Pakistan Journal of Otolaryngology 2024: 35(1):16-18
DOI 10.70224/pjoh.1.1.2024.5

ORIGINAL ARTICLE

Leaking Lymphatics to Resolution: Article On Conservative Management of Low-output Chylous Fistulae

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ABSTRACT

Background: Chyle is an infrequent complication in neck dissections. It has been implicated on left side more than right however in 25% of cases they can occur on right side as well. Beside neck dissections, lymph node biopsy, penetrating or blunt trauma, and cervical rib resection. This article focuses on conservative management of low volume chylous fistula on both, right and left sides.
METHODOLOGY: This study retrospectively examined all patient records from the past two years at Dr. Ziauddin University Hospital, Karachi, who underwent neck dissection. Six cases of chyle leaks were identified, and their medical records were reviewed. A data collection form was used to gather information on patient demographics, primary diagnosis, risk factors for chyle leaks, chyle leak diagnosis, and subsequent management strategies.
RESULTS: A total of 160 neck dissections have been performed and 6 cases of chyle leak have been reported as a complication. Of the six chyle leaks, five (83%) occurred on the left side and one (17%) on the right.All identified patients had low output fistulae (<500ml in 24 hours). The peak 24-hour drain output ranged from 50ml to 330ml. Half of the patient were presented in first four days and all of them were treated with conservative management and were healed within two weeks.
CONCLUSION: Chyle leak may persist for two weeks but may heal without any surgical intervention. This demonstrates importance of conservative management in low volume fistula.

Key Words: Chyle leak, conservative management, neck dissections, surgical intervention

INTRODUCTION: Chyle leak is an infrequent but serious complication associated with surgical procedures in the neck. It has been reported as an uncommon complication of neck dissections, where the left side has been implicated more than the right[1]. Other procedures that can lead to this dreaded problem include lymph node biopsies, cervical rib resection, penetrating and blunt trauma and even anterior cervical discectomy. The rate is recounted to be 1 to 2.5% of all neck dissections[2]. Most chylous fistulae occur on the left side. However, in 25% of the cases, they can occur on the right[1].

In this article, we aim to present our expertise in managing enduring low-volume chylous fistulas on both the right and left sides using non-surgical or conservative methods.

METHODOLOGY: This study retrospectively examined all patient records from the past two years at Dr. Ziauddin University Hospital, Karachi, who underwent neck dissection. All surgeries were performed by consultants or residents in the Department of Otolaryngology, Head and Neck Surgery. Residents identified chyle leaks based on visual assessment of the neck drain contents. Six cases of chyle leaks were identified, and their medical records were reviewed. A data collection form was used to gather information on patient demographics, primary diagnosis, risk factors for chyle leaks, chyle leak diagnosis, and subsequent management strategies.

RESULTS: A total of 160 neck dissections have been performed and 6 cases of chyle leak have been reported as a complication. The mean age is 51.2 ± 17.6 years. Of the six patients treated, there were five (83.3%) men and one (16.3%) woman.

All six patients were managed for a primary mucosal squamous cell carcinoma of the upper aerodigestive tract. In four of these patients, the primary tumor was a squamous cell carcinoma of the tongue. One patient had carcinoma of the larynx whereas one had squamous cell carcinoma of the right cheek. Only 1 patient received an unknown amount of pre-operative radiation.

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Table 1: Summarizing the Results

Patient No.	Age (yrs)	Neck Procedure	Preoperative XRT	Leak in OR	Start of Leak (POD)	Peak 24 h Drainage (ml)	Medical Management		
							Pressure Dressing	Closed Drainage	Nutritional Modification
1	52	Left RND	No	No	10	300	Yes	Yes	Enteral
2	40	Left MND	No	No	11	200	Yes	Yes	Enteral
3	70	Left MND	Yes	No	15	175	Yes	Yes	Enteral
4	41	Left MND	No	No	1	300	Yes	Yes	TPN
5	30	Left MND	No	No	4	150	Yes	Yes	Enteral
6	74	Right FND	No	No	4	330	Yes	Yes	Enteral

However, his last cycle was completed 2 months prior to the surgery. These were all elective surgeries and there was no history of trauma to the neck.

Of the six chyle leaks, five (83%) occurred on the left side and one (17%) on the right. The operations included: one functional neck dissection, four modified neck dissections and one radical neck dissection.

Interestingly, all chyle fistulas were discovered after surgery. Half of the cases presented within the first 4 days while the remaining were identified in the following week. All six patients received conservative management as the initial treatment strategy. This protocol consisted of:

Bed rest: to minimize lymphatic flow and promote healing, Closed drainage: to collect leaked chyle and prevent wound complications, Pressure dressing: to reduce lymphatic pressure and fluid accumulation, Nutritional modifications: to ensure adequate nutrition while minimizing chyle production. Methods included were:

- Total Parenteral Nutrition (TPN): for one patient
- Enteral feeding with Medium Chain Triglycerides (MCTs): for the remaining five patients

All identified patients had low output fistulae (<500ml in 24 hours). The peak 24-hour drain output fluctuated from 50ml to 330ml. The average duration of drainage was 31 days. Three patients (50%) experienced complications related to prolonged drainage. Two (33%) had both wound dehiscence and infection, one (17%) had dehiscence alone, and one (17%) had infection alone. Two patients had no complications, which was potentially attributed to the use of prophylactic antibiotics. This regimen consisted of Augmentin 625mg three times daily and Flagyl 400mg three times daily. The same antibiotics were used to treat the wound infections when they occurred.

