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Bilateral chylothorax following left-sided radical neck dissection

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Abstract

Chylothorax is an extremely rare but potentially life-threatening complication of radical neck dissection. Its rarity makes surgeons unfamiliar with its management. We report the case of a bilateral chylothorax occurring after a left radical neck dissection and discuss its management. A multi-disciplinary approach is advocated, involving surgical, respiratory and dietetic input, and this led to a favourable outcome for our patient.

Key words: Neck Dissection; Chylothorax; Surgical Procedures

Introduction

The occurrence of chylothorax following radical neck dissection is extremely uncommon. It is a serious condition that can be life-threatening due to severe respiratory, metabolic and immunologic derangements. We report the case of a bilateral chylothorax in a young patient following left radical neck dissection. We review the limited literature available on the subject and suggest a treatment strategy which led to a favourable outcome for our patient.

Case report

A 24-year-old Caucasian woman presented with a 20-week history of a left-sided neck swelling and left-sided hearing loss. She had smoked 10 cigarettes a day for the last 10 years but was otherwise fit and well. Clinical examination revealed a 4 cm fixed lymph node in level two on the left side and an obvious mass lesion in the nasopharynx. A computed tomography (CT) scan of the neck, skull base and chest was performed. This revealed a large, asymmetrical lesion in the nasopharynx and confirmed a 4 cm lymph node in level two. A full work up, including a biopsy from the nasopharyngeal mass, revealed a poorly differentiated nasopharyngeal carcinoma, staged at T_1 N_2 M_0.

The patient initially received two cycles of chemotherapy, involving 5-fluorouracil and cisplatin. After an initial phase of apparent success, there was recurrence in the neck at levels two and three prior to irradiation treatment. This was confirmed by a CT scan, with the largest lymph node measuring 3×3 cm.

The patient subsequently underwent left radical neck dissection. Intra-operatively, the high-riding thoracic duct was injured, leading to leakage of chyle, and this was successfully repaired with 3.0 vicryl.

The patient had an uneventful recovery until the third post-operative day, when a chylous leak was noted from the remaining neck drain.This initial chyle leak seemed to resolve spontaneously, and the drain was removed on the fifth post-operative day. The same day, the patient began to complain of shortness of breath and her oxygen saturation was found to be decreased. Clinical examination revealed bilateral diminished air entry at the lung bases, and a chest X-ray revealed large, bilateral pleural effusions (Figure 1). Pleural taps were compatible with bilateral chylothoraces and chest drains were inserted. The chylothoraces were diagnosed firstly on the characteristic milky appearance and then confirmed by biochemical analysis of the effusion. Three days later, there were persistent, large amounts of chyle draining from the chest so further imaging was requested.

A CT scan of the neck and chest was performed. This showed a 3 cm collection of fluid posterior to the left lobe of the thyroid gland indenting the oesophagus and trachea (Figure 2) and persistent bilateral chylothoraces (Figure 3).

The patient underwent re-exploration of her neck at this stage; findings included an intact thoracic duct and a small collection of chyle in the posterior triangle of the neck, which was drained. Further opinions from the cardiothoracic surgeons and respiratory physicians were sought, along with dietetic input, and the decision was made to pursue conservative management. As well as intermittent chest

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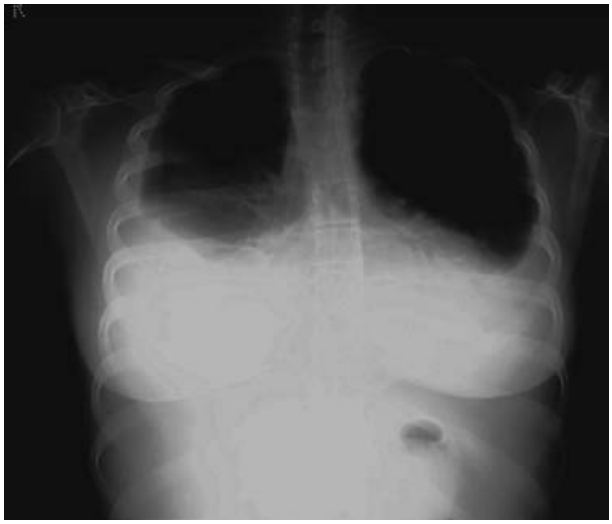

FIG. 1
Chest X-ray revealing bilateral pleural chylous effusions.

drainage from the indwelling catheters, the patient was made nil-by-mouth and given total parenteral nutrition (low fat formulation) and daily octreotide sub-cutaneous injections (200 μg) for two weeks.

The chyle leak resolved completely and the chest drains were removed after the two week treatment period.

The patient was discharged home on day 23 post-operatively and was still asymptomatic three months later.

Discussion

Chylous fistula is a well documented complication of radical neck dissection, occurring in over 2 per cent of left-sided procedures.[1] Bilateral chylothorax after neck dissection was first described by Stuart in 1907.[2] There have only been 14 further cases reported since then.[3]

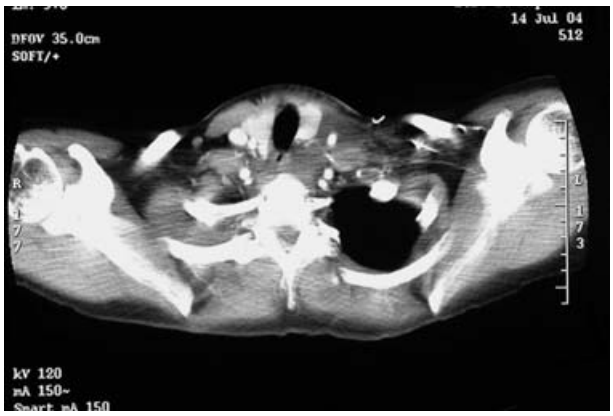

FIG. 2
Computed tomography scan revealing fluid collection on the left side of the neck, slightly indenting the trachea; note that there is no internal jugular vein on this side following an earlier radical neck dissection.

