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Open Reduction of Coxofemoral Luxation with a Toggle Pin & Synthetic Capsule Technique in a Rottweiler

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Rottweiler에서 발생한 고관절 탈구의 개방적 정복

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요 약 : 체중 43 kg의 10개월령 암컷 로트와일러가 약 2개월전부터 점진적으로 진행된 좌측 후지의 심한 파행 병력으로 내원하였다. 신체검사로 고관절 탈구를 진단하였으며 골반의 외측 및 복배측 방사선 사진 촬영으로 확진할 수 있었다. 전배측 접근 후 골수내정으로 제작한 한 개의 toggle pin 및 두 개의 bone screw를 병용 적용하여 대퇴골두를 고정하였다. 일차 교정은 술후 7일의 재탈구로 실패하였으며 동일 방법으로 이차 시술한 후 Ehmer sling을 적용하고 운동을 제한하였다. 술후 20일에 환축은 거의 정상보행을 회복하였다.

Key words : coxofemoral luxation, open reduction, toggle pin, capsulorrhaphy

Introduction

Coxofemoral luxations in small animal are generally the result of external trauma, with 59 to 83 percent due to vehicular trauma[1,2]. Most are unilateral injuries, and owing to the massive forces required to produce the luxation, about 50 percent have been associated with major injuries, often chest trauma. A list of the technics for fixation of coxofemoral luxations includes: Knowles toggle pinning[12], plastic extension of the acetabular rim[8], trochanteric pinning[10], Durr cross-pinning[5], purse-string suturing[9], the De Vita pin[4], and a total hip replacement. A De Vita pin is useful in obese, short-legged dogs and in situations where postoperative use of the limb is desired[4]. It may be used in conjunction with bandaging techniques. The Olsen device maintains reduction of luxation by attaching a Kirschner/Ehmer apparatus to the pelvis; a small swivel joint device is inserted and it laterally contacts a pin set into the proximal femur[13]. Other methods of fixation involve the use of intramedullary pins either around or transfixing of the joint or the trochanter[5,6,10,12]. The Knowles toggle pin maintains reduction of luxation by serving as a replacement of the ligament of the femoral head[11]. Thus, the procedures used to treat for canine coxofemoral luxation vary from simple replacement to installation of a total hip prosthesis. The new technique used in this report was a combination of stainless steel toggle pinning and synthetic capsule technique, using two bone screws and nonabsorbable suture materials(Supramid®, BRAUN).

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Case History

A 10-month-old female Rottweiler weighing 43 kg was admitted to veterinary medical teaching hospital, Kyungpook National University with a history of exercise intolerance and intermittant lameness in its left hindlimb which had developed gradually during about 2 months. The dog had been treated at a local animal clinic for 1 month before admission to our

hospital. Physical examination revealed a non-weight -bearing lameness and a slight abduction of the left hindlimb. There was a evidence of pain when attempts were made to manipulate the left coxofemoral articulation. Crepitus and instability on flexion and extension of the left coxofemoral joint also were appeared. Comparison with the right side revealed a disparity in position of the greater trochanters. Being based upon history taking, the cause of luxation could be assumed to be repeated falling down on slippery bottom in the breeding ground. In hematological and serum chemical examination, all values were normal range(Table 1). A tentative diagnosis of left coxofemoral luxation was made, although it did not appear to be typical. Ventrodorsal and lateral radiograph of the pelvis were taken(Fig 1). There was a craniodorsal coxofemoral luxation of femoral head. The acetabulum was flattened and the femoral head was luxated craniodorsally.

Table 1. Hematological and serum chemical values

Items	Values	Normal range
PCV(%)	49	37~55
RBC(10^6)	7.45	5.5~8.5
WBC(10^3)	8.6	6.0~17 0
Segmented cells(%)	60	60~70
Band cells(%)	0	0~4
Eosinophils(%)	6	2~8
Lymphocytes(%)	34	12~30
BUN(mg/dl)	14	12~25
Creatinine(mg/dl)	1.3	1.0~2.0
AST(U/L)	<10	10~80
ALT(U/L)	25	10~80

