Title:

Standard operating procedure for jugular cannulation in sheep and goats

Species:

Ovis aries or Capra hircus

Purpose:

Jugular cannulation is commonly used to insert a tube into the jugular vein to collect frequent blood samples for an extended period of time. Once the cannula is in place, this strategy eliminates the need for multiple needle insertions that would cause potential discomfort to the animal and increase the risk of haematomas. This technique is commonplace in research that profiles changes in hormone secretion over time.

Linked SOPs:

Animal Care Service (ACS) SOPs:

- Handling and restraint of the sheep (208-20)
- Injection of the Sheep (208-25)

Definitions:

Cannula – tube inserted into the body for the delivery or collection of fluid.
Jugular vein – blood vessel that carries deoxygenated blood back towards the heart

Description of Procedure:

Jugular cannulation involves the insertion of a tube into the jugular vein using a low gauge needle. The needle is then removed and the tube is secured to the skin on the neck of the animal using Elastoplast® wrapped around the tubing. Once in place, this tube allows blood to be removed and/or fluids to be introduced without the need for repeated needle insertion that would cause additional discomfort and distress to the animal. Studies where it is necessary to collect multiple samples over an extended period of time commonly use this technique. The use of aseptic technique is important to reduce the risk of infection at the site of cannula insertion.

- General Description

Animal Preparation (2 person operation)

1. Clip an area of wool around the jugular vein that is big enough to allow easy visualisation of and access to the jugular vein. 10 cm X 5 cm should be adequate, but larger is OK.
2. Using gloves, apply local anaesthetic cream (Emla®; lignocaine 25mg/g, prilocaine 25mg/kg) to the area – note the time of application.
3. Inject the animal with sedative (Xylazine - Ilium Xylazil®; 0.1mg/kg i.m.) approximately 25 minutes after the application of anaesthetic cream.
4. Approximately 30 minutes after application of the local anaesthetic cream, the designated animal holder should restrain the animal by straddling its back and gently supporting the head.

Site Preparation (2 person operation)
1. Set up the cannulation trolley for the required number of animals. Ensure that all needles, tubing and equipment are kept in 70% ethanol.
2. Spray the shaved window with 70% ethanol
3. The vein must be clearly located by pressing down on the jugular groove at the bottom of the clipped area and watching the vein rise and fall with pressure and release. Ensure that you are confident in where the vein is located before moving on to step 4.
4. Rinse the tubing with sterile saline to remove any traces of alcohol
5. Insert the 12/13G luer lock needle into the jugular vein and quickly feed the tubing through the needle into the vein.
6. Slide the needle off the tubing and quickly attach the tap to the end of the tubing.
7. Check that blood is flowing freely through the tubing using a syringe filled with sterile, heparinised (40iu) 0.9% saline. Rinse the tubing by pushing 2-3mls of heparinised saline back into the tubing.
8. Wrap a piece of fabric tape (Elastoplast®) around the tubing at the point where it enters the neck, leaving two ‘wings’ on either side. Stitch the wings to the skin on the neck to secure the cannula in place.
9. Wrap a piece of fabric tape around the junction between the tap and tubing to reduce the risk of kinking or holes forming in the tubing.
10. Lie the cannula on the neck of the sheep and wrap 2-3 layers of tape around the neck of the sheep. Ensure that the tape covers the cannula but is not too tight to restrict the movement of the sheep.
11. Check the animals daily while the cannula is in place (i.e. 1-2h after cannula insertion and on the day of the frequent sampling regimen) for any sign of ill health (withdrawn from the group, not eating, dull eyes and ears carried low) and after cannula removal (if applicable: i.e. if the animals are not euthanized at the end of the experiment), record any observations on the intensive monitoring sheet and take the appropriate action (see step 13).
12. If the cannula is removed at the end of the procedure (i.e. if the animals are not killed at the end of the experiment) - cut through the tape used to secure the cannula around the animals neck. Cut the stitches to remove the Elastoplast from the skin of the sheep. Gently pull the tubing out of the jugular vein of the animal and hold sterile swabs firmly over the cannulation site. Remove the swabs, check the site and if it appears normal (i.e. no bleeding, swelling or excessive redness) release the animal back to the pen.
13. If any animal appears unwell after cannula insertion or removal (i.e. withdrawn from the group and off food or water or if the cannulation site looks inflamed) - check their rectal temperature (normal range: 38 – 39.5°C) and inform the AWO. The animal that appears unwell should be treated as follows: If the animal has an elevated temperature (i.e. above 39.5°C) indicative of infection, seek veterinary advice and give a dose of antibiotics (e.g. Noracillin 10mg/kg i.m.) if advised by the vet. Check the animal 24 hours later. If there is no improvement (i.e. the temperature is still elevated above 39.5°C) seek veterinary advice. If the animal does not have a temperature, we will give them electrolytes and vitamin B complex to encourage their appetite. If they do not respond within 24 hours with an improved appetite, seek veterinary advice. If you are in doubt of the health and welfare of any animal seek veterinary advice immediately.

