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TREATMENT OF UPWARD FIXATION OF THE PATELLA IN THE HORSE
AN UPDATE

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Introduction

Upward fixation of the patella (UFP) in the horse was well known in antiquity (Apsyrtos cited by Leclainche (1955)). In the standing position of the equine hind limb, the patella is located at the top of the femoral trochlea, and the medial patellar ligament with its parapatellar fibrocartilage hooks over a notch of the medial ridge of the femoral trochlea. This locking mechanism enables the horse to remain in the standing position with minimal muscular effort (Nickel et al., 1986; de Lahunta and Habel, 1986). When the stifle is flexed, the quadriceps femoris muscle first contracts to lift the patella clear of the notch, then relaxes to allow it to slide down the trochlea (Nickel et al., 1986).

UFP 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. In that position, the stifle cannot be flexed, and, as a result of the reciprocal apparatus, the hindlimb is fixed in extension with the fetlock flexed. Consequently, the horse assumes a posture with the affected limb is extended in a caudally abducted position.

Clinical signs

Severe form of UFP occurs when locking of the patella prevents flexion of the stifle and hock, but the fetlock is normal, although usually the fetlock is flexed with the toe resting on the ground or dragging as the horse moves forward. With the severe form, the horse assumes a posture with the affected limb extended in a caudally abducted position. The duration of UFP can vary from momentary to several minutes or even be permanent. This situation can occur on daily or weekly basis and sometimes occasionally.

In most instances, there is a partial and intermittent locking of the patella and a palpable and sometimes audible click as the patella is released. This mild form of UFP may only be shown for few numbers of strides, the gait then becoming quite normal.

The mildest form of UFP is manifested by a subtle delayed release of the patella, which appears to move in a jerky fashion, especially as the horse decelerates, without the limb becoming fixed in extension. UFP is often bilateral and may affect one limb more than the other.

Diagnosis

The history, owner's description and clinical features of UFP are almost pathognomonic if a horse has locked the patella, but the partial locking and subtle delayed release of the patella can be much more difficult to identify, because of their episodic or subtle nature. Locking of the patella can occur at any pace though usually at the walk or trot. It is often noticed when the horse moves off from a standstill or turns in the stable (Wyn-Jones, 1988). To provoke locking of the patella, the horse should be trotted slowly, backed up and turned in very tight circles toward the affected hindlimb, walked with repeated stops and starts or walked down a slope. The toe of the involved limb should be evaluated for excessive wear caused by dragging of the foot.

This condition should also be checked by forcing the patella upward and outward with the hand, this will lock the patella over the notch of the medial ridge of the femoral trochlea. If the limb can be manually locked in extension for one or more steps, it is predisposed to UFP (Stashak, 2002).
In cases in which the patella locks only partially, the hindlimb usually jerks up quickly, mimicking stringhalt. Severe cases of UFP must be differentiated from coxofemoral luxation, and subtle delayed release of the patella should not be confused with low-grade hindlimb ataxia (Dugdale, 1997).

Radiographic and ultrasonographic examination of both femoropatellar and femorotibial joints as part of the diagnosis workup is advocated, because any concurrent stifle disease (osteochondrosis, osteoarthritis, ligament or meniscal injury) affects decisions as to treatment and prognosis (Walmsley, 1994; Dyson, 1998). Although uncommon, hypoplasia of the medial trochlear ridge, as occurs with osteochondrosis, facilitates the displacement (Stashak, 2002).

**Treatment**

If the horse presents with the patella locked, pushing the patella medially and distally, backing the animal is recommended, and usually pulling the limb forward with a side-line is necessary in a severe case (Stashak, 2002).

Treatment of UFP should be based first on elimination of predisposing factors when these can be identified. A variety of approaches to treatment of UFP exist. In most cases, conservative or medical treatments should be indicated first. Cases unresponsive to such treatments and severe forms should undergo surgery.

