



Clinical Report

Surgical Repair of Lateral Patellar Luxation in Two Foals

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Abstract

Case Description- Two foals were referred for lameness evaluation. Case 1 was an 8-month-old male KWPN foal and the second one was a 2-day-old female Arabian foal.

Clinical Findings- The KWPN foal was presented with severe lameness at walk and the second foal was unable to stand. In both patients luxation of the patella was confirmed on physical and radiological examinations.

Treatment and Outcome- Patellar luxation was corrected by combination of releasing and imbrication methods in both cases. Follow up revealed that lameness gradually improved during postoperative period.

Conclusion and Clinical Relevance- Diagnosis and surgical repair of lateral patellar luxation were reported in two foals as the first report in Iran. It was concluded that patella luxation as a congenital cause of lameness in foals can be corrected by surgical techniques successfully.

Key Words- Foal, Lateral patellar luxation, Surgical repair.

Case Description

Two foals were presented to the Veterinary Teaching Hospital of Ferdowsi University of Mashhad for evaluation of severe lameness. The first case was an 8-month-old male KWPN colt that presented with severe lameness at walk. According to his owner's information the foal was born prematurely and was mildly lamed just after birth which has been became more severe while growing up. Second one was a 2-day-old female Arabian foal was unable to stand after birth.

Clinical Findings

Case 1 (The KWPN colt): On clinical examinations, motion's stiffness and grade 4 lameness (The alternative lameness scoring system¹) were obvious. Episodically,

the animal could not bear weight on the right hind limb. On palpation of the right stifle, pain and soft tissue swelling of this joint were revealed. The right patella was laterally luxated with manipulation (Fig 1). There was no sign of abnormality in left stifle. Lateral and craniocaudal radiographic assessments of affected limb confirmed the right patella was positioned laterally, no signs of other bony changes were seen.

Case 2 (The Arabian foal): The foal was very weak to stand and adopted the crouched position with assistance. Complete clinical examinations were performed for localization of the disorder. On palpation of the stifle regions, both patellae were laterally dislocated and were reducible into the normal anatomical positions. In radiographic evaluation, cranioproximal-craniodistal oblique view was taken from both stifle joints that revealed bilateral patellar luxation. Both patellae were dislocated laterally. No signs of trochlear ridge hypoplasia and shallow trochlear groove were observed (Fig 2). In this case congenital lateral luxation of the patellae was confirmed on physical and radiographic evaluations.

Complete biochemical blood analysis were performed in both cases as a part of routine examinations.

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Figure 1- Clinical presentation of KWPN colt shows the swelling of the right stifle joint (arrow).



Figure 2- Cranioproximal-craniodistal oblique view of both stifle joints in the Arabian foal shows bilateral patellar luxation (arrows). No signs of trochlear ridge hypoplasia and shallow trochlear groove are observed.

Treatment and Outcome

The surgical techniques include lateral releasing of the patellae and stabilization by imbrication were selected as a preferred method of treatment in both cases. General anesthesia was performed by two different anesthesia regimens as follows:

Case 1 (The KWPN colt): Xylazine hydrochloride (1.1 mg/kg intravenously [IV]; Alfazyne 2%; Alfasan, Woerden Holland) and diazepam (0.2 mg/kg [IV]; Valium, Caspian tamin pharmaceutical Co., Rasht, Iran) for sedation and ketamine hydrochloride (2.2 mg/kg [IV]; Alfamine 10%, Alfasan, Woerden, Holland) for inducing of anesthesia.

Case 2 (The Arabian foal): Diazepam (0.1 mg/kg [IV]; Valium, Caspian tamin pharmaceutical Co., Rasht, Iran) for premedication and ketamine hydrochloride (1 mg/kg [IV]; Alfamine 10%, Alfasan, Woerden, Holland) for inducing of anesthesia.

Following intubation, anesthesia was maintained using isoflurane (Isoflurane, Nicholas Piramal Limited, London, UK) delivered in 100% oxygen by spontaneous ventilation in both cases. The vital parameters, respiratory and cardiovascular systems of these foals were monitored during anesthesia. In order to restore normal electrolyte and hydration, suitable intravenous fluid therapy related to each patient, was chosen and administered during surgery. Flunixin meglumine (1.1 mg/kg [IV]; Flunex 5%, Razak Co, Tehran, Iran) was injected before operation. Cefazolin sodium (15 mg/kg [IV]; Cefazolin, Daana Pharma Co. Tabriz, Iran) was administered preoperatively to reduce the chance of infection after surgery.

