Usefulness of video thoracoscopy in the management of spontaneous and postoperation chylothorax

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Abstract

Background: The aim of this study was to evaluate indications and results of video thoracoscopy (VATS) in the management of nine chylothorax cases.
Methods: Four spontaneous chylothorax cases were treated by VATS and talc pleurodesis with immediate positive results. Among five postoperation chylothorax cases, two were treated early by VATS and selective lymphatic clipping (VATS group), and three had medical treatment (MT group).
Results: Duration of drainage was 4 days for the VATS group versus 15.3 days for MT group. Amount of collected chyle was 2.4 l versus 5.7 l, respectively.
Conclusions: We suggest that VATS should be considered the treatment of choice for spontaneous chylothorax and could be indicated earlier in postoperation chylothorax.

Key words: Chylothorax — Surgical management — Video-assisted thoracic surgery

Management of a chylothorax is an infrequent eventuality. Valentine and Raffin [21] collected only 191 cases in 1992. Moreover, the incidence of postoperation chylothorax was evaluated to be only 0.6 per 1000 to 6 per 1000 [5, 17].

Chylothorax is a rare life-threatening disorder with an initial mortality rate estimated to be 50% to 100%. The question of its management is closely linked to its etiology. Medical therapy alone has been found to have a significant failure rate, and surgical treatment has become a main alternative [5, 14, 19]. However, methods and time of surgery are still controversial [1, 8, 15, 18]. If talc pleurodesis is largely accepted as treatment for spontaneous chylothorax management of post-operation chylothorax still remains debatable [2, 4]. Some authors prefer a conservative approach

[6], whereas others suggest early aggressive surgical management [15, 19].

Several authors [6, 8] have shown the efficacy of thoracic duct ligation. More recently, selective ligation of lymphatic branches has been demonstrated to be useful in the treatment of postoperation chylothorax [5]. One such procedure, video-assisted thoracic surgery (VATS) appears to be the method of choice in the management of chylothorax [4, 20]. We report a series of nine chylothorax cases, with six patients managed by VATS.

Materials and methods

From 1992 to 1997, records of all patients seen at our two institutions (Surgery Clinic of Rouen University Hospital and Medical-Chirurgical Centre, Le Cèdre Bois Guillaume) were reviewed retrospectively. There were nine consecutive patients with chylothorax, four women and five men. Four chylothorax cases were spontaneous and five were postoperation (Table 1). The diagnosis and etiology were recorded. Daily chest tube output and the nature and volume of any fluid obtained through pleural tab were assessed. Duration of the chylous leak, length of time from the diagnosis or from the first operation until removal of the pleural drain with no recurrence of pleural effusion, and definitive correction of the chylothorax were noted.

Among the four spontaneous chylothorax cases, two chronically ill patients were treated by pleural tabs and one by pleural drainage for 3 or 4 weeks. Only one patient was immediately diagnosed. In this patient, postoperation chylothorax was suspected on examination because of an increasing milky pleural effusion evacuated via the chest tubes. All chylothorax cases were confirmed by a test of cream administration and a dosage of chylomicrons and triglycerides in the pleural fluid.

Medical methods

Patients with a spontaneous chylothorax had a low-fat diet and pleural evacuation during their hospitalization (Table 2). Only one spontaneous chylothorax was immediately managed by VATS after diagnosis. Patients with a postoperation chylothorax were subsequently drained. Four were managed by enteral nutrition with a strict regimen of medium-chain triglycerides or total parenteral nutrition when enteral nutrition was not sufficient. Total parenteral nutrition included no oral intake and a strict regimen via a deep venous catheter. One patient with postoperation chylothorax (thoracic duct cyst) underwent reoperation immediately.

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Table 1. Etiology of nine chylothorax cases

Spontaneous (n = 4)		Postoperation (n = 5)	
Primitive	1	Lung cancer	
		Left upper lobectomy	1
		Right inferior lobectomy	2
Lymphoma	1	Thoracic duct cyst	1
		(resection)	
Esophagus carcinoma	2	Histiocytosis (pleurectomy)	1
(mean age, 71.7 years)		(mean age, 39.8 years)	

Surgical methods

Techniques used for the VATS procedure have been well described recently in the literature [9, 11]. Perioperatively, patients were placed in lateral position. Surgical procedures were performed with the patient under general anesthesia and selective intubation. Two or three ports were used depending on the preference of the operating surgeon and the procedures to be carried out. The initial port was a 10-mm port for the telescope. It usually was placed in the sixth intercostal space in the anterior axillary line. A rigid 0° telescope was first inserted for pleural visualization. In the event of a postoperation chylothorax, the original drainage orifice was used as the preferential site for thoracoscope insertion.

