



Original research

Thoracic duct lesions in thyroid surgery: An update on diagnosis, treatment and prevention based on a cohort study



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HIGHLIGHTS

- Thoracic duct injury at cervical level is a rare complication following thyroid surgery.
- Thoracic duct injury is associated to lateral neck dissection and thyroidectomy for mediastinal goiter.
- Conservative treatment is the first option with parenteral nutrition and wound dressing.
- High flow fistula, chyloleak, cutaneous inflammation and necrosis, chylothorax are indications to surgery.
- Duct ligation after unsuccessful conservative treatment is the only resolutive treatment of cervical chylous fistula.

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ABSTRACT

Introduction: Thoracic duct fistula at the cervical level is a severe but rare complication following thyroid surgery, particularly associated to lateral dissection of the neck and to mediastinal goiter.

Methods: we retrospectively analyzed chylous fistulas observed in a cohort of 13,224 patients underwent surgery for thyroid disease since 1986 to 2014, in the Unit of Endocrine Surgery, S. Maria University Hospital, Terni, Italy.

Results: We observed 20 cases of chylous fistula. Thirteen patients underwent primary surgery in our institution while the remaining 7 cases had been referred to our Department from other hospitals for an already diagnosed lymphatic leak. Surgical procedures carried out included total thyroidectomy for mediastinal goiter in 4 patients, total thyroidectomy for cancer in 2 patients, unilateral functional lymphadenectomy in 11 patients and bilateral in 3. Intraoperative repair was carried out in 4 cases. Of the remaining 16 cases, 4 of the 6 fistulas with low flow leakage healed in about 30 days of conservative treatment, 2 cases instead required surgical repair. All 10 patients with “high-flow” fistula underwent surgery.

Despite surgery was performed later, postoperative course in patients with late surgical repair is similar to what observed in those patients with early surgical repair. Both groups underwent cervical drainage removal in post-operative day 4.

Conclusion: Healing of a cervical chylous fistula can be achieved by conservative medical therapy (nutritional and pharmacological) but in case of therapeutic failure with rapid decrease of general condition, the surgical approach is necessary. In our experience, duct ligation after unsuccessful conservative treatment, is the only resolutive treatment.

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1. Introduction

Thoracic duct injury is a rare but severe complication following cervical surgery. Lymphatic duct injuries are more commonly observed during laryngeal and esophageal surgery, nodal biopsy,

subclavian catheterization, radical or functional neck dissection [1].

Considering the anatomy of the thoracic duct, accurate dissection must be used during lateral neck lymphadenectomy or during thyroidectomy especially for mediastinal goiters.

Chylous fistulas can occur after a thoracic duct lesion following neck surgery at the level of omoclavicular triangle, which contains other important anatomical structures such as lymph-nodes, brachial plexus, transverse cervical and suprascapular veins and arteries, subclavian artery, the terminal part of the external jugular vein and the phrenic nerve [2]. Chyle leak is known to lead to prolonged hospitalization. Clinical management of chylous fistulas may be difficult and it is complicated by local inflammation and systemic failure. Thoracic duct lesions can be recognized intraoperatively by direct visualization of the damaged duct or after surgery when macroscopic changes of drainage features occurs with “milky white” fluid. However, in patients who are nil by mouth or on a fat-free diet, it may present as a leakage of clear fluid and diagnosis can be confirmed by laboratory assessment with triglycerides dosage over 100 mg/dL. In most cases, the finding of a cervical lymphatic fistula is not immediate but it appears during the second postoperative day in most of the cases. Conservative treatment is recommended as first approach but when complicated or high flow fistula are observed surgical treatment by duct’s ligation is the only resolutive approach to this potentially severe complication. Persistent chyle loss leads to electrolyte disturbance, hypovolemia, hypoalbuminemia, coagulopathy, immunosuppression, chylothorax, peripheral oedema, wound infection with increased mortality.

Aim of this study was to focus on diagnosis and therapeutic approaches in patients with cervical injury of the thoracic duct, analyzing the personal experience in the treatment of this rare event.

2. Materials and methods

We retrospectively analyzed a population of 13.224 patients admitted for thyroid disease over a period of 28 years, since 1986 to 2014, in the Unit of Endocrine Surgery, S. Maria University Hospital, Terni, University of Perugia. This retrospective cohort study was designed according to the STROBE criteria [3].

