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Case Report

Treatment of a congenital lateral patellar luxation by recession trochleoplasty in a donkey foal

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Summary

The present report describes the surgical treatment of a congenital lateral patellar luxation in a 6-month-old female donkey foal. The foal was presented with a slight crouched position, muscle atrophy, moderate lameness, reluctance to flex the right hindlimb at a walk and slight effusion of the right stifle joint. The foal responded painfully to the stifle flexion test. Irreducible lateral luxation of the right patella was confirmed on physical examination and radiography. The animal was treated surgically by recession trochleoplasty and imbrication of the medial joint capsule. The animal gradually improved after surgery, and good clinical results were reported after 6 months post-operatively. In conclusion, congenital lateral luxation of the patella should be considered as a congenital cause of lameness in donkeys and surgical repair by recession trochleoplasty and medial imbrication of the joint capsule can be helpful to treat this problem.

Introduction

Patellar luxation is known to be a rare, probably inherited, disorder in equidae (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993). Most of the recorded cases of patellar luxation have been congenital in origin (Kobluk 1993; Ghasemi *et al*. 2015). A traumatic luxation of the patella has also been reported (O'Meara and Lischer 2009).

Different forms of patellar luxation have been described in horses such as lateral, medial, distal, unilateral, bilateral, intermittent and persistent luxation of the patella (Arighi and Wilson 1993; Busschers 2009; Hart *et al*. 2009; Talbot and Singer 2009; Hall *et al*. 2010).

Lateral patellar luxation has been treated by transection of the lateral supporting structures of the stifle joint or reinforcement of the medial supporting structures, or a combination of both techniques, with various degrees of success (Engelbert *et al*. 1993). A lateral release incision and medial imbrication of the parapatellar fascia to the tendon of the sartorius muscle was performed to treat bilateral patellar luxation in four horses and resulted in various degrees of improvement (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993; O'Meara and Lischer 2009; Ghasemi *et al*. 2015). In addition, several post-operative complications have been recorded such as recurrent luxation, septic arthritis caused by incisional dehiscence, muscle atrophy and degenerative joint disease (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993; O'Meara and Lischer 2009; Ghasemi *et al*. 2015).

Another surgical treatment including recession trochleoplasty (sulcoplasty) and medial imbrication of the joint was successfully used for correction of lateral luxation of the patella in three foals (Kobluk 1993). This surgical technique is recommended for treatment of foals with lateral patellar luxation and having a shallow trochlear groove and a hypoplastic lateral trochlear ridge (Kobluk 1993).

This report describes the application of recession trochleoplasty and medial imbrication of the joint capsule for the treatment of a 6-month-old female donkey foal with a congenital lateral luxation of the patella.

Case presentation

A 6-month-old female donkey foal was presented to the surgery clinic at the Faculty of Veterinary Medicine, Cairo University, Egypt, with difficulty walking. According to the owner information, the foal showed mild lameness just after birth and the lameness became more severe over time.

Upon presentation, the donkey foal showed a slight crouched position, swelling of the right stifle joint, muscle atrophy, slight femoropatellar joint effusion and moderate lameness (**Fig 1a**). The foal was reluctant to flex the right hindlimb at a walk, dragged the toe of the affected limb during exercise and was unable to back-up.

Physical examination revealed no outstanding disorders apart from the right stifle joint. On palpation of the right femoropatellar joint, pain and slight joint effusion were noticed. The right patella was palpated at the lateral aspect of the stifle joint. The luxated patella was irreducible into its normal anatomical site. The foal responded painfully to the stifle flexion test.

Lateromedial and caudocranial radiographic views of the right stifle joint confirmed lateral luxation of the patella with no evidence of degenerative joint disease (**Fig 1b**).

Based upon the case history, physical examination and radiography, the case was confirmed as a congenital lateral luxation of the patella (grade 4) according to Arnoczky and Tarvin (1980). Therefore, recession trochleoplasty and imbrication of the joint capsule were decided to correct the condition.

One day before surgery, phenylbutazone at a dose of 2.2 mg/kg bwt (Phenyloject®)[1] and cefazolin sodium at a dose of 15 mg/kg bwt (Cefamezin®)[2] were given administered.