The right stifle and both hindlimbs were operated in the KWPN and the Arabian foals, respectively using the same methods. The patients were placed in dorsal recumbency and the hind limbs were positioned partially flexed. Stifle regions were prepared for aseptic surgery. A craniolateral curved skin incision was made from proximal to the patella and extended below the tibial crest. Then, the subcutaneous tissue was separated bluntly along the same line. The biceps femoris muscles were identified and incised at their insertion adjacent to the lateral patellar ligament. For complete releasing of the patella, the lateral patellar and femoropatellar ligaments were transected. The patella could be easily repositioned in trochlea groove. In order to stabilize of the patella and avoid the recurrence of dislocation, the imbrication technique was performed via suturing to the medial structures of the stifle joint. For this purpose, the parapatellar fascia and the sartorius muscle tendon were sutured to the joint capsule and the medial patellar ligament using a nonabsorbable suture in an interrupted Lambert pattern. The patella was rest in the trochlear groove when the stifle joint was passively flexed and extended. A Penrose drain was secured in a wound to remove the fluid from its bed and facilitate the healing process. The subcutaneous layer was approximated using an absorbable suture with a running subcuticular pattern. Finally, the skin was closed in a vertical mattress pattern with nonabsorbable suture material. A sterile and well-padded bandage was applied for supporting the limb. The preoperative antibiotic regimen was continued five subsequent days postoperative (15 mg/kg [IV]; twice a day, Cefazolin, Daana Pharma Co. Tabriz, Iran). For relief of pain and wound swelling, flunixin meglumine (1.1 mg/kg [IV]; once a day, Flunex 5%, Razak Co, Tehran, Iran) was used for 5 days. Ranitidine hydrochloride (2 mg/kg [IV]; twice a day, Ranitidine, Caspian tamin pharmaceutical Co., Rasht, Iran) was prescribed for the same period. The foals owners were recommended to other postoperative cares consist of stall rest, monitoring the incision, removal of drain and skin sutures, daily physiotherapy and hand walking. Postoperative follow up information was obtained from these two patients.

Case 1 (The KWPN colt): No significant complications related to incision site and swelling of the periarticular structures were observed a few days later. Fourteen days after surgery, the degree of lameness was significantly decreased and the foal was appeared to bear weight on right hindlimb hind limb at walking. The patella was located on its normal anatomical position on palpation. Four months after surgery the owner reported that the foal walked with a very mild lameness. The patient was followed up till 8 months and 1 year post-surgery without any complication.

Case 2 (The Arabian foal): The foal was able to stand 2 days after surgery. Phone call conversation 4 days after surgery was indicated that in spite of weight bearing at a stance, lameness noted at walking. The left stifle had mild swelling and wound dehiscence was occurred in the right hindlimb. Daily wound cleaning, dressing, and anti-inflammatory and repeated systemic antibiotic therapy were recommended. Ten days later, according to the referring veterinarian, no purulent discharge was seen in the right side wound and its healing process was significantly improved. Three months postsurgical follow up, showed the lameness was progressively improved clinically over time, so that the foal was bearded weight on hindlimbs almost evenly.

Clinical Relevance

Several literatures have been reported different types of patellar luxation in equine species, although it is a rare condition in general population of horses.^{2,3,4,5,6} This disorder was more frequently diagnosed in miniature breeds especially ponies due to their genetic predisposing factor, caused by an autosomal recessive gene.^{4,7,8,9,10,11} Lateral partial and complete luxations of the patella in horses were first described by Bernard in 1828.¹² Such conditions appear by changing the normal anatomical position of the patella towards the lateral portion of the femoral trochlea.¹² Although the most reported cases consider to be affected congenitally, different agents and factors have been described to be involved in patellar luxation in horses. Developmental defects of muscular, ligamentous or bony supporting structures of the patella in growing period and traumatic agents especially in mature horses have been suggested as other causes of patellar luxation.^{3,4,5,8,9,10,14,15} Hind limbs lameness as a common clinical sign of patellar luxation can vary from mild, moderate to non-weight bearing lameness depends on severity and unilaterally or bilaterally of luxation.^{2,4,8,11,15} Surgical intervention recommends as a preferred method for treatment of patellar luxation. Several surgical procedures including releasing, imbrication and bone reconstructive techniques are described for correction of patellar luxation in horses. These techniques can be utilized either alone or in combination together.^{2,4,7,8,10,14,15} The present article reports the clinical features, surgical management and outcomes of two cases of lateral

