

How to Airlift a Horse

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1. Introduction

Horses can become stranded after floods and snowstorms, can fall from a trail, or can become physically trapped in a variety of circumstances. Practical approaches for treating the horse and easy methods of moving the horse to safety should always be considered first. For example, during floods, horses can often be led to higher ground and provided food and water while the environmental circumstances run their course and the waters recede. However, in some situations, horses may be stranded without a way out. In these instances, airlifting the horse may be the last and only viable option for preserving the horse. It is imperative that the proper equipment and technique be used when airlifting a horse to prevent injury to the horse or to humans. The University of California at Davis Anderson Sling Support Device (UCD Anderson Sling)^a has been used in 28 successful horse airlifts. We will describe the method of training, the equipment required, and the precautions essential for the safe emergency transport of horses by helicopter.

2. Preparation and Equipment

Before a rescue group begins to prepare for a specific airlift request, there are several crucial pieces of equipment and resources that need to be in place.

Equipment

Live cargo transport presents numerous potential problems for helicopter safety.¹ A horse that has uncontrolled movements in the air or when on the ground during liftoff or landing can cause significant aircraft instability. Equipment that controls the head and body of the horse and proper sedation are highly desirable. The UCD Anderson Sling (Fig. 1) is a sling that effectively supports and immobilizes a horse during lifting.^{2,3} This is done by lifting the horse by the skeletal system and providing head control. The sling unit consists of an overhead support frame, blind fold and head support, breast-collar support, mid-body support, and rump support.

Attachment Cable

The attachment of the frame to the bottom of the helicopter is by a 150-ft long-line cable (termed

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Fig. 1. Lucky, the training dummy, hangs in the UCD Anderson Sling. Notice that the load is distributed throughout the abdomen and thorax as well as the rump and pectoral region.

“sling” by aviation personnel) with secure, locking attachments for the support frame and helicopter. Kevlar lines are preferred over steel cables, because they do not build up static electricity that can provide a considerable shock if the line and metal frame are not grounded first. Cables <150 ft may be used, but the close proximity of the helicopter to the ground increases rotor wash. This rotor wash produces more flying dirt and debris that can frighten or agitate the horse.

Helicopter

The airship should be rated to lift at least 1200–1500 lb at sea level, and the pilot have experience with long-lined heavy loads. We have used a UH-1 Huey, a UH-60 State National Guard Blackhawk helicopter, and a Navy helicopter in various rescues. Commercial aviation services can be hired for the rescue. Ideally, rescue groups should have a prior arrangement and training session with the pilot who is on call. We have held training sessions with Air National Guard units to practice equine airlifts.

Chemical Restraint and Emergency Equipment

The first principle to be emphasized is that no one single drug or drug-use protocol can be universally applied for chemical restraint during a helicopter airlift. Variables that affect the chemical restraint used include cardiovascular stability, hydration status, temperament, age and degree of prior handling of the horse, terrain, working-area size, need for animal movement, altitude, and other factors.⁴ Circulatory collapse and death may occur because of improper selection of medications for restraint in stressed animals. We have used various drugs depending on the circumstances and condition of the animals, including combinations of detomidine^c and butorphanol^d with yohimbine^e (or other alpha-2 reversal agent) available for reversal. Cardiovascu-

Table 1. Pre-Rescue Orientation

1. Who is in charge of the rescue?
2. Who will perform a brief physical exam of animal prior to sedation or transport?
3. Orientation and inspection of the sling equipment and overhead support device
4. Ground-to-air radio communications and hand signals from ground to air
5. Helicopter safety orientation, grounding methods of the sling overhead frame prior to human or animal contact
6. Animal restraint—physical and chemical, as well as precautions for personnel
7. Application and detachment of the Anderson Sling
8. Personnel safety equipment including ear and eye protection
9. Planning for implementation of helicopter hovering, animal positioning, lift protocol (including inspection at 10-ft hover), and landing and detachment methods
10. Lift team and receiving team assignment
11. Cable attachment to helicopter and overhead frame
12. Time table of events.

lar instability may preclude the use of a phenothiazine derivative (acepromazine)^f and alpha-2 agent (detomidine) together because of resultant severe hypotension and bradycardia. Mule sedation is more difficult and may require acepromazine pre-medication followed by detomidine and butorphanol for sedation. Additional equipment needed depends on the circumstances of the specific rescue but could include IV catheters, IV fluids for resuscitation and stabilization, limb splints, etc. A list of materials that may be carried to the site of the airlift is listed in Table 3.

Rescue Personnel Equipment

Helmets, goggles, gloves, identification badges, ear plugs, jackets or long-sleeved shirts, cell phones, and radios are useful in the rescue situation.

