

Experience with mediastinoscopy

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Mediastinoscopy, as introduced by Carlens (1959) in particular, promises to become an important aid in the diagnosis of pulmonary and mediastinal affections. For some time now this method has been used routinely in our clinic as one of the pre-operative examinations carried out in patients with a possibly operable malignant lesion. It is also being used to verify by histological means the clinical diagnosis of a pulmonary condition. There is a by no means negligible number of cases, moreover, in which the diagnosis is made primarily by mediastinoscopy.

The great advantage of mediastinoscopy over biopsy, according to Daniels (1949), is that a better view of the anterior mediastinum can be obtained. The mediastinoscope can be passed beyond the tracheal carina, sometimes as far as the origin of the upper lobe bronchi. It is possible to obtain biopsy specimens closer to the pulmonary lesion, and metastases are consequently identified earlier. Another advantage is that a single route of approach affords bilateral access to the anterior mediastinum.

In our review of the mediastinoscopies carried out, we raised the following questions: 1. Can mediastinoscopy obviate an exploratory thoracotomy in inoperable pulmonary carcinoma? 2. What is the value of mediastinoscopy as a primary diagnostic aid? 3. What are the risks entailed by this method? 4. Is it possible to establish a range of indications for mediastinoscopy?

METHOD OF INVESTIGATION

In all the cases described in this study, the mediastinoscopic examination was carried out by the same investigator. From November 1962 to April 1964 this examination was carried out in 145 patients.

Our technique corresponds in principle with that described by Carlens (1959), Reynders (1963), Knoche and Rink (1963), and others. It may be useful, however, to point out that we avoided mobilizing the entire circumference of the trachea, because in another clinic we saw recurrent nerve lesions after using this method. It is hardly likely, moreover, that metastases would have a predilection

for a dorsal localization relative to the trachea. Our primary concern was always to take a lymph node biopsy specimen as close to the lesion as possible. If the field of operation remained clear other lymph nodes were subsequently explored. Whenever the lymph drainage pattern suggested this, *e.g.*, in tumours of the left lower lobe, lymph nodes heterolateral to the trachea were explored in addition to lymph nodes close to the lesion.

RESULTS

Mediastinoscopic explorations were undertaken for carcinoma (group A) and other pathological conditions (group B).

In this paper our use of the term 'operable' refers to a resection which, so far as can be judged, is possibly curative. The term 'resectable' refers to a resection which is palliative though it is practically certain that metastases persist.

GROUP A This group consisted of 122 patients. Histological examination of the biopsies yielded positive findings in 28 patients. In eight of these 28 patients the primary diagnosis had been made by mediastinoscopy. In the remaining 20, positive findings had also been obtained by bronchoscopy, puncture of the carina, percutaneous aspiration of the tumour or in other ways.

In nine of the 28 patients an exploratory thoracotomy was carried out. The growth was irresectable in seven of these. In one patient the tumour was, in fact, resectable, but definitely not operable. In only one patient were no metastases found after lobectomy of the left upper lobe and evacuation of the mediastinum.

In the remaining 19 of the 28 positive cases we refrained from operation because of the site and character of the tumour which suggested that it was inoperable or irresectable. This was confirmed by mediastinoscopy.

The pathological anatomy was negative in 94 patients. Of these, 72 patients were operated upon. In 67 of these 72 patients the tumour was resectable or operable because there were either local metastases

only in the hilus of the resected specimen or no metastases at all. In five patients we found the tumour to be irresectable because it was in the right middle lobe with local invasion of the heart (two patients), in the left lower lobe with local invasion of the heart (two patients), and in the left upper lobe with subclavicular metastases.

GROUP B This group consisted of 23 patients. There were positive findings in 13 patients: Boeck's sarcoïd (6, diagnosed by mediastinoscopy); reticulosis (4, diagnosed by mediastinoscopy); tuberculosis (2, diagnosed by mediastinoscopy); and thoracic goitre (1).

In 10 patients the findings were negative.

Complications after mediastinoscopy included haemorrhage from the azygos vein in one patient, a recurrent nerve injury in one patient, and pneumothorax in one patient. An implantation metastasis was formed in the cicatrix after mediastinoscopy in one patient.

