



JVD

Electronic Supplement 1

Editorial
Lymphatic System and Fistulas –
Radiological Imaging Primer



10. November 2022 / CMS

Summary Report #1

“1st Surgical-Radiological RoundTable for the Improvement of the Interdisciplinary Treatment of Patients with Postoperative Lymphatic Fistulas”

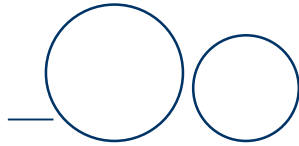
March 19, 2022, Frankfurt am Main, Germany

1 Background

Postoperative lymph fistulas can occur anywhere in the human body. Frequently, but not exclusively, lymphatic drainage disorders are the consequence of oncological surgical interventions: for example, after esophagectomy, duodenopancreatectomy, hysterectomy, or lymph node dissection.

Clinically, lymphatic drainage disorders present as chylothorax, chylous ascites, or percutaneous lymphatic fistulas, among others. They can also lead to wound healing disorders and subsequent infections.

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Lymphography allows not only the diagnosis but also the treatment of lymphatic drainage disorders. There are several approaches to this minimally invasive technique (Pieper et al. 2019). Lymphangiography is used to find location of lymphatic drainage in order to plan further treatment, but can also have a curative effect depending on the drainage volume (Sommer et al. 2020). In addition, there is the possibility of second-line interventional radiological therapy to close the lymphatic drainage pathways with cyanoacrylates or sclerosing agents (Pieper et al. 2019; Sommer et al. 2021).

2 Goal

This roundtable of surgeons and interventional radiologists will identify the medical need for lymphography in the diagnosis and treatment of postoperative lymphatic drainage disorders and explore how to make this service available to all patients.

3 Time and Place

March 19, 2022, Frankfurt am Main, Airport, 1:00-4:00 pm.

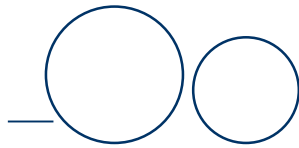
4 References

Pieper CC, Hur S, Sommer CM, Nadolski G, Maleux G, Kim J, Itkin M. **Back to the Future: Lipiodol in Lymphography-From Diagnostics to Theranostics.** Invest Radiol. 2019 Sep;54(9):600-615. doi: 10.1097/RLI.0000000000000578. PMID: 31283538.

Sommer CM, Pieper CC, Itkin M, Nadolski GJ, Hur S, Kim J, Maleux G, Kauczor HU, Richter GM. **Conventional Lymphangiography (CL) in the Management of Postoperative Lymphatic Leakage (PLL): A Systematic Review.** Rofo. 2020 Nov;192(11):1025-1035. English. doi: 10.1055/a-1131-7889. Epub 2020 Mar 26. PMID: 32215900.

Sommer CM, Pieper CC, Offensperger F, Pan F, Killguss HJ, Königer J, Loos M, Hackert T, Wortmann M, Do TD, Maleux G,

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Richter GM, Kauczor HU, Kim J, Hur S. **Radiological management of postoperative lymphorrhea.** Langenbecks Arch Surg. 2021 Jun;406(4):945-969. doi: 10.1007/s00423-021-02094-z. Epub 2021 Apr 12. PMID: 33844077.

5 Participants

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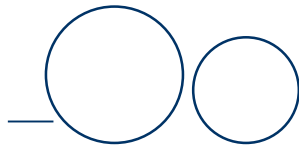
Prof. Dr. Goetz M Richter, **Clinic of Diagnostic and Interventional Radiology, Stuttgart Clinics.**

Dr. Christian Reul, **Guerbet.**

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Michael Callahan, **Guerbet**.

6 Outcome Measures

1. Caseload analysis in Germany.
2. Action plan 2022/2023
 - a. Training / Proctorship
 - b. Scientific communication / congress contributions (e.g. symposium DCK)
 - c. New clinical studies
 - d. Guidelines.
3. Expert opinion paper, white paper, etc..

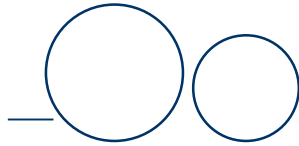
7 Lectures

Lymphatic leaks from the perspective of general/visceral surgery - triggers/incidents, frequencies (literature), reporting, surgical treatment options. **Department of General, Visceral and Transplantation Surgery, Heidelberg University Hospital & Department of Surgery, Frankfurt University Hospital** - 10 min.

