Getting to Grips with Jugular Catheters
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Jugular catheters are becoming more widely used in small animal medicine and veterinary nurses play an important role in the preparation of equipment, patient and catheter care.

The tip of the jugular catheter is placed in the cranial or caudal vena cava.

**Indications for use**

For some patients having access to the central circulation can be far more suitable than peripheral access and indications for their use include:

- Delivery of Intravenous fluids
- Delivery of medications
- Delivery of parenteral nutrition (TPN/PPN)
- Frequent blood sampling
- Central venous pressure monitoring (CVP)
- Volume resuscitation
- Cardiac arrest
- Lack of peripheral access
- Long term IV access
- Need for multiple fluid lines

*Because the introduction of foreign material into the central circulation carries far more serious consequences than peripheral vessel contamination, good aseptic technique during placement and management can not be stressed enough.*

There are a number of contraindications and complications associated with jugular catheters and these include:

**Contraindications**

- Bleeding disorders
  - Von Willibrands
- Coagulopathy or thrombocytopaenia
- Distorted local anatomy
  - Obesity, oedema, hypervolaemia, hypotension
- Cellulitis, burns, severe dermatitis at site
- Trauma patients
- Vasculitis
- Raised intracranial pressure
  - Potential for decreased venous drainage during placement
- Length of time IV access is required
  - Can remain in place for up to 14 days if good aseptic techniques are achieved
- 24hr nursing care must be available
- Stability of patient
- Cost
Complications

- Vascular
  - Air embolus
  - Phlebitis
  - Venous thrombosis
  - Arterial puncture
  - Haematoma
  - Blood clot
  - Haemorrhage
- Miscellaneous
  - Dysrhythmias
  - Nerve injury
- Mechanical
  - Kinking
  - Patient interference
  - Occlusion
    - One or more of the lumens with thrombi
- Infectious
  - Sepsis
  - Cellulitis

Catheter selection

There are a variety of types of catheters available to use for jugular catheterisation and they can have a single, double or triple lumen. The decision on how many lumens to select will depend on why the catheter is being placed in the first place e.g. is frequent blood sampling and IV fluids required in which case a double lumen may be suitable. If the patient also requires total parenteral nutrition then a triple lumen may be more appropriate.

It is important also to bear in mind that the more lines there are the narrower each individual section will be, therefore the largest catheter practicable should be considered.

The compound used to make different types of catheters will affect the rigidity, reactivity and thrombogenicity. Catheters made of silicone and polyurethane are less thrombogenic than other materials such as polypropylene and for this reason are the preferred material of choice.

The length and gauge of catheter required is dependent on the purpose of the catheter and the patient size. If the administration of large fluid volumes is required; such as in the critically ill patient a large gauge catheter should be placed. If central venous pressures are to be monitored the length is very important to ensure that the tip of the catheter is positioned in the cranial or caudal vena cava just outside the right atrium (an x-ray will confirm this).

The table below gives a guide to size selection:

<table>
<thead>
<tr>
<th>Weight of patient</th>
<th>Catheter size</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;3kg</td>
<td>4F (22G)</td>
</tr>
<tr>
<td>3 – 15kg</td>
<td>5.5F (20-22G)</td>
</tr>
<tr>
<td>&gt;15kg</td>
<td>7F (16-18G)</td>
</tr>
</tbody>
</table>

Techniques and patient preparation

The two techniques of catheter placement used are, the peel-away sheath needle technique and the modified Seldinger jugular catheter technique. All equipment should be prepared prior to positioning the patient (see boxed text). For both techniques the patient should be placed in lateral recumbency with a support placed under the neck (e.g. a sandbag or drip bag) to help visualisation of the jugular vein.
The patient’s head is extended and its forelimbs positioned caudally, which helps immobilise the vessel and make it more accessible. Correct positioning is vital to achieve successful catheterisation and it is important that the patient remains still during placement to avoid trauma to the jugular vein. Ideally the patient will be sedated on under anaesthesia but there will be occasions when the patient’s condition is so compromised, that this will not be possible and in these situations local anaesthesia may be used.

An area should be clipped around the planned insertion site from the jaw line to the thoracic inlet giving at least 5 to 10cm either side of incision in order to allow the multiple lumen of the catheter to be fixed appropriately. A larger area may be advisable for patients with very long or thick coats. A surgical skin prep should be performed using 50% chlorhexidine solution applied with clean (non-sterile) swabs and finished with isopropyl alcohol. You should carry out effective hand hygiene and wear disposable gloves throughout the entire skin prep procedure.

