The role of mediastinoscopy in the diagnosis of mediastinal lymphadenopathy

H. Porte *, D. Roumilhac, L. Eraldi, C. Cordonnier, P. Puech, A. Wurtz

Clinique Chirurgicale, Hopital Albert Calmette, CHRU de Lille, rue du Pr Leclerc, F-59037 Lille, France

Received 4 August 1997; received in revised form 24 November 1997; accepted 16 December 1997

Abstract

Objective: The reported experience of axial mediastinoscopy (MDS) performed in a diagnostic purpose only (rather than prognostic) is limited. Therefore, we designated the present study to clarify morbidity, sensitivity and accuracy of MDS performed to diagnose various mediastinal lesions. Methods: We prospectively performed 400 MDS in a diagnostic purpose on 398 patients for: (1) isolated mediastinal adenopathies in 271 patients (group 1), and (2) mediastinal adenopathies associated with a pulmonary or a hilar lesion of unknown aetiology in 127 patients (group 2). In group 1, most of the patients were suspected to have a sarcoidosis, a tuberculosis or a lymphoma. In group 2, most of the patients were suspected to have a lung cancer. In both groups, the other current diagnostic procedure usually used in each pathology had failed to give an accurate diagnosis. Results: A total of 76% of the samples were performed in the right laterotracheal lymph node station, 12.5% in the lower subcarinal and superior subcarinal lymph node station and 7.8% in the left laterotracheal lymph node station. The per- and post-operative mortality rates were nil. The per-operative morbidity accounted for six cases (1.5% of the examinations). The post-operative morbidity accounted for three cases (0.75% of the examinations). MDS data radically modified the pre-operative suspected diagnosis in 74 patients (18.5% of the patients). There were 17 false negative results (4.3% of the patients). The global sensitivity of MDS was 94%, the global specificity was 100% and the accuracy was 95%. In group 1, the sensitivity was 96% and in group 2 it was 92%. Conclusion: According to the results, the few contraindications of the procedure and its low cost, we confirm that MDS is still the first choice procedure to diagnose lesions located in the axial mediastinum. © 1998 Elsevier Science B.V. All rights reserved.

Keywords: Mediastinoscopy; Lung cancer; Sarcoidosis; Hodgkin’s lymphoma; Non-Hodgkin’s lymphoma

1. Introduction

The diagnostic approach of mediastinal masses keeps evolving as new imaging and surgical modalities like video-assisted biopsies become available [1,2]. Accurate histological diagnosis of a mediastinal lesion is required to institute the most appropriate therapy for each patient. The ideal surgical approach should allow sampling of large tissue specimens for immuno-histo-chemical and pathological studies. The most current minimally invasive procedure is axial mediastinoscopy (MDS), first described by Carlens in 1959 [3]. MDS is mainly used to assess lung carcinoma operability and few studies have reported a significant number of MDS performed only in a diagnostic purpose [4,5]. The aims of the study were to evaluate the diagnostic value of MDS according to the various lesions harboured in lymph node stations accessible to this procedure and to ascertain its indications in comparison with the other diagnostic procedures: anterior mediastinotomy and thoracoscopy.

* Corresponding author. Tel.: +33 3 20444559; fax: +33 3 20444890.
2. Patients and methods

2.1. Patients

A total of 398 patients with undiagnosed mediastinal lesions underwent MDS in the institution from October 1985 to 1996. Two patients underwent 2 iterated examinations. These patients ranged in age from 16 to 85 years (mean age 45 years). There were 267 men and 131 women. These 400 procedures were performed in two different schemes: (1) the diagnosis of isolated mediastinal adenopathies or masses of unknown aetiology: n = 271 patients (group 1); and (2) the diagnosis of mediastinal adenopathies associated with unilateral pulmonary or hilar lesions of unknown aetiology: n = 127 patients (group 2).

In the first group, most of the patients were suspected to have a sarcoïdosis, a tuberculosis or a lymphoma. Clinical examination, biological and morphological studies had failed to ascertain the diagnosis. In the potentially sarcoïdosis patients, the other procedures performed before MDS were at least: fiberoptic-bronchoscopy with bronchiolo alveolar lavage, bronchial biopsies and trans bronchial pulmonary biopsies (in case of interstitial abnormalities) plus accessory salivary glands. In patients suspected to have a lymphoma, there was no subcutaneous peripheral adenopathy accessible to a biopsy under local anaesthesia. Consequently, MDS was performed since it was considered as the least invasive procedure to ascertain the diagnosis and to make the most appropriate classification of the lesion.

Most of the patients of the second group were suspected to have a lung cancer without any evidence of metastatic spread according to clinical and paraclinical examinations. The other procedures (bronchial fibroscopy or CT guided biopsies) had failed to give an accurate diagnosis of the pulmonary lesion. Consequently, MDS was performed to ascertain the histologic diagnosis in order to institute the most appropriate therapy (surgery, chemotherapy or radiotherapy).

