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Chylous Leakeage after Left Axillary Lymph Node Dissection: Incidence, Clinical Aspect and Management

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Abstract: Chylous leakeage is a well know complication reported in 1% to 3% of patients undergoing cervical neck dissection, mediastinal lymph node dissection, or gastric resection for cancer as well in breast cancer patients undergoing axillary lymph node dissection; most of these cases occurs on the left side. This complication seems to be mainly related to abnormalities of the thoracic duct anatomy or the subclavian duct leading to injury of an aberrant lymphatic channel trunk during level I-II ALND. Two case reports in breast cancer patients with left sided chylous leakage following level I-II ALND are reported; their diagnostic and therapeutic management is discussed with a literature review in order to update the diagnostic and therapeutic perspectives in this peculiar clinical setting.
Keywords: Chylous leakage – Breast Cancer – Axillary Dissection**.**

INTRODUCTION

Chylous leakeage is a well know complication reported in 1% to 3% of patients undergoing cervical neck dissection, mediastinal lymph node dissection, or gastric resection for cancer; most of these cases (75%-92%) occurs on the left side [1-5]. Chylous leakage is reported also in 0.26% to 0.68% of breast cancer patients undergoing axillary lymph node dissection (ALND), most of them (93,5%) being reported on the left side [6-8]. In such instance, the complication seems to be related to abnormalities of the thoracic duct anatomy or the subclavian duct leading to injury of an aberrant lymphatic channel trunk during level I-II ALND [6, 9-12].

The management of chylous leakage is primarily conservative (suction drainage coupled with pressure dressings, low fat diet, partial and/or total parenteral nutrition), re-operation being advocated only in patients with a high-flow leakage (>500-700) or no clinical response to conservative treatment [1, 4, 13-15].

Herein, our clinical experience in two breast cancer patients with left sided chylous leakage following level I-II ALND is reported with a literature review in order to update the diagnostic and therapeutic perspectives in this peculiar clinical setting.

Patient N. 1

On April 2017, a 57 year-old woman underwent skin-sparing mastectomy with immediate tissue expander reconstruction for bifocal invasive ductal carcinoma of the left breast at the Breast Unit of San Martino Hospital (Genoa – Italy) (Table-1). Level I and II ALND was performed due to a negative preoperative radio-localization of the sentinel lymph node (SN). No intraoperative complication did occur and two suction drainages (18 French Blake into the axilla and 15 French Blake into the subpectoral pocket) were positioned. On the first post-operative day, approximately eight hours after lunch, the axillary drainage turned from serous to a frankly milky fluid with a total daily amount of 180 ml; a fluid sample was collected for microbiologic and chemical assessment, the latter demonstrating high triglycerides (150 mg/dl) and protein content (31 g/L) thus confirming a sterile chylous leakage. On the second post-operative day the patient began a low fat diet with progressive reduction of the chylous leakage; the axillary drainage was removed ten days later while the drainage into the breast pocket was removed just the day before due to a daily drainage lower than 40 ml/day; the total amount of axillary fluid collection was 695 ml (mean 69.5 ml/day). During the hospitalization the patient underwent lymphoscintigraphy with 99mTc-Nanocoll that showed impaired lymphatic drainage of the arm, especially in the deep lymphatic system, with stasis and dilatation of lymphatic pathways near the axilla.

Moreover, Magnetic Resonance (MR) lymphangiography with paramagnetic contrast medium (gadolinium) was undertaken and it demonstrated slight dilatation of the terminal part of the thoracic duct, little fluid collection, and lymphatic dilatation at the axilla. She continued the prescribed low fat diet for ten days after being discharged from hospital, and 21 days after surgery she was in good clinical conditions without any axillary seroma and a more than satisfactory wound healing.