Surgical Procedure

The dog was premedicated with atropine sulfate (0.02 mg/kg, IM). Anesthesia was induced with intravenous injection of thiopental sodium(10 mg/kg, IV) and maintained inhalation of enflurane and oxygen through endotracheal tube. The patient was placed in lateral recumbency. The left hip was exposed by means of a craniodorsal approach. A skin incision was longitudinally made about 20 cm over the great trochanter of the femur. After the biceps femoris muscle was exposed and reflected caudally, tendons of the gluteal muscle were transected at their insertions on the greater trochanter and reflected dorsally to expose the acetabulum. The sciatic nerve was retracted posteriorly. After the joint capsule was incised dorsally, the acetabulum was thoroughly cleaned of all debris, including the round ligament. A hole is drilled from the fovea capitis, through the neck to emerge along the crest of the third trochanter. And then drill is used to create a hole in the acetabular fossa. It must be taken not to penetrate too deeply. With the hip reluxated, two strands of polyamide suture, size 3, are threaded through the toggle pin and then it is placed in the acetabular hole and pushed to the medial side. The suture of toggle pin(Fig 2) is pulled through the drill hole in the femoral neck using straighted needle, and held taut while the hip is returned to the normal position. A hole is drilled from cranial to caudal through the lateral femoral cortex, slightly proximal to the exit hole of the sutures. One pair of sutures is pulled through the second drill hole and then tied to

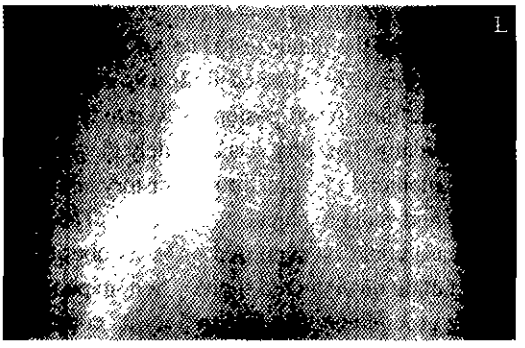

Fig 1. Preoperative ventrodorsal radiographic view of the pelvis and hind limb of a dog with persistent lameness.

Fig 2. Toggle pin made with a intramedullary pin.

the opposite pair on the lateral side of the femoral cortex. The joint capsule is sutured to the extent possible. After reduction as explained above, two bone screws of suitable diameter were inserted into the dorsal rim of the acetabulum, at the 11:00 and 1:00 o'clock. A hole is then drilled transversely through the bony bridge of the femoral neck. Knots of 3 polyamide sutures were placed under the screws to prevent the sutures from slipping off the head of the screws. 3 polyamide sutures were threaded through a hole drilled in the bony bridge between the trochanter and femoral head. The femoral head was held firmly reduced with the hip at a normal angle of flexion and slightly abducted while the sutures were tied snugly. This initial surgical treatment was failed by recurrence of luxation on the 7th day(Fig 3), and the dog was reoperated through same procedure after the second open reduction. Ventrodorsal and lateral radiographs were taken immediately after reduction to confirm reduction it was corrected or not(Fig 4).

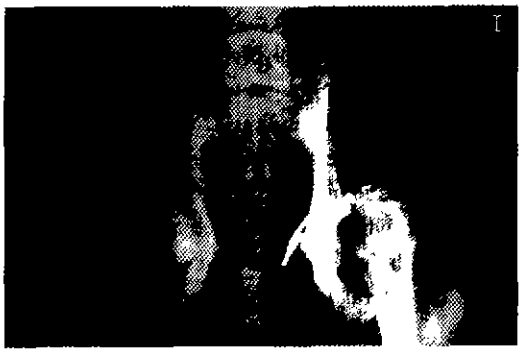

Fig 3. Raiographic appearance on the 7th day. The femoral head was reluxated.

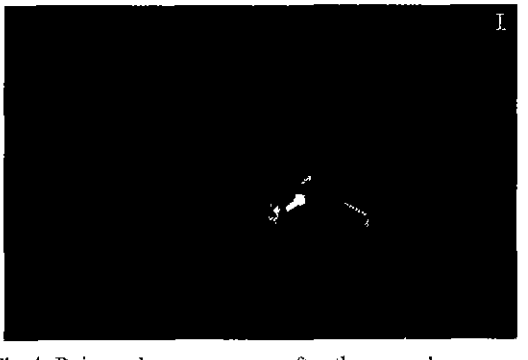

Fig 4. Raiographic appearance after the second surgery.

Aftercare and Prognosis

Aftercare consists of penrose drainage, antibiotics, and limited exercise. The dog was confined in the cage and was allowed outside on leash for urination and defecation. Normally, the dog walked with the operated leg within 3 weeks after the 2nd surgery. Follow-up radiographs have shown no signs of degeneration of the femoral head and osteitis at the rim of the acetabulum.

