

# Video-Assisted Thoracoscopic (VATS) Pleurodesis for Malignant Effusion: An Australian Teaching Hospital's Experience

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**Background.** Video-assisted thoracoscopic surgery (VATS) is commonly employed to achieve pleurodesis in patients suffering malignant pleural effusion (MPE).

**Aims.** To evaluate the utility and outcome of VATS pleurodesis in management of MPE.

**Methods.** Two hundred and two consecutive VATS pleurodesis for MPE were evaluated. Data was derived from a prospectively maintained database and hospital records. Pleurodesis was deemed unsuccessful if a significant effusion occurred within 30 days of surgery.

**Results.** VATS pleurodesis was successful in 88% of patients (failure 12%) while recurrence of effusion occurred in 18%. Post-operative air space, air leak, empyema and prolonged intercostal catheter drainage (>14 days) were all significantly associated with a failed procedure.

Mean length of stay was 10.4 days and 42% of patients were discharged within 7 days of surgery. Morbidity was 20% with no operative deaths and median survival was 94 days. Inpatient mortality was 5%. High ASA ( $\geq 4$ ) was significantly associated with increased risk of inpatient death ( $p < 0.001$ ) and poorer long-term survival (43 days versus 133 days,  $p = 0.05$ ).

**Conclusions.** VATS pleurodesis offers reasonable palliation of MPE with low morbidity and rapid recovery. Patients with an ASA score of  $\geq 4$  have a poor overall outcome and warrant less invasive palliative measures.

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**Keywords.** Malignant effusion; Pleurodesis; Thoracoscopic surgery

## Introduction

Pleural effusion is a common complication of both primary and secondary pleuropulmonary malignancy. Around 50% of patients with metastatic cancer will develop pleural effusion at some stage in the disease.<sup>1</sup> Many will die within months of developing a malignant effusion.<sup>2,3</sup> The majority of malignant pleural effusions (MPE) are symptomatic<sup>4</sup> and the ensuing dyspnoea suffered by many of these patients is a distressing symptom that greatly impairs the quality of their remaining life. Often the clinician faces a significant management dilemma.<sup>5,6</sup> Simple observation is indicated if the patient is asymptomatic. Therapeutic measures available include thoracentesis, pleurodesis, pleuroperitoneal shunt-

ing and pleurectomy.<sup>7,8</sup> Each of these options is successively more invasive. Thoracentesis is a simple, repeatable treatment that is useful for patients with very short life expectancies. However, over 90% of effusions will have recurred within one month.<sup>9</sup> If a patient develops recurrent effusion following initial thoracentesis, pleurodesis is recommended.<sup>4</sup>

Pleurodesis is the process of obliterating the pleural space, preventing the development of pleural effusion. This can be performed mechanically, using pleural abrasion or via various chemical sclerosants. Talc has been shown to be superior to all other agents used for chemical pleurodesis.<sup>4</sup> Similarly, different approaches are available to achieve pleurodesis. Tube thoracostomy with insertion of a sclerosant has been shown to be effective.<sup>2,3</sup> Operative pleurodesis may be performed via thoracoscopic or open approach. This has the advantage of direct visualization of the pleural cavity, allowing concurrent diagnostic and therapeutic maneuvers. Deloculation or decortication to release trapped lungs can be performed thereby offering more reliable pleurodesis. Pleural or pulmonary biopsy for diagnosis as well as creation of pericardial

**Abbreviations:** VATS, video-assisted thoracoscopic surgery; ASA, American Society of Anaesthesiology; MPE, malignant pleural effusion

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windows or insertion of pleuroperitoneal shunts can be performed.

This report describes experience with video-assisted thoracoscopic pleurodesis undertaken in a major metropolitan Australian teaching hospital by a specialist Thoracic Surgical unit.

## Materials and Methods

Details of treatment of patients managed by the Thoracic Surgical Unit of The Austin and Repatriation Medical Centre, Melbourne, has been collected prospectively and entered into a dedicated database since 1992. This data was combined with a retrospective medical record review of 200 consecutive patients undergoing VATS pleurodesis over an 8-year period. Clinical, operative and pathological data was collated and analysed to determine outcome, complications and recurrence.

