EQUINE VETERINARY EDUCATION
Equine vet. Educ. (2006) **18** (4) 219-222

Tutorial Article

Full body support sling in horses. Part 1: equipment, case selection and application procedure

A. ISHIHARA*, J. E. MADIGAN†, J. D. HUBERT‡ AND R. S. MCCONNICO‡

The Ohio State University, College of Veterinary Medicine, 601 Vernon L. Tharp Street, Columbus, Ohio 43210, USA; †University of California Davis, School of Veterinary Medicine, Davis, California 95616, USA; and ‡Louisiana State University, School of Veterinary Medicine, Baton Rouge, Louisiana 70803, USA.

Keywords: horse; full body support sling; equipment

Introduction

A full body support sling is a valuable device as an adjunct to treating horses with neurological or musculoskeletal disorders (Stashak 1987; McConnico *et al.* 1991). Severely injured or recumbent horses are usually difficult to handle due to their size and behaviour. To facilitate the care of such patients using a minimal number of personnel, mechanical suspension devices have been designed and constructed (Pauli *et al.* 1994). Horses do not always tolerate being placed in a sling, particularly during the initial stages and an unsuitable application may involve the risk of serious injury in both patients and personnel. Although horses can subsequently accept a sling, performing an inadequate suspension without appropriate intensive care could lead to a number of complications. For these reasons, careful case selection and meticulous patient management are crucial to successful treatment and outcomes.

Equipment and facility

Although various kinds of equine full body support slings have been developed during past decades, 2 types of sling equipment are commercially available and have been used in equine clinics in the United States.

The Liftex large animal sling[1] (**Fig 1**) has been popular for several years. It is relatively light in weight, and adjustable straps and soft materials help to reduce skin abrasions. Although patients are elevated by one point fixation, chest and tail pieces can adequately maintain the horse's position and minimise pressure sores. Application of the Liftex large animal sling is reasonably simple so that it may be quickly and safely applied to an agitated recumbent horse or neurological patient with a stuporous or maniacal mental status.

The U.C. Davis-Anderson sling[2] (**Fig 2**) was developed by Charles Anderson with the assistance of experienced veterinarians at University of California, Davis and may have increased versatility compared to other equine sling models (Madigan 1993). Some of the advantages of this sling include the rectangular overhead support providing levelling adjustment, leg-supports that minimise pressure over the abdomen, and the head restraint device, which can easily and safely control head and neck movement (Madigan 1993).

Stall and hoist for installation of equine full body support sling should be carefully selected. Distance between the floor surface and beam of the stall should be over 3.66 m (12 feet) to provide a sufficient height suspension in adult horses. Moreover,

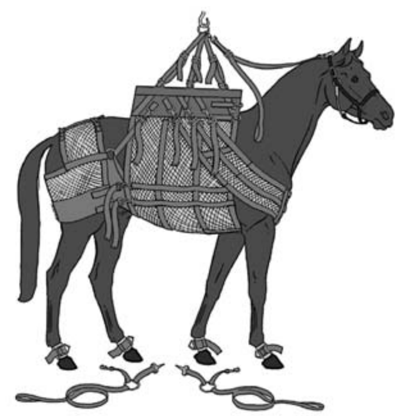

Fig 1: Horse in the Liftex large animal sling.

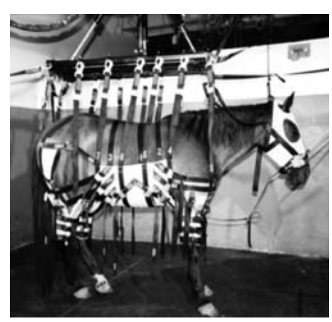

Fig 2: Horse in the U.C. Davis-Anderson sling.

*Author to whom correspondence should be addressed.

