

Treatment of Medial Patellar Luxation by Placement of a Cortical Screw on the Medial Side of the Tibial Crest in a Dog

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Abstract : An 8 kg, 9-month-old castrated male Shiba Inu presented with a history of intermittent bilateral hind limb lameness. On examination, grade III medial patellar luxation of the bilateral hind limbs was diagnosed. A novel surgical method involving relatively noninvasive tibial tuberosity transposition was used to restore normal alignment of the quadriceps mechanism. The procedure involved an incision on the medial cortical bone of the tibial tuberosity along the tibial crest and placement of a cortical screw on the medial side of the tibial crest to laterally transpose the tibial tuberosity. Lameness and patellar luxation of bilateral hind limbs were improved at a 3-month postoperative examination. This technique could be considered an effective treatment for medial patellar luxation in skeletal immature patients.

Key words : cortical screw, dog, medial patellar luxation, tibial tuberosity.

Introduction

Patellar luxation is a common condition seen in toy, miniature, and large breed dogs (2,3). Medial luxation accounts for the majority of all cases, regardless of the size or type of dog. Patellar luxation is a developmental disease resulting from anatomic abnormalities involving the entire hind limb (6). However, skeletal deformities may also follow as a result of chronic patellar luxation and can steadily worsen until skeletal maturity. Therefore, surgical correction should be conducted as early as possible, although there have not been any reports on the optimal age for correction.

Numerous surgical techniques, including bone reconstruction (trochleoplasty and tibial tuberosity transposition) and soft tissue reconstruction (medial soft tissue release and lateral soft tissue tightening), have been used for the correction of patellar luxation. Most patients receive some combination of bony and soft tissue techniques. In general, surgery is indicated only in those dogs that are experiencing significant clinical signs or in young dogs where soft tissue techniques might be utilized for a temporary repair. However, soft tissue techniques cannot be applied successfully in serious cases. Bony reconstructive techniques could also result in damage to the distal femoral or proximal tibial physal plate.

We have developed a technique to correct the medial patellar luxation in skeletally immature dogs. The technique in-

volves an incision along the tibial crest on the medial cortical bone of the tibial tuberosity and placement of a cortical screw on the medial side of the tibial crest to laterally position the tibial tuberosity.

This case report describes a clinically significant patellar luxation in a musculoskeletal immature dog, which was corrected with a modified and noninvasive tibial tuberosity transposition technique.

Case

A 9-month-old, castrated male Shiba Inu weighing 8 kg presented to the Veterinary Medical Teaching Hospital of Seoul National University with a history of intermittent bilateral hind limb lameness. Orthopedic examination revealed bilateral grade III medial patellar luxations.

Radiography confirmed medial displacement of the bilateral patella (Fig 1). Shorter fibula, relatively medial bowing of the bilateral tibia, osteophytes at the distal part of the bilateral patella, and slightly compressed infrapatellar fatpads of the bilateral stifle joints were also evident.

In the absence of any other significant abnormalities, the bilateral hind limb lameness of the dog was considered to be due to the medial patellar luxation. Surgical correction was conducted to improve the quadriceps mechanism alignment and stabilize the femoropatellar joint.

The patient was positioned ventrodorsally and a wide area centered on the stifle joint was prepared for aseptic surgery. A craniomedial skin incision was made to the right stifle joint first. Using a No. 15 blade and an osteotome, a longitu-

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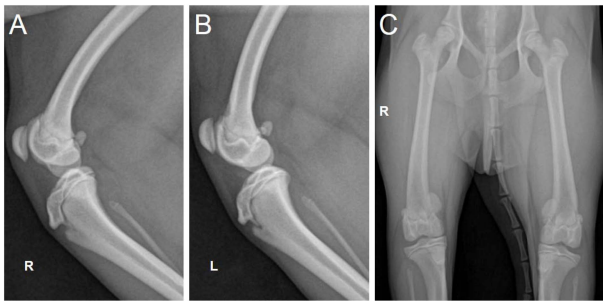


Fig 1. Preoperative (A) right and (B) left mediolateral, and (C) craniocaudal radiographic views from the dog, showing medial patellar luxation.

dinal incisions was made in the cortical bone on the medial side of the tibial tuberosity (Fig 2A). A 2.0 mm cortical screw was placed in the medial side of the tibial crest (Fig 2B) and the tibial tuberosity was transpositioned laterally (Fig 2C). A lateral parapatellar incision was made on the fascia, and then lateral soft tissue tightening was performed. A long 2.0 mm cortical screw was applied on the medial side of the distal femur as an adjunctive procedure (Fig 2D) to prevent medial deviation of the quadriceps muscle. The subcutaneous tissue and skin were closed routinely. The procedures at the left stifle joint were conducted in the same manner as those at the right stifle joint.