A total of 11 patients out of 398 had a superior Vena caval syndrome.

The prognostic MDS performed to assess either the N2 involvement in patients with non-small cell lung cancer histologically confirmed by previous studies or the residual or recurrent masses after treatment of malignant lymphomas were excluded from the study.

2.2. Methods

On the day of the procedure, a form with the patient’s identity, the suspected diagnosis and the different examinations data including morphological data from thoracic CT scan was filled in. The different sampling sites and the number of biopsies realized were reported on a diagram. All the procedures were performed under general anaesthesia with a single lumen tracheal intubation according to the MDS routine technique. When CT only showed nodes in the aorticopulmonary window we did not use the Ginsberg technique by crossing between the left primitive carotid artery and the brachiocephalic arterial trunk but performed an anterolateral mediastinoscopy or a thoracoscopy. In these cases, the patients were not included in the study. The follow-up was assumed every 6 months by chest CT scan in cases of non-malignant lesions diagnosed by MDS. Several surgeons performed MDS, including young surgeons in training.

2.2.1. Statistical studies

Data are presented as frequency distribution and simple percentages. The technique was considered positive when a precise pathological diagnosis was obtained after MDS and confirmed by either thoracotomy or follow-up data. The false negative results were either due to the technical failures of the procedure or to inaccurate pathological diagnoses obtained by MDS according to thoracotomy or follow-up data. The sensitivity, specificity, accuracy and negative predictive values were calculated.

3. Results

3.1. Surgical results

The mean operative time was 25 min (range 12–80 min), the peri-operative mortality was nil, the peri-operative morbidity accounted for six cases (1.5% of the examinations) including: three bleedings in the operating field treated by a 3-day packing (two of them had a superior vena caval syndrome), one pleural injury with a post-operative pneumothorax treated by a pleural drainage, one small tracheal wound in a patient previously tracheotomized and one oesophagus wound stitched through a cervicotomy in a patient who had a megaoesophagus. These 6 patients had a normal post-operative recovery.

The post-operative mortality was nil. The post-operative morbidity was of three cases (0.75% of the examinations) including: two left recurrent nerve paralyses and 1 cervical tuberculous abcedation occurring 3 weeks after a MDS had been performed to sample tuberculous adenopathies. This abcedation was treated by percutaneous drainage and antituberculous drug local instillations.

The overall morbidity was of nine cases (2.5% of the examinations) and a conversion to cervicotomy was required only once (0.25% of the examinations).
3.2. Sampling results

A total of 660 different lymph node stations were sampled during 400 examinations in 398 patients. The mean number of lymph node stations sampled per examination was 1.6 (range 1–4) and the mean number of samples realized in each lymph node station was 5 (range 1–10). Of the samples, 76% were performed in the right laterotracheal lymph node station, 12.5% in the lower subcarinal and superior subcarinal lymph node stations and 7.8% in the left laterotracheal lymph node station.

3.3. Diagnostic corrections according to MDS data

MDS confirmed the suspected diagnosis after clinical and paraclinical examinations (including CT scan) in 310 patients (77% of the patients) and modified the suspected diagnosis in 74 patients (18.5% of the patients). There were 19 false negative results of the procedure one after the two iterative MDS, there were finally 17 false negative results of the procedure (4.3% of the patients).

3.4. MDS results in isolated mediastinal adenopathies (group 1)

The precise pathological results obtained by MDS included: sarcoidosis \(n = 191\) (sensitivity 97%), metastatic adenopathies of extrapulmonary origins \(n = 20\) (sensitivity 95%), Hodgkin’s and non-Hodgkin’s lymphoma \(n = 17\) (sensitivity 90%), tuberculosis \(n = 16\) (sensitivity 94%), sinus histiocytosis or anthracosis \(n = 17\) (sensitivity 100%). In the 17 patients with a MDS diagnosis of sinus histiocytosis or anthracosis no further treatment was instituted and the follow-up ranging from 14 to 110 months, (mean 53 months) confirmed MDS diagnosis.

With 261 accurate diagnoses and ten false negative results, the overall sensitivity in this group was 96%.

There were ten false negative results of the procedure. In 7 out of these 10 patients, the diagnosis was corrected during the follow-up including six cases of sarcoidosis and one case of mediastinal metastasis from a renal adenocarcinoma. Two false negative results were corrected by an exploratory thoracotomy including one case of tuberculosis and one case of non-Hodgkin’s lymphoma. The remaining false negative result was diagnosed by iterative MDS as a case of Hodgkin’s disease.

