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The 1 man rope assisted recovery from anaesthesia in horses.

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In most equine hospitals, assisted recovery is only performed to recover horses after difficult orthopaedic procedures, or for horses with myositis or neurological problems. Fracture repair is not a common surgical procedure in most hospitals and for this reason assisted recovery is not a routine procedure for most equine surgeons and anaesthetists.

Two types of recovery are generally used: rope assisted recovery within the recovery room and warm water pool recovery.

Pool recovery is uncommon in the majority of European equine hospitals, due to the high cost of facilities, personnel and time. However, it can be invaluable and lifesaving in the recovery of proximal long bone fracture repairs in adult horses. A warm water pool with Jacuzzi jets can also be used for therapeutic treatment of post surgical or idiopathic myositis.

By contrast, rope assisted recovery can be used in almost any recovery room. Provided some basic safety guidelines are followed, rope assisted recovery using a tail rope and head rope is safe and atraumatic for both the horse and the handler. This talk will explain what equipment is needed and will give you practical tips on how to modify your recovery room and how to perform the procedure. It will also review basic safety guidelines.

Since 1998, we have used rope-assisted recovery on all horses recovering from general anaesthesia in Dierenkliniek De Bosdreef/De Morette. We have recovered more than 7000 horses and have a recovery complication rate of almost zero. Our recovery system has been installed in most of the
major equine referral hospitals in the UK and mainland Europe improving recovery of horses after general anaesthesia.

The system we use can be fitted in almost any recovery room, requires only one handler, is cheap to purchase and has minimal maintenance costs.

The major aim of assisted recovery is to prevent the fright and flight behaviour when the horse is regaining consciousness. This behaviour will stimulate the horse to stand up before regaining full body control. A combination of excitement and ataxia will lead to self-inflicted injuries (fractures, bruising, muscles sprains, wounds, luxations, implant failure). Injuries during recovery are also related to the size and the temperament of the patient, the type and duration of surgery and the experience of the anaesthetist.

To prevent self-inflicted injuries there are a number of actions that should be taken before, during and just after the surgery to decrease excitement and ataxia during the recovery.

1° the anaesthetic protocol used will influence the recovery.

Sedation during recovery is helpful, especially after isoflurane anaesthesia. Induction with agents such as guaiphenesin/thiopentone can lengthen the recovery especially after a relatively short procedure.

2° Good postoperative analgesia is important.

Less pain means less stimulation to get up and results in a quieter horse during recovery. The use of perineural or intra-articular analgesia during surgery is also useful to reduce distal limb pain during recovery. In cases of fractures or joint instability, a good immobilisation of the affected leg is mandatory.
It is also important to give the analgesia before the pain begins (pre-emptive effect) i.e. during the premedication.

3° Empty the bladder before recovery.

The horse will be more comfortable and the recovery floor less wet and slippery. Catherise the bladder at the beginning of the surgical procedure or at least before bringing the horse to the recovery room.
4° **A quiet environment is important during recovery.**

Dim the lights, reduce the noise and if necessary, plug the ears with cotton wool to reduce stimulation.

5° **Good recovery surface.**

Make sure that the horse lies comfortably in the recovery room on a non-slippery surface. Support the head to prevent fascial paralysis e.g. using an inflated inner tube. This is important during assisted recovery because the horse is wearing a head collar. Use a head collar without metal rings to prevent fascial paralysis. An unbreakable nylon head collar without bulky metal rings or buckles is essential.

6° **Positioning.**

The operated leg should be positioned uppermost if possible (maintain same left or right lateral position as on surgical table). When using assisted recovery the legs can be directed to or away from the wall to which you are recovering the horse. The horse should be positioned close to the back wall of the recovery room. The horse needs ± 2 meter in front of him to stand up easily before his nose touches the wall. Those few meters allows for a bit of space to move forward when the horse is standing up. This forward movement is necessary to maintain tension on the tail rope.

7° **Respiratory support.**

Make sure you always have an open airway during the recovery. Recover the horse with an endo- or naso-tracheal tube. Nasal obstruction will lead to excitement.

A second important respiratory support is oxygen. Hypoxemia is likely to develop during recovery, as the horse ceases to receive high oxygen levels. Continue to deliver high flow rates of oxygen (15-20 L/min) while the horse is in lateral recumbency.

8° **Sedation.**
This is almost always carried out prior to assisted recovery. However, sedation should not prolong the recovery. We try to keep the horse quietly down for ± 20 minutes before it makes his first attempts to get up. We prefer to use xylazine in IV bolus. Detomidine and romifidine are longer acting and so prolong the recovery. Following painful orthopaedic procedures, the combination of alpha-2 agonists with opioids is useful e.g. xylazine with butorphanol, buprenorphine or morphine.

9° Manually assist the recovery using a head and tail rope.

To be able to perform a save and controlled head and tail rope assisted recovery, the following items should be present (see pictures below):

Metal rings bolted through the wall positioned at ± 2 m high (above horse’s head when standing).
Locking carabiners.
Mountaineering rope (10-11 mm diameter).
Self-braking belay descender device (Petzl grigri).
Strong buckles nylon recovery head collar (no metal rings).

