Gajah 29 (2008) 35-38

Drug Immobilisation – Yesterday, Today and Tomorrow

Jacob V. Cheeran

Technical Services, Cheerans Lab (P) Limited, Trichur, Kerala, India

Introduction

Drug immobilisation (DI) of captive elephants is more often required in range countries than in the western world. Even if such a situation arises, it will be often in zoos and rarely in circuses. In the zoos, the immobilising team gets a controlled environment and the darting is relatively easy. In range countries DI is required mostly in two situations. One situation is in forests where there are logging operations. Even though logging is stopped officially in the forests, it still happens in many plantations of coffee, tea and cardamom as well as illegally. Darting in a forest environment is very difficult since the elephant, often a bull in musth, can easily charge you and your escape to safety is very difficult. Climbing a tree, which is big and elephant proof is difficult; otherwise the animal can knock you down. If you go round a bush, the animal will wait for you on the opposite side. This has actually happened and resulted in the death of a senior forest officer. If you run it can easily overtake you. Occasionally there may be a person mounted on the elephant who can be a mahout or a layman as in the case of festivals, or a hired help who are known as elephant mounts. This is again an additional risk.

In a DI, there are three components, the dart gun, the syringe and the drug. My first darting was a bull in musth, which weighed 5250 kg, pride of the owner and pet of the local public. The drug available was a nicotine alkaloid having a low margin of safety. Now I don't dare to use nicotine although I have used it in 25 bulls with a couple of mortalities, mostly due to indirect reasons. Then I tried gallamine (Flaxedil®), which could be reversed by neostigmine. But a great amount of effort was required to get the commercial preparation to the concentration required for use in elephants. Later newer chemicals, with a greater margin of safety that could be used intra-muscularly route, were developed. They were xylazine and acetylpromazine (ACP), which are powerful sedatives. Etorphine which is commonly known as M99 or its combination with ACP (Immobilon LA®) was out of reach because of its narcotic nature and hence the difficulty to obtain.

Finally I managed to get information that a combination of xylazine (Rompun®) and ACP is ideal for captive elephants. Getting Rompun® was a big task and I managed to get it through the Rotary Club of Thrissur and ACP (high potency, 20 mg/ml) was imported directly from the manufacturer, Boots Pure Drug Company, UK.

On many occasions the elephants had to be immobilised in the hot sun and ACP was found to cause photosensitisation on the dorsum. Although the fact that phenothiazines often cause photosensitisation, the ACP reaction was extensive and the practice had to be abandoned. Then I tried xylazine with ketamine. Ketamine also showed photosensitivity in the hot sun. This I learned from the clinical condition and from literature surveys. The use of xylazine alone has the disadvantage of disturbance during inductions, which can prolong the induction period or even nullify the effect. Xylazine can be combined with midazolam, a short acting benzodiazepine compound for synergistic effect. Other drugs for captive elephants are azaperone, medetomidine and ditomidine. For wild animals etorphine with ACP (Immobilon LA®) is the preferred one. Carfentanyl, which is more powerful than etorphine is also available. But these being narcotic and since most of the countries are signatories to the Singles Convention, which controls narcotic sales and distribution, they are difficult to obtain and there are strict rules and regulations for its stocking and use. But personal use convinced me that Immobilon LA® is an excellent drug for wild elephants.

Captive elephants

Tips of captive elephant immobilisation:

1. Control the crowd. They create more problems than the elephant itself.
2. Carry strong polypropylene ropes (preferred over nylon ropes) 2 cm in diameter and 20 m long, preferably with an iron ring at one end to noose.
3. After darting (Fig. 1) the drug effect starts by 8-10 min. noticed by the relaxation of penis but peak effect will require 45 min. in an undisturbed situation.
4. Test for the level of immobilisation is done by touching the back with a long pole (usually bamboo). If sedation is not enough wait and if necessary give additional dose after one hour, depending upon the degree of sedation.
5. Snoring may be noticed which does not indicate the depth of anaesthesia. Snoring is due to relaxation of vocal cords and the animal can be explosively aroused if disturbed.
6. Noose the hind and forelimbs in alternate fashion.
7. Pull each rope of the forelimbs alternatively to the tethering site, which is to be selected in advance (Fig. 2).
8. 10-15 persons are required to pull each rope. Animal may aimlessly swing the trunk and it may frighten the volunteers who pull the ropes.
9. Ropes on the hind limbs held by persons act as a break. This rope may be tied to a tree if available whenever necessary. But the knots are to be made to release easily.
10. Animal which under sedation may be mounted also if transported too long distances and also if the ground is uneven. After tethering, remove the syringe holding vertically, to avoid bending of needle.
11. Treat the punctured wound caused by the penetration of the dart syringe by injecting any broad spectrum antiseptic to the site. Or an intra -mammary infusion, which is having a nozzle may come in handy. This to avoid the development of an abscess at the darting site subsequently.
12. Treat the punctured wound by injecting antiseptic solutions or an intra-mammary infusion may come in handy. This is to avoid development of abscess at the injection site.
13. Open the syringe at the tailpiece to avoid popping of plunger.
14. Clean the needle assembly. Needles have to be cleaned. Those, which will have blood clots use a stylet. Sterilise the syringe assembly; 75% alcohol can be used.
15. Keep the syringe charge the 0.22 blank dry. The easy way to do this in the tropics, is keeping it in a metal plate in the hot sun or use a silica gel which will change the colour, in the presence of moisture.
16. Never put any left over drug or opened distilled water ampoules in the kit. This may dampen the charges.
17. Pass the empty assembled dart through the barrel and ensure its easy passage. Slight bulge can hinder easy passage. It will be difficult to change the syringe after filling it with drug.
18. If the syringe meets resistance after filling, then it can be due to over tightening, usually the tail piece. Hence unscrew the tail assembly a little to enable easy passage.
19. Don't leave any vacant space in the dart. Fill it with water for injection.
20. Air in the dart can wobble the syringe.
21. Short syringe with long needle is likely to tumble forward before reaching the target, hence avoid such short syringe.
22. Ensure the syringe charge is selected properly and inserted into the syringe in the correct direction.
23. Warm up the charge rubbing between the palms to ensure proper explosion.
24. Clean the syringe dart and the syringe

Figure 1. Always use a 'cover' while darting.

Figure 2. Coax to the tethering site.

projector (gun) as early as possible - "look after your weapon before you look after yourself."

25. A mobile phone may come in handy for ease of communication.
26. Spray water over the face and body of the immobilised animal to wake it up from sedation. Retraction of penis is an indication of recovery, but do not chill the animal. This is important if darting is done during the heat of the day. Chilling can cause impaction especially if the stomach is full.
27. Lying down and sleeping for a long period after darting and tethering, is also not advisable. Keep the animal standing and relax and let it sleep till it is fully recovered. Elephants can stand and sleep.
28. Animal will not feed and drink till fully recovered. Xylazine alone or its combination is the preferred drug since the animal can be coaxed to obey the commands.
29. Always give a dose only for standing sedation for ease of translocation.
30. Carry additional ropes if extra restraint is necessary (limbs, tail or even trunk).

Wild elephants

For wild elephant immobilisation, often it is possible to plan ahead and elaborate preparations are required:

1. A project leader who will supervise the entire operation.
2. Trackers and labourers to carry water cans.
3. Ropes for tying legs, tail, trunk etc.
4. Drug of choice is etorphine with acepromazine (Immobilon LA®).
5. Always carry human antidote. Most of the team members must be aware, where the antidote is kept. If human antidote (Narcan®) is not available use Revivon® as an emergency measure.
6. Have enough number of walik-talkies with the team. Cell phones may not have coverage in forest.
7. Carry machete, axe, sticks etc.
8. Have minor surgical tools and dressing materials.
9. Most of the animals where there is HEC may have bullet wounds. A metal detector will help to locate bullets buried in the tissues.
10. A heavy dose of long acting antibiotic.
11. Carry enough ropes and gears to shift the animal to lateral recumbency in case it falls on sternal recumbency.
12. If radio-collaring is the purpose of DI, check the length of the collar belt and do some rehearsal before the actual collaring. This will help to complete the process quickly. Remove the electronic lock sufficiently in advance not to forget the same in the last minute haste.
13. If animals are transported check the vehicle for appropriate scaffolding, tethering facility, floor strength etc.
14. Set the timepieces (wristwatches) of all team members to avoid confusion about the darting time, induction time, revival time etc.
15. Once the animal is down, herd mates will hang around. Hence carry guns to scare them away. These are in addition to the heavy rifles that are to be carried for safety of the darting team. Guns will make more noise than rifles, which will help to scare and keep the herd mates at bay. Koomkies can also be used for this purpose.
16. If a cow with a calf is immobilised the calf also may need a mild dose, so that the mother can be handled. A mere physical control may not be sufficient
17. Carry a strong solution of potassium permanganate to clean, if Immobilon LA® is spilled. Use gloves and specs while handling the drug.
18. Burn or bury all contaminated disposable tools (e.g. syringes) and other accessories.

19. Carry absorbent cotton and paper tissue to clean surfaces quickly in case of spillage.
20. Animal may be darted either from elephant back or on foot, depending upon the terrain and skill of the marksman.
21. Carry as many magnetic compasses as possible, preferably GPS so that the team will not lose their way in the forest and help them to come out of the forest.
22. Keep the team members in touch as frequently as possible without making much noise.
23. Study direction of wind before approaching the animal.
24. Retreat all team members before giving antidote (Fig. 3).
25. Supplementary drugs other than antidotes, e.g. stimulants, vaccines, toxoids, antibiotics, supplemental drugs are to be carried in a separate back-pack.
26. All the team members especially if they are new should be appraised about the whole sequence and their assigned duties. If possible show a video to the team.
27. Biometry and physiological parameters are to be recorded or for convenience dictating machine (Dictaphone®) may be used.
28. Also record ambient temperature, relative humidity.
29. Never attempt darting in the evening or near a waterhole.
30. If DI is a planned sufficiently in advance prefer dry season and nights with moonlight so that the party can return from the forest even if it is late due to various reasons.
31. Have a good marksman if required.
32. If a depredator elephant is the target, make sure that the right animal is identified and captured.

Discussion

When I started on 22nd April 1979, I had only nicotine that has a narrow margin of safety and also without any antidote. Then came muscle relaxants, which were reversible but with poor margin of safety and which requires immediate reversal and frequent relapses. Opiates, e.g. etorphine heralded a new era with quick and predictable reversing agents. But the problem was its narcotic nature and difficulty in obtaining it as well as extreme precaution to be taken due to toxicity. Then xylazine (Rompun®) and Ketamine were another milestones that initially lacked antidotes but later development of antidotes were a boon for the veterinarians. The future of immobilising animals would be 'No-Drug Immobilisation' for elephants. It is not a utopian wish since it has already been achieved in deer farming to avoid drug residues, and to a large extent in cattle. This uses very high DCV equipment with two electrodes. This has to be distinguished from Taeser®, equipment used for self-defence in countries like US. This usually operates on battery and mortality is not possible since the battery get totally discharged even before accidental death, which is a safety point. In electronic immobilisation the muscles are locked and can be released gradually using a sliding switch. In captive elephants even a long pole can be used and once the muscles are locked, chains or other tethering tools can be put. Since captive elephants are used to tethering routinely unnecessary struggling and injury arising out of it is unlikely.

Figure 3. When reversing stand at a safe place.

I feel envy about those who can use it on captive elephants, probably not in a very distant future.

Author's e-mail: jacob@cheerans.com