Data available in the observational period were collected from our database and analyzed.

In all operated patients drainages were used, one in the thyroid space after total thyroidectomy with or without central neck dissection and one along the carotid artery when a lateral neck dissection was carried out. Three drainages were used in case of bilateral lymphadenectomy plus total thyroidectomy with or without central neck dissection.

When a chylous fistula is suspected postoperatively after macroscopic changes of drained fluids, diagnosis was confirmed by laboratory assessment with triglycerides dosage over 100 mg/dL. We classified chyle leaks considering the daily volume of the drainage and we defined low-flow and high-flow fistulas respectively with volume less and more than 500 mL/die.

The different approach to the chylous leak included intraoperative ligation, post-operative conservative treatment and reoperation.

3. Results

We observed twenty patients with chylous fistula due to cervical injury of the thoracic duct following surgery. Thirteen patients (0.01% out of 13.224) underwent primary surgery in our institution while the remaining 7 cases had been referred to our Department from other hospitals for an already diagnosed lymphatic injury

after neck surgery. Surgical procedures performed included total thyroidectomy for mediastinal goiter in 4 patients, total thyroidectomy for cancer in 2 patients and total thyroidectomy associated to left unilateral and bilateral functional lymphadenectomy respectively in 11 and in 3 patients (70% out of 20).

The intraoperative finding of anomalous lymphatic leakage allowed prompt suture with a consequent regular post-operative course in 4 cases.

The remaining 16 cases showed the lymphatic leak during the post-operative period with no evidence of chylothorax; 6 leaks were low-flow (<500 mL/die) and 10 highflow (>500 mL/die).

Four cases of the 6 fistulas with low flow leakage, healed in about 30 days of conservative treatment (drainage, starving, total parenteral nutrition, compressive dressing of surgical incision, somatostatin 6 mg per day intravenously), 2 case instead required surgical repair. All 10 patients with “high-flow” fistula underwent surgery: 6 were submitted to surgery during the first postoperative week, 1 after 2 weeks and 3 after a period of 30 days of conservative therapy and failed medical support (Table 1). Duct ligation was performed once by videothoracoscopy.

In the 6 patients who underwent early surgical repair, post-operative course was regular, drainage was removed in post-operative day 4 after oral feeding resumption in all cases; all the 3 patients, submitted to surgery after 30 days from diagnosis of fistula, had previously unsuccessfully been treated by conservative therapy.

Despite surgery was performed later, postoperative course in patients with late surgical repair is similar to what observed in those patients with early surgical repair.

4. Discussion

The occurrence of a thoracic duct injury during neck surgery is strictly related to the anatomy of the lymphatic trunks at the cervico-thoracic level.

The thoracic duct originates from Paquet’s cisterna chyli which receives, at the level the second lumbar vertebra, the right and left lumbar lymphatic trunks and the intestinal lymphatic trunk. Then the duct runs through the retroperitoneum and the mediastinum for a length of 38–45 cm, having its caudal course in proximity to the left side of the esophagus and then arising posteriorly in the mediastinum towards the carotid artery and the internal jugular vein. It consequently bends with inferior concavity following an anterior-lateral direction to the jugular subclavian confluence. At cervical level, the thoracic duct receives the left jugular lymphatic trunk, the subclavian trunk and sometimes the broncho-mediastinal affluence. The last one can separately flow into the jugular-subclavian confluence. At that level an anatomical variability can be observed (single duct with simple junction, delta-shaped junction, wide dilation with multiple terminal branches) [2].

Incidence of lymphatic fistula becomes particularly considerable, with variable rate (1–2.5%) in those patients undergoing radical and functional neck dissection [4,5].

Neck dissection has been recognized as an integral part of the surgical treatment of head and neck cancer since the 19th century and many technical changes were standardized in order to preserve loco-regional structures, to conserve function and to prevent dysmorphism without reducing the oncologic efficacy of the procedure [6].

Latero-cervical lymphadenectomy is classified in radical, modified radical and selective. Selective lymphectomy is additionally divided in: supraomohyoid dissection, postero-lateral, lateral and anterior dissection. The omoclavicular triangle shows the following borders: posterior margin of sternocleidomastoideus

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