### Operative Technique

We perform VATS pleurodesis under general anaesthesia using a double lumen endotracheal tube to facilitate unilateral lung ventilation. Generally three 10 mm ports are inserted under direct vision for intrapleural access. After initial thoracoscopy and complete drainage of effusion, significant loculations are disrupted with blunt dissection or sharp division of adhesions. Limited decortication is performed if required. Where heavy tumour involvement precludes this and extensive decortication is considered inappropriate, limited access to pleural surfaces is accepted. If the underlying diagnosis is uncertain, directed biopsies are taken. In this series, aerosolized talc (5 g) was used to effect pleurodesis in 95% of cases, with a smaller number being performed with direct mechanical abrasion, pleurectomy or alcoholic iodine sclerosis. Thoracoscopic vision ensured a complete distribution of talc around the pleural cavity and upon pleural surfaces.

### Post-Operative Care

Routine suction to a negative pressure of 20 cm of water was applied to the underwater seal drains. Drains were removed when fluid drainage was less than 100 mL per 24 h and no air leak identified. Radiographs of the chest were obtained at the completion of surgery and serially during the inpatient stay and at follow up. Pleurodesis was considered successful if CXR was free of significant effusion just before death or at last follow up beyond 30 days. Failure was defined as evidence of significant effusion within 30 days of the procedure. Recurrence was defined by the presence of a significant effusion greater than 30 days post-operatively, in a patient who had an initially successful procedure. A significant effusion was defined as greater than one-third of the pleural space.

Statistical analysis was performed using chi-squared ( $\chi^2$ ) or Fishers Exact Test for evaluation of  $2 \times 2$  contingency tables. Mann-Whitney *U* tests were used to assess non-parametric data and survival analysis was performed using Cox Linear Regression.

**Table 1. Underlying Pathology**

| Primary Pathology           | Number of Cases |
|-----------------------------|-----------------|
| Non-small cell lung cancer  | 57              |
| Breast cancer               | 35              |
| Mesothelioma                | 30              |
| Unknown primary adenocancer | 20              |
| Ovarian cancer              | 7               |
| Haematological              | 6               |
| Colon cancer                | 5               |
| Melanoma                    | 5               |
| Sarcoma                     | 5               |
| Skin squamous               | 4               |
| Lung small cell             | 3               |
| Lung unknown type           | 2               |
| Oesophageal                 | 3               |
| Gastric                     | 2               |
| Prostate                    | 2               |
| Other                       | 14              |
|                             | 200             |

## Results

Two hundred consecutive patients underwent 202 VATS pleurodesis. Sixty percent patients were males and there was an equal distribution of right and left-sided procedures. The mean age was 64 years old (29-86) with 60% of patients aged between 60 and 80. American Society of Anaesthesia (ASA) scores were noted as an indication of patient health status. Eighty-three percent of patients had an ASA score of three or greater. A wide range of primary pathology ranging from solid organ to haematological malignancy was observed in the group of patients (Table 1). The majority of cases have either primary pleural-pulmonary malignancy or breast carcinoma. Multiple concurrent procedures for diagnostic or therapeutic indications were performed in 175 instances and thoracoscopy facilitated this (Table 2). Pleural biopsy was the most common concomitant procedure. Of note is the creation of a pericardial window in 8% of patients to treat associated pericardial effusions.

The mean length of inpatient stay was  $10.4 \pm 7.3$  days (2-50 days). This is longer than the average time to removal of intercostal tubes, which was  $5.7 \pm 4.3$  days. Issues relating to underlying disease rather than recovery from the surgery alone often determined the length of stay. Despite this, 42% of patients were in hospital for only 7 days or less following VATS pleurodesis.

**Table 2. Procedures Undertaken Concurrently with VATS Pleurodesis**

| Concurrent Procedures  | Number of Cases<br>( <i>n</i> = 202 <sup>a</sup> ) | Percentage of Cases (%) |
|------------------------|--|-------------------------|
| Pleural biopsy         | 91   | 45.0                    |
| Bronchoscopy           | 50   | 24.8                    |
| Lung biopsy            | 19   | 9.4                     |
| Pericardial window     | 17   | 8.4                     |
| Excision of metastasis | 1  | 0.5                     |
| Breast biopsy          | 1  | 0.5                     |
| Gastroscopy            | 1  | 0.5                     |

<sup>a</sup> Includes two re-do procedures.

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