Proceedings of the
World Small Animal Veterinary Association
Sydney, Australia – 2007

Hosted by:

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NURSES
SETTING UP FOR ANAESTHESIA
HOW TO PLAN FOR A SAFE ANAESTHETIC

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Anaesthesia usually proceeds smoothly but when things go wrong they can be disastrous so it makes sense to try and minimise the potential for these problems to occur. This means that all anaesthetic and monitoring equipment should be set up and checked, that all potential problems are considered and that the patient is supported and monitored appropriately during the anaesthetic and peri-anaesthetic period.

Pre-anaesthetic Monitoring

Sedated patients don't often show unusual reactions but after administration of sedative drugs they should be placed in an area where they can be frequently monitored. The area should be warm as animals can become cold due to lack of movement and reduced metabolic rate. Hypothermia after acepromazine is especially common because the drug induced peripheral vasodilation further enhances heat loss. Hypothermia reduces drug metabolism, lowers requirements for subsequent drugs, may induce bradycardia and slows recovery.

In some patients "usual" sedative doses may result in marked depression so that respiration is compromised. This is most commonly seen in older animals, brachycephalics breeds, (bulldogs, pugs, Pekinese etc) and in those with pre-existing respiratory or cardiac disease. Respiratory depression raises carbon dioxide which in itself may not compromise the patient unless it becomes very high but hypoventilation can cause hypoxia in a patient that is breathing room air. Blood and tissue hypoxia can result in cell death, organ dysfunction and possibly death of the patient.

Using the correct agents at an appropriate dose doesn't always ensure freedom from complications so sedated patients need to be monitored.

Setting up the Equipment

We usually choose an anaesthetic circuit (ie circle or T-piece) based on the weight of the patient but patients of the same weight have different capacities to cope with the resistance in a circle system. Go ahead and choose a circuit based on weight or size but watch the animal for the first 5-10 minutes after connection to the machine and intermittently throughout the anaesthetic period to ensure that it is coping. For example in our practice, animals under 5 kg routinely go on a T-piece and those over, on a circle. However, occasionally dogs weighing 5-10 kg appear to expend a huge amount of effort in moving their chest wall for very little movement of the reservoir bag. If we are sure that there is no obstruction in the ET tube or kinking of the tubing then it usually means that there is too much resistance in the anaesthetic circuit and that the animal needs a T-piece rather than a circle. Changing the system usually results in a much reduced ventilatory effort.

Check for Leaks

Before inducing anaesthesia the machine must be checked to make sure that it is functioning properly. This means ensuring that there is enough agent (halothane or isoflurane) and oxygen to last for the duration of the procedure. Thymol, a preservative in halothane can build up within the vaporiser and make it appear as though there is sufficient agent present when in fact there is not. Vaporizers need regular servicing (about once per year) to ensure that they are accurate (ie put out the concentration of halothane or isoflurane that is indicated on the dial) and to drain and clean them to prevent thymol build up. Thymol can also make the vaporiser sticky so that it becomes difficult to rotate the gauge when changing concentration. Isoflurane doesn't contain a preservative so this is not a problem with these vaporisers.

A full oxygen cylinder contains hundreds of litres of oxygen (depending on cylinder size) and the gauge needle sits on the red area (supposedly, meaning nearly empty) when there is about ¼ of the oxygen remaining. So if we run the oxygen at 1 L/min then when the oxygen cylinder moves to the red area there is still over a hundred litres of oxygen present ie at least 1½ hours of oxygen if running at 1 l/min. It is not necessary to change the oxygen cylinder as soon as it reaches the red area – after all the oxygen supply company will happily take back a ¼ cylinder and charge for a full one. Although we don't need to change the cylinder at this point we should still ensure that there will be sufficient oxygen to last the duration of the procedure.

The anaesthetic machine should be checked to ensure that there are no leaks in the system as there is nothing more frustrating or potentially dangerous than attempting to ventilate an apnoeic patient and finding too many leaks in the anaesthetic system. To check the machine, the pop-off valve is closed (pressure relief valve), the patient port occluded with a thumb or finger and the reservoir bag inflated until no wrinkles are present. The oxygen is turned off and the bag observed for reappearance of wrinkles. A deflating reservoir bag indicates that there is at least one leak in the system. Common sites for leaks include the reservoir bag (inhalation agents perish rubber), at joints especially around the soda lime canister and within tubing of the Y-piece. Ideally a pressure check like this should be carried prior to every anaesthetic but should be done at least once a day or after changing the soda lime. Once a day a high pressure system check should also be carried out. This is done by occluding the fresh gas flow rate port and turning the oxygen flow meter to 1L/min. After a short of time you should observe the flow meter falling due to the build up in pressure. If the bobbin or ball does not fall a leak in the back-bar should be considered.

Endotracheal Tubes

Setting up also includes estimating the size of ET tube needed by the patient and then getting one or two tubes either side of this. This array of tubes is necessary so that if intubation is difficult, a small tube is available for easy placement when an airway needs to be secured rapidly. Some animals

especially the brachycephalics breeds of dogs (bulldogs, Pekinese, pugs etc) frequently have tracheal hypoplasia ie a smaller trachea than expected and so they need an ET tube that is very much smaller than anticipated. So, in these breeds it pays to have a very wide range of tubes available at the time of intubation. Larger tubes should be available because occasionally the patient will have a wider trachea than anticipated. It is necessary to use the correct sized tube, otherwise the cuff is excessively inflate to prevent leakage which exerts pressure on a localized area of the trachea and can potentially cause tracheal necrosis. This is a greater problem with the red rubber tubes because the cuffs are low volume, high pressure although some of the clear tubes may have a similar effect.

The cuff on every tube selected should be checked by inflating and gently squeezing it. The reason for squeezing the cuff is that you may detect a slow leak that won't be detected if the cuff is simply left to deflate naturally.

Induction is a time when large amounts of anaesthetic agent are given to overcome the extremely strong protective airway reflexes. Consequently, cardiovascular and respiratory depression can be profound and apnoea is extremely common. Having ET tubes close at hand is a necessity so that rapid intubation can be achieved if necessary.

Support and Monitoring Equipment

Support and monitoring equipment should also be organised prior to induction. If the patient is to receive fluids then these should be warmed to about 38^{o}C and an administration set attached. Appropriate sized catheters should be available and the tape necessary to keep them in place. If the animal is to receive fluids for hours to days post-operatively then a sterile preparation of the catheter site should be carried out. It is not sufficient to simply wipe the site with alcohol or methylated spirits for long term catheter placement. The catheter should also be taped or glued firmly in place to prevent movement as this can result in thrombophlebitis necessitating premature removal of the catheter.

Heating pads should be pre-warmed so that they are ready for the patient. Monitoring equipment such as dopplers, pulse oximeters, Apalerts, ECGs etc should be checked to see that they are working properly prior to use.

Complicated cases

It pays to be a pessimist when setting up for the anaesthesia of a complicated case or critical patient. This is because if all or most complications are considered and contingencies set up to manage them, they rarely occur. In our practice we make a table of the emergency drugs that may be needed for a particular patient and calculate the volume of drug that would need to be drawn up. By doing this and having the doses available there is no need to do various calculations in the heat of a critical moment

Drugs for 10 kg	Mg/kg	Mg/ml	Volume (ml)

Atropine	0.01	0.65	0.15
Adrenaline	0.01	1	0.1
Lignocaine	1	20	0.5

Conclusion

Setting up for an anaesthetic involves not just getting the equipment out but checking that it is functioning properly so that in the case of an emergency everything is ready to go.