patellar luxation in foals. Lateral, medial and distal dislocation of the patella in horses and surgical correction of them have been reported in different publications.^{3,5,7,9,10,11,14,16} Patellar luxation may be congenital, developmental and traumatic in origin and the prognosis of treatment may be affected by its etiology.^{3,15} Congenital patellar luxation as the most common form may be occurred either unilaterally or bilaterally.^{2,3,7,8,9,14} Selection of the appropriate surgical procedure for treatment of patellar luxation is very important to have a good result.¹¹ Successful outcome may be affected by its pathogenesis and some pathologic conditions such as disruption of the parapatellar soft structures, trochlear groove hypoplasia and misalignment of the tibial tuberosity.^{3,15} Information about the application of different surgical techniques, comparison of them and their prognosis in human and dogs are well recognized. The information are limited in horses because of patellar luxation is an uncommon condition.⁴ According to the some studies, congenital patellar luxation has a better overall prognosis than developmental and traumatic luxations.¹⁵ Since the most available reports in horses related to miniature breeds, treatment outcome and prognosis of future athletic use in larger breeds remain challenging.⁴ Lateral releasing incision on the parapatellar structures in combination with imbrication of the medial structures of the patella are usually employed for treatment of congenital lateral patellar luxation in foals.^{3,7,8,11} The similar reverse technique was used when medial patellar luxation is present.⁴ More extensive surgical procedures including different reconstructive methods are needed in patients with major anatomical abnormalities.^{3,4,5,10,14} Also these techniques could be employed when the use of releasing and imbrication methods are unsuccessful.⁷ Liethc and Kotlikoff (1980) demonstrated that combination of these two methods for treatment of patellar luxation in foals and calves has better results than either method alone.¹¹ Engelbert et al (1993) used this method for treatment of 4 miniature horses with bilateral patellar luxation. Although, the presence of the trochlear ridge hypoplasia was radiographically confirmed in their cases but they reported that this technique was successful in 3 of cases.⁷ Bone reconstructive techniques such as trochlear sulcoplasty or chondroplasty have been used successfully for luxation of the patella confused by bone defects in horses. Edinger and Stanek (1991) used the wedge osteotomy for treatment a Shetland pony with bilateral patellar luxation.¹⁶ Medial imbrication combined with resection sulcoplasty has been used by Kobluk (1993) for correction of congenital and traumatic lateral patellar luxation in three foals. Two out of three patients with trochlear ridge hypoplasia on radiographic examination had good prognosis after surgery. Another patient was a Standardbred filly that suffered from traumatic unilateral patellar luxation and disruption of the soft tissue and joint structures. The surgery in this case was unsuccessful and the foal

euthanatized due to postoperative complications.⁵ Hall et al (2010) reported the distal patellar luxation in 19-year-old Thoroughbred horse caused by poor body condition and dysfunction of the musculoskeletal system. Because of they did not observe any pathological findings on radiographic and ultrasonographic evaluations; they corrected the luxation with manual manipulation successfully.⁹ The results of Kobluk and Hall articles revealed that traumatic patellar luxation might have a less favorable prognosis. Medial disposition was another form of patellar luxation occurs in foals. Good outcomes after surgical treatment reported in three separate literatures involve medial patellar luxation in miniature foals.^{3,10,14} The present report describes the surgical treatment of lateral patellar luxation in two foals. According to radiographic evaluations no radiological abnormalities associated with patellae, trochlear ridges and grooves observed. So correction was performed by combination of releasing and reinforcement techniques. Some of the most complications such as relaxation, wound dehiscence, muscles atrophy, septic arthritis, impaired stifle extension and trochlear wedge migration can occur following various corrective techniques. These side effects may contribute to the poor prognosis of

treated patients.^{4,7,11,17} Postoperative complications for patellar luxation in large breed horses are not well recognized. In presented cases, wound dehiscence was the major complication that occurred unilaterally in one case. Postsurgical swelling, tension on the wound or improper postoperative care may be related to wound dehiscence in the Arabian foal. This complication resolved with daily wound cleaning, dressing change and combination antibiotic and anti-inflammatory therapy. No other serious complications were seen several months after surgery in two cases reported here. Foals presented significant improvement in functional level and quality of life over this time. In conclusion, this article reports the diagnosis, treatment, and surgical management of two cases with lateral patellar luxation as a rare disorder in horses. The obtained outcomes demonstrated that the surgery is an effective method for correction of congenital form of patellar luxation with a good prognosis in horses.

