

# Initial clinical impressions of the UC Davis large animal lift and its use in recumbent equine patients

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## Summary

The UC Davis Large Animal Lift (LAL) is a lightweight sling developed to help lift horses in clinical and rescue situations. Here we report on its first use in 16 recumbent horses with neurologic, muscular and musculoskeletal disorders. For each horse, history, sedation, ease and time of LAL application and hoisting, standing ability, LAL tolerance and outcome were recorded. The LAL was easily and safely applied in all horses in less than five minutes and the procedure was well tolerated with minimal to no sedation. While 10 horses were able to stand in the LAL after being hoisted, 6 horses were unable to stand and were eventually euthanized due to the inability to regain weight bearing function. The LAL has shown to be a useful device to evaluate the standing ability of recumbent horses and can be used alone or in combination with the Anderson Sling Support Device to allow standing support of horses with a variety of debilitating problems.

Keywords: large animal lift, recumbency, horse

## Erste klinische Erfahrungen einer neuen Aufrichtungshilfe (UC Davis Large Animal Lift) an festliegenden Pferden

Ein neues Schlingenverfahren, der UC Davis Large Animal Lift (LAL), wurde für das Aufrichten von Grosstieren in der Klinik oder in Rettungssituationen entwickelt. Wir berichten hier über seinen Gebrauch an 16 Pferden mit unterschiedlichen Erkrankungen des nervösen und muskulären System. Für jedes Pferd wurde die Krankheitsgeschichte, die verwendete Sedation, die Akzeptanz und die Anpassungszeit der Schlinge, das Aufrichten der Pferde und die Schlingentoleranz aufgezeichnet. Das Schlingensystem konnte innerhalb von fünf Minuten an allen Pferden ohne Probleme und sicher angebracht werden. Die Akzeptanz des Verfahrens war sehr gut und benötigte minimale bis keine Sedation. Während es zehn Pferden gelang, in der LAL zu stehen, nachdem sie aufgerichtet wurden, mussten sechs Pferde eingeschläfert werden wegen ihrer Unfähigkeit zu stehen. Erste Erfahrungen im Umgang mit diesem Schlingenverfahren haben gezeigt, dass es sich dabei um ein sehr hilfreiches Gerät handelt, welches alleine oder in Kombination mit einem permanenten Schlingenverfahren (Anderson Schlinge) erlaubt, das Stehvermögen eines festliegenden Pferdes zu beurteilen.

Schlüsselwörter: Schlingenverfahren, Aufrichten, Festliegen, Pferd

## Introduction

Equine slings have been successfully used to rescue horses in various situations and have been described in the literature for many centuries (Pauli et al., 1994). Equine 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 (Bowman, 1995). Although many home-made 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 (Madigan, 1993a). The same sling has been successfully used for helicopter rescue of horses (Madigan and Moore, 1995). This system consists of an overhead support and a 4-component sling that provides lift through the musculoskeletal system with less pressure on the

abdominal regions. To prevent injuries to the patient and attending personnel during sling application and to improve patient tolerance of the sling, sedation is indicated in the conscious horse (Madigan, 1993b; Bowman, 1995). In addition, short-acting general anesthesia may be necessary in the recumbent horse to assure personnel safety. The application of the ASSD in recumbent horses is cumbersome, time-consuming and requires a minimum of six people. Further, evaluation of the standing ability of a horse once lifted is impaired due to the heavy sedation or anesthesia associated with the application of the ASSD. To eliminate these difficulties, a lightweight device called the UC Davis Large Animal Lift (LAL) has recently been developed with the intention to lift down horses (Anonymous, 2004). The purpose of this paper is to provide a preliminary report of the LAL and its use in the clinical setting.