During this talk the use of these items will be demonstrated. The success and ease of assisted recovery lies in the use of a self braking descender devise by which 1 person can control the tail rope of any size horse pulling back on the tail rope. We use a Petzl Grigri (see pictures below).

Depending on the size of the recovery room, an indoor (handler standing in recovery room) or outdoor (handler standing outside the recovery room) assisted recovery can be performed.

Size of the recovery room:

Our recovery room is 4 m 50 cm on 2 m 60 cm. This seems to be a good size for a warmblood horse. If the length of the room is too short, the horse cannot move forward enough during recovery and cannot maintain tension on the tail rope when getting up. If the room is too long, the horse cannot find head support in the corner of the recovery box once standing, which makes him pull excessively on the tail rope.
In developing our assisted recovery system, the aim was to create a system which is safe for both horse and handler and which can be performed by only one handler.

What is the aim of AR?
1- You want the horse laying down in lateral or sternal recumbency as long as possible (control excitement).
2- You want the horse to get up only when it is fully capable of standing.
3- Ideally the first attempt to get up should be the only and successful attempt.
4- Strong tension on the tail rope will assist the horse in lifting up its hind quarters.
5- Once up and standing, both head- and tail rope should stabilise and support the horse against a wall of the recovery room until the horse can stand stable unaided and has regained his muscle strength (control ataxia).

The technique needs to be learned and practiced for smooth and reliable operation. It should not be reserved only for the high-risk case so that when assisted recovery is essential the handlers are familiar with the process and understand how best to use it. It is undoubtedly best learned from a clinic, which routinely uses the system. When recovering a long bone fracture repair, it should be a routine job for all the people involved. Everybody involved should know what to expect and what to do.

During the talk the practical tips of manually assisted recovery will be discussed.

Once the horse is positioned in the recovery room the head and tail rope are guided through metal rings bolted through the wall of the recovery room. The metal rings are positioned on the short wall of the recovery room in each corner (see pictures below). A metal climbing pulley is attached to each ring with a locking carabiner to facilitate smooth traction on the ropes (see pictures below). Both head and tail rope exit the recovery room through a small opening in the recovery door (see pictures below). Use nylon mountaineering rope of 10-11 mm and a nylon head collar without metal rings. An emergency quick release-locking device is needed on the tail rope. We use a Petzl Grigri, the use of which will be demonstrated. The head rope is attached to a ring at the front of the noseband. The tail rope must be securely fastened, as failure of either head or tail rope will lead to
disaster (see pictures below). An emergency quick-release locking device (e.g. a Petzl Grigri) is used on the tail rope outside the recovery box so that one person can control the tail rope of any size horse. The tail rope can thus be locked to assist in holding the tail, but may also be released quickly if necessary (see pictures below). The tail rope should always be pulled in maximal tension.

When the horse starts to stand, it is assisted by helping to lift its hindquarters by maintaining the tail rope in full tension. If the tail rope is locked in full tension within the grigri before the horse is standing up, pulling the tail rope will not be needed. The horse will move forward when standing up and in doing this full tension will be maintained on the tail rope. The head is controlled but not pulled up. Once the horse is standing, both head and tail ropes should stabilize and support the horse against a wall of the recovery room until it can stand unaided without ataxia and has regained muscle strength. The horse should not be left unattended while attached to the ropes.

It undoubtedly of considerable benefit to keep the horse in lateral recumbency until judged ready to stand, so that it does not attempt to stand until it is able to do so at the first attempt. Judicious sedation is required as described above.

We had 4 implant failures in 58 fractures repair recoveries. All 4 of these horses had to be put down.

In more than 7000 non-fracture patients recovered in this way, only 4 sustained a fracture during recovery. All of those had a violent and very excited recovery. None had to be treated/euthanased for luxations, muscle sprains or serious wounds.

This type of assisted recovery system is, in our hands, a very valuable and safe way of controlling recovery from general anaesthesia. In the recovery from horses with proximal long bone fracture repairs (radius, tibia) warm water pool recover is still ideal. However, this type of recovery will certainly reduce the recovery risk to a great extend when compared to “non aided” recovery.
Positioning of the horse and ropes in the recovery room using the 1 man rope assisted recovery system. Look at the size of the room, the position of the metal rings bolted through the wall, the opening in the recovery room, and the full tension on the tail rope.
Position of the handler standing outside the recovery room. Look at the tail rope locked in the grigri. Tail rope always in maximal tension. Head rope in right hand, tail rope in left hand.
Position of head in recovery room resting on an inner tire. Look at buckles nylon head collar to prevent fascial paralysis. Metal ring through noseband of head collar to attach head rope with locking carabiner. Oxygen supply during recovery.
Close up of tail rope running through the Petzl Grigri. This emergency quick-release locking device is used on the tail rope outside the recovery box so that one person can easily control the weight of a pulling horse, no matter the size or body weight.
Pulley attached to metal rings in recovery room using a locking carabiner. This facilitates pulling the ropes.