The general anaesthesia was induced by intravenous administration of 1 mg/kg bwt of xylazine HCl (Xylaject®)[1], 0.1 mg/kg bwt of diazepam (Neuril 10 mg Amp®)[3] and 2.2 mg/kg bwt of ketamine HCl (Keiran®)[4]. General anaesthesia was maintained by intravenous triple drip

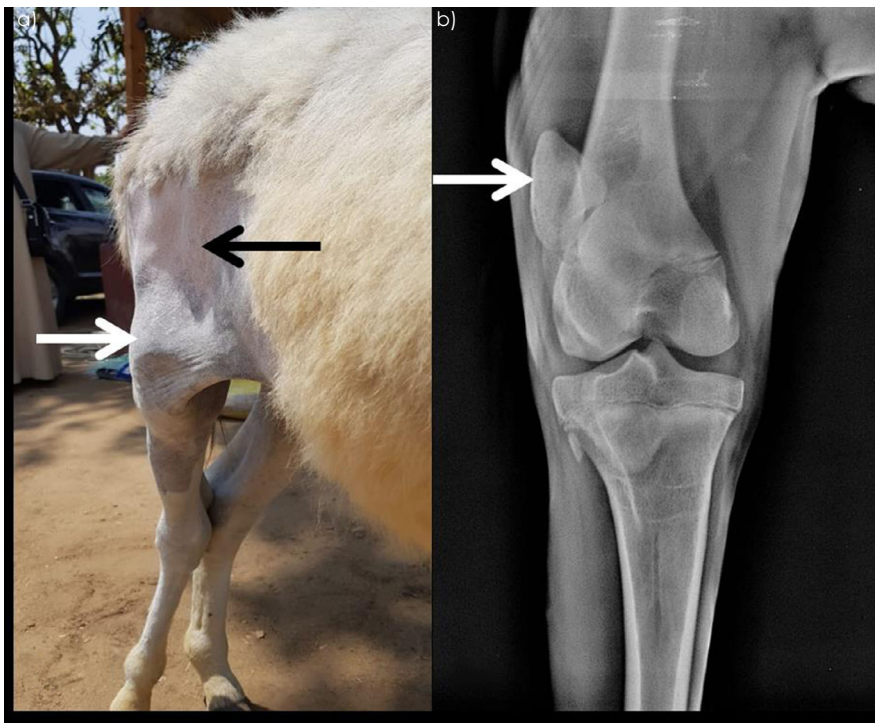

Fig 1: a) A 6-month-old female donkey foal with right lateral patellar luxation showing atrophy of the thigh muscles (black arrow), swelling of the right stifle joint and site of patellar luxation (white arrow). b) Caudocranial radiographic view of the right stifle joint of the same donkey foal showing the luxated patella (white arrow).

technique using a combination of 1 g of ketamine HCl, 0.5 g of xylazine HCl and 1000 mL of 5% guaifenesin solution. This combination was given to effect up to a rate of 2 mL/kg per hour.

During surgery, the foal was given 500 mL of dextrose 5% solution (Dextrose 5%)[5] and 250 mL of Ringer's lactated solution (Ringer's Lactated)[5].

The foal was placed in a dorsal recumbency with its right hindlimb partially flexed. The diseased limb was aseptically prepared from the mid-femoral region to the mid-tibial region and draped with towels. A lateral femoropatellar arthrotomy was made as follows:

A craniolateral curved skin incision was carried out along the lateral trochlear ridge, starting at 5 cm above the luxated patella and extending below the tibial crest. Then, blunt dissection of the subcutaneous tissue was made along the same line and the skin was reflected medially to expose the whole joint. To release the patella, both lateral patellar and femoropatellar ligaments were transected and the cranial branch of the biceps femoris muscle was retracted caudally. Then, the fascia lata and fibrous joint capsule were incised on the lateral side. The trochlea had a shallow trochlear groove and a hypoplastic lateral trochlear ridge (**Fig 2a**). Once the patella could be easily repositioned in the trochlear groove, recession trochleoplasty was made as follows:

A wedge of bone with cartilage from the trochlear groove (**Fig 2b**) was cut with an oscillating saw (FMM 350 Q MultiMaster Oscillating tool)[6]. The induced defect was deepened by excision of 0.5 cm of bone from its medial and lateral sides (**Fig 3a**). Remodelling of the defect and the wedge was undertaken using a bone curette. The surgical site was flushed by sterile warm saline. Trimming of the articular cartilage was carried out to make an even trochlear groove. Then, the bone wedge was repositioned in the trochlear groove and the patella was repositioned into its normal anatomical site. The lateral joint capsule was reconstructed using No. 3.5 metric Braided Polyglycolic Acid suture (Egysorb®)[7] with a simple continuous pattern.