3.5. MDS results in mediastinal adenopathies associated with a unilateral pulmonary or hilar lesion (group 2)

Among the 127 patients suspected to have a lung cancer with mediastinal lymph node involvement, the diagnosis of cancer was confirmed in 99 of them by MDS including small cell carcinoma \(n = 45\), adenocarcinoma \(n = 26\), squamous cell carcinoma \(n = 23\), neuro endocrin carcinoma \(n = 4\) and large cell carcinoma \(n = 1\). There were nine false negative results of the procedure and consequently, 108 patients had a lung cancer with a mediastinal lymph node involvement. The remaining 15 patients were real negative results of the procedure and underwent thoracotomy. A total of 11 had a lung cancer without mediastinal involvement and 4 had a non-cancerous pulmonary lesion (i.e. actinomycosis, tuberculosis, primary pulmonary non-Hodgkin’s lymphoma and silicosis). Overall, in this group, the sensitivity was 92%, the accuracy 93% and the negative predictive value 62.5%.

In the nine false negative results of the procedure, the definite histopathological diagnosis of lung cancer was obtained by one iterative MDS, thoracoscopy, mediastinotomy, CT guided biopsy and five thoracotomies.

3.6. Global results of the procedure including group 1 and group 2

Among the 398 patients on whom MDS was performed in a diagnostic purpose only, MDS gave 379 accurate results and there were 19 false negative results. The sensitivity was 95%, the specificity was 100% and the accuracy was 95%.

4. Discussion

4.1. MDS morbidity

Although MDS is a minimally invasive surgical procedure, it should not be regarded as a banal endoscopic sampling method deprived of any hazards. Due to the absence of video, the technique is difficult to learn. Per- and post-operative morbidity rates are generally evaluated between 0.9 and 4.5%, [5,6] with increased rates in inexperienced hands. Most of the time, morbidity consists in per-operative bleedings, post-operative pneumothorax, wound infections and temporary post-operative recurrent nerve paresis, usually caused by damage to the left recurrent laryngeal nerve (two cases in our series) [5].

The pleura is frequently seen (usually on the right side) but rarely opened and pneumothorax requiring a chest drain is a rare complication (one case in our series). This makes a systematic post-operative chest X-ray examination unnecessary. The reported experience in out-patient MDS is limited [7], therefore, we still advocate for a routine 24-h hospital stay. Out-pa-
tient MDS should concern patients in a good general health and a very adequate home support.

### 4.2. MDS accuracy

In the series, global sensitivity was 95% and global specificity 100%. This sensitivity rate is superior to the results previously reported, with sensitivities ranging from 75 to 90%. This is not only due to the high proportion of patients suffering from sarcoidosis because in other pathological groups, the sensitivity was always up to 90%. In a majority of patients suffering from sarcoidosis, the preoperative diagnosis was uncertain between sarcoidosis, lymphoma or tuberculosis. In lymphomas, the sensitivities reported are usually inferior (from 70 to 80% [6,8], 90% in the study), due to the fact that histological categorization requires complementary procedures to define immunological and genetic features important for differential diagnoses. These methods require several large and adequate samples avoiding necrotic areas.

### 4.3. MDS merits compared to other diagnostic procedures of mediastinal lesions

MDS provides an easy access to the paratracheal and superior subcarinal lymph node stations, whereas, the aortopulmonary window, the periazygos and the lower retrotracheal subcarinal stations are more difficult to assess. However, the aortopulmonary window can be explored during MDS with the Ginsberg technique. Ginsberg and others showed excellent results with this technique called ‘extended mediastinoscopy’ [9,10]. Nevertheless, the point of view is that anterior mediastinostomy is more recommended to explore this area [8,11] despite a potential morbidity consisting mainly in the possibility to injure the internal mammary artery, pneumothorax and increased post-operative pain as compared to MDS [12]. In fact, anterior mediastinostomy seems mostly interesting to sample left anterior mediastinal mass abutting the chest wall. The low retrotracheal subcarinal lymph node remains, in some cases, inaccessible to either MDS or anterior mediastinostomy (only 12.5% of the samples were performed in the subcarinal lymph node station). Consequently, the thoracoscopic procedure appears to be a valuable adjunct to MDS when the mediastinal area to explore is out of reach of the mediastinoscope (aoropulmonary window or low retrotracheal subcarinal lymph node station) [1,2,11–13]. But like anterior mediastinostomy, thoracoscopy requires a double lumen tube for split ventilation, which is not possible in some patients, because of the narrowing of the trachea. Furthermore, Gossot et al. recently demonstrated a higher morbidity with a longer hospital stay for thoracoscopy versus MDS [12]. Consequently, these three different approaches are rather complementary than competitive. A pertinent study of morphologic data from thoracic CT scan provides information on the best route to use, determined only on the lymph node stations to explore.

### References