Table-1: Clinical features of patients. Legenda: Pt, patient; BMI, body mass index; NACT, neoadjuvant chemotherapy; SSM, skin-sparing mastectomy; NSM, nipple-sparing mastectomy; ALND, axillary lymph node dissection; N, number

Pt	Age (years)	BMI	NACT	Breast resection	ALND	Total Lymph Nodes (N)	Total Positive Lymph Nodes (N)	Tumor Stage
1	57	29.3	no	Left SSM	I-II	11	2	m(2)pT2/G2 /N1a
2	49	17.6	yes	Left NSM	I-II	10	2	ympT1c/G2/N1a

Patient N. 2

On May 2017, a 49 year-old woman underwent SN biopsy and nipple-sparing mastectomy with immediate reconstruction by tissue expander for a multicentric invasive ductal carcinoma of the left breast after neoadjuvant chemotherapy at the Breast Unit of San Martino Hospital (Genoa – Italy). The surgical procedure was completed with level I-II ALND due to positive intraoperative histologic examination of one out of two SNs. No intraoperative complication did occur and two suction drainages (18 French Blake into the axilla and 15 French Blake into the subpectoral pocket) were positioned. On the first post-operative day, a few hours after meal, the drainage turned to a milky aspect (90 ml/day) although the patient was clinically asymptomatic. A sample was soon collected for microbiologic and chemical assessment, the latter demonstrating high triglycerides (130 mg/dL) and protein content (35 g/L), thus confirming a sterile chylous leakage. The patient immediately began a low fat diet and the axillary suction drainage was maintained. Postoperative lymphoscintigraphy showed impaired lymphatic drainage of the arm both in the superficial and in the deep lymphatic system, with stasis and dilatation of lymphatic pathways afferent to the axilla. She was discharged on the seventh post-operative day while continuing a low fat diet and with a low (20 ml/day) milky axillary drainage. The patient was followed in the outpatient clinic but 24 days after surgery she was re-admitted due to the onset of fever (38.3°C) and the detection of an axillary seroma notwithstanding the daily drainage of approximately 50 ml/day of milky fluid. After collecting a fluid sample for microbiologic assessment she was started an empiric antibiotic therapy (intravenous amoxicillin and clavulanic acid, 1g three times a day) coupled with partial parenteral nutrition (PPN). The axillary drainage soon turned to a serous appearance and was removed three days later with an overall fluid collection equal to 1770 ml (mean, 68 ml/day). Hence, she was discharged from hospital without fever while continuing antibiotic therapy for five days; after one week the patient was always in good clinical conditions without any axillary serous collection. Microbiological examination identified *Staphylococcus aureus* infection.

DISCUSSION

Chylous leakage is a well know post-operative complication occurring in 1% to 3% of patients after cervical or mediastinal lymph node dissection, or gastric resection for cancer [1-3]. This complication was reported also in 0.26% to 0.68% of patients undergoing ALND for breast cancer, most of them (93.5%) occurring on the left side [6-8]. In our experience, this complication was observed only in two out of 1,404 axillary dissections (0.14%) that were performed from January 2000 to December 2017; their occurrence in the short lap of time of one month seems to be mostly incidental due to different surgeons involved in the two operations.

As expected, chylous leakage always occurred on the left side, and it seems to be related to anatomical reasons. As a matter of fact, the thoracic duct origins from the right side in the posterior mediastinum then crosses the midline at the level of the aortic arch. It continues ascending until it reaches the root of the neck where it joins the venous system at the jugulo-subclavian angle [16]. Single-site termination is present in approximately in 80% of cases whilst multiple branching termination occurs in the remnants [17-19]. There are three subsidiary lymphatic channels that reaches the thoracic duct termination: the subclavian, jugular, and broncho-mediastinal trunks [20]. These subsidiary ducts occasionally enter the thoracic duct before termination but usually have separate venous terminations; the absence of valves in these trunks is supposed to lead to chyle reflux [17]. Different anatomic variants of the thoracic duct have been reported including paired ducts, a single right-sided duct, or bilateral branching of the upper duct. All of these variants are well documented in the literature [21]. More than two terminal ducts are reported in 7% to 20% of cases; although the thoracic duct usually has no direct anatomical connection with the axilla, a rare anatomical abnormality of the lymphatic trunk, on the postero-inferior side to the axillary vein, was described

and this may justify the occurrence of the chylous leakage in patients undergoing axillary dissection [9, 14, 22].

