AIRWAY DISEASES

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1. Laryngeal paralysis
2. The brachycephalic airway obstruction syndrome
3. **Chylothorax**

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III: CHYLOTHORAX

What is chylothorax?

Chylothorax is an uncommon disease characterized by an accumulation of chyle in the pleural cavity due to a leakage from the thoracic lymphatic system. This is associated with obstruction of the thoracic duct and a subsequent lymphangiectasia of pleural and mediastinal lymphatics. Chyle is a white or pink / white effusion (pseudochylous effusions are not proven to occur in the dog or cat). Chyle can cause severe inflammation within the pleural space and can lead to a restrictive pericarditis and pleuritis with a resultant lung collapse.

Aetiology

Any condition that results in increased right-sided venous pressures or obstruction to the lymph flow into the venous system is known to be associated with the development of chylothorax. These conditions include traumatic or iatrogenic rupture of the thoracic duct, heart disease (right-sided heart failure, cardiomyopathy, pericardial effusion, congenital cardiac abnormalities, heartworm infection), cranial mediastinal masses (lymphoma or thymoma), fungal granulomas, thrombosis of the cranial vena cava, and congenital abnormalities of the thoracic duct.

- Idiopathic
- Cardiac Failure
- Neoplasia
- Cranial vena cava thrombus
- Dirofilariasis
- Congenital

Clinical Signs

The clinical presentation will depends on the severity and rapidity of pleural fluid accumulation. Dyspnoea is the commonest sign and is usually seen with a marked forceful inspiration with a delayed expiration. Other signs are tachypnoea, cyanosis, open mouth breathing, muffled heart and lung sounds, dull on percussion and coughing. Coughing is a result of pleural irritation and is frequently the first presenting sign in chronic chylothorax.

Diagnosis

Imaging: Radiography imaging will show the presence of a pleural effusion with loss of the cardiac silhouette, rounded costophrenic angles, interlobar fissures and separation of the lungs from the sternum. Ultrasound is a useful diagnostic adjunct.

Lymphangiography is useful in confirming the diagnosis but can be difficult to perform. The efferent mesenteric lacteals must be cannulated to administer a water-soluble iodine based contrast material. Alternatively, it may be possible to inject the contrast directly into the popliteal lymph node. Dilated lymphatics will be evident within the mediastinal.

Clinical pathology: diagnosis is usually confirmed on thoracocentesis; the recovery of a milky fluid is very suspicious and laboratory diagnosis is confirmatory. The classical diagnosis of chyle using an ether clearance test has been superseded by measurement of the triglyceride and cholesterol ratio.

A chylous effusion has:

- Cholesterol / Triglyceride ratio < 1
- Chylous triglyceride > Serum triglyceride
- Chylous cholesterol ≤ Serum cholesterol
- Total Protein = 20 - 65 g/l
- Specific gravity = 1.012 - 1.037
- Chylomicrons are present.

Management

Medical: management of the condition should be directed to the treatment of the underlying cause; however in a large number of the patients the underlying cause is not identified and the disease is considered to be idiopathic. This condition has been initially managed medically because it may resolve spontaneously in approximately 50% of cases. This involves:

- low-fat diet,
- intermittent palliative thoracocentesis
- supplementation with rutin and benzopyrone.

Surgery: Many surgical techniques have been proposed to treat idiopathic chylothorax when medical management fails. These include the most widely accepted technique,

- thoracic duct ligation - The classical surgical management of chylothorax is to perform ligation of the thoracic duct via a 10th intercostal thoracotomy. The patient must be either fed a high fat diet to dilate the duct or methylene blue dye can be injected into the oesophageal wall and will outline the thoracic duct. The problem with this approach is that there are frequently other thoracic lymphatics which will dilate and divert lymph around the ligated portion.
- cisterna chyli ablation
- embolisation of the thoracic duct with cyanoacrylate
- passive trans-diaphragmatic shunting
- active pleuroperitoneal shunting
- various combinations of the above techniques

Pleurodesis is achieved by instilling an irritant compound (e.g. tetracycline) into the pleural space to produce an acute inflammatory response. Such a technique is extremely painful and must be carried out under general anaesthesia and a local anaesthetic is added to the irritant solution. Bilateral thoracic drainage is employed to promote adhesion of the visceral and parietal pleura. Drain thorax and then instil 15 - 20 mg/kg tetracycline solution diluted in 75 ml sterile water plus 5 - 10 ml 0.5% bupivacaine. Rotate patient to distribute solution, drain thorax 2 hours later and cease drainage when effusion is <150ml/24hrs.

However none of those techniques results in consistent resolution of pleural effusion in more than half of affected dogs and 40% of affected cats. Additionally, many techniques are published with only a small number of clinical cases to support them.

Recently Fossum et al recently published a new combined technique of thoracic duct ligation (TDL) and pericardectomy (PPC) showing a significant improvement in the outcome for both dogs and cats. This followed from the hypothesis that the diseased pericardium leads to an increased systemic venous pressure which could impair the drainage of the chyle from the thoracic duct into the venous system. This technique has been claimed to have success rates of 90%; 100% in dogs and 80% in cats), compared to the TDL alone. In our hands this has proved to be a very successful technique with almost consistent resolution of the signs of the disease.

Conclusion: the high success rate for TDL combined with PPC now justifies this approach as the 'first line' of management without prior medical management.