

## MEDIASTINAL LYMPHOGRAPHY USING NON-IONIC, WATER-SOLUBLE CONTRAST MEDIUM

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### ABSTRACT

To circumvent the "irritative" effects of oily contrast and the high permeability of ionic water contrast medium, we reexamined the usefulness of mediastinal lymphography in dogs and patients using non-ionic (low permeability) water soluble contrast. Despite better delineation of lymph channels and nodes by indirect (transcarinal bronchofiberscopy) and direct (nodal injection at thoracotomy) mediastinal lymphography, the problem of false positive and false negative imaging remains.

Use of mediastinal lymphography to visualize parahilar pulmonary lymph nodes has been hampered due, in part, to oily and ionic (high permeability) water contrast material (1-3). Thus, oily material is retained for longer periods at the injection site and in-

duces tissue inflammation both locally and within lymphatics and eventually embolizes to the lungs. High-ionic water contrast material, on the other hand, readily permeates lymphatic walls precluding clear delineation of lymphatics and regional nodes (4). With introduction of non-ionic (i.e. low permeability) water soluble contrast medium, we reexamined in both healthy dogs and patients (malignancies and tuberculosis) mediastinal lymphography to define lymph node anatomy.

### MATERIALS AND METHODS

Initially experiments were carried out in mongrel dogs (~10 kg) using a specially

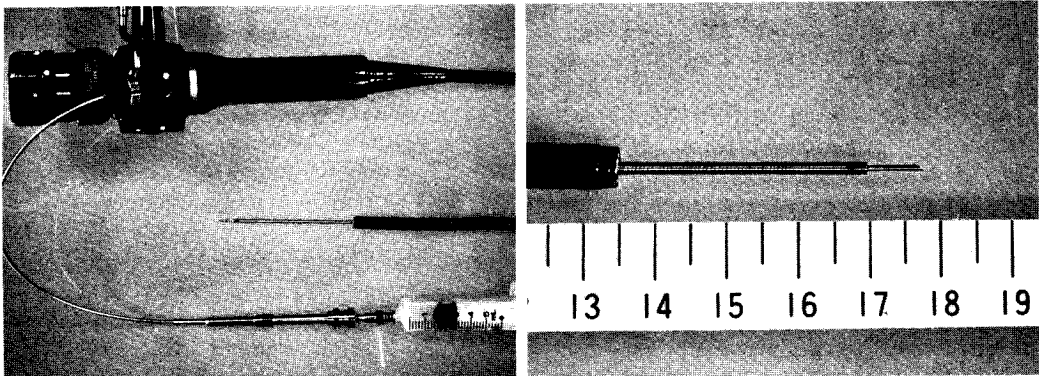


Fig. 1: Bronchofiberscope with flexible needle adapted for mediastinal lymphography (left) with closeup of needle tip (scale cms) (right).

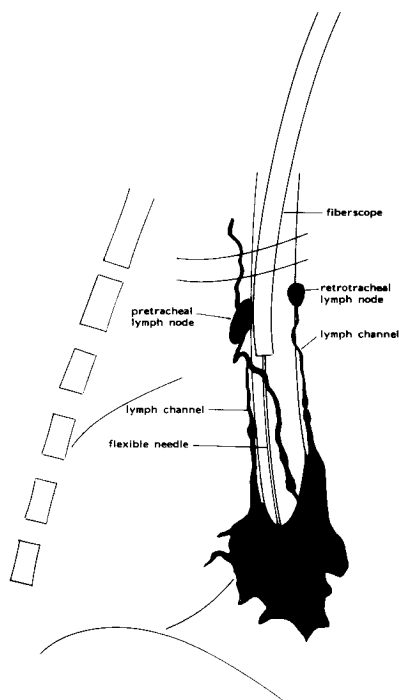


Fig. 2: Transbronchial mediastinal lymphogram (left) and schematic diagram (right) in dog delineating peribronchial lymph channels and interposed lymph nodes.