It's rather difficult to preoperatively identify such anatomical abnormalities in order to prevent a iatrogenic lesion of an accessory axillary duct because there are no specific risks factors [23]. Similarly, the damage of an aberrant thoracic duct is difficult to be intra-operatively detected because it's likely to collapse. As a matter of fact, the intra-operative detection (two out of six patients) was reported only by Singh *et al*., [6] due to the milky appearance of the chylous leakage. Conversely, the majority of leaks were identified in the first two post-operative days due to the onset of a milky drainage [24]. Laboratory tests are useful to confirm the high fat (triglycerides >110 mg/dl, cholesterol <200 mg/dl), and protein content (20-30 g/L) of the chylous leakage [25-27]. As regards the benefit of imaging techniques, lymphoscintigraphy, MR-lymphangiography and CT lymphography may be useful to identify the site of leakage and associated anatomical abnormalities but they are preferably requested when a surgical revision is to be considered [28, 29].

In our clinical experience, one patient underwent lymphoscintigraphy and lymphangio-MR, and the other one had only lymphoscintigraphy. These examinations were effective in assessing the entity of lymphatic stasis, the site of chylous fistula, and the presence of dilated lymphatic trunks at the surgical site indicating a congenital dysplastic anatomical variation.

As for the therapeutic management, a conservative approach is more frequently adopted (85.8%), and it consists of a protracted use of continuous suction axillary drainage coupled with pressure dressings. Moreover, the patient should begin a low fat diet containing medium chain triglycerides because they are absorbed directly into the portal system thus by-passing the lymphatics; PPN and/or total parenteral nutrition can be adopted if the fistula tends to persists [23, 30, 31].

Somatostatin has been suggested in order to decrease gastrointestinal and pancreatic secretions, reduce splanchnic blood flow and hepatic venous pressure; as an alternative solution, the percutaneous embolization of the thoracic duct or the intra-thoracic ligation of the thoracic duct for a refractory fistula have been suggested [15, 23, 31, 32]. These solutions are not used in case of an axillary chylous fistula because Somatostatin has no action on the lymphatic drainage of the axillary region; moreover, percutaneous embolization cannot be performed in this area because of the very peripheral site of the leak.

Only in patients with a high-flow fistula (>500-700 ml/day) or persistent leakage after more than two weeks of conservative treatment a re-operation has been selectively proposed [1, 4, 13-15]. Surgical management is aimed at ligating the injured lymphatic channel that can be intra-operatively identified after a fatty meal at least 6-8 hours before the operation; the duct may be plugged with gel foam, biological glue, or local muscle rotation flaps [33, 34]. Surgical revision is also aimed at reducing the length of in-hospital stay, preventing secondary infection of the axilla, or avoiding a delay of adjuvant medical treatments. Moreover, too much chylous fluid loss may have devastating consequences on nutritional status and immune function [13, 34]. Literature data suggests that, at re-operation, the site of the chylous fistula was always successfully identified with a definitive resolution of the chylous leakeage within a few days from the operation [6, 9, 10, 35].

Based on our clinical experience on the management of thoracic and abdominal chylous effusions as a postoperative complication after oesophageal, heart, lung, gynecologic, urologic, and colo-rectal surgery, the injury of the main thoracic duct or its branches represents an extremely rare event in the absence of congenital dysplastic anatomical variations so it might be postulate that there are no chylous leakages without a congenital dysplasia of the thoracic duct and/or its subsidiaries [15, 34]. In this view, whether an axillary chylous leakage does occur, the entity of the chylous leakage determines the clinical management of the patient. Low-flow leakage may be conservatively treated for at least two weeks while no-responding patients or with high-flow leakage since the beginning require imaging studies such as lymphoscintigraphy and/or lymphangio-MR in order to define the best surgical approach because the study of the deep and superficial lymphatic circulation of the upper limbs may define the anatomic abnormalities of thoracic duct anatomy, the site and entity of the chylous leakage (Figure-1). This accurate diagnostic work-up may aid in selecting the most appropriate interventional strategy in order to prevent added complications, above all infections, protracted hospitalization as well as co-morbidities related to metabolic and immunologic alterations.

