Developing solutions to expedition pack mule tethering injuries in the High Atlas

Author: Glen Cousquer, Hassan Alyakine

Categories: Vets

Date: July 30, 2012

GLEN COUSQUER, HASSAN ALYAKINE continue an article begun in VT 42.09 by looking at the damage some methods of mule tethering can cause and highlighting three alternatives

PACK mules play an essential role in mountain tourism and agriculture in the High Atlas of Morocco and contribute significantly to the local rural economy.

Harness sores and injuries are a common health problem with significant welfare implications in these remote areas (Sells et al, 2010; Cousquer, 2011). Tethering injuries are commonly seen in expedition pack mules and arise where the tether causes damage to the underlying tissues. This article reviews the aetiology of these injuries and key points that must be considered in developing solutions to sustainably reduce their incidence.

Three different potential solutions were presented to muleteers working for the Centre de Formation aux Métiers de la Montagne (CFAMM) during a 300km, 12-day crossing of the High Atlas in 2010 and in 2011. Drawing on these experiences and feedback from the muleteers, the three alternatives are compared and evaluated.

Owners of expedition pack animals feel the need to tether their animals to prevent them wandering off (Brager, 2005; Cousquer, 2011; US Army, 2004). Plastic or nylon rope is readily available in Morocco and many other countries in the developing world. It is cheap, strong and durable and, when knotted around the lower limb of a mule, will prevent its escape if secured to an immovable object, such as a tree, fence post or stake (Figure 1).
Unfortunately, tethering systems made from wire, chain, nylon or plastic rope, and other synthetic materials, can easily cause damage to the underlying tissues (Hadrill, 2002; Pearson et al, 2003; Garrett, 2010; SPANA, 2002). This occurs in a number of ways. The tether can move across the affected area, rubbing the underlying skin and produce a friction burn (Thomsett, 1991) – with clinical signs sometimes taking days or weeks to appear (Knottenbelt and McGarry, 2009; Figure 2).

Direct pressure applied to a small surface area can also cause damage where the narrow diameter of the material used allows it to cut through the skin and into the underlying soft tissues (Figures 3 and 4).

Where the skin is damaged the creation of a wound may induce the owner to swap the tethering to the other leg, thus temporarily eliminating the cause of any wound and affording it an opportunity to heal. Therefore, in time, injuries appear on both forelimbs.

The presence of broken-off pieces of nylon rope and other foreign bodies or contamination within a wound can, however, delay healing (Knottenbelt, 2003; Cousquer, 2011). The repeated and sustained nature of these injuries results in considerable remodelling of the local tissues with many older mules demonstrating scarring around the entire circumference of the pastern. Such individuals demonstrate varying degrees of leukotrichia, where the melanocytes associated with the hair follicles have been destroyed (Thomsett, 1991).

In extreme cases, all layers of the epidermis, including the basal tissues, are destroyed, as occurs with second-degree burns (Hanson, 2005) and freeze branding (Farrell et al, 1966; Thomsett, 1991). The destruction of hair follicles results in the formation of a hairless scar.

During a weekend veterinary clinic in the Aït Bouguemez Valley, where CFAMM, the national mountain guide school, is based, it was estimated that less than 20 of the 324 mules treated had no obvious sign of tethering injuries (Elmouhaine, pers comm). This is consistent with the author’s estimate that 90 per cent or more of mules working in the High Atlas have such injuries.

Ropes tied above the fetlock can also cause damage to the epidermal and dermal tissues – even the underlying tendons (Hadrill, 2002). Fortunately, tendon damage appears to be relatively rare as the pastern area is more commonly used for tethering. However, the incidence of injuries to the tendons, arising through blunt trauma and compression, where no skin damage is visible, may be underreported, given the absence of an external wound.

Tethering injuries are, at best, uncomfortable and even painful. At worst, they can provide a breach in the skin’s defences through which infection can enter. However, the incidence of wound infections is difficult to quantify, for mules appear to be resistant to infection. Bacterial contamination of the wound is to be expected, but it is difficult to predict how often it will overwhelm the animal’s ability to deal with it (Cousquer, 2011).
It is known that ponies mount a more effective acute inflammation during secondintention wound healing than horses (Wilmink et al, 1999a; Wilmink et al, 1999b). It is likely this is also true of mules, given their reputed resistance to disease. The ability to rapidly mobilise large numbers of polymorphonuclear leucocytes may allow wound infection to be controlled and the wound to pass swiftly from the inflammatory to the granulation phase.

Tetanus is often cited as a serious consequence of tethering injuries (Kay, 2007), but there has been little work conducted to quantify this risk, relative to the thousands of mules with pastern wounds. During an 18-month period between 2003 and 2004, the Society for the Protection of Animals Abroad (SPANA) hospitalised 56 cases of equine tetanus in Morocco (Kay, 2007). It is unclear whether this figure reflects a widespread resistance to the disease among working equines in Morocco and, without further research, it is impossible to draw any conclusions.