## Animals, Materials and Methods

### Animals

The 16 horses ranged in age from 1 to 20 years (mean  $\pm$ SD =  $10.6 \pm 7.5$  years) and were comprised of 8 mares and 8 geldings. Seven were Quarter Horses, while the remainder were Percheron (3), Arabian (3), Mustang (1), Appaloosa (1) and American Paint horse (1). The patient's weight was recorded for 14 of them and ranged from 363 to 1,000 kg ( $559 \pm 189$  kg). The 16 patients were diagnosed with the following conditions: West Nile virus encephalitis (5), cervical spine myelopathy (2), hyperkalemic periodic paralysis (2), thoracic vertebral trauma (1), spinal cord neoplasia (1), equine protozoal myeloencephalitis (1), tetanus (1), polysaccharide storage myopathy (1), semimembranosus muscle tear (1) and severe hind limb osteoarthritis (1).

### Description and application of lifting device

The LAL (Large Animal Lift Enterprises, [www.largeanimallift.com](http://www.largeanimallift.com)) 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 metal rod. The rod has a U-shaped end that allows the retrieval of the nylon straps from underneath the patient without having to roll it over (Fig. 2). Once the 5 double straps are in place, they are hooked up to the counterbalance bar, and the horse is lifted by its skeletal system. A manual or electric hoist can be used in the hospital or a backhoe or forklift in the field. Tail, head and leg ropes are commonly used to assist the horse during lifting. LAL application and lifting attempts were recorded for 16 horses over a period of 18 months. The procedure was performed



Figure 1: The UC Davis LAL consists of a counterbalance bar and two sling components made out of nylon straps.

in these horses in order to assess their ability to stand and provide important diagnostic and prognostic information, as well as to elevate them for easier application of a more permanent sling. Twelve procedures were performed at the Veterinary Medical Teaching Hospital (VMTH), School of Veterinary Medicine in Davis, while 4 procedures were performed in the field



Figure 2: A metal rod with a U-shaped tip allows pulling of the sling components underneath the horse without having to roll it over.



Figure 3: Ventral (a) and dorsal (b) view of the UC Davis LAL fitted on a 1,000 kg recumbent Percheron gelding. The gelding was initially extracted from the trailer and moved onto a board.

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.

## 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 due to the progression of their primary disease, while one horse was unable to rise after a myelogram. Six additional horses were referred to the VMTH because of acute recumbency. These horses had been down for 4 to 17 hours ( $7.2 \pm 4.9$  hours) on arrival to the hospital. Four horses were presented in the field and had been recumbent for 8 to 48 hours in 3 horses and for 2 weeks in one horse.

Gas anesthesia was performed in only one horse in order to perform selective diagnostics (skull and neck

radiographs, atlantooccipital cerebrospinal fluid tap) prior to application of the LAL. Injectable anesthesia with a combination of xylazine (1 mg/kg BWT) and ketamine (2 mg/kg BWT) was performed in 3 horses that presented recumbent to the hospital, in order to safely extract them from the trailer and move them to a stall prior to lifting. In seven horses (4 acutely recumbent in the hospital, 1 horse presented recumbent in the trailer, 1 recumbent in the field, 1 unable to stand after a myelogram) xylazine (0.3 to 0.5 mg/kg BWT) was the sole drug used to sedate these horses prior to application of the LAL. A combination of detomidine (0.01 mg/kg BWT) and butorphanol (0.01 mg/kg) was used once to move a recumbent horse from the trailer to a stall prior to application of the LAL. In a total of 4 horses (3 recumbent in the field, 1 acutely recumbent in the hospital) no sedation was used during the application of the LAL and lifting procedure.

The LAL was applied without any technical problems in 15 horses. In the largest horse, a 1,000 kg Percheron



Figure 4: Twenty-year-old Quarter horse gelding able to stand after being lifted with the LAL.



Figure 5: Twenty-year-old Appaloosa gelding unable to stand after being lifted with the LAL in the field with the help of a backhoe.