3. Initiating Call

A request for assistance can come from a horse’s owner, law enforcement, fire/rescue personnel, or private practitioners. Because of the inherent danger in airlifting a horse, it is very important that all other options (e.g., walking the horse out or pulling the horse up with other equipment) be considered and exhausted before undertaking the airlift. A request for assistance should be accompanied by an equine practitioner’s onsite assessment of the stranded horse. This assessment should include a report on the health of the horse and prognosis if there are any injuries. Additionally, costs of using a helicopter and possible costs from the rescue team and veterinarian need to be discussed with the owner before mobilizing for the rescue. A staging or meeting area should be established, because most horse accidents take place on remote trails that are impassable to vehicles. Helicopter availability is

Table 2. Suggested Hand Signals for Communication Between the Pilot and Ground Crews at Lift and Receiving

Lift and hold (used once horse is in sling)	Hold arms outstretched horizontally, then raise upward in a waving motion. When correct height is reached, arms are held out in horizontal position
Down/descend (use for needed adjustments or at receiving site)	Hold arms outstretched horizontally, then lower to the ground in a slow motion
Depart with horse (after lift and hold)	Arms raised and held straight up

the next consideration, and previously arranged options in the region should be discussed.

Before leaving for the rescue, ensure that all parts of the sling are included, that the long-line is intact and not showing signs of wear, and that safety gear is in good condition. It is strongly recommended that all personnel have a hard hat/helmet and goggles to protect them from flying debris caused by the helicopter's rotor wash. A drug bag should contain syringes, needles, detomidine or xylazine^g (or both), an $\alpha 2$ antagonist (e.g., yohimbine), butorphanol, acepromazine, and euthanasia solution.

A minimum of four trained personnel are taken to the rescue; more are preferred, because the likelihood of a successful rescue will increase when there are more trained personnel on site. Based on our experience in a variety of circumstances, there are usually volunteers willing to help with the rescue at the site, and they can be trained to safely hold up the support frame as the sling is attached or detached.

4. At the Staging Area

After the rescue team arrives at the arranged meeting or staging area, the rescue-team leader meets with the law enforcement or fire/rescue-incident commander (if one is present) to introduce the team and be briefed on the situation (Table 1). After this briefing, the next priority is to find a landing site for the horse by using input from the helicopter pilot, if possible. Trained rescue personnel are divided into a sending team and a receiving team (Table 1). Each team then proceeds to either the horse or the landing site, taking volunteer bystanders as necessary to ensure that enough personnel will be present for the rescue. Volunteers and bystanders need to be reminded of potential hazard zones with horses and be kept away from these areas whenever possible. It is imperative that a veterinarian accompany the sending team. The veterinarian will examine the horse, design a sedation protocol, and administer it before the airlift. Communication through handheld radios is maintained so that each team can update the other on changes in the horse, location, etc. If these radios are not able to communicate with the pilot, rescue-team members must establish hand signals (Table 2) to communicate

Table 3. Additional Items for an Emergency Airlift Bag

IV catheters/syringes/needles
Catheter site prep, flush, etc.
IV fluid — 5-l bags
Duct tape
Long-handled twitch
Kimsey splint
Small surgery pack with suture
Local anesthetic
Limb bandages
Flunixin meglumine
Epinephrine
Phenylbutazone (injectable)
Butorphanol
Detomidine
Xylazine
Yohimbine
Acepromazine
Ketamine
Diazepam
Euthanasia solution

with the pilot. Regardless of whether or not the radios have ground-to-air capabilities, it is always a good idea to have hand signals in case the radios fail or the helicopter noise drowns out the transmission from the ground. It is also imperative that the rescue teams and pilot establish a “ditch” direction. If there is a mechanical or other problem on board the helicopter, the pilot will direct the helicopter in the “ditch” direction, and the rescue team will move in the opposite direction.

Before leaving the staging area, the sending team checks to make sure that they have all of the equipment that they will need when they reach the horse. Each team carries a syringe of additional sedation and alpha-2 antagonist such as yohimbine. When the terrain or other circumstances make it difficult to carry the sling to the horse, it is possible to have the helicopter bring in the sling. This can actually be helpful, because it will allow the pilot to evaluate the site and terrain for any potential hazards and to develop a flight plan for when the horse is airborne. The horse should again be examined for any injuries, especially those of the musculoskeletal system, because the UCD Anderson Sling primarily uses this system to lift and support the horse. After the horse has been deemed healthy to fly, it is sedated with a combination of detomidine and butorphanol. The sling is placed on the horse and kept in place by the temporary back strap. This strap allows for the various clips to be organized according to their labels so they can be easily and quickly hooked onto the support frame when it is brought in by the helicopter.

