How to Lift Recumbent Equine Patients in the Field and Hospital With the UC Davis Large Animal Lift

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The UC Davis Large Animal Lift (LAL) is a lightweight and easily applied sling developed to help lift horses in clinical and rescue situations. The LAL has been shown to be a useful device for evaluating the standing ability of recumbent horses; it can be used alone or in combination with the Anderson Sling Support Device (ASSD) to allow for standing support for horses with a variety of debilitating problems. Authors’ addresses: Department of Medicine and Epidemiology, School of Veterinary Medicine, University of California at Davis, 1 Shields Avenue, Davis, CA 95616 (Pusterla, Madigan); and Center for Equine Health, School of Veterinary Medicine, University of California at Davis, 1 Shields Avenue, Davis, CA 95616 (Ferraro); e-mail: npusterla@ucdavis.edu (Pusterla). © 2006 AAEP.

1. Introduction

Equine slings have been successfully used to rescue horses in various situations and have been described in the literature for centuries. Such slings are primarily used to raise, stabilize, and/or support a horse that has difficulty standing and to lift a horse for movement, transportation, or evacuation. Although many homemade supportive devices are used in the field, not all slings have been evaluated in the clinical setting and found suitable for horses. One widely used equine sling is the Anderson Sling Support Device (ASSD), which has been proven to be a valuable aid in the care of horses with a variety of debilitating problems such as spinal cord dysfunction, long-bone fractures, cranial trauma, vestibular disease, and tetanus. The same sling has been successfully used for helicopter rescue of horses. Slinging a recumbent horse with the ASSD requires sedation or short-acting, general anesthesia to assure the safety of the patient and personnel. Additionally, its fitting is technically challenging, because the patient needs to be rolled side to side to allow for proper application. Further, the important diagnostic and prognostic information provided from the response of a recumbent horse to slinging is often limited because of the heavy sedation required with the application of the ASSD. To help with less drastic and more common situations in the field and clinics, the UC Davis Large Animal Lift (LAL) has been developed. This lightweight device is easy to apply, and it lifts horses by the skeletal system. The basic nature of the LAL makes it practical for use by veterinarians, large-animal rescue teams, and emergency personnel alike. The LAL is also much more affordable than the ASSD. However, the LAL is not meant to be used as a support system.
for long periods of time. Instead, for large animals that are unable to stand, the LAL should be used in conjunction with the ASSD.

2. Materials and Methods

Description and Application of the Lifting Device

The LAL consists of a counterbalance bar and two sling components made out of nylon straps (Fig. 1). The device can be easily applied by as few as one person on the sedated or anesthetized recumbent horse with the use of a strap retrieval device. The device consists of a metal rod with a U-shaped end that allows for placement of the nylon straps underneath the patient without having to roll it over. During the placement of the LAL, one additional person is needed to keep control of the horse’s head. To improve safety, all the steps of the application of the LAL are performed from the backside of the horse. After the horse is adequately restrained, the front piece of the LAL is placed between the front legs of the horse (Fig. 2), and the lower straps are retrieved from underneath the horse by using the metal-strap retrieval device (Fig. 3). Thereafter, the back piece of the LAL is placed between the back legs of the recumbent horse (Fig. 4), and the lower strap is pulled from underneath the horse’s flank with the use of the retrieval device (Fig. 5). When the five double straps are in place, they are hooked to the corresponding, numbered carabiners on the bar and adjusted in length according to the available lifting clearance (Fig. 6). Thereafter, the horse is lifted by
its skeletal system with the use of a manual or electric hoist in a hospital stall, backhoe forklift, or other crane-like machine in the field. It is advisable to use tail, head, and leg ropes to assist the horse during lifting whenever possible. Further, to prevent horses from leaping forward during the lifting procedure, a corner strap can be used to secure the LAL to one corner of a stall. After the horse is lifted, its standing ability should be evaluated. Care must be taken not to keep horses that are unable to bear weight hanging in the LAL for >20 min.

Equine Patients
LAL application and lifting attempts were recorded for 17 horses over a period of 20 mo. The procedure was performed in these horses to assess their ability to stand and provide important diagnostic and prognostic information. Additionally, the LAL was used to elevate these horses for easier application of a more permanent slinging device. Thirteen procedures were performed at the Veterinary Medical Teaching Hospital (VMTH), School of Veterinary Medicine in Davis, whereas four procedures were performed in the field at the request of private owners. For every procedure, the patient’s history, sedation (drugs used, dosage of each drug), ease and time of LAL application and hoisting, standing ability post-hoisting, LAL tolerance, and outcome were recorded.