DISCUSSION

It should be pointed out that mediastinoscopy is intended as an important supplement to other diagnostic methods. Other important factors are the experience of the mediastinoscopist and the meticulous nature of the examination.

Our findings indicate that a positive mediastinoscopic result in a patient with carcinoma is associated with a very poor chance of operability. Whether a thoracotomy is nevertheless carried out in such a patient is a matter of principle. If we adopt the principle that one must attempt to resect some tumours so as to prevent obstructive pneumonia, then a thoracotomy should be performed. Our series shows that the chance of resectability in such cases is poor. This means that in the presence of a positive mediastinoscopy we must carefully consider, depending on the point of view taken, whether an exploratory thoracotomy should be done.

If mediastinoscopy has a negative result, then it is the experience of the mediastinoscopist which must determine the course to be followed. If the mediastinoscope was not passed far enough, or if haemorrhage obscured the field of operation, then the biopsy may have been taken from a normal lymph node, although possibly a metastasis could have been found 1 cm. further down. Beginners sometimes conclude that no lymph nodes are present, whereas patient blunt dissection will in the end disclose some.

Other factors in the evaluation of a negative result are the processing of the biopsy specimen and the

care with which the histological examination is carried out. If the biopsy specimen is taken with insufficient care, or is afterwards treated roughly, then mechanical damage may occur which will impede the work of the histologist. It is also conceivable that if an insufficient number of sections are cut through the specimen one small metastasis may escape scrutiny. In one of our cases we sent part of a biopsy specimen to the pathologist and another part of the same specimen to the cytologist. In the latter fragment carcinoma was demonstrable, but in the former it was not found. The subsequent operation confirmed that the lymph node in question did indeed contain a tumour.

Yet another important factor is the site of the tumour. Generally speaking, a tumour of the lower or middle lobes may be irresectable because it has invaded adjacent tissues; although the tumour is still small and has not yet disseminated metastases, it may have invaded, say, the atrial septum (two patients) or the liver.

In general, greater value should be attached to a positive than to a negative mediastinoscopic result. Yet, in the case of a negative result, exploratory thoracotomy is more justified than in the case of a positive finding. Irresectability was found in only five of 72 patients in whom a thoracotomy was carried out on the basis of a negative mediastinoscopy.

In pulmonary carcinoma the importance of mediastinoscopy is stressed by the fact that in eight of the 28 positive cases it was only by mediastinoscopy that the microscopical diagnosis could be made pre-operatively.

Mediastinoscopy has also proved important in the primary diagnosis of sarcoidosis (*cf.* Klein, Primer, and Quartz, 1963). In all cases diagnosed by mediastinoscopy, other methods of investigation had failed; in some the diagnosis came as a surprise and saved the patient from a useless thoracotomy. In reticulosis and tuberculosis mediastinoscopy can afford primary diagnostic confirmation, as shown by the data of Group B. Maassen (1964) is of the same opinion.

Another example of the importance of this procedure in pulmonary carcinoma follows. In a 41-year-old man routine fluoroscopy disclosed a small opacity in the periphery of the right upper lobe. There were no signs of metastases, and bronchoscopy was negative. The condition was diagnosed as operable carcinoma or adenoma, and mediastinoscopy was regarded as superfluous. It was nevertheless carried out, and carcinoma was found in the biopsy specimen; subsequent thoracotomy revealed a completely inoperable cancer (inoper-

ability was caused by miliary pleural metastases throughout the right hemithorax).

The risk entailed by mediastinoscopy is not grave, provided the mediastinoscopist has had some experience. Omission of this exploration can entail a much graver risk, *viz.*, an unnecessary thoracotomy after an erroneous diagnosis or in a patient with an irresectable carcinoma.