**Conservative and medical treatments**

**Conditioning program**

With mild form of UFP which are not causing lameness or gonitis, especially in young horses, strengthening quadriceps muscle tone and improving the horse fitness is the goal. Treatment consists of trotting exercise on soft ground preferably in straight lines rather than circles or walking and trotting up and down hills. Administration of anthelmintics and an increased plane of nutrition as appropriate for each case are recommended. If necessary, phenylbutazone should be administered to relieve pain until the condition has resolved. However, once an affected horse drops a level of fitness, UFP may recur (Stashak, 2002). Complete stable rest should be contraindicated. Young horses, even healthy, are occasionally affected and improvement will normally be observed as the horse is put into training, probably due to improved coordination between the flexor and extensor muscles of the stifle.

**Injection of counter-irritants**

Injection of counter-irritants containing iodine into and around the medial and middle patellar ligaments has been recommended in persistent cases to increase the fibrosis of the ligaments with subsequent thickening and potential shortening (Norrie, 1982; Brown et al., 1984; Stashak, 2002). This is performed in the standing sedated horse. Horses so treated should be exercised lightly every day to minimise the loss of muscle tone that results from the injections (Stashak, 2002). This treatment has been associated with irregular results. The author has few experience of this treatment. Recently, the effects of injecting 2% iodine in almond oil and ethanolamine oleate were experimentally compared. The use of the former induces a more severe ligament inflammation and fibroplasia than the latter (Van Hoogmoed et al., 2002). Injection of counter-irritants containing iodine into synovial sheaths of the stifle joint is rare, but has been associated with disastrous sequel of this joint.

**Other treatments**

**Steroidal anti-inflammatory drugs**

Injection of such drugs into and around the medial and middle patellar ligaments has also been associated with good results in some cases.

**Shoeing**

A shoe with a raised heel is used by some practitioners to make locking less likely in horses with mild intermittent UFP. The angle of slope on the summit of the trochlea varies in individual animals and this anatomical feature may account for those cases which improve when extension of the stifle joint is...
limited by raising the heels of the shoe (Hickman and Walker, 1964). However, the effect of shoeing is less likely on the proximal joints of the limb, especially the stifle joints.

**Acupuncture**

Acupuncture is another conservative treatment used in conjunction with exercise to remedy UFP. Some practitioners claim the efficacy of acupuncture in treating UFP, but most acknowledge the scepticism that exists regarding acupuncture efficacy.

**Surgical treatments**

Surgery should be indicated only when there is certainty of diagnosis, in cases unresponsive to conservative management and in severe forms. In young horses surgical treatment should be delayed to determine if the horse will grow out of the problem. For many years, the recommended surgical treatment of UFP involved performing medial patellar desmotomy (MPD). Recently, a new surgical technique has been described by the author and consists of splitting the proximal third of the medial patellar ligament (Tnibar, 2001; Tnibar, 2002).

**Medial patellar ligament desmotomy**

MPD is a surgical technique that aims at disrupting the locking mechanism, and is well described in the literature (Turner and McIlwraith, 1989; Stashak, 2002). This surgical procedure is usually performed under local anaesthetic on the standing horse, so that the medial patellar ligament is clearly defined. The area over the middle and medial patellar ligaments is prepared for surgery. This requires a small skin incision over the distal part of the medial patellar ligament. A curved Kelly forceps is advanced caudally under this ligament developing a path for a blunt ended bistoury. The end of the bistoury can be palpated caudal to the ligament before it is severed close to its tibial insertion. The skin is closed using one or two sutures. Stringent asepsis should be observed and care should be taken to avoid excessive tissue damage. Some surgeons perform this surgery on the standing horse by exteriorising and cutting the ligament through an incision. Short term complications of MPD are swelling, pain and wound dehiscence. Postoperative administration of non steroidal anti-inflammatory drug is advisable to control these complications. Although this procedure is a straightforward means of treating UFP, it is not without adverse effects. MPD results in an unstable femoropatellar joint, and the instability may lead to fragmentation of the articular cartilage and subchondral bone at the apex of the patella, in the region of attachment of the middle patellar ligament. In the author's experience, some horses experience persistent low grade postoperative lameness and frequently femoropatellar synovial effusion. Radiographic control after MPD showed that the patellar base was displaced cranially from the femur and remained in this abnormal position until month 8 after surgery (Riley and Yovich, 1991). Entheseous new bone at the insertion of the middle patellar ligament is another complication of this surgery. Arthroscopic treatment of osteochondral fragmentation of the patellar apex is advisable and may allow return to full athletic function (McIlwraith, 1990). MPD was found to have detrimental effects on the femoropatellar joint of normal horses (Gibson et al. 1989). A recent study reported a low complication rate in definite clinical cases (Bathe and O'Hara, 2004).

