Improving the management of cervical chyle leak following neck dissection: A case series of management algorithm; 10 years clinical experience with Video Assisted Thoracoscopy and Thoracic Duct Ligation

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Abstract

Key points instead of abstract as per author guidelines: * Chyle leaks (CLs) following neck dissection for metastatic head and neck malignancy are infrequent but represent a serious complication, with an incidence of 1-2.5%. * CL is associated with significant morbidity including metabolic imbalance, immunosuppression, dehydration, poor wound healing and prolonged length of hospital stay. * A protocolised approach to the management of CL post neck dissections is highlighted for expedient patient management. * Thoracic duct (TD) ligation using video-assisted thoracoscopic surgery (VATS) is an effective method of treating moderate (500-1000ml/24 hours) to high-volume CL (>1000ml/24 hours) not responding to medical therapy. * VATS TD ligation is a safe procedure to treat CL. It has a low morbidity compared to other surgical techniques (neck re-exploration or open thoracotomy).

Key points:

- Chyle leaks (CLs) following neck dissection for metastatic head and neck malignancy are infrequent but represent a serious complication, with an incidence of 1-2.5%.
- CL is associated with significant morbidity including metabolic imbalance, immunosuppression, dehydration, poor wound healing and prolonged length of hospital stay.
- A protocolised approach to the management of CL post neck dissections is highlighted for expedient patient management.
- Thoracic duct (TD) ligation using video-assisted thoracoscopic surgery (VATS) is an effective method of treating moderate (500-1000ml/24 hours) to high-volume CL (>1000ml/24 hours) not responding to medical therapy.
- VATS TD ligation is a safe procedure to treat CL. It has a low morbidity compared to other surgical techniques (neck re-exploration or open thoracotomy).

Introduction

Chyle leaks (CL) following neck dissection are an infrequent but can represent a serious complication. An incidence of 1-2.5% is reported in patients undergoing neck dissections and is associated with thoracic duct

(TD) injury, particularly in the left side of the neck at the terminal portion of the duct[1]. The incidence rises with metastatic lymphadenopathy in level 4 of the neck (most commonly seen in thyroid and hypopharyngeal malignancy), bilateral neck dissection or salvage surgery[2].

CL noted intra-operatively during neck dissection should be repaired promptly. Recognition that diathermy and bipolar haemostasis is not effective on dilated lymphatics due to lack of the haemoglobin protein is mandated. Intra-operative techniques include the use of non-absorbable suture, metallic ligaclips and fibrin sealant utilisation. Fat-free diet is recommended to commence prophylactically post-operatively to limit the pressure within the ligated TD in the hope that this minimises CL post-operatively[3].

Post-operative CL noted by the presence of milky coloured fluid in the drain should be promptly managed in a multi-disciplinary approach involving dieticians, head and neck surgeons and thoracic surgeons. Whilst awaiting biochemical confirmation with analysis of the drained fluid by assessing the presence of elevated lymphocyte count, triglycerides over 110mg/dl and chylomicron of more than 4%[4], medical management is usually commenced[7].

Currently there is no standardised treatment for the management of CL[5]. In 2011, we published a departmental instituted guidelines on the management of CL based on best evidence available (Figure 1) [3]. Its aim was early identification, risk-stratification and management of postoperative CL in order to minimise morbidity. If surgical intervention is warranted, we advocated Video Assisted Thoracic Surgery (VATS) procedure due to approaching the TD in a non-operated field and thus in theory should be less morbid than neck re-exploration.

At our institution, all CL are initially managed medically with a trial of low-fat diet either via the oral intake route, naso-gastic feeding or total parenteral nutrition, orlistat and octreotide. Low volume leaks (<500ml/24h) are managed medically for 7-10 days. Moderate volume leaks (500-1000ml/24h) are managed medically for 5-7 days. High volume CL (>1000 ml/24h) are planned for early surgical intervention whilst concurrently medical management is commenced. Surgical intervention in the form of Video-Assisted Thoracoscopy Surgery (VATS) thoracic duct (TD) ligation is pursued if the CL remain unresolved despite medical management in low and moderate CL and where the risk of medical complications such as infection and wound breakdown is high.

The aim of this quality improvement study is to present the outcomes and effectiveness of our management approach of CLs following the implementation of the departmental standard operational protocol.

Method

The revised Standards for Quality Improvement Reporting Excellence (SQUIRE 2.0) reporting methodology was adopted. A retrospective case series review was conducted of all patients who developed clinically & biochemically confirmed CL following neck dissection for malignant head and neck and thyroid disease between 2010 and 2019 at a tertiary head and neck unit. Patients were managed as per the aforementioned unit guidelines. In the multi-disciplinary management of patients, dietary modifications were managed by dieticians and the VATS TD ligation procedure were performed by the thoracic surgeons.

Medical management consisted of fat-free diet, orlistat and octreotide. Surgical management via TD ligations by VATS procedure was carried out when indicated.

