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An overview of Chylothorax in dogs: A clinical study

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Abstract
The present study was carried out in three dogs presented to the University Veterinary Hospital and Teaching Veterinary Clinical Complex, Mannuthy, Thrissur during the year of 2019. Chylothorax is an accumulation of chylous fluid in the thoracic cavity. The dogs presented with the history of respiratory distress and anorexia were subjected to detailed clinical examination and diagnostic procedures which included radiography, ultrasonography and laboratory tests. Emergency thoracocentesis was done in all the three animals to relieve the respiratory distress as a therapeutic and diagnostic procedure. The effusions collected were milky white in colour and it was subjected to laboratory examination. Cholesterol and triglyceride levels were measured in both thoracic effusion and serum. Higher level of triglycerides were observed in the thoracic effusion. Echocardiography was done to find out the functions of the heart. With all the above-mentioned studies, three cases were diagnosed as idiopathic chylothorax. All the three cases treated successfully with rutin, diuretics and mind-calming supplements to lead a quality life.

Keywords: Chylothorax, Rutin, triglycerides, thoracocentesis

Introduction
Chylothorax is a rare disorder that is seen in both dogs and cats characterized by accumulation of chylous fluid in the thoracic cavity. It can be idiopathic or congenital or secondary due to predisposing factors which affect thoracic duct drainage like trauma, obstruction and tumour mass. Other factors included like cardiac disease, pericardial disease, dirofilariasis, lung lobe torsion, diaphragmatic hernia and systemic lymphangiectasia. Chyle has characteristic milky white appearance and it contains small molecules of fat (chylomicrons), lymphatic fluid, protein, white blood cells and vitamins. Occasionally this fluid may be light pink coloured due to the trauma induced during thoracocentesis (Michelsen *et al*., 2012; Singh *et al*., 2012; Hawkins, 2014) [4, 1, 3].

Materials and Methods
Three dogs presented with the history of respiratory distress and anorexia formed as subjects of this study. The present study was performed in accordance with the animal ethical committee guidelines and with owner's informed consent on the whole procedure. These animals were presented with the history of respiratory distress and anorexia. The animals were subjected to detailed clinical examination, different laboratory and imaging techniques. Standard thoracic ultrasonography, echocardiography and thoracocentesis procedures were done in lateral recumbency.

Results and Discussion
All the three animals included in this study were successfully diagnosed and treated with available facilities. Signalment of the animals were given in the table 1.

Table 1: Signalment details of animals

S. No.	Age	Breed	Sex	Body weight
Case 1	Four years	Rottweiler	Male	40 kg
Case 2	Five years	Rottweiler	Male	37kg
Case 3	Two years	Dobermann Pinscher	Male	39kg

Clinical examination revealed dyspnoea, increased respiratory rates and heart rates, open mouth breathing and rectal temperature was within the normal range.

Wet film examination was done to rule out microfilaria in blood. Thoracic radiography showed increased soft tissue opacity and unclear cardiac silhouette which suggested effusion in the pleural cavity. Thoracic ultrasonography was done and confirmed the presence of pleural fluid as anechoic area in the thoracic cavity. Echocardiography showed no abnormalities with the heart in all the three animals.

Blood and serum samples collected to assess the complete blood count, kidney and liver functions, electrolytes, triglycerides and cholesterol. Thoracocentesis was carried out as per standard protocol in all three cases with the aim of diagnosis and as a therapeutic procedure (Hawkins, 2014) [3]. The effusions collected were milky white in colour and it was subjected to laboratory examinations to check the level of triglycerides and cholesterol. These effusions were modified transudate or non-septic exudate with moderate level of protein.

Milky white appearance of serum samples were also observed due to elevation of triglycerides level.

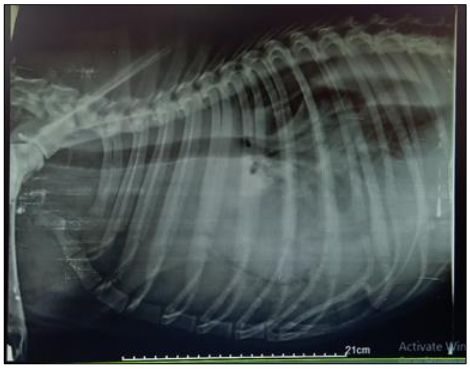

Fig 1: Thoracic Radiography (Right Lateral) of Doberman Pinscher, Pleural Effusion, Before thoracocentesis

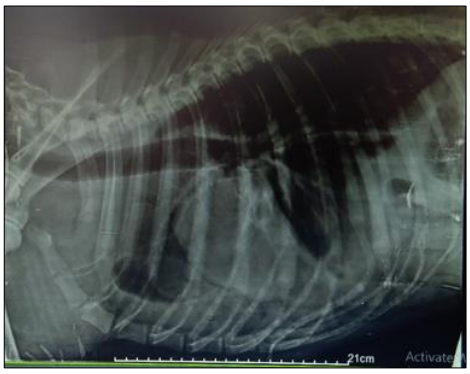

Fig 2: Thoracic Radiography (Right Lateral) of Doberman pinscher, after thoracocentesis