Lymphatic leakage from the perspective of vascular surgery (TBD) - triggers/interventions, frequencies (literature), reporting, surgical treatment options. **NN & Clinic and Polyclinic for Visceral, Thoracic and Vascular Surgery, Dresden University Hospital** - 10 min.

Lymphatic leaks from a thoracic or transplant surgery (TBD) perspective - triggers/interventions, frequencies (literature), reporting, surgical treatment options. **Department of General, Visceral, Thoracic and Transplantation Surgery, Stuttgart Clinics** - 10 min.

Lymphangiography: approaches, diagnostics and therapeutic effect, literature review and case studies. **Clinic of Diagnostic and Interventional Radiology, Heidelberg University Hospital**



**& Institute of Diagnostic and Interventional Radiology,
Frankfurt University Hospital - 10 min.**

Lymphatic interventions: TD embolization, MR lymphography, syndromes (e.g., plastic bronchitis), retrograde approaches, and case reports. ***Clinic of Diagnostic and Interventional Radiology, Bonn University Hospital - 10 min.***

Lymphography registry: approach and current developments. ***Clinic of Diagnostic and Interventional Radiology, Stuttgart Clinics & Institute and Polyclinic for Diagnostic and Interventional Radiology, Dresden University Hospital - 10 min.***

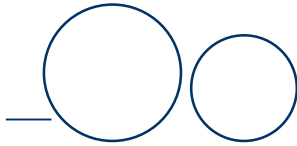
8 Questionnaire Result Presentation

Presentation of the results of the preliminary questionnaire
(Guerbet)

1. Confirmation / comments on the presented data?
2. After the review lectures: Which patient collective could / would be referred for lymphography?
3. What are (also after the lectures) barriers to refer patients to radiology for lymphography?
4. How can these barriers be overcome?

9 Discussion

1. Optimizing the care of patients in clinical reality.
2. Surgical perspectives
 - a. Which of the "wishes" of surgery can be fulfilled immediately?



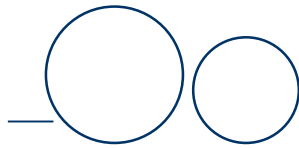
- b. Which of the wishes cannot be fulfilled immediately?
Why?
 - c. How can these wishes be fulfilled in the future
(training / studies, etc.)?
- 3. Lack of evidence - what kind of studies should be done?
- 4. Consensus document / white paper?!

10 Questionnaire

See annex 1 and annex 2.

11 Get Together

Further exchange of views and ideas in a somewhat more informal atmosphere.

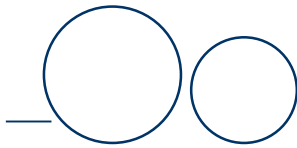
**Annex 1 – Questionnaire Structure****A – Surgical Partner Perspective**

1. *What are the 5 most common surgical procedures that result in lymphatic leakage (based on your own experience)?*

Type	Frequency	Standard of care

2. *In which other settings were lymphatic leakage observed?*

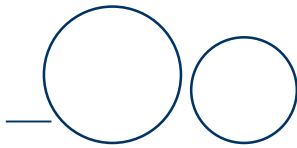
Type	Frequency (if known)	Standard of care



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3. What are the main reasons why a patient is not treated by lymphography or lymphatic interventions (check one)?

Reason	Fully agree	Partially agree	Do not agree at all
Reimbursement problems			
Availability of radiology room capacity			
Lack of radiologists who can technically perform the procedure			
Lack of information about the options and chances of success			
Lack of information about the radiological procedure			
No established or institutionalized treatment regimen			
Other			

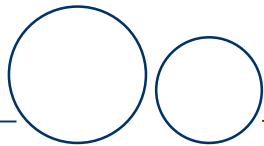
**B – Radiological Partner Perspective**

- 1. What are the 5 most common surgical procedures that result in lymphatic leakage (based on your own experience)?**

Type	Frequency	Standard of care

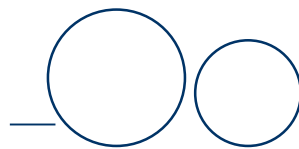
- 2. In which other settings were lymphatic leakage observed?**

Type	Frequency (if known)	Standard of care



3. What are the main reasons why a patient is not treated by lymphography or lymphatic interventions (check one)?

Reason	Fully agree	Partially agree	Do not agree at all
Reimbursement problems			
Availability of radiology room capacity			
Lack of radiologists who can technically perform the procedure			
Lack of information about the options and chances of success			
Lack of information about the radiological procedure			
No established or institutionalized treatment regimen			
Other			



