique in large animals have not been found. The standard treatment of hip dislocation in cattle is conservative with closed reduction, success varying from 42.8% to 75%, depending on the age, weight, time until treat-

ment, and mainly on postoperative handling conditions [2]. In order to increase the chances of success of the conservative treatment, it may be necessary to support the total weight for a long period of time [7]. Techniques, such as femoral head and neck resection, open reduction with joint capsule suture [8], and reinforcement of the capsule dorsal area with synthetic material [3], have been described as open surgical treatment in cattle. The iliofemoral suture technique has advantages over other reported surgical techniques in cattle. When compared to the femoral head and neck resection, the iliofemoral suture has several advantages, as it allows preservation of the joint and achievement of superior biomechanical results. In the authors' opinion, the fe-

moral head and neck resection should only be indicated in cases when the joint is malformed or presents any morphologic alterations that predispose to instability.

When compared to the joint capsule suture technique, already reported in cattle [8], the iliofemoral suture provides better joint stability, as the anchoring made to the bone is more resistant than joint capsule sutures, thus yielding greater stability and lower risk of disruption in the postoperative period.

When compared to the technique of reinforcement of the joint capsule with synthetic material, also reported in cattle [3], the iliofemoral suture appears to be faster, simpler and more economic, and provides similar stability. More elaborate surgical techniques, with reinforcement of the joint capsule dorsal area with synthetic threads (prosthetic capsule technique) [4], replacement of the femur head by synthetic material (pin technique), and total arthroplasty [1], have been successfully employed in the treatment of hip dislocation in horses. However, they have not been tested in cattle.

Another challenge to the treatment of hip dislocation regards anesthesia. Physical restraint and sedation of cattle with locoregional anesthesia allows the accomplishment of many surgical procedures in the field [6]. However, for more complex surgeries such as reported herein, it is necessary to apply general anesthesia, which requires less available equipment like the inhalation anesthesia apparatus.

If well applied, multimode anesthesia may provide intense myorelaxation, hypnosis, analgesia, as well as minimum hemodynamic alterations. The locoregional blocks with epidural anesthesia applied to the patient in this study allow maintenance of general anesthesia on a superficial level, which causes lower cardiovascular and respiratory depression, thus making anesthesia safer. Vaporization of 0.5% isoflurane throughout the procedure was significantly

shorter than reported in literature, 1.5% to 2.5% [6]. This was mainly due to the epidural block, but it was also influenced by the combination of drugs used in the pre-anesthetic medication and in the induction.

The choice to use bupivacaine in association with morphine in the epidural block was due to the longer action period of bupivacaine and the potent and longer sedation effect of morphine when applied to the epidural space. Bupivacaine is a more potent drug than lidocaine, even though its latency is slow (20 to 30 min). Besides, it has long duration (3 to 10 h), being ideal for extended orthopedic procedures and providing postoperative sedation [6]. A great number of opioid receptors are present in the gelatinous substance of the spinal cord dorsal horn, which justifies the use of a small dose of morphine in the epidural block. Another advantage of the epidural use of morphine is that its effect may last for 18 to 24 h, much longer than 6 h when applied intramuscularly [10].

In summary, the use of the iliofemoral suture technique proved to be a satisfactory alternative for the treatment of hip dislocations in young cattle, whenever performed in conjunction with early diagnosis.

MANUFACTURES

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