- **Purpose of the procedure**
  To facilitate the insertion of a plastic tube (cannula) into the jugular vein to allow the collection of frequent blood samples from sheep and goats.
• **How the animal is caught**  
The animal is caught by an experienced animal handler in either a group pen or individual pen.

• **How the animal is restrained**  
The animal is restrained by hand in either a group pen or individual pen by an experienced animal handler. The person will typically hold one hand under the head of the sheep or goat and one hand towards the rump, typically up against a wall or fence to provide some stability for the handler and animal.

• **How the animal is monitored including frequency**  
The animal is continuously observed after the initial sedation and approximately 30 mins after the procedure.

• **If the animal is anaesthetised, details of the clinical or physiological criteria that will be used to monitor the depth of anaesthesia**  
Not applicable

• **How long is the animal restrained for**  
The animal is initially restrained for approximately 5 mins to clip the cannulation site and apply the anaesthetic cream. The animal is then restrained for approximately a further 5 min during the main part of the procedure.

• **How long does the actual procedure take**  
The procedure takes approximately 5 min to prepare the cannulation site and approximately 5 min to insert and secure the cannula in place.

• **Any determinants of procedural success**  
The cannula is tested at several points through the technique (i.e. easy withdrawal of blood and insertion of 0.9% saline).

• **Any other protective measures to safeguard the animal’s wellbeing**  
Aseptic technique to minimise the risk of infection

---

**Precautions - Health and Safety Considerations**

- Animals must be handled by trained personnel to avoid injury to both the animal and handler.
- Current “Permission to use animals (PUA) authority” from The University of Western Australia.
- Valid tetanus immunisation.
- Current AEC approval for research involving animals.
- Q fever immunisation as necessary (http://qfever.org)
- Care must be taken when working with needles. All disposable sharps must be disposed of into designated sharps containers.
- Personnel must wear appropriate footwear to avoid injury from being trodden on.

**Animal Welfare Risks:**

Experienced personnel will restrain the animal.
Experienced personnel will perform the procedure.

**Equipment:**

- 12/13G luer lock needles
- Tubing
- Three-way taps
- Blunted 18G needles
- 25ml syringe
- Elastoplast tape
Jugular cannulation in sheep and goats.

Needle holders and curved triangular cutting needles
Thread
Brown tape
40iu/ml heparinized 0.9% saline
Anaesthetic cream
Gloves
70% ethanol
Spray bottle
Clippers and size 40 clipper blade
Nail brush to clean clipper blades
Swabs
18G needles and 1 mL syringe (for injecting Xylazil)
Ilium Xylazil-20
Heparin (25,000 iu per 5 mL)

<table>
<thead>
<tr>
<th>Drug name (generic name, not trade name)</th>
<th>Dose rate (mg/kg body weight)</th>
<th>Route</th>
<th>Timing of administration and frequency (eg. 90 minutes pre-operative, to induce anaesthesia, during procedure, at specific intervals during the procedures)</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anaesthetic cream (lignocaine and prilocaine)</td>
<td>lignocaine 25mg/g, prilocaine 25mg/kg</td>
<td>Applied to skin</td>
<td>Approximately 30 min prior to needle insertion</td>
<td>Minimise pain associated with needle insertion</td>
</tr>
<tr>
<td>Xylazine (eg. Ilium Xylazil®)</td>
<td>0.1mg/kg i.m</td>
<td>Intravenous</td>
<td>Approximately 5 min prior to needle insertion</td>
<td>Minimise the stress associated with restraint and needle insertion.</td>
</tr>
</tbody>
</table>

References:
Not applicable

Applicant’s Name: Title, First name, Last name
Dr Penelope Hawken

I give permission for this SOP to be made available for general use  
YES [ X ]   NO [ ]

Applicants Signature:  
Date: 21/03/2014