The 17 horses ranged in age from 5 mo to 20 yr (mean ± SD = 9.9 ± 7.7 yr) and were comprised of 9 mares and 8 geldings. Seven were Quarter Horses, and the remaining were Percheron (3), Arabian (3), Appaloosa (2), Mustang (1), and American Paint Horse (1). The patient’s weight was recorded for 15 of 17 horses, and their weights ranged from 170 to 1000 kg (516 ± 219 kg). The 17 patients were diagnosed with the following conditions: West Nile virus encephalitis (5), cervical spine myelopathy (2), hyperkalemic periodic paralysis (2), spinal cord trauma (2), spinal cord neoplasia (1), equine protozoal myeloencephalitis (1), tetanus (1), polysaccharide storage myopathy (1), semi-membranosus muscle tear (1), and severe hindlimb osteoarthritis (1).

3. Results
The time from recumbency to application of the LAL was recorded in all horses. Five hospitalized neurologic horses were found acutely recumbent in their stall because of the progression of their primary disease, whereas one horse was unable to rise after a myelogram. Seven other horses were referred to the VMTH because of acute recumbency. These horses had been down for 4–17 h (7.8 ± 4.8 h) on arrival to the hospital. Four horses were presented in the field; three of these horses had been recumbent for 8–48 h, and one horse had been recumbent for 2 wk.

Gas anesthesia was performed in only one horse to help perform selective diagnostics (skull and neck radiographs and atlantooccipital cerebrospinal fluid tap) before application of the LAL. Injectable anesthesia with a combination of xylazine (1 mg/kg) and ketamine (2 mg/kg) was performed in three horses that presented recumbent to the hospital to safely extract them from the trailer and move them to a stall before lifting. In seven horses (four acutely recumbent in the hospital, one recumbent in the trailer, one recumbent in the field, and one unable to stand after a myelogram), xylazine (0.3–0.5 mg/kg) was the sole drug used to sedate these horses before application of the LAL. A combination of detomidine (0.01 mg/kg) and butorphanol (0.01 mg/kg) was used one time before moving a recumbent horse from the trailer to a stall before application of the LAL. In a total of five horses (three recumbent in the field, one acutely recumbent in the hospital, and one referred to the hospital), no sedation was used.

Fig. 5. Retrieval of strap 3 from underneath the flank of the mock horse by using the retrieval device. Figure reprinted with permission from the Swiss Journal of Veterinary Medicine. Pusterla N, Madigan JE. Initial clinical impressions of the UC Davis large animal lift and its use in recumbent equine patients. Schweiz Arch Tierheilk 2006;148:161–166.

Fig. 6. Dorsal view of the mock horse showing the five double straps hooked to the corresponding numbered carabiners.
used during the application of the LAL and lifting procedure.

The LAL was applied without any technical problems in 16 horses. In the largest horse, a 1000 kg Percheron gelding, the number 4 straps had to be extended by using two extension straps to fit the horse. In all of the 17 horses, the LAL was applied in <5 min. Hoisting was performed without any problem in all cases with an electric hoist (13 horses) in the hospital and a backhoe (3 horses) or a manual hoist in the field (1 horse). Eight horses were able to stand and bear weight after being lifted (Fig. 7). Two horses were able to stand with assistance, but seven horses were unable to support their weight (Fig. 8). In all horses, the sling was well tolerated.

Ten hospitalized horses (five standing, two standing with support, and three unable to support weight) were transitioned into the ASSD to allow for better distribution of support and long-term slinging (Figs. 9 and 10), whereas three hospital patients were euthanized at the request of their owners because of their inability to bear weight in the LAL. Three of the four horses lifted in the field were able to stand without support; however, one horse was euthanized, because he could not bear weight in the LAL. Standing horses were left in the LAL until the ASSD was applied (i.e., <10 min) or ≤12 h in three field horses. Because the LAL is not intended as a long-term sling, care was taken in those three horses to avoid pressure injuries from the nylon straps. Be-
because the ASSD uses a rectangular overhead support that attaches to the corresponding sling, horses unable to stand had to be lowered to sternal recumbency before they could be lifted in the ASSD. However, because the ASSD was applied while these horses were hanging in the LAL, dropping, switching the frame, and rehoisting took <10 min. In these horses, the LAL was removed from under the ASSD without any problems while the horses were down. The three horses that were unable to stand and therefore, were switched to the ASSD never regained the ability to stand despite intensive medical treatment and supportive care. They were euthanized shortly thereafter.