If a horse undergoes a MPD, it should be rested for three to five months before training resumes. Three months seem to be a minimal time period necessary for ligament healing and stabilisation of the femoropatellar joint. However, no data have been published that indicate that a long convalescence period decreases the likelihood of postoperative complications.

Failure of MPD to correct UFP has been reported (Hickman and Walker, 1964; Dyson 1998). MPD should be approached with caution if UFP is not confirmed or the possibility of additional femoropatellar or femorotibial damage exists.

**Medial patellar ligament splitting (MPLS) (Tnibar, 2001)**

For this surgical procedure, horses are placed under general anaesthesia in dorsal recumbency. Both hindlimbs are suspended under complete extension to hook, and subsequently to tense the medial patellar ligament over the medial ridge of the femoral trochlea. The medial patellar ligaments are not as easily palpated in this position as in the standing horse. The surgery site is shaved and the surgical skin
preparation is performed. Horses undergo an ultrasound-guided percutaneous splitting of the proximal third of the medial patellar ligament using a surgical knife with an N° 15 blade. The ultrasonographic transducer is placed transversally over the proximal part of the medial patellar ligament and the blade is introduced longitudinally into the ligament in a craniocaudal direction. The blade is fully visualised as it enters the ligament, progresses into it and throughout the splitting procedure. The blade enters the medial patellar ligament, but should not proceed through the femoropatellar synovial pouch, which lies immediately under the ligament, neither through the articular cartilage of the medial ridge of the femoral trochlea. The blade is then fanned 45° proximally, then distally, laterally and medially. The procedure is repeated at approximately 5-mm increments until the entire length of the proximal third of the medial patellar ligament, as determined by intraoperative ultrasonography, has been split. Splitting is not performed on the parapatellar fibrocartilage. The largest skin incisions are sutured and a sterile bandage is applied over the surgery site. Perioperative antibiotics are used for 5 days, but no anti-inflammatory drug is administered. Some horses were more painful than others, and received one single dose of nonsteroidal anti-inflammatory drug. Horses are put into exercise the day following surgery. Walking in hand for 15 minutes 3 times a day is continued for 2 weeks after surgery. Thereafter, horses are allowed to resume progressively their normal activity. Clinical signs of localised desmitis of the proximal third of the MPL develop immediately after ligament splitting. Moderate local swelling and heat with variable pain on palpation are most evident over the splitting site. Some horses show a complete resolution of UFP within 24 hours of surgery, while others show progressive improvement until resolution in 2 to 15 days after surgery. Some horses needed a continuous pasture exercise for a complete resolution.

A symmetrical and moderate hindlimb discomfort can be noticed at the walk following the onset of desmitis, but resolves within a few days. Periligamentous oedema persists for few days and results in moderate cutaneous fibrous reaction in some cases. All the surgical sites healed without complication. Ultrasonographic evaluation revealed a significant and progressive increase in the ligament size during the first 4 postoperative weeks with a stabilisation thereafter. Desmitis, accompanied by both anechoic and hypoechoic lesions, was induced in all split ligaments. Ultrasonographic evaluation revealed that thickening of the medial patellar ligament is 2-3 time the initial diameter.