Orthopedic examinations were performed and radiographs were obtained to observe the healing process immediately post-operatively, and 2, 4, 8, and 12 weeks post-operatively (Fig 3).

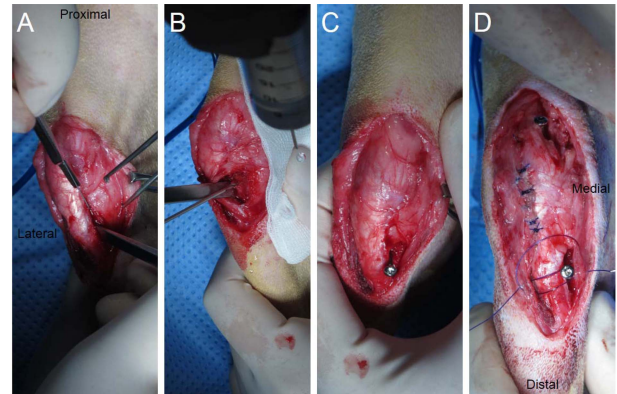


Fig 2. Intra-operative photographs of the dog. Following (A) a longitudinal incisions in made in the cortical bone on the medial side of the tibial tuberosity, (B) a cortical screw was placed in the medial side of the tibial crest, and (C) the tibial tuberosity was transpositioned laterally. (D) A long cortical screw was applied on the medial side of the distal femur as an adjunctive procedure.

At a recheck appointment 2 weeks after surgery, bilateral hind limb lameness of the dog was subtle and there was evidence of normal incisional healing. Three weeks later, cortical screws that had been temporarily placed on the medial side of the distal femur to prevent medial deviation of the quadriceps muscle were removed. Bilateral patellar relaxations of grade I were palpable at 8 weeks, but the postoperative grade was lower than the preoperative grade. At 12 weeks

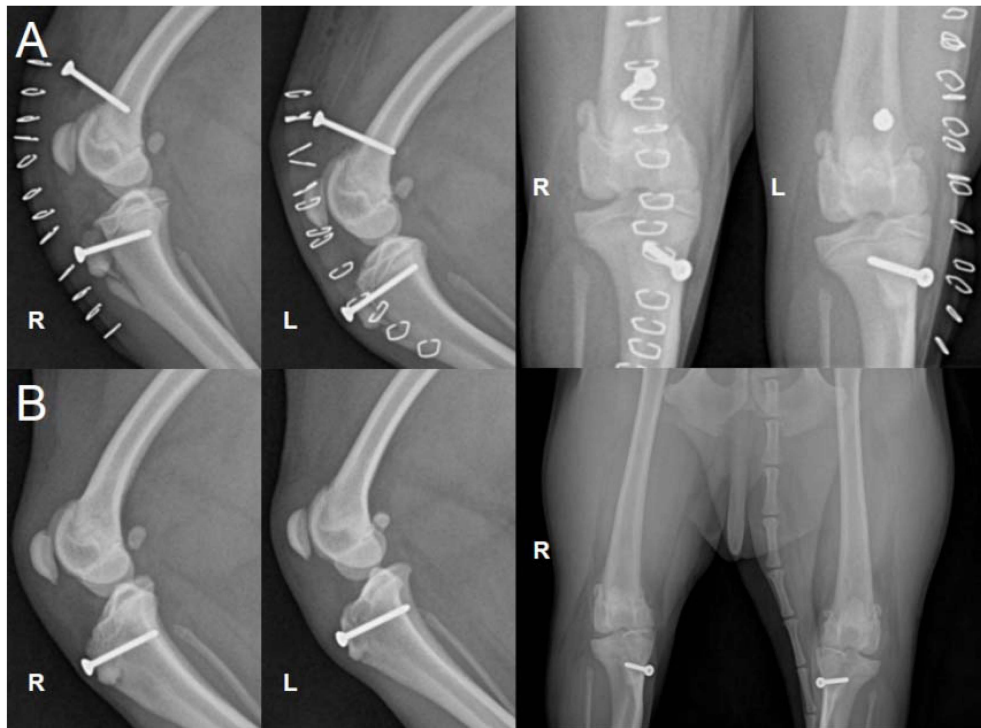


Fig 3. Postoperative radiographic views of the dog taken (A) immediately and (B) 12 weeks after the surgery, revealing improved patellar reduction and stability.

following surgery, the dog was able to walk normally and no additional progression of patellar relaxation was confirmed. No signs of adverse effects of the surgery on the physis of the proximal tibia were evident. The dog showed clinical improvement following correction of the patellar luxation.