4. Discussion

It is the authors’ opinion that recumbency should be addressed as an emergency, and all actions should be taken to diagnose the underlying disease. Whenever possible, early slinging should be attempted to assist a horse to its feet; this decreases muscle damage, promotes limb usage and circulation, and decreases the possibility for development of decubital ulcers. The age of a horse is important when considering using a lifting device, because young horses are known to be less tolerant of such devices.

Although all age groups were represented in our study, only four horses were <2 yr of age, which may explain the relatively low level of sedation used during the procedure for most study horses.

Precautions regarding the use of slings should be understood by the attending personnel, and sedation and/or general anesthesia should be used when the patient is struggling or attempting to stand up. Blindfolding recumbent horses and working in a quiet environment will often allow the application of the LAL with little to no sedation. The majority of the study cases required minimal or no sedation, and general anesthesia was restricted to patients needing diagnostic workup or being moved from the trailer to the stall. Whenever sedation with an alpha-2 agonist may affect the ability of a weak or uncoordinated horse to rise, the use of an alpha-2 antagonist such as yohimbine should be considered to reverse the effects. In all circumstances, one must remember that recumbent horses are unpredictable, even when sedated; arousal or violent activity can occur abruptly and cause injury. Personnel should be made fully aware of this potential to minimize human injury.

The LAL can be used effectively on a recumbent horse with as few as two people. One person should always control the head and be in charge of sedation, if needed, and at least one person should apply the sling components. The advantage of the LAL is that all steps can be performed by working from the back side of the patient. This prevents any unnecessary risk of injury to personnel from standing between the legs of the recumbent horse. Because of the simplicity of the LAL, application took <5 min in all horses. In the case of a large horse (adult draft horse), the sling components may be too short to allow attachment to the counterbalance bar, but they can be extended with two adjustable nylon straps to allow for proper sling fitting. This situation was only encountered one time in our study when applying the LAL to a 1000-kg Percheron gelding. When hoisting horses, control of the head should be ensured by using one or two ropes attached to the halter. As an alternative, head and tail rope recovery can help assist patients during the lifting and allow for better protection of attendants.

Personnel should not stand in front of the horse when it is being lifted, because horses with hindlimb weakness tend to leap forward when they regain consciousness. To prevent horses from moving forward, we do recommend using nylon straps attached from one corner of a stall to the caudal part of the counterbalance bar whenever possible.

Evaluating the ability of a recumbent horse to stand may provide important diagnostic and prognostic information. The best scenario was encountered in 10 study cases that were able to stand and bear weight. These horses tolerated the LAL without any problems and never became violent or tried to escape the sling. At the hospital, seven standing horses were transferred to the ASSD, which provides better long-term support. This was performed by applying the ASSD over the LAL and replacing the counterbalance bar with the rectangular overhead support. After the standing horses were secured to the ASSD with the appropriate sling components, the LAL was removed. The total procedure took <5 min in all standing cases.

Three standing horses presented in the field were left in the LAL for <12 h. It is important in such situations that the LAL be secured with corner straps to prevent violent activity and that constant supervision be provided. The LAL was very well tolerated in the three standing field horses, and none of them tried to lay down. Seven horses were unable to stand when lifted. These horses were given 20 min to show any improvement. It is important during this procedure to assist the horse with leg ropes and to encourage the horse to stand. Although four horses were euthanized because of the inability to stand, three horses were moved to the ASSD. Applying the ASSD, lowering the horse to recumbency to switch the overhead frame, removing the LAL, and relifting the horse took <10 min in each patient, and the whole procedure was well tolerated. Despite the use of the ASSD, these three horses never regained weight-bearing function and were eventually euthanized. We are aware that horses should not hang in a sling if they are not weight bearing; however, applying the ASSD in a hanging position was easy and fast, and it did not require general anesthesia as indicated for down horses.
In conclusion, the LAL has proven to be a valuable aid in lifting recumbent horses with a variety of debilitating problems. The unique features of this device make it easy to use in the clinic and field setting, and it is well tolerated by the recumbent horse. The use of the LAL for additional applications—recovery from anesthesia, extraction of horses from difficult rescue-type situations (mud, ravines, swimming pools, etc.), lifting of older horses that cannot rise, and prevention of horses with pelvic injuries or other orthopedic injuries from laying down—needs to be further investigated.

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References and Footnotes

4Anderson Sling Support Devise, Care for Disabled Animals, Potter Valley, CA 95469.
5UC Davis Large Animal Lift (www.largeanimallift.com), Large Animal Lift Enterprises, Chico, CA 95926.