***Fig 3:** Application of the U.C. Davis-Anderson sling to a standing horse. (a) The body piece, breast collar and rear quarter piece are attached to the horse. Note the hoisting hooks are connected to each other over the back, which allows the horse to 'wear' the sling until the straps are attached to the overhead device. (b) Following the administration of appropriate chemical restraint, the overhead device is lowered above the horse and all hooks are connected with the rectangular frame. (c) The leg-supports should be applied around the antebrachial and tibial area.*

the beam has to be strong enough to support the weight of horse, sling, chain, hoist, and the force of a horse jumping or struggling. A hoist able to lift approximately 2 tonnes (4000 pounds) is required and the beam of the stall needs to support the 2 tonnes plus the weight of the hoist itself. An electric hoist is recommended for a quicker suspension and release although it may be heavier than a hand-operated hoist. A counterbalance system using a large water-filled tub can be used for slinging, but this device has not been applied commonly enough to suggest it as the best technique (Stashak 1987).

Case selection

Careful case selection is necessary when electing to use a full body support sling in a clinical situation for an adult horse. Considerations include 1) body score and weight (pressure sores can be exacerbated by excessive bodyweight and underweight animals have poor protection over protuberances such as the shoulder, sternum, and *tuber coxae*) 2) pre-existing conditions such as abdominal incisions (because of the presence of a supporting abdominal band [bellyband], the sling may be contraindicated for cases with abdominal wounds or incisions), 3) anatomical differences (a bellyband may interfere with a male horse's ability to urinate), 4) safety of both horse and personnel working near the horse (adequate sedation must be administered depending on an individual patient's temperament), and 5) expertise of personnel working with the sling (personnel should be well-trained and experienced in order to prevent or minimise the potential for injuries to the horse or people; Bowman 1995).

Application procedure for standing horses

The U.C. Davis-Anderson sling should be applied to standing horses as follows:

1) The body piece of the sling is installed with 3 belly straps being fastened around the abdomen.
2) The breast collar and rear quarter piece are attached to the body piece (**Fig 3a**).
3) Following administration of an appropriate chemical restraint, the overhead device is descended over the horse slowly and all hooks fastened to the rectangular frame (**Fig 3b**).
4) The leg-supports are then connected with the upper pieces and secured above the carpus and hocks (**Fig 3c**).

The Liftex large animal sling should be applied to standing horses as follows:

1) Following adequate sedation, the sling is laid under the horse and the overhead hoist is lowered (**Fig 4a**).

***Fig 4:** Application of the Liftex large animal sling to a standing horse. (a) After sedation, the body piece of sling is laid under the belly as the overhead hoist is descended. (b) The lifting rings of the body piece are connected with the hoisting hook. Note the straps below the rings should be adjusted as the hooks are located right over the centre of the gravity. (c) The straps of the chest and tail piece are fastened with the body piece and adjusted to fit snugly. Note the tail piece should be carefully positioned to ensure no interference with urination, defaecation and hindlimb movement.*

a b c

Fig 5: Application of the U.C. Davis-Anderson sling to an anaesthetised horse. (a) The body piece, breast collar, rear quarter piece, and leg-supports are applied to the upper half of the body. (b) All straps are passed under the horse and fastened to the overhead frame. It is necessary to roll the horse into dorsal recumbency in order to get the straps under the body and to apply the lower limb leg supports. (c) The horse is hoisted and placed in sternal recumbency to adjust the straps evenly on both sides. Note the use of the head support device while the horse is recovering from general anaesthesia.

2) The lifting rings are attached to the hoist hook (**Fig 4b**).
3) To minimise pressure sores, the lifting rings should be located over the centre of gravity of the horse by adjusting the straps under the rings.
4) The straps of chest and tail pieces are connected to the body pieces and adjusted (**Fig 4c**).