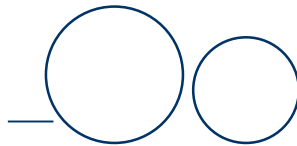
Annex 2 – Questionnaire Preliminary Results

A – Surgical Partner Perspective

1. What are the 5 most common surgical procedures that result in lymphatic leakage (based on your own experience)?

2. In which other settings were lymphatic leakage observed?

Type	Frequency	Standard of care	Center
Pancreas	Ca. 10%	Step up approach (fat free diet, total parenteral nutrition, lymphangiography)	Heidelberg
Pancreas	10%	Conservative	Frankfurt
Pancreas head resection	Ca. 10%	Fat free diet, total parenteral nutrition, conservative	Dresden
Kidney transplantation	10%	Surgical approach	Frankfurt
Kidney transplantation	40%		Stuttgart
Kidney transplantation	25%	Conservative, drainage, sclerotherapy, surgical approach (fenestration)	Heidelberg
Esophagectomy	5%	Step up approach (fat free diet, total parenteral nutrition, lymphangiography)	Heidelberg
Esophagectomy	40%		Stuttgart
Thoracic surgery	10%	Surgical approach (clipping)	Dresden
Lymph node dissection	5 per anno	Conservative, radiation therapy, surgical approach	Frankfurt
Lymph node dissection inguinal	10%	Lymphangiography, surgical approach	Heidelberg
Lymphadenectomy inguinal	Ca. 30%	Sclerotherapy, lymphangiography, surgical approach	Dresden
Lymphadenectomy axillary	10%	Lymphangiography, surgical approach	Heidelberg
Lymphadenectomy axillary	20%	Sclerotherapy, lymphangiography, surgical approach	Dresden
Further			
Bowel resection	2 per anno	conservative	Frankfurt
Colorectal surgery			Heidelberg
Rectum resection	60%		Stuttgart
Vascular surgery	?		Dresden
Vascular surgery			Heidelberg
Oncological liver surgery	5 per anno	conservative	Frankfurt
Liver resection	5%	conservative	Frankfurt
Surgery upper abdomen	<10%	Sclerotherapy, lymphangiography, surgical approach, conservative, fat free diet	Dresden
Lymphadenectomy paraaortic	Ca. 30%	Sclerotherapy, lymphangiography, surgical approach	Dresden
Lymphadenectomy iliac			Dresden
Adrenal gland resection	2%	conservative	Frankfurt
Thyroid resection	50%		Stuttgart
Gastrectomy	20%		Stuttgart
Exploration			Heidelberg
Sarcoma resection retroperitoneal			Heidelberg
Lymph node exstirpation			Heidelberg
Pelvic exenteration			Dresden
Gynecological surgery			Heidelberg

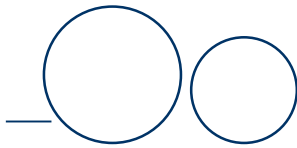


B – Radiological Partner Perspective

1. What are the 5 most common surgical procedures that result in lymphatic leakage (based on your own experience)?

2. In which other settings were lymphatic leakage observed?

Type	Frequency	Standard of care	Center
Lymphadenectomy inguinal iliac	15	Conservative, lymphangiography, radiation therapy	Frankfurt Dresden Dresden
Chylous ascites in malignant disease	2	Drainage + conservative	Frankfurt
Chylous ascites after surgical procedure	3	Drainage + conservative	Frankfurt
Chylous ascites in infectious disease	2	Antibiotics, drainage, conservative	Frankfurt
Chylous ascites	5	Conservative, lymphangiography + embolization, surgical approach, radiation therapy	Frankfurt
Chylopericardium	1	Conservative, surgical approach	Frankfurt
Esoophagectomy			Dresden
Esoophagectomy with gastric reconstruction	300%	Conservative, lymphangiography + embolization, surgical approach, radiation therapy	Frankfurt
Thoracic surgery diverse	6	Conservative, lymphangiography + embolization, surgical approach	Frankfurt
Thoracic intervention diverse			Dresden
(lung resection, lymphadenectomy)			Frankfurt
Debulking in ovarian carcinoma	2	Conservative, lymphangiography + embolization	Frankfurt
Postoperative lymphocele			Dresden



A and B Combined Surgical / Radiological Partner Perspective

3. *What are the main reasons why a patient is not treated by lymphography or lymphatic interventions (check one)?*