Fig 3: Thoracic ultrasonography showing anechoic area suggestive of pleural effusion and fibrin strands

Increased levels of triglycerides, cholesterol or both in blood are called as hyperlipidaemia. Triglyceride levels were high in thoracic effusions than in the serum in all three animals. In cases of chylous effusion, the level of triglycerides in the pleural fluid is greater than that in the serum (Hawkins, 2014) [3]. Anaerobic and aerobic culture of the effusions were found to be negative for the presence of any bacteria. In case 2 effusion was slight pink in colour and that might be due to capillary rupture during the procedure of thoracocentesis.

Fig 4 & 5: Milky white chylous effusion collected form thoracocentesis

Thoracocentesis is an important procedure in the medical management of chylothorax which involves evacuation of chyle from the thorax, either with a tube placed in the chest or intermittent thoracocentesis to relieve the respiratory distress at different times (Singh *et al.*, 2012) [1]. Intermittent thoracocentesis was carried out in all the three cases according to their condition of respiration, discomfort and thoracic radiographic detail. Thoracic radiography was not repeated after post thoracocentesis in two cases.

Table 2: Triglycerides and cholesterol level in thoracic effusion (chyle)

S. No	Thoracic effusion (chyle)	
	Triglycerides (mg/dL)	Cholesterol (mg/dL)
Case 1	553	110
Case 2	1154	104
Case 3	790	58

Table 3: Triglycerides and cholesterol level in serum sample

S. No	Serum sample	
	Triglycerides (mg/dL)	Cholesterol (mg/dL)
Case 1	90	101
Case 2	234	140
Case 3	220	78

Amount of chyle removed at different intervals by intermittent thoracocentesis was given in table 4.

Table 4: Volume of fluid removed through thoracocentesis at different intervals

S. No	Intermittent Thoracocentesis
Case 1	1350ml+2000ml =3350ml Three times (3.35 litres)
Case 2	480ml+240ml =720 ml Two times (0.72 litres)
Case 3	150m1+550ml+1300ml+2000ml+1500ml+900ml = 6400ml six times (6.4 litres)

Rutin, a benzopyrone derived from the Brazilian fava d'anta tree is commonly used adjunctively in the non-surgical management of idiopathic chylothorax. It is thought to reduce protein content of effusion by affecting macrophage function and thereby it enhances the resorption of effusion and minimizes the fibrosis of pleura. This drug is available in the label of nutraceutical product. A dosage of 50 to 100 mg/kg

given orally every 8 hours is recommended (Singh *et al.*, 2012) [1]. This drug was prescribed in all three cases to reduce the formation chyle and its consequences in thoracic cavity. Supportive treatment with enzymes (Relaxyme[a]) was advised in case 2 along with other treatments.

Low fat diets were suggested to reduce the volume of chyle flow through the thoracic duct (TD) which could allow the spontaneous healing of thoracic duct defects. Mind calming drug (Anxocare[b]) was prescribed to control activity and anxiety of the animal.

The lifespan of the animal with chylothorax with medical management depend on several factors and concurrent infections and health condition of that animal.

(a-Brand of Vivaldis Animal Health and b- Brand of Himalaya Animal Health)

Table 5: Lifespan of three animals after the initial diagnosis of chylothorax with medical management

S. No	Lifespan after diagnosis
Case 1	Alive for four months after the initial diagnosis
Case 2	Alive for 15 months from the initial diagnosis (under monitoring)
Case 3	Alive for seven months from the initial diagnosis

Conclusion

In conclusion, medical management of chylothorax having its own limitations in the patient recovery. Quality of life improved for some period of time with medical management. Three cases of idiopathic chylothorax were medically managed with intermittent thoracocentesis, rutin and low-fat diets.

Surgical management is superior to the medical management of chylothorax. Surgical procedures were recommended in patients which are not improved with clinical signs or medical management after two to three months. Surgical procedures recommended were thoracic duct ligation and subtotal pericardiectomy with or without ablation of cisterna chyli, thoracic omentalization, pleurodesis, cisterna chyli and thoracic embolization (Fossum *et al.*, 1986; Singh *et al.*, 2012; Reeves *et al.*, 2020) [2, 1, 5] These surgical procedures were technically difficult and needed skilled surgeon and sophisticated operation theatre infrastructure.

The authors confirm contribution to the paper as follows: study conception and design: R.B. Vishnurahav, S. Ajithkumar, Usha Narayana Pillai; data collection: R.B. Vishnurahav, N. Madhavan Unny; analysis and interpretation of results: R.B. Vishnurahav; draft manuscript preparation: R.B. Vishnurahav and S. Ajithkumar. All authors reviewed the results and approved the final version of the manuscript.

The authors confirm that the data supporting the findings of this study are available within the article.

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Conflict of interest: Authors have no conflict of interest in this study.

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