The first suspension should be operated gradually to avoid agitating the horse. If the horse shows anxiety or fright, a small amount of suspension should be applied and released multiple times to give the horse opportunities to become accustomed to the pressure over the abdomen. Once the horse is completely raised, lengths and tightness of all straps should be readjusted to ensure that all parts of sling fit snugly. The breast and tail piece may need to be repositioned to avoid an airway compression or interference of defaecation. Placement of soft-padding over pressure points are also useful to minimise decubital sores. If a sling is applied by suitably trained personnel, the total procedure requires approximately 15 mins for the U.C. Davis-Anderson sling and 10 mins for the Liftex large animal sling.

Long-acting tranquilisers may be useful to improve an initial tolerance in some patients. The combination of short-acting tranquilisers with phenothiazines (e.g., acepromazine) or opioids analgesics (e.g., butorphanol) has been known to result in an effective chemical restraint for prolonged time period (Muir 1991). Previous studies have also demonstrated that some sedatives such as detomidine and romifidine can induce sufficient sedation in clinically normal horses for several hours (Hamm *et al.* 1995; Freeman and England 1999). Because administration such tranquilisers may cause cardiopulmonary depression (Muir 1991), the systemic condition of the patient should be carefully monitored as a full body support sling is often applied for horses with severe injuries or illness. Simultaneous usage of analgesics may also be utilised to achieve successful sling application by reducing pain from the primary injuries or discomfort due to the secondary pressure sores and skin abrasions.

Application procedure for anaesthetised or recumbent horses

The U.C. Davis-Anderson sling should be applied to anaesthetised or recumbent horses as follows:

1) With the horse lying in lateral recumbency, the body piece, breast collar, and rear quarter piece are applied over the upper side of the body.
2) Two leg supports are fastened around the upper fore- and hindlimb (**Fig 5a**).

a b c

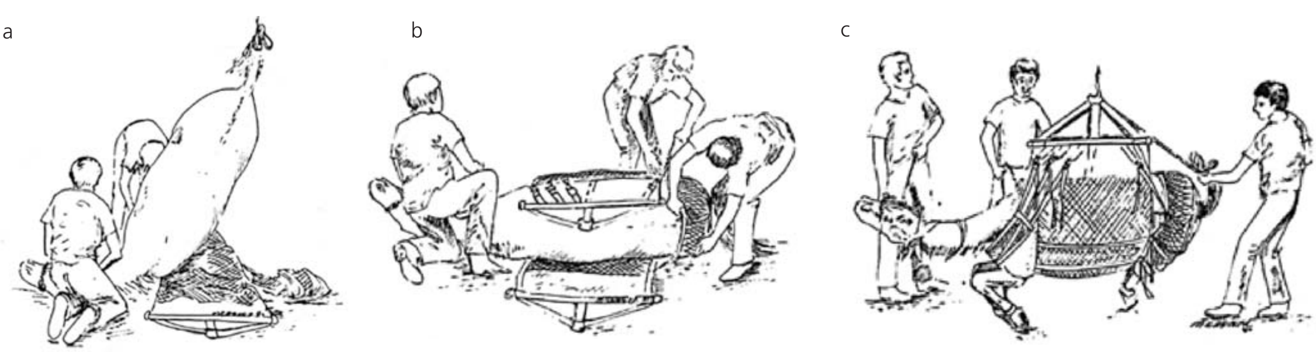

Fig 6: Application of the Liftex large animal sling in a recumbent horse (a) While the hindquarters of the horse are raised by a tail rope, the body piece of sling is placed under the body. Note the horse may be able to be rolled over the sling with appropriate sedation depending on the size and temperament of the patient. (b) The chest and tail piece are applied with the neck and hindlimbs being lifted. If the horse is excessively agitated and hindquarters cannot be safely manipulated, the horse can be suspended without the tail piece. (c) The lifting rings are attached to the hoist and the horse is suspended. Note the head, tail and feet should be securely restrained to prevent self-trauma of the patient.

3) While the horse is rolled onto the dorsal recumbency, the straps of the body pieces are pushed under the body and the remaining 2 leg supports can be fastened around the lower fore- and hindlimb.
4) After the horse is replaced in lateral recumbency, the straps under the horse are retrieved from the opposite side and all hooks attached with the overhead frame (**Fig 5b**).
5) The horse is hoisted and positioned in sternal recumbency so that an evenness of right and left sides of straps is easily re-established (**Fig 5c**).