To stabilise the patella in its anatomical position, medial imbrication was carried out by suturing the parapatellar fascia and the sartorius muscle tendon to the joint capsule and the medial patellar ligament using No. 5 metric nonabsorabable polyester coated suture (Trubond®)[8] in a simple interrupted pattern (**Fig 3b**).

The stifle joint was passively flexed and extended to ensure correct reposition of the patella. Following this, the subcutaneous tissue was sutured using No. 3.5 metric Braided Polyglycolic Acid suture with simple continuous pattern. The skin wound was approximated with stainless staples using a disposable skin stapler (Advan Disposable Skin Stapler®)[9].

After surgery, a sterile bandage was applied. Phenylbutazone at a dose of 2.2 mg/kg bwt (Phenyloject®)[1] and cefazolin sodium at a dose of 15 mg/kg bwt (Cefamezin®)[2] were given intravenously twice daily for 5 days. The donkey foal was given 1500 IU of anti-tetanic serum (Tetanus-antitoxin®)[10] by subcutaneous administration. Dressing of the skin wound was carried out with povidone-iodine solution, three times daily for 10 days. The skin staples were removed after 10 days of surgery.

Stall rest with hand walking and physiotherapy in the form of passive flexion and extension of the stifle, 10 times daily, was performed for 3 weeks.

Post-operative follow-up information, up to 6 months, confirmed the success of surgery with ability of the animal to

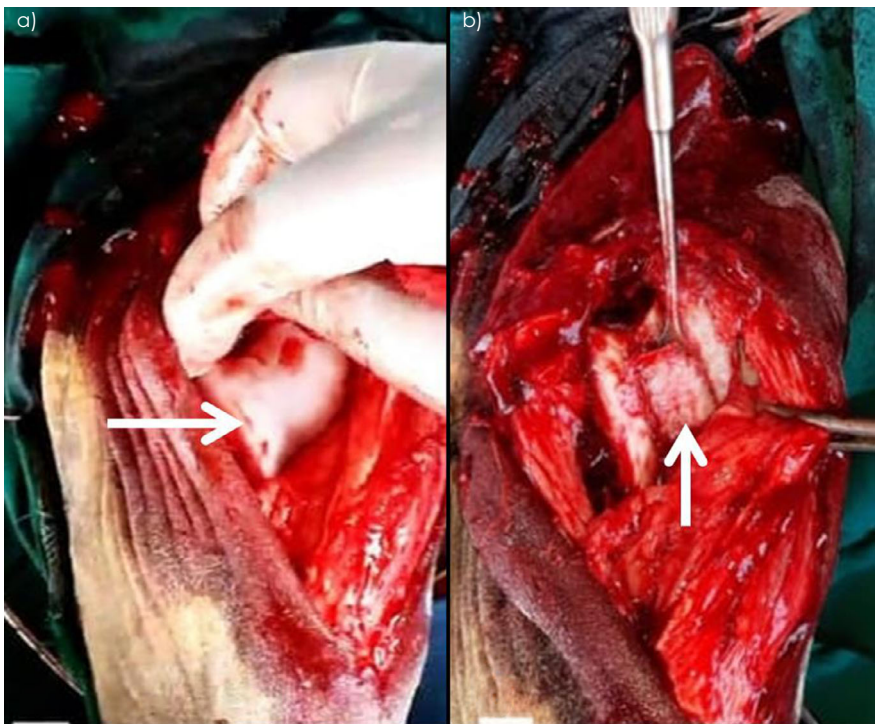

***Fig 2:** a) Intraoperative photograph of the right femoral trochlea (white arrow) showing a shallow trochlear groove and a hypoplastic lateral trochlear ridge. b) Resection of a wedge of bone (white arrow) from the trochlear groove during the recession trochleoplasty.*