Long-term follow up showed that this surgical procedure is highly successful in the treatment of UFP with a success rate of 95.5% and, in the author’s hands, no short term or long term complication were observed.

Discussion

UFP is one of the most common causes of gait abnormality referable to the stifle in horses and ponies (Stashak, 2002). Care should be taken to diagnose the condition accurately. Radiographic and ultrasonographic examination of both femoropatellar and femorotibial joints as part of the diagnosis workup is strongly recommended, because any concurrent stifle disease affects decisions as to treatment and prognosis. Surgical measures become necessary only when there is certainty of diagnosis and in cases unresponsive to conservative management.

MPD was advocated as the treatment of choice for surgical correction of UFP. This surgical technique is considered to be somewhat benign and without serious complications; however, recent studies, both retrospective (McIlwraith 1990) and experimental (Gibson et al., 1989), along with clinical cases studies (McIlwraith, 1990; Riley and Yovich, 1991; Grosenbaugh and Honnas, 1995) suggest that MPD predisposes the patella to fragmentation. However Bathe and O’Hara (2004) reported a success rate of 98% with 18% of the horses having undergone complication following surgery.

Furthermore, this procedure has the disadvantage of interrupting the horse's training program and a small proportion of cases does not respond to this procedure (Hickman and Walker, 1964; Dyson, 1998). Unfortunately, MPD has gained widespread use in the diagnosis and treatment of vague hindlimb lameness or stiffness, even when UFP has not been demonstrated (McIlwraith, 1990). Performing MPD in such cases is inappropriate and this surgical procedure should be performed only in genuine cases of UFP which have proved unresponsive to conservative treatments or when severe clinical signs are present. If MPD is performed, the owner should be informed that the resultant patellar instability may lead to pathologic changes at the distal aspect of the patella, and that these lesions may induce stifle
lameness. Some veterinarians would claim that this procedure is innocuous, others acknowledge that some horses show postoperative lameness following this procedure.

The rationale for MPLS is to induce a localised desmitis, without transecting the ligament, which subsequently leads to a localised thickening of this ligament (Tnibar, 2002; Tnibar, 2003). This will disable the proximal part of this ligament to hook easily over the notch of the medial ridge of the femoral trochlea preventing UFP. This surgical procedure abolished UFP even in cases with conformation abnormalities (straight hindlimb). The clinical effects of this surgical technique were attributed to the increase in size of the proximal third of the medial patellar ligament resulting from the induced surgical desmitis. It is therefore strongly recommended that splitting of the medial patellar ligament be accurately achieved to induce a strong localised desmitis. This surgery was performed with horses under general anaesthesia. This has the disadvantage of the risks related to anaesthesia, but has the advantage of allowing a good asepsis and a precise and accurate ultrasound-guided percutaneous splitting of the ligament. Blind percutaneous splitting of the proximal third of the medial patellar ligament is possible on a standing horse, but care should be taken not to traumatise the underlying structures. This surgical technique was highly successful; in 95.6% of cases all evidence of UFP has disappeared and the horse has regained its normal activity (Tnibar, 2005). This surgical technique is indicated in horses and ponies with UFP that are unresponsive to conservative treatments, including cases with severe or mild forms of the condition, as well as cases with subtle delayed release of the patella.

Detrimental effects of MPD were acceptable risks when this procedure was the only surgical technique available.

MPLS for treating UFP is an alternative surgical technique that has demonstrated numerous advantages when compared to MPD not the least being:

- A minimally invasive surgery
- Considered highly successful in the treatment of UFP
- A technique which allows a rapid return to full activity
- An innocuous procedure: no postoperative complications
- A technically easy surgical procedure
- Not contraindicated by some existing femoropatellar or femorotibial damage, which is the case for MPLD.

Backdraws of MPLS are a possible recurrence and general anaesthesia related cost and low risks.

References