Our series includes one case of haemorrhage, in a woman who had previously undergone surgery for mammary carcinoma. A metastasis, probably from this mammary tumour, existed in the hilus of the right lung and had invaded the azygos vein. Mediastinoscopy was done, but at the exploratory biopsy the azygos vein was injured. In a subsequent thoracotomy this vessel was ligated without difficulty. This shows the importance of mediastinoscopy being carried out by a surgeon familiar with the intrathoracic anatomy and experienced in intrathoracic interventions. If in the event of a complication one must wait for a surgeon, this may be deleterious to the patient. This has also been pointed out by Reynders (1963) and by Lacquet (1964).

Pneumothorax occurred in one of our cases; the pleura was stripped off with too much force, and a tear was made. This is as a rule no serious complication when it is discovered in time; a drain can be inserted, which is usually removed again after 24 hours.

Lesions of the recurrent nerve occur chiefly when the dissection is dorsolateral or dorsal to the trachea. Even careful digital mobilization of the trachea can give rise to transient paresis of the vocal cords. This complication has been noted previously. Damage to the recurrent nerve was seen in one of our cases; this patient was one of the first to be submitted to mediastinoscopy, and experience would consequently seem to play an important role in this respect. Mediastinal infection was never observed in our series.

In one patient we saw transportation of metastases into the wound; Reynders (1963) also describes this complication. Theoretically there is a risk of dissemination of tumour cells, in which case the biopsy is bound to be positive. Almost certainly, however, one is dealing with an irresectable tumour in that case, and the metastasis in the wound or in the mediastinum is of little significance as compared with the other metastases. But this complication does not warrant the omission of mediastinoscopy in favour of an exploratory thoracotomy. If the latter should disclose an inoperable tumour, we believe that much more harm is done to the patient.

One could formulate a number of contraindications to the procedure. We have so far not had to refuse a mediastinoscopy, but we would certainly do so if the access to the area to be examined were known to be infected, *e.g.*, fistulae, a tracheotomy opening, and cervical furuncles. Mediastinoscopy might be technically impracticable in a patient with a pronounced barrel chest deformity. We have no experience of such cases. Arthrosis or kyphoscoliosis need not be an obstacle, provided one proceeds with caution.

To conclude, we believe that any pulmonary focus not proved to be of an infectious nature warrants the consideration of mediastinoscopy. This can confirm, obtain or reject the diagnosis, and it may save the patient from an unnecessary exploratory thoracotomy.

SUMMARY

On the basis of a review of 145 patients in whom mediastinoscopy was carried out, the following conclusions were drawn.

In many cases of pulmonary carcinoma mediastinoscopy can obviate an exploratory thoracotomy.

Esides bronchoscopy, mediastinoscopy is an important aid in confirming the diagnosis of pulmonary carcinoma. The method can also help to establish the diagnosis in non-malignant affections of the lung and mediastinum.

Haemorrhage from the azygos vein occurred in one patient in this series; the recurrent nerve was injured in one patient; pneumothorax occurred in one patient; and an implantation metastasis was formed in the cicatrix in one patient.

Mediastinoscopy should be considered in all pulmonary and mediastinal affections which cannot be identified with certainty as infectious.

REFERENCES

- Carlens, E. (1959). Mediastinoscopy: a method for inspection and tissue biopsy in the superior mediastinum. *Dis. Chest*, **36**, 343.
- Daniels, A. C. (1949). A method of biopsy useful in diagnosing certain intrathoracic diseases. *Ibid.*, **16**, 360.
- Klein, G., Primer, G., and Quartz, W. (1963). Zur Diagnostik der Lungensarkoidose unter besonderer Berücksichtigung der Mediastinoskopie. *Tuberkulosearzt*, **17**, 217.
- Knoche, E., and Rink, H. (1963). Mediastinoscopy: *Bioptic Exploration of the Superior Mediastinum according to E. Carlens (German text)*. F. K. Schattauer, Stuttgart.
- Lacquet, L. K. (1964). Mediastinoscopy (Dutch text). *Levens genesesk. T.*, **3**, 116.
- Maassen, W. (1964). Die Bedeutung der Mediastinoskopie nach Carlens für die Operabilitätsbeurteilung des Bronchialkarzinoms. *Thoraxchirurgie*, **11**, 619.
- Reynders, H. (1963). Mediastinoscopy (Dutch text). Thesis, Amsterdam.