The aetiology of chylothorax can be classified as congenital, traumatic or obstructive. Traumatic chylothorax is the most common cause and can be further subdivided into iatrogenic or accidental. Iatrogenic chylothorax is more common during surgical procedures involving the lung, oesophagus, aortic isthmus or mediastinal tumours. It is less common following radical neck dissections, and bilateral chylothoraces almost unknown. Obstruction of the thoracic duct can be either intrinsic or extrinsic. Intraluminal obstructions, such as neoplastic cells or infective organisms, can both lead to subsequent chylous effusion. Extraneous lymph node enlargement or local tumour enlargement can both lead to extrinsic duct compression. Congenital chylothorax is very rare and may be associated with Down's and Noonan's syndromes.[4]

The exact mechanism for the formation of chylothorax is still not clearly understood. Two distinct mechanisms have been postulated. Following a chyle leak, there can be direct extension of the chyle from the base of the neck to the mediastinum. In the mediastinum, the extravasated chyle soon penetrates into the pleura via the increased hydrostatic pressure generated and the inflammatory reaction stimulated.[5] This appears to be the most likely cause in our patient, as there was a definitive chyle leak identified in the neck. The second mechanism is increased intraluminal pressure in the thoracic duct following ligation of the duct. This, coupled with negative intra-thoracic pressure during inspiration, can lead to an atraumatic leak of chyle into the mediastinum. It is interesting to note that no direct injury to the pleura is necessary to cause chylothorax, as none of the cases reported in the literature had additional pneumothoraces.

Diagnosis of chylothorax is the first step in its management. In our patient, an original chest X-ray revealed a large, bilateral pleural effusion. Certain tests can confirm the diagnosis on the basis of the constituents of the pleural aspirate; Sudan 3 is a stain with a high affinity for fat particles and can be used to confirm the diagnosis, while lipoprotein electrophoresis of a sample can demonstrate a

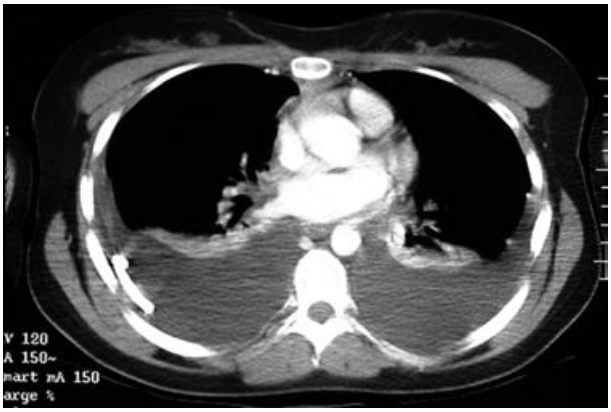

FIG. 3
Computed tomography image through the level of the left atrium, showing effusions and chest drain in situ.

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chylomicron band.[6] Our patient also had a CT scan of the neck and thorax in an attempt to find the level of injury of the thoracic duct. This revealed a neck collection, which led to surgical re-exploration.

Management of chylothorax is primarily conservative in the literature. The principles of management include drainage of chyle, decrease in chyle formation and adequate nutritional supplementation. A large chylous pleural effusion can compress vital structures in the thorax, leading to hypoxia and cardiac arrhythmia. In our patient, drainage of the effusion was achieved using continuous chest tube drainage and close monitoring of the amount of chyle. After collaboration with the respiratory team, it was decided to drain the effusions freely until 500 mls had appeared in the bottle, then to clamp the drain for two hours. Drainage of chylous effusions can result in severe nutritional depletion due to loss of proteins, fat-soluble vitamins and electrolytes. This can lead to impaired wound-healing. Chyle is also rich in leucocytes and its loss causes an immunodeficient state. Therefore, close surveillance for infection is important. The authors checked daily full blood counts and also gave prophylactic antibiotics.

The authors recommend total parenteral nutrition in such cases in order to ensure adequate enteral rest. This has been shown to allow spontaneous cessation of chyle drainage.[7]

Somatostatin and its analogues have been used in the conservative treatment of chylothorax.[8] Octreotide, a long-acting somatostatin analogue, has an inhibitory effect on gastric acid and on pancreatic and biliary secretions. It is thus logical to expect that this will lead to a decreased volume and protein content in the thoracic duct and to reduced chyle leakage into the pleural cavity.

Surgical intervention for chylothorax following neck dissection is controversial. Indications previously suggested include: persistent leak for more than two weeks despite optimal conservative treatment; severe metabolic or nutritional complications; and chyle leakage of more than 1 l per day for more than five days.[9] Our patient underwent re-exploration of the neck for two reasons: firstly, she had a fluid collection seen on CT scan; and secondly, chyle drainage had exceeded 1 l per day for five days.

A multi-disciplinary approach, utilizing optimal conservative treatment, as detailed above, along with surgical re-exploration of the neck, prevented the need for any cardiothoracic intervention and led to a successful outcome in our patient. A high index of clinical suspicion is vital in any patient presenting with dyspnoea after neck dissection, as is early and aggressive therapy, in order to prevent the fatal complications associated with chylothorax.

- **Bilateral chylothorax is an uncommon but serious complication of radical neck dissection**
- **The exact mechanism is unknown. Possibilities include direct leak from the neck and rupture of the mediastinal thoracic duct following ligation in the neck**
- **Management, which is usually conservative, is discussed**

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Mr J R Newton takes responsibility for the integrity of the content of the paper.
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