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References

- Ross MW. Movement. In: Ross MW, Dyson SJ, eds. *Diagnosis and management of lameness in the horse*. St. Louis, Missouri: Saunders-Elsevier, 2003; 66-67.
- Fowlie JG, Stick JA, Nickels FA. Stifle. In: Auer JA, Stick JA, eds. *Equine surgery*. 4th ed. St. Louis: Saunders-Elsevier, 2012; 1438-1439.
- O'Meara B, Lischer CJ. Surgical management of a pony with a traumatic medial luxation of the patella. *Equine Vet Educ* 2009; 21 (9): 458-463.
- Talbot M, Singer ER. Luxation of the patella in foals. *Equine Vet Educ* 2009; 21 (6): 313-314.
- Kobluk, CN. Correction of patellar luxation by recession sulcoplasty in three foals. *Vet Surg* 1993; 22: 298-300.
- La Faunce NA, Lerner DJ, O'Brien TR. Bilateral congenital lateral patellar luxation in a foal. *Can Vet J* 1971; 12 (5): 119-120.
- Engelbert TA, Tate LP, Richardson DC, et al. Lateral patellar luxation in miniature horses. *Vet Surg* 1993; 22: 293-297.
- McDiarmid A. Lameness in the Pony. In: Ross MW, Dyson SJ, eds. *Diagnosis and management of lameness in the horse*. St. Louis, Missouri: Saunders-Elsevier, 2003; 1072-1073.
- Hall MS, Jalim SL, Russell TM. Distal luxation of the patella in a horse. *Aust Vet J* 2010; 88 (10): 396-398.
- Hart JCA, Jann HW, Moorman VJ. Surgical correction of a medial patellar luxation in a foal using a modified recession trochleoplasty technique. *Equine Vet Educ* 2009; 21 (6): 307-311.
- Leitch M, Kotlikoff M. Surgical repair of congenital lateral luxation of the patella in the foal and calf. *Vet Surg* 1980; 9:1-4.
- Rathor SS. Clinical aspects of the functional disorders of the equine and bovine femoropatellar articulation with some remarks on its biomechanics. *PhD Thesis*. Utrecht 1968, p. 38-40.
- Duzgon OA. Retrospective study: evaluation of patellar luxation cases in cats. *Turk J Vet Anim Sci* 2005; 29: 279-283.
- Arighi M, Wilson JW. Surgical correction of medial luxation of the patella in a miniature horse. *Can Vet J* 1993; 34: 499-501.
- Busschers E. Patellar luxation in horses: Treatment and prognosis. *Equine Vet Educ* 2009; 21 (9):464-466.
- Edinger H, Stanek CH. Surgical correction of a congenital bilateral lateral stationary patellar luxation in a Shetland-filly using trochleoplasty by wedge osteotomy. *Pferdeheilkund* 1991; 7: 197-203.
- Arthurs GI, Langley-Hobbs SJ. Complications associated with corrective surgery for patellar luxation in 109 dogs. *Vet Surg* 2009; 35 (6): 559-566.

چکیده

اصلاح جراحی دررفتگی کشکک به خارج در دو راس کره اسب

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توصیف بیمار- یک راس کره اسب نژاد KWPN ۸ ماهه نر و یک راس کره اسب ماده نژاد عرب ۲ روزه جهت ارزیابی لنگش اندامهای حرکتی خلفی ارجاع داده شدند.

یافته‌های بالینی- کره اسب KWPN در معاینه بالینی لنگش شدیدی را نشان می‌داد و کره اسب عرب، قادر به وزن‌گیری بر روی اندامهای حرکتی خود نبود. در معاینه بالینی و ارزیابی رادیوگرافی دررفتگی کشکک به سمت خارج در هر دو بیمار تایید شد.

درمان و نتیجه- در هر دو راس بیمار مذکور تصحیح جابجایی کشکک به سمت خارج با استفاده از آزاد سازی ساختارهای حمایت کننده کشکک در سمت خارج صورت گرفت و پس از قرارگیری کشکک در محل آناتومیکی طبیعی خود تثبیت این ساختار انجام گردید. ارزیابی‌های پس از جراحی، بهبود قابل توجهی را در وضعیت لنگش در هر دو بیمار نشان می‌داد.

کاربرد بالینی- این مقاله رخداده، تشخیص و درمان دررفتگی کشکک را برای نخستین بار در ایران گزارش می‌کند. نتایج حاصل از درمان این دو بیمار نشان می‌دهد که اصلاح جراحی دررفتگی مادرزادی کشکک به سمت خارج، روشی مناسب و قابل اعتماد به منظور درمان این عارضه است.

کلید واژگان- دررفتگی کشکک به سمت خارج، کره اسب، اصلاح جراحی.