Treatment of Idiopathic Canine Chylothorax with Thoracic Duct Ligation, Pericardiectomy, and Omentalization

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Introduction
Chylothorax can be characterized by an accumulation of chyle in the thoracic cavity. It affects respiratory system, contributing to tachypnea, increased respiratory effort, and shallow respiration. Moreover, it entails metabolic compromise and fibrosis pleuritic (7). Chylothorax, might be caused by cardiomyopathy, mediastinal tumor, dirofilariasis, blastomycosis, jugular venous thrombosis, diaphragmatic herniation, pericardial effusion, congenital anomalies, and heart base tumor. Even if it is resulted from several factors, major cause is idiopathic (1,4). Primary treatment for this condition is a thoracocentesis which alleviates dyspnea of the dogs, a provision of low-fat diet supplemented with benzopyrone, and general supportive treatments. In case of idiopathic chylothorax, medicinal treatments are relatively ineffective. Thus, surgery is recommended (5,6). This study demonstrated the treatment of idiopathic chylothorax with thoracic duct ligation, pericardiectomy, and omentalization in the dog with idiopathic chylothorax.

Surgical procedure
Prior to surgery, he was orally administered with 2-2.5 ml/kg of corn oil, subcutaneously premedicated with morphine (0.5 mg/kg). His cephalic vein was catheterized for anesthesia and further monitor. Anesthetic induction was performed by propofol (6-10 mg/kg). After endotracheal intubation, anesthesia was maintained with isoflurane in oxygen (1L/ min) delivering through a circle breathing system. Thoracic cavity of the patient was incised at right tenth intercostal space for locating thoracic duct. Right paracostal laparotomy was done to isolate the mesenteric lymph node. Thereafter, 0.2 ml of methylene blue diluted with saline to 1 cc in total was administered into mesenteric lymph node in order to localize the thoracic duct (Fig. 1). After that, the thoracic duct was ligated with 3-0 polyamide (difilon®) as shown in Fig. 2. Thereafter, omentalization was performed by inserting the omentum into pleural space through and opening created in the diaphragm. Thereafter, it was fixedly sutured with diaphragm by 3-0 polydioxanone (Fig. 3). Furthermore, pericardial surface was assessed prior to performing pericardiectomy. Pericardium was incised from ventral to the phrenic nerve, extending to cranial and caudal directions (Fig. 4). Thereupon, thoracic drainage was performed. Finally, thoracic and abdominal cavities were closed in the standard manner.

Signalment and history
A three-year-old Thai male dog visited the veterinary hospital with the chief complaint of severe panting. Prior treatments revealed that he has got antibiotics and bronchodilator. In addition, thoracocentesis was performed every 2-3 weeks for four months. A veterinarian performed complete physical examination and found that he got an apparent dyspnea. Radiographic findings depicted pleural effusion. Fluid from thoracocentesis was sent to laboratory for further diagnosis; it was confirmed that was a chylus. According to complete physical examination, no cause of chylothorax was examined; assuming he was idiopathic chylothorax. An initial treatment was performed by providing low-fat diet supplemented with benzopyrone; it, unfortunately, did not respond well. Finally, the veterinarian decided to treat him with surgery by thoracic duct ligation, pericardiectomy, and omentalization.
Figure 1 Location of the thoracic duct. It becomes visible after administering methylene blue diluted with saline (arrow).

Figure 2 The thoracic duct was ligated with 3-0 polyamide (difilon®).

Figure 3 The omentum (A) was inserted into the thoracic cavity via the incision of the diaphragm (B).

Figure 4 Pericardiectomy.

**Post-operation**
The dogs was well-conscious after this surgery. Three days passed, fluid from thoracic drain was not noticed. Consequently, such drain was removed. Six months later, the dog was in good health with no recurrence of chylothorax.
Discussion and conclusion
In case of idiopathic chylothorax, surgery should be performed when medicinal treatments did not work well. The previous study revealed that thoracic duct ligation, pericardiectomy, and omentalization in dogs with idiopathic chylothorax were apparently beneficial to the animals: 72.7% of dogs had no recurrent clinical signs of chylothorax within 1,850 days (3). In addition, the accomplishment of thoracic duct ligation resulted in the establishment of an alternate lymphatic pathways for chyle to return to the venous system without passing through the thoracic duct. Accordingly, this could prevent the leakage of chyle into the pleural space. (3). As for pericardiectomy, it helped decrease right heart and venous pressures (7). Furthermore, omentalization was beneficial for chyle absorption. Six months after treatment, the dog, in the present study, has not shown any clinical sign relevant to chylothorax, such as severe panting. Moreover, he has not visited the veterinary hospital for thoracocentesis and earned a better quality of life.

References
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