Figure 6: Eight-year-old Percheron gelding standing in the LAL before (a) and after (b) being transitioned into the ASSD.

gelding, the hind limb sling component had to be extended by using two extension straps in order to fit the horse (Fig. 3a, b). In all of the 16 horses, the LAL was applied in less than 5 minutes. Hoisting was performed without any problem in all cases with an electric hoist (12 horses) in the hospital, and a backhoe (3) or a manual hoist in the field (1). Eight horses were able to stand and bear weight once lifted (Fig. 4). Two horses were able to stand with assistance, while 6 horses were unable to support their weight (Fig. 5). In all horses, the sling was well tolerated. Ten hospitalized horses (5 standing, 2 standing with support, 3 unable to support weight) were transitioned into the ASSD to allow better distribution of support and long-term slinging (Fig. 6a, b), while two hospital patients were euthanized at the request of the owner due to inability to bear weight in the LAL. Three out of the four horses lifted in the field were able to stand without support, while 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. less than 10 minutes) or up to 12 hours in 3 field horses. Because the LAL is not intended as a long-term sling, care was made in the three horses not to cause any pressure injury by the nylon straps. Since the ASSD uses a rectangular overhead support that attaches to the corresponding sling, horses unable to stand had to be dropped before they could be lifted in the ASSD. However, since the ASSD was applied while these horses were hanging in the LAL, dropping, switching the frame and re-hoisting took less than 10 minutes. In these horses, the LAL was pulled without any problems from under the ASSD while the horses were down. The three horses that were unable to stand and were switched to the ASSD never regained the ability to stand despite intensive medical treatment and supportive care and were euthanized shortly thereafter.

## Discussion

Commercial slings, such as the ASSD, are complex to apply, require training of veterinarians and staff, and have been cost-prohibitive for wide-spread use. This type of sling, however, has proven to be a valuable aid in the care of horses with a variety of debilitating problems and is considered the gold standard in large animal lifting equipment (Madigan, 1993a). Slinging a recumbent horse with the ASSD requires sedation or short-acting, general anesthesia to assure safety of patient and personnel; and its fitting is technically challenging since the patient needs to be rolled over to the other side to allow proper application. Further, the important diagnostic and prognostic information provided from the response of a recumbent horse to slinging is often limited due to heavy sedation required with the application of the ASSD. In order to help with less drastic and more common situations in the field and clinics, the UC Davis LAL has been developed (Anonymous, 2004). This lightweight device is easy to put on and 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 for long periods of time. Instead, for large animals that are unable to stand, the LAL should be used in conjunction with the ASSD. Here we report on the first experience with the LAL at our hospital in 16 recumbent patients.

The majority of study cases included horses with neurologic, muscular or musculoskeletal disorders presented for inability to rise either at the VMTH or in the field. With the exception of one horse with a 2-week history of recumbency secondary to West Nile virus encephalitis, all horses were acutely recumbent. It is the author's 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 in order to decrease muscle damage, promote limb usage and circulation, and decrease the possibility for development of decubital ulcers. The age of a horse is important when considering using a lifting device, since young horses are known to be less tolerant of such devices (Bowman, 1995). Although all age groups were represented in our study, only 3 horses were less than 2 years of age, which may explain the relatively low level of sedation required by the study horses to perform the procedure.

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. Blind-folding 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 work up 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 even when sedated, recumbent horses are unpredictable and arousal or violent activity can occur abruptly producing injury. Personnel should be made fully aware of this potential in order to minimize human injury.

The LAL can easily be fully utilized with a minimum of two people on a recumbent horse. One person should always control the head and be in charge of sedation if needed, while at least one person is necessary to 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. Due to the simplicity of the LAL, application took less than 5 minutes in all horses. In case of a large horse, the sling components may be too short to allow attachment to the counterbalance bar and extension can be performed by using two adjustable nylon straps to allow proper sling fitting. This situation was only encountered once in our study when applying the LAL to a 1,000 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 better protection of attendants. Personnel should not stand in front of the horse when lifted, since horses with hind limb 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 the stall to the caudal part of the counterbalance bar.

