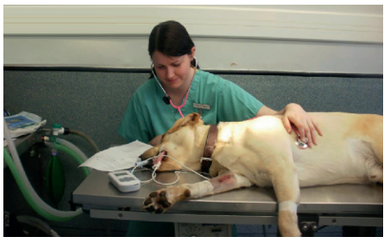

Rachel McDermott RVN CertVNES

Rachel qualified in 2012 and works nights at Armac Vets in Bury where she deals with emergencies and critically ill patients on a daily basis. In November 2013 she passed the City and Guilds Certificate in Veterinary Nursing of Exotic Species and she is currently studying for the Certificate in Emergency and Critical Care. Rachel lives with her boyfriend and four rescue dogs that keep them both busy!

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Pericardiocentesis - clinical signs and treatment

Rachel McDermott RVN CertVNES
Armac Veterinary Clinic, 147 The Rock, Bury, Greater Manchester, BL9 0ND, UK

ABSTRACT: This article describes how to prepare for pericardiocentesis and outlines how to monitor the patient after the procedure.

Introduction

Pericardial effusion is described as a collection of fluid within the pericardial sac, (Lane & Guthrie, 2001). This fluid restricts the heart's ability to function correctly, which results in an inability to maintain circulation and supply the body with adequate oxygenated blood. If the condition is severe enough the patient will go into shock, however if the amount of fluid in the pericardium is small, the body can usually compensate for this and it is not until the amount of fluid has increased that clinical signs may become evident. These signs include ascites, abdominal distension, collapse, exercise intolerance, pale mucous membranes, muffled heart sounds and tachycardia (Howarth, Gear & Bryan, 2007).

Causes of pericardial effusion include right-sided congestive heart failure, hypoproteinaemia, infectious pericarditis, neoplasia, acute haemorrhage or may be idiopathic (Baines, 2007).

Pericardial effusion can be diagnosed by clinical examination, thoracic radiographs, ECG trace and ultrasound. Clinical examination should show a muffled heart beat with a rapid and weak arterial pulse (Baines, 2007). An ECG trace may show ST segment deviation with alternating large and small QRS complexes and thoracic radiographs will show globular cardiomegaly (Baines, 2007). Ultrasound can be used to show pericardial effusion as well as the presence of a tumour.

Pericardiocentesis

Treatment of pericardial effusion requires initial stabilisation of the patient followed by pericardiocentesis to remove the fluid from the pericardium and reduce the pressure around the heart to allow it to be able to fill correctly. An important factor to consider prior to carrying out pericardiocentesis is whether the patient has a clotting disorder, which could have been a contributing cause of the pericardial effusion. This can be investigated by performing clotting time tests and there are kits that are available for this purpose.

Pericardiocentesis is a sterile procedure and requires the patient to be sedated, unless in severe shock. All the necessary equipment should be gathered and assembled prior to the dog being sedated so that the procedure is carried out as efficiently as possible, (Howarth, *et al*, 2007) states that the equipment required includes:

- 60ml syringe
- three-way tap
- intravenous fluid extension line
- 16G over-the-needle catheter
- sterile gloves
- lidocaine for local anaesthesia
- scalpel blade
- clippers
- ECG
- ultrasound
- IV access
- crash box

The drugs used to sedate the dog should be considered carefully, as almost all drugs, especially alpha2-agonists and

acepromazine (ACP, Novartis), will depress the cardiovascular system and should both be avoided.

Once the dog has been sedated it should be placed in left lateral recumbency and an area clipped and surgically prepared on the lateral thorax. There is some debate concerning the exact area to be prepared, Baines (2007) states that the area should be from the 3rd to the 8th intercostal space whilst Cornell (2007) states that it should be between the 4th and 5th intercostal spaces. The dog should be very closely monitored during the procedure, preferably by ECG, to check for any changes in the heart trace and for abnormal rhythms once the procedure is completed.

Samples of the fluid should be collected and analysed for bacterial culture and cytological examination. Other tests that can be carried out on this fluid after the catheter has been removed include PCV and clotting time evaluation. It is important to check whether or not the sample clots, as this can determine if the fluid is fresh blood caused by the placement of the catheter or if it is pericardial fluid.

Monitoring of the patient after the procedure

Cornell (2007) states that most animals improve rapidly after the fluid is removed from the pericardium. Monitoring of the dog post-procedure includes monitoring of the usual parameters following a procedure requiring sedation, such as temperature, pulse (rate, rhythm and quality), respiration, mucous membrane colour, CRT, haemorrhage from the catheter incision site or recurrence of the pericardial effusion, level of consciousness and signs of pain or discomfort. Signs that the pericardial effusion needs to be drained again include increased CRT, pale mucous membranes, tachycardia and muffled heart sounds.

It is advisable to continue to monitor the patient's ECG trace to check for any arrhythmias or changes. Rishniw (2002) states that observation for recurrence of clinical signs (ascites, breathlessness and collapse) should be carried out. It is also useful to monitor the patient's central venous pressure (CVP) via placement of a central venous catheter as the CVP will increase should the pericardial fluid re-accumulate.

Box 1. The pericardiocentesis procedure (Baines, 2007)

- The veterinary surgeon will infiltrate the areas with lidocaine, making a small cutaneous incision with the scalpel blade and advancing the catheter.
- The assistant will be instructed to aspirate the fluid slowly.
- Ventricular complexes may be seen during the procedure. These usually resolve once the procedure is complete. (These are a sign that the myocardium has been touched by the catheter.)
- The fluid is usually very bloody.

Box 2. Measurement of central venous pressure (CVP) (Moses & Curran, 2007)

- The area for insertion of the catheter is surgically prepared.
- The catheter is placed using an aseptic technique. For a jugular catheter the tip must be positioned at the entrance to the right atrium. For femoral or saphenous catheters, the tip should be positioned at the junction of the vein with caudal vena cava.
- The catheter should be secured in place with tape or sutures and then flushed with heparinised saline.
- The catheter should then be attached to plastic tubing which is then attached to a pressure transducer or manometer.
- The patient should be in lateral or sternal recumbency and ideally measurements should be taken with the patient in the same position.
- A reference/zero point needs to be taken prior to taking measurements: this can be done by positioning the bottom of the manometer at the level of the right atrium. This is at the height of the manubrium in a lateral patient, or the scapulo-humeral joint with the patient in sternal recumbency.

CVP can be measured using a catheter inserted into the patient's vena cava via another suitable blood vessel, such as the jugular, femoral or saphenous veins (Moses & Curran, 2007). CVP estimates the blood pressure within the right atrium by measuring pressure in the cranial or caudal vena cava which in turn is a reflection of vascular volume (Moses & Curran, 2007). Measurement of CVP is detailed in **Box 2**, normal values range from 0 to 5 cm water (Moses, & Curran, 2007).

Complications

- Recurrence of the pericardial effusion
- If repeat drainage is required it can become more difficult to carry out as the pericardial sac becomes thickened
- Infection
- Pneumothorax or haemothorax
- Iatrogenic damage to heart and lungs

Conclusion

Pericardial effusion is a life-threatening condition that can present with a variety of clinical signs, early recognition of these and close monitoring post-drainage can result in a positive outcome for the patient.

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