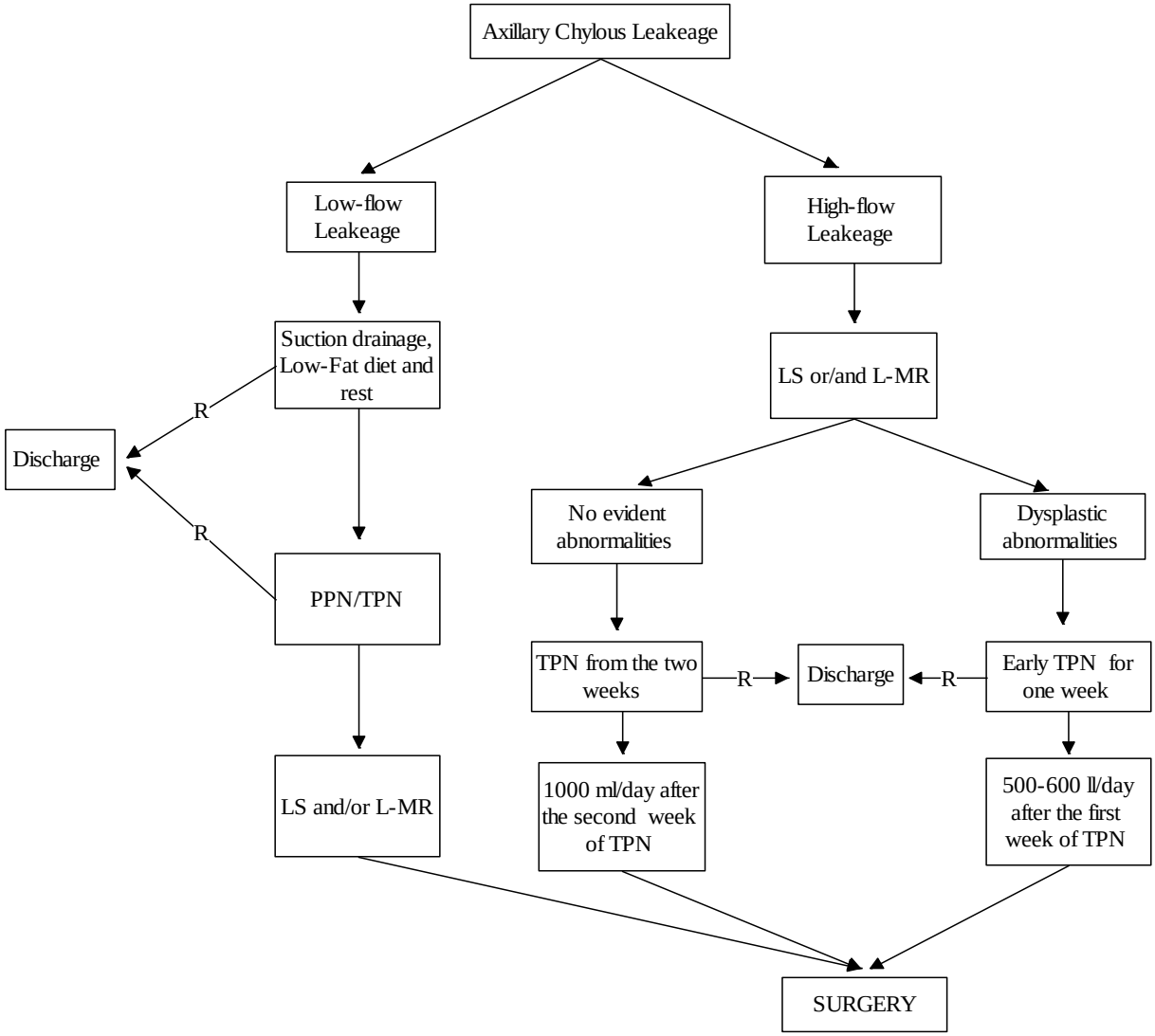

Fig-1: Proposed flow-chart for the management of chylous leakage after axillary lymph node dissection. Legenda: LS, Lymphoscintigraphy; L-MR: MR-Lymphangiography; R, clinical response

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