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, 7 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. Once the standing horses were secured to the ASSD with the appropriate sling components, the LAL was removed. The total procedure took less than 5 minutes in all standing cases. Three standing horses presented in the field were left in the LAL for up to 12 hours. It is important in such situations that the LAL is secured with corner straps to prevent violent activity and that constant supervision is provided. The LAL was very well tolerated in the 3 standing field horses and none of them tried to lie down. Six horses were unable to stand when lifted. These horses were given up to 30 minutes to show any improvement. It is important during this procedure to assist the horse with leg ropes and to encourage the horse to stand by rubbing its body. While three horses were euthanized due to the inability to stand, three horses were moved to the ASSD. Applying the ASSD, dropping the horse in order to switch the overhead frame, removing the LAL and re-lifting the horse took less than 10 minutes in each patient and the whole procedure was well tolerated. Despite the use of the ASSD, these horses never regained weight bearing function and were eventually euthanized. We are aware that horses should not be allowed to be hanging in a sling if not weight bearing; however, applying the ASSD in a hanging position was easy and fast and 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 feature of this device makes it easy to use in the clinic and field setting and is well tolerated by the recumbent horse. The use of the LAL for additional applications such as anesthesia recovery, extracting horses from difficult situations (mud, ravine), lifting older horses that can not rise, preventing horses with pelvic injuries or other orthopedic injuries from lying down needs to be further investigated.

### Premières expériences clinique avec un dispositif d'aide au relevé (UC Davis Large Animal Lift) sur des chevaux

Un nouveau système de sangles, le UC Davis Animal Lift (LAL) a été développé pour relever les grands animaux dans les cliniques ou lors de sauvetage. Nous rapportons ici son emploi sur 16 chevaux souffrant de diverses affections des systèmes nerveux et musculaire. Pour chaque cheval, l'anamnèse, la tranquilisation utilisée, l'acceptance et le temps de mise place de sangle, le relevé du cheval et la tolérance envers les sangles ont été documentés. Le système a pu être mis en place en 5 minutes sur tous les chevaux sans problème et de façon sûre. L'acceptance du procédé était très bonne et ne nécessitait qu'une tranquilisation minime voir aucune tranquilisation. Alors que 10 chevaux ont pu se tenir debout dans le LAL après qu'ils aient été relevés, 6 autres chevaux ont dû être euthanasiés en vu de leur incapacité à se tenir debout. Les premières expériences avec ce système de sangles ont démontré qu'il s'agit d'un appareil très utile qui permet, seul ou en combinaison avec des sangles permanentes (sangles d'Anderson), de tester la capacité d'un cheval à se tenir debout.

### Prime esperienze cliniche di un nuovo sistema di sollevamento per cavalli immobilizzati a terra (UC Davis Large Animal Lift)

È stato sviluppato un nuovo procedimento con lacci per il sollevamento di grandi animali in clinica o in situazioni di salvataggio (UC Davis Large Animal [LAL]). Riferiamo qui di seguito sul suo uso prendendo in esami i casi di 16 cavalli con diverse malattie del sistema nervoso e muscolare. Per ogni cavallo è stato annotato il decorso della malattia, la sedazione utilizzata, l'accettazione, il tempo impiegato per adattarsi ai lacci e per rialzarsi e la tolleranza ai lacci. Il sistema di lacci ha potuto essere applicato ed assicurato senza problemi a tutti i cavalli nello spazio di cinque minuti. L'accettazione del procedimento è stata ottima e la sedazione non è stata, o solo in minima parte, necessaria. Dieci cavalli sono riusciti a stare in piedi da soli nella LAL mentre 6 cavalli si sono dovuti addormentare a causa della loro incapacità di restare in piedi. Queste prime esperienze con questo ausilio di lacci hanno mostrato che si tratta di un'apparecchiatura di grande aiuto che utilizzata da sola o combinata con un sistema di sollevamento permanente (Anderson) permette di valutare la capacità della posizione in piedi di un cavallo immobilizzato a terra.

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