Modified muscle sparing posterolateral thoracotomy

M Ashour

Abstract

A modified posterolateral thoracotomy is described that combines the advantages of complete muscle sparing through a thoracolumbar fascial slide with excellent exposure. The technique is easy to perform. The procedure was associated with relatively little postoperative pain, coughing was effective, and early ambulation was achieved. Experience with this approach in the first 49 patients suggests that it offers an attractive alternative to the standard muscle cutting posterolateral thoracotomy approach for elective procedures.

The standard muscle cutting posterolateral thoracotomy is the approach used most frequently in thoracic surgery today. Its major advantage is excellent exposure for a wide range of thoracic procedures. Its main disadvantages are due to the division of the major chest wall muscles and include severe post-thoracotomy pain, ineffective coughing and poor performance of chest physiotherapy exercises, limited ipsilateral shoulder mobility, and delayed ambulation.[1–6] These increase postoperative morbidity.[7 8] Lung herniation has also been reported after this procedure.[9]

Noirclerc *et al* in 1973[10] and Bethencourt and Holmes in 1988[7] described the technique of muscle sparing thoracotomy and found a remarkable decrease in the complications that occur with the standard thoracotomy. It has not, however, become widely accepted, probably because of the extensive subcutaneous detachment of the latissimus dorsi (up to the iliac crest), the use of two overlapping rib retractors that obscure the surgical field, and the impossibility of using it in muscular patients.

Our experience with the modified muscle sparing posterolateral thoracotomy in 49 patients over the last 18 months forms the basis of this report.

Division of Thoracic Surgery, King Khalid University Hospital, Riyadh, Saudi Arabia
M Ashour

Address for reprint requests:
Mr M Ashour,
King Khalid University Hospital, PO Box 7805,
Riyadh 11472, Saudi Arabia.

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Methods

From October 1988 to March 1990 54 patients were admitted for definitive surgical procedures for various intrathoracic diseases (table 1). Forty nine of these were subjected to a modified muscle sparing posterolateral thoracotomy approach, the standard muscle cutting approach being used in the other five patients. The criteria used to decide on the approach were the urgency of entering the pleural cavity and the age of the patient.

The surgical intensive care unit's flow sheets for the first 24 hours as well as the physiotherapist's records were reviewed for (1) narcotic consumption; (2) effectiveness of cough and cooperation with the chest physiotherapist; (3) ability to sit up with little or no help; and (4) mobility of the ipsilateral shoulder.

The standard lateral decubitus position is used in all patients. The skin incision starts midway between the medial border of the scapula and the vertebral spines, extend in a gentle curve to about 2 cm below the inferior angle of the scapula, and continue forward to end in the mid axillary line at the level of the submammary crease (fig 1). Skin flaps are developed over the latissimus dorsi, superiorly up to the axilla, inferiorly to 5 cm below the incision line, and posteriorly over the trapezius muscle (fig 2). The plane between the trapezius muscle and latissimus dorsi is opened. The posterior border of the latissimus dorsi is freed from the chest wall and in the axilla from teres major (fig 3). At this stage blunt dissection is used to separate the thoracolumbar fascia from the underlying erector spinae muscle. A 6 to 7 cm longitudinal incision is made in the thoracolumbar fascia 2 cm away from the spinous processes (fig 4). Caution should be exercised as the latissimus dorsi is being dissected off the posterolateral chest wall because large perforating arteries are encountered frequently. The serratus anterior is then freed from the chest wall along its entire inferior border. The desired rib bed is then entered; this could be

Table 1 Disease patterns in the 54 patients

Diagnosis	*No of patients*
Bronchiectasis	15
Pulmonary neoplasm	12
Post-tuberculous lung destruction	3
Pulmonary aspergilloma	4
Hydatid cyst of the lung	2
Bronchogenic cyst	3
Bronchopleural fistula	2
Gastro-oesophageal reflux	1
Carcinoma of the oesophagus	3
Mediastinal teratoma	1
Postpneumonectomy space infection	1
Lobar emphysema	3
Enteric cyst	1
Massive haemoptysis during late pregnancy	1
Hepaticopulmonary hydatid disease	1
Hepatoma eroding into the diaphragm	1
Total	54