The Liftex large animal sling should be applied to anaesthetised or recumbent horses as follows:

1) The body piece of sling is pushed through under the belly and, if the patient is small enough, can be rolled over the body piece; otherwise, the hindquarters may need to be hoisted by tail rope (**Fig 6a**).
2) While the head is lifted, the chest piece is slid under the neck and fastened to the body piece.
3) The tail piece is applied around the haunches (**Fig 6b**).
4) After the lifting rings are attached to the hoist hook, the horse is suspended with head, tail and feet being restrained (**Fig 6c**).

If the recumbent horse is excessively agitated and the limbs cannot be safely manipulated, it can be suspended without the leg-support devices (the U.C. Davis-Anderson sling) or tail piece (the Liftex large animal sling) and they can be applied after the horse has been completely raised. To encourage the horse to bear weight on all limbs, it may be occasionally necessary to place the feet squarely as the sling is lowered. Once the horse stands, pressures over protuberances should be reduced by soft-padding placement and repositioning of each piece of the sling.

Removal procedure

The equine full body support sling should be removed from the horse if any signs of pain, dyspnoea, discomfort, and refractory agitation or anxiety, in spite of appropriate sedation, are observed. When prolonged suspension is required, the patient's physical condition and tightness of the straps should be monitored closely, since exhaustion or over-reliance on the sling can lead to respiratory distress and asphyxiation. Otherwise, the sling can be removed as soon as the horse becomes capable of maintaining its own balance. This can be determined by gently pulling the tail or pushing the withers from the side.

All pieces of the sling are unfastened in the reverse order of the application procedure for a standing horse and the head and tail are securely restrained by two personnel. However, the hoisting hooks of the body piece (the U.C. Davis-Anderson sling) or the lifting rings (the Liftex large animal sling) should be detached last as patients with suspected fatigue, severe ataxia or weakness may collapse.

Manufacturers' addresses

[1]Liftex Corporation, Warminster, Pennsylvania, USA.
[2]Care for Disabled Animals (CDA) Products, Potter Valley, California, USA.

Acknowledgements

The authors would like to thank Dr John Hubbell, Dr Stephen Reed, Veterinary Teaching Hospital in University of Wisconsin-Madison, Liftex corporation, CDA products and Mr Charles Anderson for offers of materials and assistance with manuscript preparation.

References

Bowman, K.F. (1995) Slinging horses. *J. equine vet. Sci.* **15**, 152-154.

Freeman, S.L. and England, G.C. (1999) Comparison of sedative effects of romifidine following intravenous, intramuscular, and sublingual administration to horses. *Am. J. vet. Res.* **60**, 954-959.

Hamm, D., Turchi, P. and Jochle, W. (1995) Sedative and analgesic effects of detomidine and romifidine in horses. *Vet. Rec.* **136**, 324-327.

Madigan, J.E. (1993) Evaluation of a new sling support device for horses. *J. equine. vet. Sci.* **13**, 260-261.

McConnico, R.S., Clem, M.F. and DeBowes, R.M. (1991) Supportive medical care of recumbent horses. *Comp. cont. Educ. pract. Vet.* **13**, 1287-1295.

Muir, W.W. (1991) Standing chemical restraint in horses. In: *Equine Anesthesia*: *Monitoring and Emergency Therapy*, Eds: W.W. Muir and J.E. Hubbel, Mosby Year Book. pp 247-280.

Pauli, H., Schatzmann, U. and Schaffer. J. (1994) Historical review of ways of slinging horses. *Pferdeheikunde*. **10**, 325-333.

Stashak, T.S. (1987) Method of therapy. In: *Adams Lameness in Horses*, Ed: T.S. Stashak, Lippincott Williams & Wilkins. pp 840-877.