

Thoracic duct lymph PO_2 ($P_t O_2$) is normally higher than systemic or splanchnic venous PO_2 and lower than arterial PO_2 , and probably represents the mean splanchnic tissue oxygen tension. In dogs, after oxygen administration $P_t O_2$ rises promptly as oxygen tension in arterial blood increases. Administration of sodium cyanide inhibits oxygen consumption and $P_t O_2$ accordingly increases toward arterial PO_2 . Reduction of splanchnic blood flow by induced cardiac arrest and ligation of the hepatic and superior mesenteric arteries initially lowers $P_t O_2$ by restricting the amount of oxygen reaching capillaries. As cellular death progresses and oxidative metabolism decreases a delayed increase in $P_t O_2$ occurs.

In patients with hepatic cirrhosis, $P_t O_2$ is decreased and is lower than central and portal venous PO_2 . This difference is accentuated by administration of vasopressin (decreases splanchnic blood flow) and glucagon (increases hepatic oxygen consumption) and is largely unaffected by portacaval shunt. These observations suggest that assessment of $P_t O_2$ may help to elucidate other clinical disorders in which oxygen exchange in splanchnic tissues is impaired.

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Complications of Lymphography

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In this report the summary of questionnaires concerning the more serious complications associated with lymphography will be presented.

Material

326 questionnaires were mailed to members of The International Society on Lymphology and to authors of publications dealing with lymphography. Eighty-three investigators returned these questionnaires. In 10 instances the questionnaires were returned blank since more than one was sent to the same department.

It is quite obvious that this type of survey is open to much criticism. Since the term "complications" has not yet been defined, many interpretations must be expected. Consequently, each person answering the questionnaires uses his own criteria as to what he considers a complication. The timely relationship between the procedure and a complication has also not been defined. As a result, some incidents occurring as late as 21 days after a lymphogram have been associated with the procedure. Frequently, the follow up of the clinical condition of patients who underwent lymphography was less than ideal. This may minimize the number of reported complications. In most instances, however, information on serious complications are relayed to the physician who performed the examination so that these most likely are reported here. Despite these reservations the value of this survey consists in the fact that it reflects the experience of investigators who performed a total of 32,000 lymphograms. Because of the large number of examinations done, it is felt that a general statement covering the incidence of serious complications associated with lymphography is justified. Some of the complications listed here have been reported in The Proceedings of the First International Symposium on Lymphology (1). We were not successful in separating them.

In the hope to receive maximum cooperation the questionnaire was made as simple as possible. The person receiving the questionnaire was requested to *estimate* as accurate as possible the total number of lymphograms done in their institution and to report only the more serious complications. Detailed clinical data of serious complications were requested, but frequently not supplied.

Results

The complications were divided into the following groups.

1. Fatalities attributed to the procedure of lymphography.
2. Pulmonary complications. These included pulmonary infarction, pulmonary edema, and other severe pulmonary reactions.
3. Cardiovascular incidents including hypo or hypertensive crisis.
4. Hypersensitivity reactions to: a) the radiopaque contrast media;
b) the vital blue dye.
5. Neurologic disorders.
6. Other complications.

The total number of lymphograms performed exceeded 32,000. In the vast majority the lymph vessels of the feet were cannulated. In over 99% the radiographic contrast media used were Lipiodol UF, Ethiodol, and Myodil.

Fatalities

The total number reported was 18. This is an incident of 1 : 1,800. The following causes of death were reported.

1. Cardiac failure	2
2. Respiratory death	7
3. Cerebral death	3
4. Not stated	6

The time between lymphography and the onset of symptoms ranged from two to three hours to five days. The time between the onset of symptoms and death ranged from three hours to 21 days.

Since in many instances the clinical data which were returned with the questionnaires were insufficient, it was chosen not to describe any of the cases in detail.

Pulmonary complications

1. Pulmonary infarcts – 81 – incidence 1 : 400. Cases were accepted if there were classical clinical and radiological signs. Pulmonary oil embolization was not included in this category. The presence of oil in the lung a short time after lymphography is very common, and is usually without clinical manifestations or significance.

2. Pulmonary edema – 10 – incidence 1 : 3,200.

3. Pneumonia – 13 – incidence 1 : 2,500 (with radiographic evidence of pulmonary infiltrates and elevation of temperature lasting more than 24 hours).

4. Hemoptysis – 10 – incidence 1 : 3,200. (Since many of the pulmonary complications are not serious, it is believed that the true incidence of such complications as pneumonia or hemoptysis is much higher than this material reflects.)

Cardiovascular complications

A surprisingly small number of pure cardiovascular complications were reported. Only six instances of hypotensive crisis were listed. This is an incidence of 1 : 5,000. One patient requiring digitalization because of acute cardiac failure was described. Pulmonary edema was classified for simplicity purposes as a pulmonary complication.