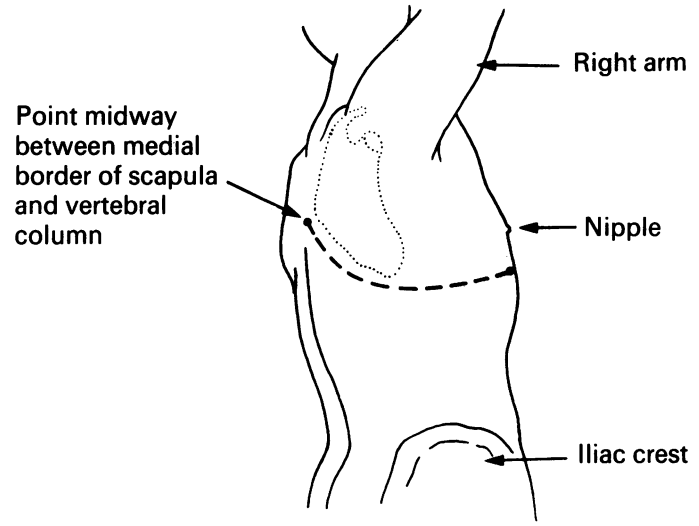

Figure 1 Diagram showing the line of skin incision.

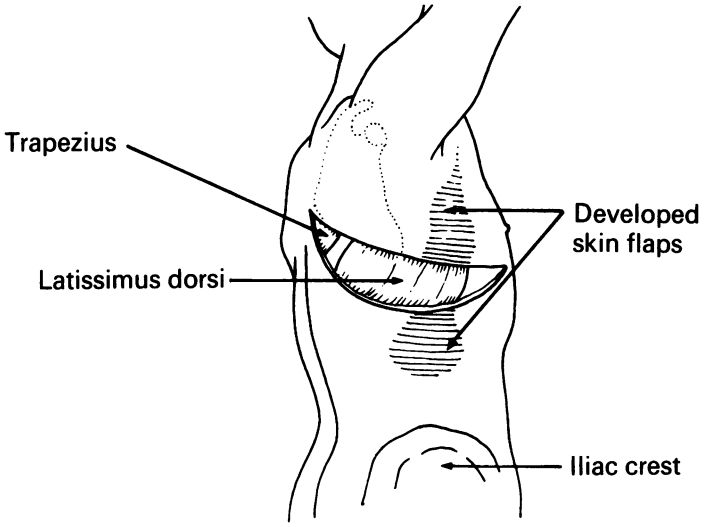

Figure 2 Developed skin flaps—the upper flap going up to the axilla and the lower flap going to 5 cm below the skin incision.

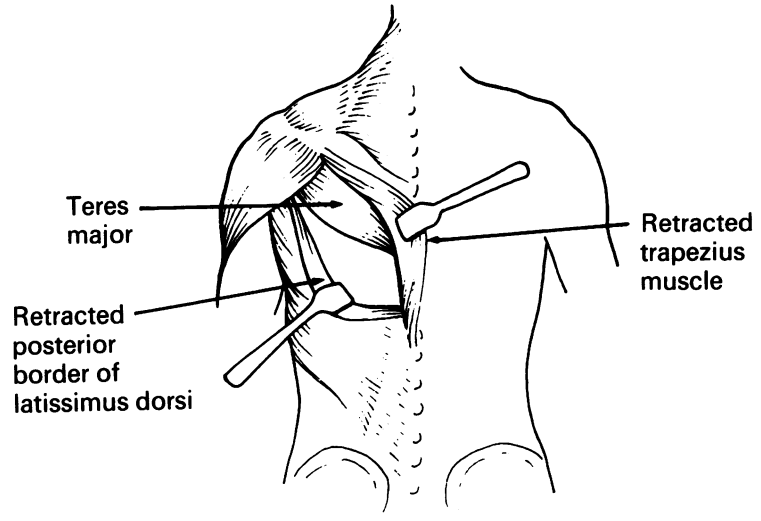

Figure 3 Diagram showing the posterior border of the latissimus dorsi muscle retracted off the teres major muscle and the chest wall.

done through ribs.[4–7] Once the rib retractor has been inserted the latissimus dorsi and serratus anterior are retracted anteriorly together with the centre piece of a Balfour retractor, which is then fixed to the vertical bar of the rib retractor (figs 5 and 6).

At the end of the procedure cryoanalgesia is performed routinely. Periosteal sutures are placed and the serratus anterior and latissimus dorsi are allowed to fall into place. Two absorbable sutures are placed to fix the inferior border of serratus anterior to the surrounding fascia. The incision in the thoracolumbar fascia is closed with interrupted absorbable sutures. A large subcutaneous suction drain is used routinely.