Discussion

Various surgical methods have been developed to treat medial patellar luxation, and most medial patellar luxations can be corrected successfully by conventional surgical techniques (2,5,8). Individualized treatment should be provided for each patient because the abnormalities such as the skeletal deformity, presence of osteoarthritis, or instability of the stifle joint, vary greatly in each case. In cases of grade III or grade IV patellar luxation surgical correction is required early in the course of the disease to alleviate progressive skeletal deformity and osteoarthritis (7). However, surgery regarding young patients with significant remaining growth potential is challenging. Bony reconstructive techniques could result in damage to the distal femoral or proximal tibial physeal plate. Therefore, bony reconstructive techniques should be avoided until skeletal maturity is reached in patients with significant growth potential remaining. However, only soft tissue technique cannot expected successful prognosis in severe case such as grade III or grade IV patellar luxation.

In the present case, we applied a unique technique to correct the medial patellar luxation in skeletal immature dogs. In this method, the tibial tuberosity was not cut off to transpose it, and instead, a longitudinal incision was made in the medial side to the tibial tuberosity and a cortical screw was placed on the medial side of the tibial crest to transpose the tibial tuberosity outward. Although the result obtained by this operation is the same as that of the tibial tuberosity transposition, this technique is easier and safer. The clinical symptoms of the dog in this case were improved after the operation. Radiographs showed normal ossification of tibial tuberosity at 12 weeks after the operation, and this surgical procedure did not negatively affect the physis of the proximal tibia. Therefore, the surgical technique described in this case is thought to be desirable in young dogs that do not yet show ossification of tibial tuberosity. Although the dog in the present case was 9 months old and physeal plate of the dog was observed, this technique may be considered as a valuable surgical method in younger patients.

A previous study reported a surgical method similar to that described in the present case to correct medial patellar luxation in young patients (4). The authors made a longitudinal groove on the medial cortical bone of the tibial tuberosity along the tibial crest, and placed small pieces of artificial ceramic bone or autoplasmic bone grafts as wedges in the groove. The method was applied to 13 cases, with good results reported. We inserted a cortical screw instead of artificial ceramic bone or autoplasmic bone grafts to transpose laterally the tibial tuberosity. Cortical screws are easily usable, non-

immunogenic, and stably secure to the bone. The cortical screws used in this case have not caused any problems, and successfully realigned the quadriceps muscles, patella, and patellar ligament in the normal position.

In this case report, relaxation of the bilateral patella was confirmed 2 months postoperatively, although the postoperative grade was lower than the preoperative grade. Relaxation of the patella is a known complication of surgical correction in dogs; one study reported an 8% frequency of relaxation following surgical correction of patellar luxation in dogs (1). Failing to overcome skeletal malformations through soft tissue reconstruction techniques alone is the main cause of poor surgical outcomes for patellar luxation in dogs. However, surgical methods like bone reconstruction are not suited for application to younger animals. Therefore, a two-stage repair can be considered in cases of severe luxation in young patients (7).

The surgical method in this case report might play a role as a temporary repair is being performed to mitigate clinical signs until skeletal maturity is reached. If patellar luxation persists or recurs, bone reconstruction techniques including trochlear block recession, tibial tuberosity transposition, and femoral corrective osteotomy, can be employed as needed once skeletal maturity is reached. Furthermore, this surgical procedure might have been more effective if it had been applied in younger patients than the dog of this case.

This case report highlights the possible surgical technique to treat severe medial patellar luxation in skeletal immature patients. Surgical correction of medial patellar luxation by this technique appears to be effective in improving the quadriceps alignment, patellar stability, and limb function. However, further work is required to better define the indications for this surgical method and to better assess outcome following surgery, because this case report dealt with only a case.

Acknowledgements

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개에서 경골 조면 내측에 피질골 나사못을 장착하는 방법에 의한 내측 슬개골 탈구 치료 증례

강병재 · 윤대영 · 류다은 · 김용선 · 이승훈 · 김완희 · 권오경¹

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요 약 : 8 kg, 9개월령 중성화 수컷 시바 이누견이 양측 후지의 간헐적인 파행 증상으로 내원하였다. 검사를 통해 3단계의 양측 슬개골 탈구가 진단되었다. 대퇴 사두근의 정상 배열을 회복하기 위해서 상대적으로 비침습적인 조면의 위치를 재배열하는 독특한 수술 방법을 적용하였다. 이 과정은 경골 능선을 따라 경골 조면의 내측 피질골을 절개하고, 경골 조면을 외측으로 변위시키기 위해 경골 능선의 내측에 피질골 나사못을 장착하는 방식으로 이루어졌다. 수술 후 3개월 검사에서 양측 후지의 파행과 슬개골 탈구가 개선된 것이 확인되었다. 이 수술 기법은 골격이 미성숙한 환자에서 내측 슬개골 탈구를 치료하기 위한 효과적인 방법으로 고려될 수 있다.

주요어 : 피질골 나사못, 개, 내측 슬개골 탈구, 경골 조면