However, it is probably fair to say these injuries should be preventable, and that owners and employers of pack mules on expedition have a duty to ensure the packing equipment used does not cause injury to the mules (Cousquer, 2011).

It should be noted that many of these tethering injuries occur when equines are first trained to accept tethering (Brager, 2005). However, mules are said to learn more quickly and may be less susceptible to such injuries than horses (Guenon, 1999).

The lack of well-designed atraumatic equipment, together with inadequate knowledge of horsemanship and animal training, contribute to the incidence of these injuries, both in young mules and in older animals (Cousquer, 2011).

Clearly, the greater severity of such injuries in older animals reflects the fact these injuries are sustained repeatedly throughout a mule’s working life.

**Developing a viable alternative**

- **Cotton hobble**

Historically, SPANA teams have distributed cotton hobbles to owners in an attempt to promote an atraumatic means of preventing equines from wandering. However, despite the distribution of many hundreds of hobbles, the authors have yet to see a cotton hobble used by muleteers in the mountains.

In seeking to develop a preventive response to tethering injuries, a number of factors must be taken into consideration. Any solution proposed must not only provide an atraumatic means of ensuring the mule does not wander off, but must meet the owner’s criteria for use.

Interviews with muleteers during the 2009 and 2010 trekking seasons in Morocco identified a
number of key issues. Muleteers were found to be unwilling to resort to hobbles (Figure 5) on expedition, as their priority was to prevent the mule from wandering off. Cotton hobbles, even when attached to one foot as part of a tethering system, were rejected as insecure and unreliable. When trialled, they were also found to be of inadequate strength and durability.

In view of the difficulties experienced trying to persuade owners to change their longheld tethering practices, alternative systems (Brager, 2005) were reviewed and a number of prototypes developed with local artisans in Marrakech.

The final two models chosen for trialling had to respect the key factors detailed in Table 1. They had to be secure, strong and durable, and simple to use and maintain. They also had to be easy and cheap to manufacture using local materials and equipment. To avoid potential over-tightening of the tether, a system was needed for it to sit snugly and comfortably in the space between the coronary band and fetlock.

Measurements were taken of the pastern circumference of 13 adult mules (both forelimbs were measured – yielding 26 measurements) to establish the range of fetlock dimensions encountered in practice. These ranged between 16cm and 20.5cm, with a mean of 17.8cm. The narrowest measurements were recorded in young mules (aged between four and five), the largest in older mules with remodelling of the underlying first phalanx.

This work resulted in the production of two models, which are compared to the cotton hobble in Table 2.

• **Leather bracelet**

The first model consisted of a leather bracelet made from thick (2mm to 4mm) cow’s leather. Strips of leather measuring 23cm by 2.5cm were cut and either end equipped with a metal eyelet. When closed around the pastern the eyelets meet up – allowing the tethering rope to be passed through and secured with an overhand knot either side (Figure 6).

This prototype has been manufactured at a cost of 20MAD (Moroccan Dirham), approximately £1.42 per unit.

• **Leather sheath**

The second model has the merit of being even simpler and preserves the natural strength of the nylon rope. It consists of a strip of leather measuring 16cm by 6cm, folded lengthwise and stitched to form a leather sleeve that can be passed over a loop of nylon rope and is then placed around the fetlock (Figure 7).

The cost of the latter is estimated at 5MAD to 10MAD per unit, based on a purchase price of 80MAD (£5.79) for one tanned goat hide, which can be used to produce 20 sleeves, and the cost
of nylon rope, which is 1.0MAD to 2.5MAD per metre. The bulk price of goat hides is as low as 2,000MAD (£145) for 50 hides.

The 13 muleteers trialling these prototypes on expedition were all of the opinion the leather sheath was worth trying, as it retained the strength and security of the rope. The rope passing through the sheath could be adjusted to ensure a snug fit. Most significantly, the leather is not required to take the strain and is not, therefore, subject to any force that might shorten its working life. Its role is purely to protect the underlying tissues from the rope. The use of a double length of rope within the sheath increases the surface area over which any force is applied.

Given these findings, more trials of the leather sheath are proposed to evaluate this tethering system further. These will focus on the willingness of muleteers to change their habits and practices in favour of a more humane tethering system.

Acknowledgements

The author would like to thank The Donkey Sanctuary and Stephen Blakeway for their invaluable support, mentoring and encouragement. This collaborative project would not have been possible without their foresight and funding. The author would also like to thank Michael Crane and the staff at SPANA Maroc for their hard work and support throughout the past few years. Additional thanks are due to Above and Beyond, Cotswold Outdoor and Brasher for their support and contributions.

References