Results

Fifty four patients (42 male) were included in this study, their ages ranging from 1 month to 70 years. The modified approach was used in 49 patients (38 male, 11 female) with ages ranging from 10 to 70 years. Excellent exposure was achieved in 47 patients (table 2). The exposure was considered inadequate in the remaining two patients as thoracotomy revealed disease extending to or beneath the diaphragm; so the approach was converted into a muscle cutting one. The average time taken to enter the pleural cavity was 35 (range 30–45) minutes and the time taken to close the chest less than 10 minutes. Of the five patients in whom the standard muscle cutting approach was used, four were children (aged 1 month to 3 years)—two with lobar emphysema, one with an enteric cyst, and one with a tension cyst that followed previous surgery. The other patient was a 27 year old pregnant woman with massive haemoptysis. All these needed a quick entry into the pleural cavity.

The average narcotic consumption among the patients in whom the modified approach was used was 3–5 mg of morphine over the first 24 hours given in 1 mg incremental doses. All the patients were able to sit up in bed even on the first day with little or no help. Cooperation with the physiotherapist was fair to excellent.

Ipsilateral shoulder mobility, initially restricted, was restored to near normal in the ensuing few days. Wound healing was excellent in all patients. One patient developed a seroma four days after removal of the subcutaneous drain. A minor wound infection occurred in one patient only.

Table 2 The procedures performed via the modified approach

Procedure	*No of patients*
Lobectomy	26
Pneumonectomy	8
Hiatus hernia repair	1
Oesophagectomy (Ivor Lewis)	3
Excision of hydatid cyst of the lung	2
Excision of mediastinal tumours	3
Thoracoplasty (limited)	3
Exploratory thoracotomy	1
Total	47

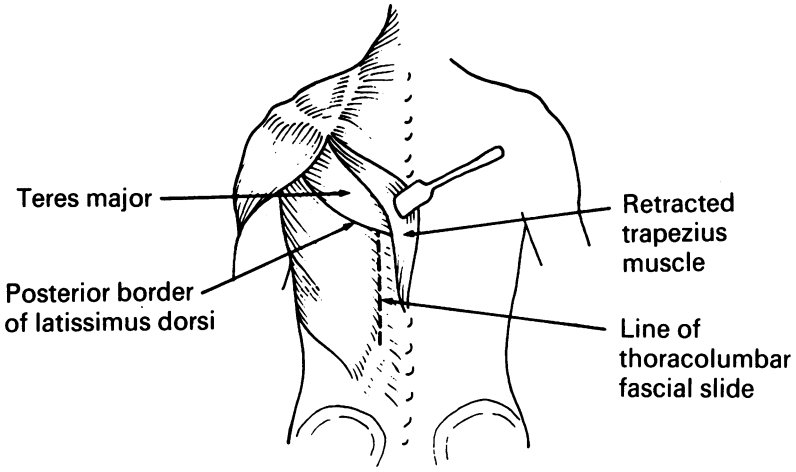

Figure 4 Diagram showing the site of the thoracolumbar fascial slide.

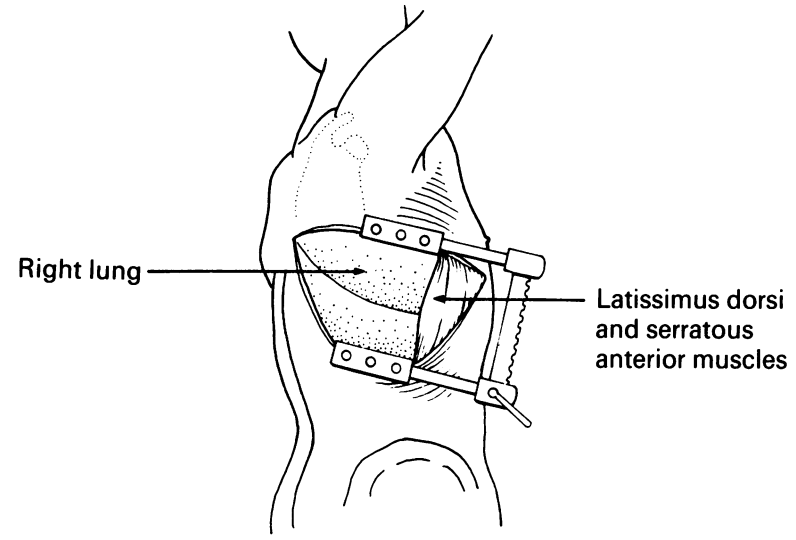

Figure 5 The rib retractor inserted: the serratus anterior and latissimus dorsi muscles are partially obscuring the surgical field.