Hypersensitivity reactions

A total of 40 patients developed hypersensitivity reactions to the oily contrast medium. In 57 instances allergic reactions to the vital blue dye occurred. The hypersensitivity reactions to the different vital blue dyes were as follows:

Tab. 1 Hypersensitivity reactions.

	Number of cases	Incidence
Ethiodol, Lipiodol or Myodil	40	1 : 800
Vital blue Dye (Total)	57	1 : 600
Patent Blue Violet	47	
Alphazurine 2 G	3	
Brilliant Green	1	
Sky Blue	1	
Not Specified	5	

The hypersensitivity reactions ranged all the way from hives to angioneurotic edema with or without laryngospasm to vasomotor collapse. In many instances a local anesthetic was mixed with the vital blue, however, since this complication also occurred in patients who had negative skin reactions to the local anesthetic, it is suggested that the vital blue may be the allergic component.

Cerebral disorders

Severe cerebral disorders were reported in 9 cases. This is an incidence of 1 : 3,500 lymphograms. In all patients definite neurological signs developed. Patients with motor disfunctions, paraplegia and deep coma lasting for weeks were reported. Six of the nine recovered within two to three weeks without permanent impairment. In three instances death occurred. In most patients the neurological signs developed within the first 48 hours after the procedure. The signs developed gradually reaching a peak in 4-7 days and then slowly subsided. Unfortunately, here too the clinical information available does not permit any detailed discussion.

Of special interest is a patient reported by Dr. GLAUNER from Stuttgart, Germany who complained of inner ear deafness 24 hours after lymphography. In this patient a total of 20 ml. of contrast media was injected. Since no otologic examination was performed prior to lymphography, no proof is available that the complications developed after lymphography, however, the physician states there is no reason not to believe the patient. In another instance transitory monoplegia was reported. In several patients EEG changes compatible with diffuse brain emboli were seen. In one case oil could actually be identified in the choreoid plexus.

Other complications

The following other complications were reported.

Prolonged fever (more than 24 hours)	24
Lymphatic fistulae	4
Lymphatic Stasis of leg	2

Conclusions

This relatively simple and somewhat inadequate questionnaire represents the experience of about 70 investigators who performed more than 32,000 lymphograms. Because of the large number of examinations involved it is believed that the survey reflects the approximate incidence of the more serious complications in lymphography. The number and incidence of complications is tabulated in Table 2. The results showed that the rate of serious complications is relatively low and that in regard to complications this type of radiographic examination compares favorably with other radiodiagnostic procedures.

Tab. 2 Incidence of serious complications in lymphography.

	Number of cases	Incidence
Death	18	1 : 1,800
Pulmonary Infarcts	81	1 : 400
Pulmonary Edema	10	1 : 3,200
Pneumonia	13	1 : 2,500
Hypotensive Crisis	6	1 : 5,000
Hypersensitivity Reaction		
Oily Contrast Medium	40	1 : 800
Vital Blue Dye	57	1 : 600
Cerebral Disorders	9	1 : 3,500

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Report on the "Second International Conference on Germinal Centers of Lymphatic Tissue", held in Padova, Italy, June 26-28, 1968

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The second "Germinal Center Conference" was aptly organized by the Institute of Pathological Anatomy of the University of Padova (Drs. L. FIORE-DONATI, L. CHIECO-BIANCHI, N. PENNELLI, G. TRIDENTE, G. M. CAPPUZZO, D. COLLAVO, and Mrs. P. SEGATO) under joined sponsorship by the Consiglio Nazionale delle Ricerche, Rome (Italy), and the Biology Division, Oak Ridge National Laboratory, Oak Ridge, Tenn. (USA). Patterned much after the successful first conference it offered an opportunity to about 100 participants from Europe, the United States and Australia to report and discuss their newest scientific findings.

A total of 53 papers were presented in 15 scientific sessions. The duration of each presentation was limited to 10 minutes, thus allowing ample time for discussion following each session. Abstracts submitted by the authors will be published in "Experimental Hematology" (Biology Division, Oak Ridge National Laboratory); the proceedings of the conference, including comments and discussion remarks, will be edited by the organizers and should appear in print at the beginning of next year. The following summaries of some of the papers presented may serve as a quick inventory of the topics covered at the meeting.

Session 1: *Development of Lymphoid Tissue and Germinal Centers in Relation to Phylogenesis.*

Comparative studies of immunological capacity and lymphoid tissue morphology in several fish species as representatives of the lowest vertebrae revealed that specific 19 S immunoglobulins (IgM) may be produced by animals lacking germinal center structures (B. POLLARA, J. FINSTAD and R. A. GOOD, Minneapolis, Minn., USA). By amino acid sequence analysis of the antibody produced by these primitive fishes, homologies to gammaglobulins in mouse and man could be detected. The conclusion