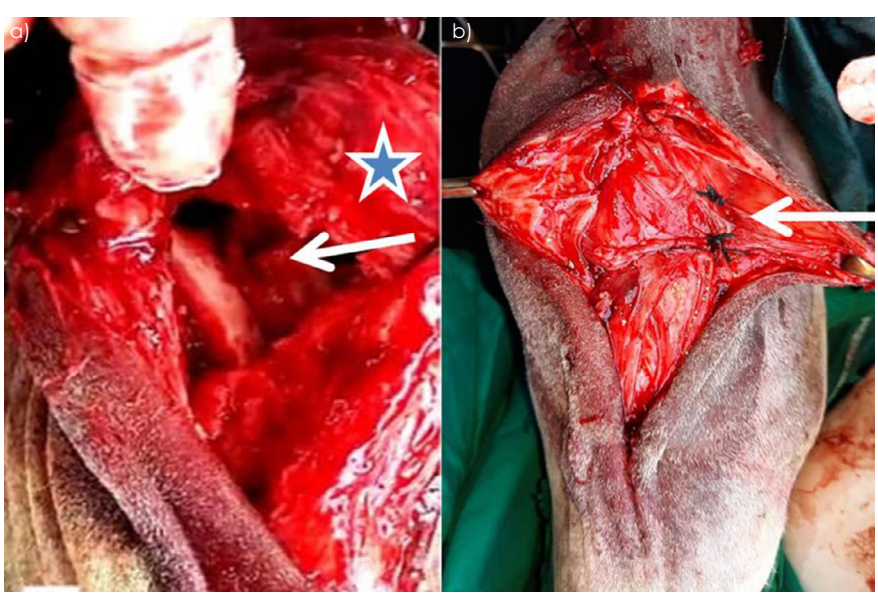

***Fig 3:** a) Intraoperative photograph showing the trochlear groove after deepening (white arrow). Note the released patella (star). b) Intraoperative photograph showing the medial imbrication of the stifle joint capsule (white arrow).*

bear weight on its right hindlimb at walking, preservation of the range of movement and no evidence of the patellar reluxation or lameness.

Discussion

Patellar luxation is an uncommon condition in equidae, and most of the available literature describes individual cases in horses (O'Meara and Lischer 2009; Talbot and Singer 2009; Ghasemi *et al*. 2015). To the authors' knowledge, there is no report describing a lateral patellar luxation in donkeys. Therefore, the present study reports a rare case of congenital lateral luxation of the patella in a donkey foal.

Regarding the aetiology of patellar luxation, an autosomal recessive gene is one of the previously suggested causes of this disorder in equidae (Engelbert *et al*. 1993; Hall

et al. 2010). It was commonly reported in miniature breeds, particularly ponies due to genetic predisposing factors (Leitch and Kotlikoff 1980; Hart *et al*. 2009). Other suggested causes include developmental defects of supporting structures of the patella in young animals and trauma, particularly in mature horses (Arighi and Wilson 1993; Kobluk 1993; Busschers 2009; Hart *et al*. 2009; Talbot and Singer 2009; Hall *et al*. 2010). Although the present case had a congenital origin, the genetic predisposition could not be confirmed. In addition, no muscular or ligamentous defects were observed at surgery but a hypoplastic lateral trochlear ridge and a shallow trochlear groove were seen. Similar findings were seen in horses by previous workers (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993).

There are four grades of the patellar luxation, grade 1: the patella can be manually luxated but readily reduce itself, grade 2: the patella is usually in the trochlear groove and luxated intermittently, grade 3: the patella is usually luxated but can be manually reduced and grade 4: the patella is luxated and cannot be manually reduced (Arnoczky and Tarvin 1980).

Based on this grading, the case recorded here is a lateral patellar luxation of grade 4. Patellar luxation results in various degrees of lameness according to the severity of the case and type of luxation, either unilateral or bilateral (Engelbert *et al*. 1993; Kobluk 1993). The lameness of the recorded case was moderate because the foal had a unilateral lateral patellar luxation. Preoperative radiography is a helpful tool to assess the degree of degenerative joint disease, the depth of the trochlear groove, the shape and site of the patella, the degree of ossification of the trochlear ridges and other bony lesions (Engelbert *et al*. 1993). Lateromedial and flexed skyline radiographic views of the femoropatellar joint are essential to evaluate the trochlear ridge hypoplasia (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993; Kobluk 1993; O'Meara and Lischer 2009; Ghasemi *et al*. 2015).