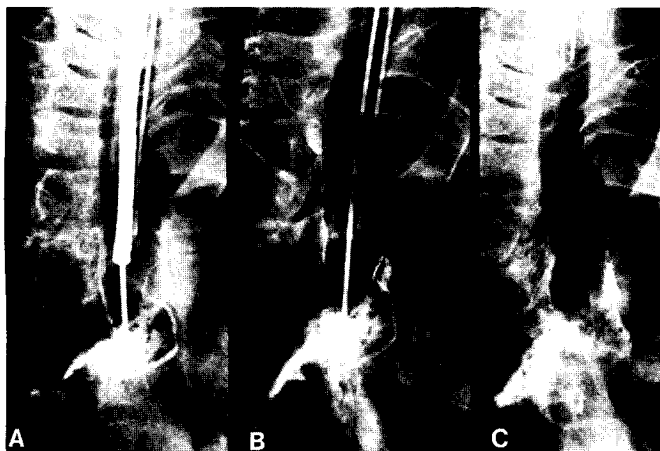
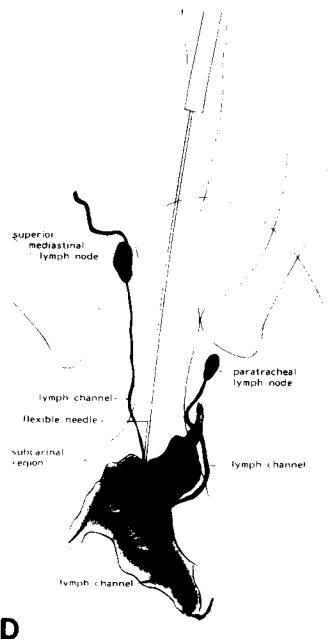


Fig. 3: Transbronchial (paracarinal) contrast injection (5 ml lohexol) (A-C) with schematic diagram (D) in patient with recurrent squamous cell carcinoma. Initially, peribronchial lymphatics from subcarina visualized on either side of trachea (A), filled a superior mediastinal lymph node (B), and drained toward right superclavicular space (B). By ten minutes (C) lymph nodes and lymphatics were no longer visible.



equipped broncofiberscope (Fig. 1) and non-ionic water-soluble contrast (Metrizamide, 300 mg I/ml or Iohexol, 350 mg I/ml) was injected transbronchial at the carina. During fluoroscopy serial chest x-rays were taken. In 23 other patients with known pulmonary cancer or pulmonary tuberculosis (2 patients), 5-10 ml of non-ionic water soluble contrast was injected at thoracotomy directly into a hilar mediastinal lymph node and a chest x-ray promptly taken.

## RESULTS

After transbronchial injection several lymph channels were seen draining from the carina toward the supraclavicular region with interposed paratracheal lymph nodes in dogs (Fig. 2) and in patients with malignancies (Fig. 3). By 30 minutes all contrast had disappeared. There were no complications. Direct lymphography consistently opacified injected nodes, demonstrated efferent lymph channels

**Table 1.**

### Mediastinal Lymphography at Thoracotomy

(lung cancer 23 cases, lung tuberculosis 2 cases)

	rate of opacification (cases)	findings (lymph nodes)
lymph nodes of injection site	25/25 (100%)	total opacification 24 partial opacification 1
efferent lymph channels	5/25 (20%)	cranial direction 4 caudal direction 1
secondary lymph nodes	7/25 (28%)	total opacification 7 partial opacification 1

**Table 2.**

### Mediastinal Lymphographic Findings

(lung cancer 23 cases, 31 lymph nodes)

	homogeneous	inhomogeneous
metastasis (+)	3/19 (16%)	9/12 (75%)
metastasis (-)	16/19 (84%)	3/12 (25%)

on five occasions and secondary lymph nodes in seven patients (Table 1, Fig. 4,5). One directly injected node and one secondary node were partially opacified suggesting metastases. Of 31 resected nodes, accuracy was limited by both false positive and false negatives (Table 2). Thus, where nodes were inhomogeneously opacified 9 of 12 were metastatic on histology. The three false positives were cigarette smokers of 30 years with histologic evidence of carbon deposition, chronic inflammation and fibrosis. Two of three false negative nodes showed micrometastasis or diffuse lymph node replacement by small cell carcinoma.

#### COMMENT:

A major limitation to mediastinal lymphography has been oily contrast with its "irritating" sequela or high permeability water soluble contrast with less than optimal imag-

ing. While finer delineation of lymphatics and nodes have been obtained using low ionic water soluble contrast, major problems remain. Although the technique is feasible, images more distinct and complication rate low, both false positive and false negative images occur.

#### REFERENCES

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Fig. 4: Direct mediastinal lymphography at thoracotomy for pulmonary cancer. Note inhomogeneous nodal opacification (single arrow). Histology confirmed metastatic squamous cell carcinoma. Double arrow signify efferent lymph trunk (prevertebral) running retrograde toward infradiaphragmatic area suggesting restricted lymph drainage and possible retroperitoneal nodal metastases.



Fig. 5: Hilar lymph nodal metastases (direct mediastinal lymphography) confirmed histologically (poorly differentiated squamous cell carcinoma). Note inhomogeneous opacification of hilar node (inferiorly), draining efferent lymphatic posteriorly (arrow) and marginal sinus of adjacent lymph node (\*).