

Research Article

New Technique for Medial Patellar Desmotomy in Cattle and Donkeys

Mohamed Wefky El-Sherif*

Department of Animal Surgery, Faculty of Veterinary Medicine, Assiut University, Egypt

*Corresponding author

Mohamed Wefky El-Sherif, Department of Surgery and Anesthesiology, Faculty of Veterinary Medicine, New Valley, Egypt, Tel: 201008467944; Email: Drmwtf@hotmail.com

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Abstract

A new medial patellar desmotomy technique in cattle and donkeys (*Equus acinus*) is presented. It has been successfully applied to 20 alive animals. The technique is simple, takes few minutes and easily applicable. In contrast to other techniques designed for medial patellar ligament desmotomy; the present technique is less invasive, the skin at the surgical site is not incised, following certain recommendations; the pericapsular fat and joint capsule are not invaded and the ligament is fully transected in a one-step procedure. Minimal tissue invasiveness limits the infection of the surgical site, minimizes bleeding and decreases their related postoperative consequences. On clinical application; the present approach was feasible, reliable and less time and tool requiring.

Keywords

- Patella
- Desmotomy
- Donkey
- Cattle
- Upward fixation

INTRODUCTION

Upward fixation of the patella (UFP) has been reported almost in all domestic animals [1-4] with a high incidence rate in equines than in cattle [5]. This condition believed to be according to the bad conformation of the hind limb [6]. Upward fixation of patella occurs when the medial patellar ligament with its parapatellar fibrocartilage fails to disengage the notch of the medial ridge of the femoral trochlea at the commencement of limb flexion [7], the stifle can't be flexed and the hind limb remains extended with flexed fetlock. The condition may occur temporarily which may spontaneously recover or permanent requiring surgical correction [8]. Affected animals are unable to protract the leg forward, or flex the affected limb causing the involved hind leg to drag behind (Figure 1) and jerky movement is pronounced during the walk [9]. The condition is economically important as it reduces the market value of the affected animal especially in riding animals like horses and donkeys. Several treatment attempts of upward fixation of patella were reported. Conservative treatment comprises conditioning and rehabilitation exercises with concurrent administration of nonsteroidal anti-inflammatory [10,9], injection of counter irritants around the middle and medial patellar ligaments [11,9] and corrective shoeing [7].

Surgical treatment is decided upon definitive diagnosis in conservative treatments non-responsive candidates. Medial patellar desmotomy (MPD) and ultrasound guided medial patellar ligament splitting (MPLS) are the classical surgical procedures for this condition [12,10,9,13-15]. Medial patellar desmotomy is usually performed while animal standing and under the effect of light sedation and local analgesia. Medial patellar

ligament splitting under the guidance of ultrasound requires general anesthesia and animal positioned in dorsal recumbency. Classical medial patellar desmotomy, also called open or blind method is performed initially by identifying the tibial tuberosity as a land mark for identifying the patella and patellar ligaments. Infiltration of 5-10ml of local anesthetic solution beneath skin and in the space between medial and middle patellar ligaments. A stab incision is made by surgical blade #12 at the skin between the two fore-mentioned ligaments. A sharp tipped surgical knife is introduced through the skin incision and advanced beyond the medial patellar ligament. The blade is used to split the ligament in a slow sawing action [16]. Further approaches described a blind splitting of the ligament without performing an initial skin incision [17] and others recommend sharp and blunt dissection of the skin and sub cutis and exteriorization of the medial patellar ligament before splitting [18]. The earlier mentioned surgical

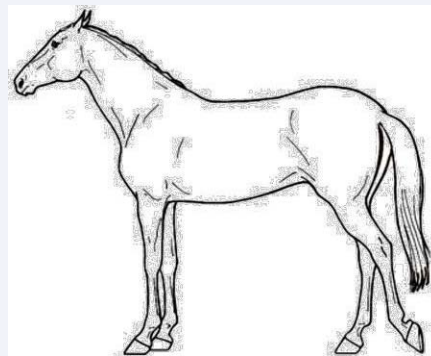


Figure 1 Typical posture of upward fixation of patella in equine. Schematic taken from Lameness, King, C. pg. 885, 1997.

treatments are invasive techniques that require skin incision. Short and long term post-operative complications associated with classic surgical treatments includes swelling, pain, sever bleeding, wound infection, persistent low grade lameness and persistence of signs due to the incomplete transaction of the medial patellar ligament [19-21,7]. The present study presents a new surgical technique for upward fixation of the patella in cattle and donkeys which is thought to be minimal invasive, easy and more suitable for field conditions.

MATERIALS AND METHODS

Experimental preliminary study

A topographical anatomical preliminary study was performed on three donkey cadavers at the faculty of veterinary medicine morgue and five cattle carcasses at the city abattoir. The anatomical features of the medial patellar ligaments and their relation were recorded. Regarding the collected data, the medial patellar ligament (MPL) was located in one donkey and one cattle and the new surgical technique to transect the MPL was performed.

The medial patellar ligament was located and hold with the index and thumb fingers, a half circle cutting surgical needle threaded with silk (USP 1) was passed through the skin, advanced inward distal to the ligament then emerged through skin at the opposite side.

Dissection of skin and subcutaneous fascia was performed to expose the medial patellar ligament and to assist the course of the silk suture around the ligament (Figure 2 ,3).

Clinical case study

The study was approved by the animal welfare committee of the faculty of veterinary medicine, New Valley (August, 2016).

The new technique was performed on five donkeys and eight cows. Participated animals were local breed adults. They were of variable sexes, ages (7-13 years for donkeys and 2-5 years for cattle) and weights (120- 160 kg for donkeys and 350-420 kg for cattles). Animals were sedated with xylazine Hcl (Xylaject, ADWIA pharma, Egypt), (1mg/kg and 0.1mg/kg) administered intravenously in donkeys and cattle respectively.