When the procedure is being performed surgical asepsis should be maintained and sterile gloves should be worn. In there are additional concerns regarding the individual patient (immunocompromised), it may be appropriate to also wear hats, gowns and mask.

**Nursing care of Jugular Catheters**

Jugular catheters are placed for long term access. Their location makes them more comfortable and less vulnerable to interference in comparison to peripheral catheters. They are easier to maintain than femoral or saphenous catheters and are less likely to become contaminated with urine and faeces. There is a greater risk of contamination during placement therefore central catheters have the added advantage of being able to stay in situ for longer than their peripheral counterparts (14 days if managed to a high standard).

One of the main roles of the veterinary nurse is to ensure that asepsis is maintained during the daily management of the jugular catheter to avoid the risk of contamination. Patients need to be closely monitored whilst the catheter is in place and be quick to flag up any concerns with the clinician.

Exceptional hand hygiene should be performed while handling the patient and disposable gloves should always be worn when handling the catheter exposed on the outside of the bandage. When the bandage is removed to monitor the catheter insertion site sterile gloves should be worn.

In our canine patients that are well enough to be taken outside, you should ensure that they are always walked with a harness to prevent any additional stress on the jugular site.

The catheter insertion site should be checked twice daily (wearing sterile gloves) for signs of infection e.g pain, inflammation or abscessation of the skin. If there are any concerns you should alert the clinician who will probably opt to remove the catheter and send the tip for culture. The clinician should also be informed if the patient develops an unexplained fever (temperature >390C).
Nursing care of Jugular Catheters – A Suggested Protocol

The patient will require 24 hour monitoring whilst the jugular catheter is in place.

Ensure all equipment is prepared prior to handling the catheter.

Exceptional hand hygiene is essential. Disposable gloves should be worn when handling any part of the catheter outside of the bandage and sterile gloves must be worn when assessing the catheter insertion site.

- Catheter insertion site should be examined twice daily
  - Remove the bandage and ensure sterile gloves are worn to redress the site. Look for signs of infection e.g. pain, inflammation or abscessation of the skin. If there are any concerns you should alert the clinician who will probably opt to remove the catheter and send the tip for culture. The clinician should also be informed if the patient develops an unexplained fever (temperature >39°C). All observations must be recorded on the inpatients record.
  - Sterile swabs should be placed over the site of insertion prior to redressing (avoid any dressings which are adhesive as they will cause trauma to the skin when removed which results in an increased bacterial load at the catheter site).
  - All injection ports should be wiped with alcohol before and after needle puncture.
  - The insertion sites should be kept bandaged to support the catheter and prevent the catheter hubs dragging on the ground (a stockinette can be placed over the bandage to enable the catheter ends to be tucked away safely when patients are being walked or are recumbent).
  - Any witnessed contamination should be responded to immediately; this may require cleaning or changing injection ports or complete catheter removal.

- Ports should be wiped with a disposable alcohol swab (steret) before and after injection. Needle free valves can be swabbed prior to use and then replaced with fresh ports.
  - Leaving ports of a central venous catheter open to the atmosphere places the patient at risk of air embolism, therefore the catheter should be occluded by a catheter lock or manual kinking whenever the catheter hub is opened.
  - Unused ports should be flushed every 4 hours with heparinised saline (0.1ml/100ml of 1000 iu/ml) to prevent thrombus formation in the lumen which will cause mechanical failure of the line. Each patient should have their own bag of heparinised saline and this should be discarded every 12 to 24 hours to minimise the risk of contamination.
  - Care not to use excessive volumes of flush solution as will increase the risk of heperinisation.
  - If a catheter port is not going to be used for a prolonged period a heparin lock can be used. The dead space of the catheter is filled with 100 U/ml heparin every 12 hours. The concentrated heparin solution should never be flushed into the patient and clear labelling is essential. The lock is aspirated prior to administration of medications or before replacing the heparin lock.

- Blood sampling from catheter port
  - If taking multiple samples or there are concerns about anaemia or causing hypovolaemia you can draw off 0.5-1ml (depending on size of the patient) into a hepsaline syringe and agitate whilst taking a fresh blood sample. You can then inject the blood/hepsaline initially drawn off back into the patient and flush the line with hepsaline.

- When removing the catheter apply pressure for approx. 5 minutes and then place a pressure bandage for an hour, obviously close monitoring that respiration is not compromised. A primapore can then be placed over the insertion site for 24 hours.

- Any dogs with a jugular catheter should be walked out using a harness rather than a regular collar/slip lead.