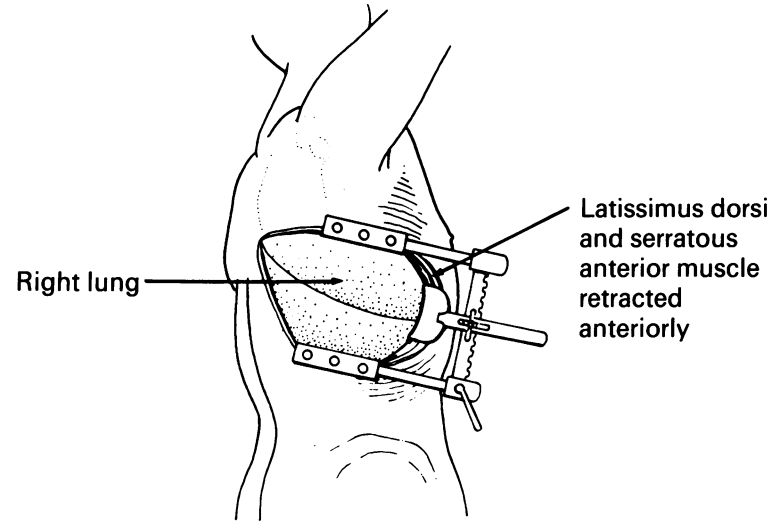

Figure 6 Anterior retraction of both muscles after the centre piece of the Balfour retractor has been mounted on the rib spreader.

Discussion

The postoperative morbidity associated with the standard thoracotomy has been reduced to a considerable extent by the muscle sparing thoracotomy described by Bethencourt and Holmes in 1988.[7] The limitations of this technique, however, have probably been responsible for its not being widely accepted. Raising the skin flap and mobilising the latissimus dorsi muscle along its anterior border down to the iliac crest is time consuming, extensive, and unnecessary. The posterior retraction of latissimus dorsi is disadvantageous for three reasons: firstly, it is carried out against the maximal convexity of the ribs, thus leading to an increased stress; secondly, it necessitates the use of two overlapping rib retractors that obscure the surgical field; thirdly, the difficult retraction against the bulk of teres major is possibly what prevents its use in large, muscular patients.

We consider that our modification of the technique of Bethencourt and Holmes has overcome these limitations. The thoracolumbar fascial slide obviates the need for extensive subcutaneous detachment of the latissimus dorsi muscle down to the iliac crest and permits its anterior retraction with the centrepiece of a Balfour retractor that does not in any way obscure the surgical field. We have used this approach in patients of differing builds and for various procedures (table 2) and have been extremely comfortable and satisfied with the exposure it offers. Inadequate exposure was encountered in two patients. One had a hepatoma eroding the diaphragm and the other had hepatopulmonary hydatid disease. Retrospectively, we think that this problem could be obviated with a thoracolumbar slide longer than 7 cm, especially when the diaphragm is suspected of being affected by the disease process. The average time we take to open the chest has been about 35 minutes, and closure is accomplished in less than 10 minutes. We do not, however, recommend this approach in emergency cases, where speed in entering the pleural cavity is essential, or in babies, whose muscles are not fully developed.

Apart from its action on the shoulder girdle, the latissimus dorsi muscle is essential for deep inspiration and efficient coughing.[11] The bulk of the muscle sweeping from the vertebral column around the convexity of the posterolateral chest wall compresses the lower thorax and acts as an accessory muscle of expiration.[12] Sparing this muscle mass helps to reduce postoperative pain and permits efficient coughing. This was evident from the low consumption of narcotic during the 24 hours after operation, the excellent cooperation of the patients with the chest physiotherapist, and their ability to walk soon after surgery.

Although pulmonary resection for bronchiectasis was the commonest operation carried out in our patients (table 1), the creation of multiple muscle planes and tissue spaces was not associated with any increase in wound infection. A minor wound infection occurred in only one of our patients. The insertion of subcutaneous drains caused no additional

morbidity and was tolerated well by all our patients. Through maintaining a negative pressure, these drains prevent subcutaneous fluid accumulation and achieve early obliteration of the tissue spaces created during dissection.

The advantages that this approach offers, including the reasonably short time required to perform the operation, make it an attractive alternative to the standard posterolateral thoracotomy approach for elective procedures.

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