DISCUSSION: A chyle fistula occurs as an outcome of intraoperative injury to the thoracic duct or the major lymphatic duct. The thoracic duct is a large lymphatic channel which drains lymph from the entire body, except the right side of the head and neck, right upper limb and the right side of the thorax. These structures drain through the right lymphatic duct. Originating from the chyle cistern in the abdomen, the thoracic duct ascends posteriorly to the aorta and continues upwards through the thorax. It traverses the posterior mediastinum along the right anterior side of the vertebral bodies. Upon reaching the superior thoracic aperture, it sequences along the left border of the esophagus and arches laterally in the root of the neck. Here, it lies posterior to the carotid sheath and anterior to the sympathetic trunk, vertebral and subclavian arteries. The thoracic duct passes in the left brachiocephalic vein at the intersection of the subclavian and the internal jugular veins[3].

Lymph from interstitial fluid and emulsified fat from intestinal lacteals, chyle is a milky fluid that streams through the thoracic duct of a resting human at an approximate amount of 120 ml/hour, amounting to 2 to 3 liters per day. This flow rate is affected by dietary factors, respiration, movements of the upper extremities, coughing, intestinal peristalsis, and rhythmic muscular contractions. The fat content is 1% to 3% and is mostly composed of triglycerides. The fat content gives chyle a milky appearance and greasy texture. The protein content is between 2 to 5% which is between ½ to 2/3rd that of serum protein. It is predominantly composed of albumin because of its small size and easy absorption through the capillaries; hence the albumin to globulin ratio is high. The electrolyte is similar to that of plasma. The white cell count ranges between 1000 to 20,000 cells/mm^3, and T lymphocytes predominate[4].

Since chyle leaks can lead to significant morbidity, the best approach is prevention[5]. The major lymphatic channels in the lower neck can be avoided by making

the lower limit of dissection two finger-breadths above the clavicle[6]. Injury is recognized by egress of milky white fluid and a high index of suspicion is required. Controlling the leaking vessel during surgery is crucial, but the anatomy of the region poses significant challenges. The phrenic and vagus nerves are both located in close proximity, making surgical maneuvers delicate. Attempting to tie the transversus colli artery risks injuring the thoracic duct, while efforts to control the leak itself can damage the phrenic nerve.

Additionally, the vagus nerve is particularly vulnerable if a chyle leak occurs after the internal jugular vein has been ligated[7]. Ligation should not be attempted as manipulation leads to progression of the tear in the lymphatic vessel[6,7]. Several series have recommended the use of a fibrin sealant alone or with a Vicryl mesh[7].

All our patients had low output chylous fistulae (<500 ml/day) that drained for an average of 31 days. Medical management was preferred and continued since the output did not increase on conservative management. In all cases, there was no elevation of the skin flaps with vascular compromise or excess volume depletion with loss of proteins and electrolytes. In all cases, the cost and morbidity of re-exploration outweighed any potential benefit.

Bed rest and pressure dressings were instituted in all six cases as part of the conservative management[8]. Decrease in activity helps to decrease the rate of lymph flow. Many authors recommend pressure dressings as part of the conservative treatment protocol, Gregor believe that pressure dressings are not of any proven benefit[5-8].

Nutritional modification is crucial for managing chyle leaks conservatively. Losing chyle weakens the immune system, causes dehydration, and lowers protein levels in the blood. It also disrupts electrolyte balance, leading to imbalances like hyponatremia and hypochloremia[9]. These patients are also susceptible to wound infection and dehiscence. The purpose of instituting nutritional modifications is three fold: firstly, to decrease the production of chyle and prevent wound complications; secondly, to maintain fluid and electrolyte balance and thirdly, to prevent malnutrition. All our patients were put on enteral feeding which comprised of half strength Vitale and half strength Promod and the drain output was monitored. In one case it was noticed that the output decreased for the first two days followed by an increase and then a downward pattern. The supplementation was fat-free. One patient was electively started on Total Parenteral Nutrition but this is not without its complications and risks. The authors of one series have expressed their doubt about its benefit in reducing the output of chyle[10].

Another option would have been to supplement the enteral feeding with medium chain triglycerides (MCT) as recommended by several authors. However, this is quite expensive and not affordable in our setting. MCTs are absorbed directly into the portal blood and bypass the lymphatics. Hence they do not contribute to the lymph volume[11]. A novel approach to decrease the chyle output includes the use of subcutaneous octreotide[10].

CONCLUSION: Despite the lack of routine antibiotic use in conservative chyle leak management, preventive antibiotics may be beneficial in reducing wound complications. In all six cases, the chyle leaks persisted for over two weeks but ultimately closed spontaneously without surgical intervention, demonstrating the effectiveness of conservative treatment for low-volume fistulas. Summarized results are depicted in Table 1.

Declaration: Conflict of interest: Authors declare no conflict of interest.

Funding disclosure: Nil

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