During the VATS TD ligation, detection of the TD is achieved by using a right-sided lateral approach to the thorax. The TD is subsequently occluded by mass ligation of the tissue superior to the supra-diaphragmatic hiatus, which lies between the aorta and the azygos vein (figure 2).

Cessation of CL was defined as the termination of chyle like fluid from the neck or the neck drain with biochemical confirmation.

Results

Eight patients developed CL post neck surgery (on average 3-5 neck dissections are performed in our unit

˜1.6% of the estimated number of lateral neck dissections). Patients developed CL between 1 and 7 days post neck surgery. One patient had an intra-operative CL noted which was addressed at the time of neck dissection but had chyle in the drain on day 1 post-operatively. There were 5 males and 3 females. Median age was 35 (range 24-75 years) (Table 1). All patients had left neck dissections with 7 being bilateral. 5 patients had total thyroidectomies, two had total laryngectomies and one patient had partial glossectomy. All 8 patients had left sided level 4 neck lymph node dissections.

One patient had a low volume CL with 200mls/ 24 hours managed medically with fat free diet, orlistat and octreotide for 22 days on outpatient basis as the patient declined surgical intervention and the CL eventually resolved. One patient had moderate volume CL and was managed medically for 7 days and due to persistence of CL then underwent VATS TD ligation. Six patients developed high volume CL from the outset and were managed both medically and surgically with fat free diet, orlistat and octreotide and then had TD ligation by VATS (date range 2- 9 days after onset of CL). CL resolved within 24 hours of ligation in all patients. There were no VATS TD ligation related complications. Length of inpatient stay ranged from 3 to 35 days, and were dependent on non-chyle leak related factors. Table 2 summarises the volume stratification of CL and their management.

Discussion

Management of CL is challenging, however, early stratification by the volume of CL can aid effective management. Postoperative medical management measures, including fat-free diet, correction of metabolic imbalances, somatostatin analogues (octreotide)[5], lipase inhibitors (Orlistat)[6] and TPN (Total parenteral nutrition) are often employed, however, if these are ineffective, surgical interventions would be necessary. Lymphangiography with sclerotherapy in the management of CL has also been reported in the literature[7]. The key findings from this quality improvement project is that low and medium-volume leaks are managed medically with a defined timeframe to consideration of surgical intervention in the form of VATS TD ligation if the CL is not resolving. High volume CL are commenced on medical management initially whilst early arrangements for a surgical intervention is encouraged. The data from this study indicates that VATS TD ligation is a safe and effective procedure with all CL resolved by day 1 post VATS TD ligation.

Comparison with other studies

Failed medical therapy or surgical re-exploration of the neck may fail and further delay definitive treatment as postoperative inflammation makes the TD more difficult to identify[3]. Delayed therapy increases the likelihood of complications. Previously published studies corroborate our results in that VATS ligation of the TD expediently halts the high drain output, and avoids the surgical morbidity associated with open thoracotomy[8].

VATS TD ligation is a low morbidity procedure and thus patients could potentially be discharged earlier[9]. The shorter duration of CL means they are less likely to develop metabolic, nutritional and immune complications. The resolution of CL after VATS TD ligation promotes an enhanced recovery of head and neck patients.

VATS ligation of the TD is an effective surgical approach of treating CL demonstrated by the 100% success rate of this case series. It has been shown to have high success and minimal complications rates compared to open thoracotomy[8]. Ilczyszyn et al[9]reviewed a series of case reports and concluded that thoracoscopic ligation is effective at stemming intractable chyle fistulas, with no added morbidity. In addition, it avoids the significant risk of morbidity associated with major thoracic access thus decreasing hospital stay[10].

This study adds to the body of evidence in the management of CL by providing guidance on the timeframe for medical management and when to consider surgical intervention. In addition, to our knowledge, it is the largest case series reporting on outcomes of VATS TD ligation procedure for CL management after neck dissection. Akin to the systematic review of CL medical management[5], a systematic review and meta-analysis of the surgical management of CL would add valuable evidence to the management of this rare complication of neck dissection.

Limitations of this study

Due to the rarity of CL as a complication of neck surgery, even a 10-year retrospective case series in a major UK tertiary referral centre yielded a low number of patients, which limits the power of the study. Furthermore, it is a non-controlled study. Both of these limitations are due to the rarity of CL post neck surgery. Nonetheless, this study highlights and assesses the effectiveness of a timeframe of the medical and surgical management of CL that head and neck teams can incorporate into their clinical practice.

Conclusions

CL is a rare but potentially troublesome complication of head and neck oncological surgery involving neck dissections. Although medical measures are employed, non-resolving low and medium volume leaks as well as high-volume leaks may require surgical intervention. An agreed management protocol should be encouraged to manage patients with CL. Early VATS ligation of the TD provides a safe and an effective method of treating high-volume (>1000ml) CL refractory to medical interventions.

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