During the entire process, one person must maintain control of the horse's head and watch to make sure that the horse is not too sedated or agitated. The blindfold piece is not put on until just before the horse is ready to be lifted. Roles for the other res-

cue personnel should be determined at this point; two people (preferably trained rescuers) should be in charge of transferring the sling-strap clips from the temporary back strap to the support frame. Two to four people should be responsible for holding the support frame off of the horse's back so that the sling straps can be clipped in after the frame is brought in by the helicopter. When the sling is secure and in place, the sending team signals the helicopter and/or the receiving team that they are ready to proceed with the airlift. The person communicating with the helicopter will be ultimately responsible for determining if the sling has been adjusted properly and if the horse is ready to be airlifted.

The receiving team assembles enough people to carry out the same jobs as described above in the sending team section. The main difference is that the person in charge of holding the horse's head is initially the only one to approach the horse when it is brought in. It is imperative that this person remove the blindfold immediately before the horse's feet touch the ground. When the receiving team is ready, they signal the helicopter pilot.

5. The Lift

If the frame is held by a steel cable, it needs to be grounded before any personnel touches it. After this, the support frame is grabbed by one or more people on the ground to prevent it from swinging and posing a threat to the horse or the rescuers. All personnel take their places on the sides of the horse and begin to clip the straps onto the support frame, ensuring that the straps on both sides are relatively even. After the straps are attached, the blindfold is placed over the horse's head, the lead rope is looped (not tied) through the halter, and the "lift and hold" signal is given to the pilot (or transmitted by radio). No personnel should be behind the horse, because horses frequently kick backwards at this time. The pilot will lift the horse ~5–10 ft off of the ground so that the rescue team members can look at the sling and make sure that it is even and secured. If there is a problem, the "down" signal is given to the pilot, who will lower the horse back down so that the issue can be corrected. The "lift and hold" is then repeated. If everything seems to be normal, the "depart" signal can be given to the pilot who will proceed to the landing area.

6. The Landing

When the horse approaches the landing area, one person is in charge of keeping all personnel back until the helicopter is in stable-hover position with the horse close to the ground. The only person near the horse should be the one in charge of holding its head. When within reach, this person grabs the lead rope and pulls off the blindfold. Previous experience has shown that horses are much more likely to properly place their feet if they can see the ground before they touch down. Another person in view of the pilot should signal when the horse is



Fig. 2. A horse being lowered to the ground after another successful rescue with the UCD Anderson Sling.

close to the ground. After the horse is on the ground and has its feet squarely underneath it, the rest of the group moves in slowly from the sides to provide four-corner support of the overhead frame as tension in the line is relaxed by the helicopter's descent. When the frame is supported properly, one or two other team members begin unhooking the sling from the overhead support frame (Fig. 3). If, after touching the ground, the horse becomes fractious and uncontrollable, the signal to "lift and hold" is given and IM sedation is administered, waiting several minutes before repeating the landing attempt. With the horse standing and all the clips removed, one or two people guide the frame away from the horse and signal the pilot that it is safe to climb and land a safe distance away from the horse.



Fig. 3. The same horse from Fig. 2 is seen here on the ground. Notice that one person holds the head, two people unclip the sling, and four people hold up the support frame.



Fig. 4. Recumbent horse prior to airlift using the UC Davis Large Animal Lift.



Fig. 5. The same horse seen in Fig. 4 being airlifted using the UC Davis Large Animal Lift.

The frame and cable are removed when the helicopter is on the ground and shut down.

7. Other Slings for Helicopter Airlifts

The Swiss Rescue Sling has been previously described for use in helicopter rescues of horses.⁵ Additionally, the UC Davis Large Animal Lift (LAL)^{b6} has been used in one airlift to date (Figs. 4 and 5). The difficulty of placing the UCD Anderson Sling on a recumbent horse led to the creation of the LAL, the application of which has been previously described.⁶ Like the UCD Anderson Sling, the LAL lifts horses by the skeletal system; however, it can easily be applied to the recumbent horse. Airlifting with the LAL requires the same sedation as with the UCD Anderson Sling and can be effectively used in some airlift situations. Further studies using the LAL for airlifting horses are being conducted.

8. Conclusion

The protocol outlined in this article is the result of 28 successful airlifts with the UCD Anderson Sling and 1 successful airlift using the UC Davis Large Animal Lift; it is meant to serve as a foundation for other rescue groups. The UCD Anderson Sling equipment has simplified the process of airlifting standing horses so that rescue groups who train with the sling can use it in real-world situations with predictable results.⁷ However, the process of airlifting a horse still carries inherent dangers for the horse and rescue personnel. Risks may be less-

ened by a program that involves regular training, including a helicopter lift when possible, to increase the team's familiarity and comfort level with the UCD Anderson Sling or LAL and airlift protocols.

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^aUCD Anderson Sling, Care for Disabled Animals, Potter Valley, CA 95469.

^bUC Davis Large Animal Lift, www.largeanimallift.com, Large Animal Lift Enterprises.

^cOrion Corporation, Espoo, Finland, F1-02101.

^dVedco Incorporated, St. Joseph, MO 64507.

^eBen Venue Laboratories, Inc., Bedford, OH 44146.

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