Discussion

The craniodorsal luxation is the most common type of coxofemoral luxation, being seen in 78 percent in dogs and 73 percent in cats[1]. One of the common orthopedic problems in veterinary medicine is a traumatic luxation of the coxofemoral joint. Open reduction in treatment for coxofemoral luxation is often necessary because of chronicity, fractures in the femur or pelvis, or bony fragments or other debris in the acetabulum, and allows the surgeon to remove interposed tissues from the acetabulum and to replace the femoral head under direct observation. Damage to the femoral head and acetabulum can be assessed and defects of the acetabular rim can be corrected surgically. In some cases, suturing the joint capsule and surrounding traumatized tissue may be effective in retaining the reduction. When closed reduction fails, open reduction, capsulorrhaphy, and bandaging may be all that is required to maintain the reduced coxofemoral joint, especially in dogs with unilateral coxofemoral luxation and no other orthopedic injuries[7].

In the radiographic examination, it was observed that the head of the femur rested dorsal and cranial to the acetabulum. The affected limb was shorter than the opposite limb when positioned ventrally and extended caudally. This dog was definitely diagnosed as a left coxofemoral luxation through history taking and physical and radiographical examination. The cause of this case could be supposed to be its obesity and several falling down on the slippery bottom pad in the breeding ground that was prepared for its comfort by the owner. For the more exact diagnosis, it is advisable to take at least 2 radiographs at a right angle each

other in all orthopedic cases. If only a ventrodorsal radiograph were taken in this case, the clinician might assume that this was a caudodorsal luxation. Considerable damage could be done if external reduction was attempted with that assumption. For this reason, two radiographs also were taken ventrodorsally and laterally in this case.

Minimal complications were associated with the use of a toggle pin, and the reported failure rate was no worse than that for other surgical procedures for coxofemoral repair[1]. But, we could believe that the combination of the toggle pinning and synthetic capsule technique is more sufficient than toggle pinning alone to prevent coxofemoral joint from recurrent luxation during early weightbearing, regardless of the intraoperative integrity of the repaired joint capsule.

Conclusions

A 10-month-old female Rottweiler weighing 43 kg was presented with a history of severe lameness in its left hindlimb which had developed gradually about 2 months. The diagnosis of coxofemoral luxation was made by physical examination and confirmed by evaluation of lateral and ventrodorsal radiographic views of the pelvis. Open reduction and stabilization of coxofemoral luxation was made via a craniodorsal approach to the hip joint, using a toggle pin which was made with a intramedullary pin and two bone screws. This initial reduction was failed by recurrence of luxation on the 7th day after surgery. The dog was postoperatively maintained in an Ehmer sling and cage rest after the second open reduction. This dog regained an almost normal gait within 20 days.

References

1. Basher AWP, Walter MC, Newton CD. Coxofemoral luxation in the dog and cat. Vet Surg 1986; 15: 356-362.
2. Bone DL, Walker M, Cantwell HD Traumatic coxofemoral luxation in dogs: Results of repair. Vet Surg 1984; 13: 263-270.
3. Denny HR, Minter HM Recurrent coxofemoral luxation in the dog. Vet Ann 1973; 14. 220-225.
4. DeVita J. A method of pinning for chronic dislocation of the hip joint. Proceedings of the 89th Annual AVMA Meeting 1952: 191-192.
5. Durr JC. The use of Kirschner wire in maintaining reduction of dislocations of the hip joint. JAVMA 1957. 130. 78-81.
6. Garbutt RJ. Animal bone surgery dislocations of the hip. JAVMA 1948, 113: 144
7. Hammer DL. Recurrent coxofemoral luxation in fifteen dogs and one cat. J Am Vet Med Assoc 1980; 177: 1018-1020.
8. Helper LC, Schiller AG Repair of coxofemoral luxation in the dog and cat by extension of the acetabular rim. JAVMA 1963; 143: 709-711.
9. Hemsmeyer LL. Purse string fixation of coxofemoral luxations. J So Afri VMA 1963, 34. 459-460.
10. Horne RD. Trochanteric pinning procedure fot reduction of coxofemoral luxations VM SAC 1971; 66: 331-334.
11. Knowles AT, Knowles JO, Knowles RP. An operation to preserve the continuity of the hip joint. JAVMA 1953; 123: 508-515.
12. Leonard EP. Orthopedic surgery of the dog and cat. 2nd Ed. Philadelphia: W.B. Sauders and Co., 1971: 209-218
13. Olsen ML. Multiple fractures of the pelvis. In Canine Surgery, 4th Ed. American Veterinary Publications, Wheaton 111., 1957: 726-734.