Donkeys were secured with ropes and kept in standing position while cows were positioned in lateral recumbency with the affected limb upward. Stifle region of the affected limb was clipped and disinfected with absolute alcohol wipes followed by application of povidone iodine solution (Betadine, Mondio, Switzerland). Ten milliliters of lidocaine Hcl 2% (Depocaine, Depiky pharma, Egypt) was injected at the surgical site beneath the skin and deep between the middle and medial patellar ligaments. Further disinfection was performed with alcohol wipes and Betadine solution. The medial patellar ligament was located with its insertion to the tibial tuberosity then held with the tips of thumb and index fingers of the left hand (the operator is right handed). With the opposite hand, a sterile strand of silk (USP 1) mounted on a half circle cutting needle is advanced through skin at the medial aspect of the medial patellar ligament (at the tip of finger) to the subcutaneous fascia and directed beneath the ligament to emerge the opposite side (at the tip of



Figure 2 The preliminary study on cadaver. (A) superficial anatomy of stifle (1, patella, 2, parapatellar cartilage, 3, medial patellar ligament, 4, patellar retinacula, 5, insertion of the common tendon of sartorius (S) and gracilis (G) muscles and Tt, tibial tuberosity), (B) insertion of silk beneath the medial patellar ligament, (C) dissection to assess the course of the silk strand.

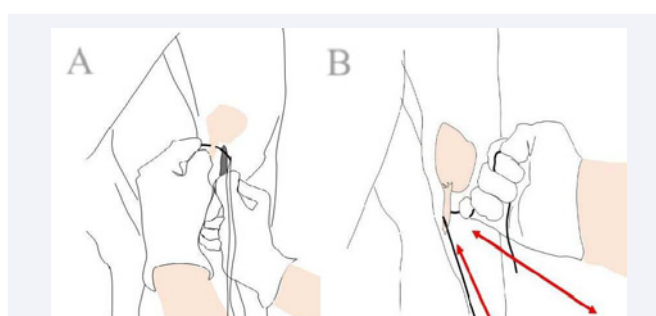


Figure 3 Schematic showing steps of the procedure (A) insertion of needle with silk beneath medial patellar ligament, (B) sawing action and ligament transection.

the other finger) at the space between the middle and medial patellar ligaments. The two ends of the silk strand were grasped with both hands and was used to transect the ligament with sawing action movements. Sawing stops when the "POP" sound indicating the completion of ligament transection heard. The silk strand removed and surgical site disinfected again. Antibiotic, anti-inflammatory and anti-tetanic prophylaxis remedies were administered.

RESULTS

The anatomical study revealed the optimal site for the needle insertion at the cranial aspect of the stifle three fingers breadth above the point of tibial tuberosity. This site is safe due to presence of pericapsular fat while, above this point, danger to traumatize superficial branch of the saphenous nerve or penetration of the medial extension of femuro-patellar capsule presents.

The surgical procedure was feasible, time and money saving and not required special instruments. The mean operative time calculated between the needle insertion and removal of silk strand from the surgical site was 3 ± 1 minutes.

Skin was not incised. Instrument needed are half circle reverse cutting needle, needle driver and silk strand (USP 1) in an appropriate length. Minute bleeding at points of needle insertion and exit which stopped spontaneously. A hearable "POP" sound indicated complete transection of tensed medial patellar ligament. All participated animals retained normal posture and be able to walk normal immediately after the procedure.

No intra or post-operative complications were recorded over two weeks after the procedures.

DISCUSSION

The present technique is a new technique designed to transect the medial patellar ligament which indicated for treatment of upward fixation of patella in cattle and donkeys. The classical closed surgical medial patellar desmotomy procedure requires skin incision to introduce a sharp fixed scalpel blade beneath the medial patellar ligament in order to sever it [19-21,12,7]. Unlike the classical procedures, the present technique didn't require special instruments or to incise skin at the surgical site. Intra and post-operative complications arise from open wound and using sharp instrument in this vital region are avoided and the subsequent hazards are prevented.

The alternate therapeutic surgical procedure is the ultrasound guided medial patellar ligament splitting [7]. This technique is more sophisticated which requires the patient generally anesthetized, special layout and positioning, ultrasound machine and involves skin incision and suturing. The present technique seems to have alike accuracy but with little tools. It is easily achievable in the field, could be performed in standing or lateral recumbent positions with minimal physical or chemical securing, doesn't require expensive instruments and performed under local anesthesia.

The present technique is highly accurate and involves complete transection of the medial patellar ligament in a single step. Incomplete severing of the ligament had been reported as a common intra-operative complication of the blind or closed technique [19], which necessitates several attempts to completely sever the ligament. A single step transection completely resolves the problem without further inflammatory reactions. Bleeding, infection and swelling are other common post-operative complications referred to skin incision and tissue invasion [5,1,6]. Unlike this, the present is minimal tissue invasive. Probability of bleeding, infection and subsequent swelling is minimal.

Several advantages of the present approach over the classical techniques were noticed. Profit of the blind technique described by [17] was obtained, no skin incision was necessary, unlikely, the present approaches overcome the using of a sharp surgical blade which may cause further tissue damage. Present approach contest a more accurate result. Unlike the open approach reported by [16,18], the present technique was minimal tissue invasive and didn't required exteriorization of the ligament. This method showed high accuracy without the need to exteriorize the ligament. Contrasting almost all the classical and ultrasound guided techniques described by [5,1,6,7] current approach uses nominal surgical tools which makes it achievable at the field conditions.

The presented technique is thought to be easy, time and money saving, field applicable, accurate and minimal complications associated procedure for a common problem of cattle and donkeys.

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