To facilitate the location of the chylous leak, a preoperation meal was given 3 hours before surgery, and 6 to 8 ounces of milk and cream orally. Perioperatively, the pleural space first was evacuated and washed meticulously with a saline solution. The location of the fatty leak was facilitated by perioperation abdominal pressure maneuvres to increase the hydrostatic pressure of the chylous system. When the chylous leak was located, an elective clipping of the lymphatic branches with endoclips (U.S. Surgical Corporation) was performed. Efficacy of the chylous leak obliteration was perioperatively controlled by repeated abdominal pressure. No sealing with fibrin glue was added.

For spontaneous chylothorax, the same VATS procedure was performed to locate the chilous leak. However, this was often unsuccessful and a talc powdrage (49 per patient, Novatech Sterile Talc, France) was carried out to perform a complite pleurodesis. At the end of the procedure, two pleural drains were inserted through the two anterior ports and aspirated.

Results

In the current study, six video thoracoscopic procedures were performed in nine patients (Table 2). All spontaneous chylothorax and two postoperation chylothorax cases were managed thoracoscopically. There were no deaths or morbidity, no procedures related to complications, no early relapse of chylothorax, and no late thoracotomy.

All four spontaneous chylothorax cases were resolved after talc pleurodesis, with one patient clipped for a chylous leak. Preoperatively, three patients with an average duration of 30 days medical treatment had a 13 l mean volume of chyle obtained through pleural tap or tube drainage. The average duration of chest tube drainage before surgery was 20.5 days. In this group, duration of drainage after VATS was 6 days (range, 5 to 8 days) and the average amount of chyle per patient was 0.6 l.

In the five cases of postoperation chylothorax, one patient underwent reoperation within 24 h. Two patients were placed on enteral nutrition and two patients on total parenteral nutrition. Three patients recovered with this particular medical approach associated with a mean drainage duration of 15.3 days and a total collected chyle of 5.7 l. Reoperation by video thoracoscopy was proposed for two patients, one immediately after VATS removal of a thoracic

duct cyst. The other patient underwent reoperation 6 days after failure of NPE following a lobectomy. These two patients experienced immediate positive results. Mean duration of postoperation drainage was 4 days, with a total collected chyle of 2.4 l.

Discussion

A spontaneous or postoperation chylothorax is an infrequent but potentially life-threatening condition. In fact, occurrence of a chylous leak after pleuropulmonary surgery is very infrequent [1, 5, 17], but often reported after esophageal resection. In the past, chylothorax mortality was high and occurred in 50% of patients. Significant progress in the management of chylothorax was demonstrated first by Lampson et al. [8], then by Goorwitch et al. [3], thus proving the surgical efficacy of thoracic duct ligation. During the same period, Maloney et al. [12] demonstrated the possibility of using total parenteral nutrition to treat this condition. In the past chylothorax management was greatly debated between conservative treatment and aggressive surgical treatment by thoracotomy [14]. However, the increased rise of miniinvasive techniques now has modified these previous approaches.

In 1965, Gingel et al. [2] reported the efficacy of chemical pleurodesis in the treatment of spontaneous chylothorax. The usefulness of this procedure was later confirmed by Graham et al. [4] using VATS. In our experience, talc pleurodesis by VATS has permitted the rapid drying of the pleural space. In contrast, initial medical management undertaken before surgery in these patients was ineffective over a period of several weeks, with a total chylous leak of about 13 l per patient. These results argue for earlier management by VATS procedure with pleurodesis in spontaneous cases. In these cases, different leakage sites may occur. Pleurodesis by talc poudrage seems to be the most effective and least aggressive method. The VATS procedure permits a perfect and uniform application of talc in the pleural space.

Regarding postoperation chylothorax, there remains considerable controversy over the usefulness, type, and date of surgical treatment [3, 6, 13]. Absence of additional surgery with prolonged drainage and medical treatment lowered mortality rates but was associated with an important late mortality in many series [1, 19]. Ferguson et al. [1] reported only three successes as well as eight late reoperations and four deaths among 13 postoperation medically managed cases.

The efficacy of thoracic duct ligation [3, 6–8, 15] was demonstrated as early as 1948, when Hertzog et al. [5] proved the efficiency of a more selective collateral ligation. In fact, the course of the thoracic duct may display considerable variability [16]. In contrast to esophageal surgery, chylothorax after pulmonary surgery generally is not caused by one thoracic duct trauma itself, but rather by trauma to its branch or collateral branches during mediastinal dissection. The infrequency of this complication after mediastinal lymph node dissection is explained by the existence of a continent valve system in the lymphatic branches [5, 16, 17].