Due to the cost, the authors were satisfied with making the caudocranial and lateromedial radiographic views, especially with the clarity of patellar luxation by the physical examination.

Treatment of lateral patellar luxation by a combination of releasing and reinforcement techniques can be associated with complications like reluxation, wound dehiscence, muscle atrophy, septic arthritis, impaired stifle extension and trochlear wedge migration (Engelbert *et al*. 1993; Talbot and Singer 2009; Ghasemi *et al*. 2015). Treatment by recession trochleoplasty (sulcoplasty) and medial imbrication of the joint capsule has been recommended in horses with lateral patellar luxation, particularly those that have a trochlear ridge hypoplasia and a shallow trochlear groove (Edinger and Staneh 1991; Kobluk 1993). Excessive imbrication may result in a medial patellar luxation as mentioned in previous case series (Engelbert *et al*. 1993).

Therefore, we preferred the recession trochleoplasty and medial imbrication of the joint capsule in order to treat the presented donkey foal through maintaining of the patella in the trochlear groove. Correction of the problem was achieved in our donkey foal without complications or recurrence.

Transection of the lateral patellar and femoropatellar ligaments was necessary for complete releasing of the patella. A similar surgical step was carried out in previous cases of lateral patellar luxation in horses (Engelbert *et al*. 1993; O'Meara and Lischer 2009).

Medial imbrication procedure is usually accompanied by the surgical repairs of the patellar luxation in order to avoid the patellar reluxation. A similar technique was reported in several previous studies (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993; Kobluk 1993; O'Meara and Lischer 2009; Ghasemi *et al*. 2015).

Suturing of the medial patellar ligament and tendon of the sartorius muscle during the imbrication decreases the chance of the sutures pulling out. The same step was carried out in previous studies (Leitch and Kotlikoff 1980; Kobluk 1993; O'Meara and Lischer 2009; Ghasemi *et al*. 2015).

After surgery, the owner was advised to perform passive flexion and extension of the operated limb to enhance walking and to decrease the periarticular soft tissue contraction. This is in agreement with previous studies (Leitch and Kotlikoff 1980; O'Meara and Lischer 2009). Pre- and post-operative antibiotics and anti-inflammatories were administered to reduce the risks of infection and swelling, as well as to provide pain relief. A similar regimen was recommended by previous authors (Leitch and Kotlikoff 1980; Engelbert *et al*. 1993; Kobluk 1993; O'Meara and Lischer 2009; Ghasemi *et al*. 2015). Under Egyptian circumstances, we used cefazolin in our recorded case to reduce the risk of potential infection after the major orthopaedic interference.

Compared with the horse, there are no differences in the functional anatomy or the surgical technique used to treat patella luxation although the outcome of recorded case here is generally better. The good outcome obtained in the recorded case after surgical treatment could be attributed to the adequate intraoperative stabilisation of the patella in its normal anatomical position and the young age of the patient, and small size of donkeys compared with horses.

The limitation of this case report was the inability to perform further radiographic views of the stifle joint for confirming all ossous lesions which were observed during surgery. The cost was taken into consideration because the donkey foal was a rescue animal.

Conclusions

Congenital lateral luxation of the patella should be considered as a cause of lameness in donkeys and surgical repair by recession trochleoplasty and medial imbrication of the joint capsule can be successful for correction of the problem.

Authors' declaration of interests

No conflicts of interest have been declared.

Ethical animal research

This is a case report and does not require an ethical approval.

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Authorship

Both authors shared equally in diagnosis and treatment of the case and in writing and reviewing the manuscript.

Manufacturers' addresses

[1]ADWIA Co., Egypt.
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[4]EIMC Pharmaceuticals Co., Egypt.
[5]Nasr Co., Egypt.
[6]Fein, Germany.
[7]Taisier-Med, Cairo, Egypt.
[8]Sutures India PVT. LTD., Bangalore, India.
[9]Ningbo Advan Electrical Co., Ltd., Shanghai, China.
[10]Pasteur Lab., Egypt.

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