Riquet et al. [17] also demonstrated the important role

Table 2. Chylothorax: treatment and results

Etiology	Treatment		Results	
Spontaneous	Initial (days)	Definitive (days)	Total duration of drainage (days)	Total volume of chyle (l)
Lymphoma	Pleural tabs (30)	VATS + TP	5	8
Esophagus carcinoma	VATS + TP		5	1.2
Primitive	Drainage (21)	VATS + TP + clips	29	14
Esophagus carcinoma	Pleural tabs (30)	VATS + TP	6	18
Postoperation				
LUL (T2 NI)	EN (6)	TPN (6)	15	3.5
Pleurectomy (histiocytosis)	TPN (12)	—	14	3.8
Thoracic duct cyst	VATS + clips	—	5	0.8
RIL (T2 N0)	TPN (6)	VATS + clips	9	4
RIL (T2 N0)	EN	—	19	10

VATS, video-assisted thoracic surgery; TP, talc powdrage; EN, enteral nutrition; TPN, total parenteral nutrition; LUL, left upper lobectomy; RIL, right inferior lobectomy

played in chylous leaks by certain mediastinal lymph nodes that directly drain into the thoracic duct. These authors identified frequent direct drainage into the thoracic duct, particularly from the left suprabronchial lymph node, the lateral right major azygos, and the left azygo-aortic lymph node, and direct segmental drainage in the triangular ligament. This suggests that elective clipping of the chylous leak is as effective as en bloc ligation of the thoracic duct.

As regards the timing of reoperation, many authors insist on the advantage of an earlier reoperation [14, 19] and have attempted to define the critical loss of chylothoraces. This has been estimated as between 1.5 l per day during 5 days [19] and 300 ml per day for 8 days [5]. The potential seriousness of this type of postoperation chylothorax results from the consequences of the chyle loss. During prolongated chyle loss, the body's reserves are depleted and both cell-mediated and humoral responses are impaired, which increases the risk of bacterial and viral sepsis, particularly after 2 weeks [1]. Furthermore, if total parenteral nutrition is the preferred method of nutritional support, long-term use may result in deficiencies.

In our experience with five postoperation chylothorax cases, three patients with low chylous leaks recovered with medical treatment alone, but the in-hospital stay was prolonged. In contrast, on two occasions, a prompt reoperation by VATS and elective clipping of the chylous leak had an immediate positive result. Regarding the medical management of postoperation chylothorax in most series, hospital stays reached 30 days and were sometimes ineffective, with late reoperation and significant mortality [1, 5, 19].

The uncertain results of medical treatment contrasted with the good results of video thoracoscopy [4, 20] advocate for earlier reoperation, particularly when the chylous leaks are more than 300 ml per day during 5 days or when oral recovery intake induces a chylous loss relapse. In the series of Hertzog et al. [5], medical treatment succeeded in only two cases after 1 month. In the series of Ferguson et al. [1] that included 13 cases, only three patients were cured after 1 month of medical treatment. Four patients died, and six patients underwent reoperation with success. Selle et al. [19] reported on eight patients with postoperation chylothorax and demonstrated the efficacy of an earlier reoperation. In contrast, Marts [13] reported 80% success with medical management, but in a series of very young patients.

In our experience, location of the chylous leak was identified easily. After pleural cleaning, the chylous leak was found close to the initial operation site. This easy location was facilitated by a preoperative high fat meal and perioperative abdominal pressings. This problem of leak location raises the question of preoperation exploration by lymphography. Performing and interpreting this test are difficult, and most surgeons have now abandoned this procedure [4, 5].

In our experience, selective leak clipping is the best method for treating traumatic chylothorax, provided a perioperative control of its efficiency is performed. Thoracoscopic ligation of the thoracic duct is a possible alternative and also has been reported in the literature [3]. This technique could be of interest if the exact site of the leak is uncertain. Sealing of duct leaks with fibrin glue has had wide recognition [3], but in our opinion, this approach is expensive and uncertain. Some authors have suggested the use of pleural peritoneal shunts [10], but according to our experience, this procedure should be avoided in postoperation chylothorax.

Currently, VATS is used by many thoracic surgeons. Any conventional surgical procedure used for chylothorax treatment can be performed easily by VATS. This technique has proved to be safe, with no related complications in the diagnosis and treatment of a wide variety of intrathoracic diseases. For treatment of both spontaneous and postoperation chylothorax, VATS could be considered as an effective method. In vulnerable patients, pain is diminished and both hospital stay and rehabilitation time is reduced by this mini-invasive technique. In our experience, VATS is the method of choice for chylothorax treatment and should be considered as soon as spontaneous chylothorax is diagnosed. In postoperation chylothorax patients, VATS management should be undertaken immediately after medical failure.

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