

# Thoracoplasty : An Obsolete Procedure ?

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After the advent of chemotherapy for pulmonary tuberculosis, the operation of thoracoplasty became rare in the developed countries. However, this was not the case in developing countries like India. Between July 1992 and June 1997, we performed thoracoplasty in 139 patients. Indications of surgery were tubercular empyema (84 patients), pyogenic empyema (33 patients), post-operative empyema with bronchopleural fistula (8 patients), drug resistant pulmonary tuberculosis (2 patients) and recurrent haemoptysis (2 patients). Successful outcome in the form of control of sepsis, closure of bronchopleural fistula, sputum conversion and control of haemoptysis was achieved in most cases. There were four deaths in the entire series. We conclude that with the persisting problem of pulmonary tuberculosis in the developing countries, thoracoplasty is still an operation of continued relevance.

**Key words :** *Thoracoplasty, Tuberculosis, Drug resistance.*

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Thoracic surgical centres all over the world are performing thoracoplasty in continuously decreasing numbers. In fact, it has even been described as an obsolete procedure. However, in India, the original indication of this operation, *viz.* pulmonary tuberculosis remains rampant. Hence, there is a continuing need to carry out this operation. We present here our five years experience of one hundred and thirty-nine patients who underwent thoracoplasty.

## **Patients and Methods**

Between July 1992 and June 1997, 139 patients underwent thoracoplasty at LRS Institute of TB and Allied Diseases. There were 82 men and 57 women whose age ranged from 16 years to 57 years (Mean age 31 years). The indications of thoracoplasty in our series were : tubercular empyema (84 patients), pyogenic empyema (33 patients), post-operative empyema with bronchopleural fistula (8 patients), drug resistant pulmonary tuberculosis (2 patients), and post-treatment recurrent haemoptysis (2 patients).

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### *Technique*

Pre-operative preparation of patients for thoracoplasty consisted of standard measures including adequate drainage of the empyema space till the discharge became minimal, improving the nutritional status of the patient, pulmonary function studies and bronchodilators, if necessary, cover of anti-tubercular drugs for at least six weeks in cases of pulmonary tuberculosis, and antibiotic treatment as dictated by pus culture and sensitivity reports.

Endotracheal intubation with general anaesthesia was used in all cases. A double-lumen endotracheal tube was used in cases where there was suspicion of bronchopleural fistula. Extent of rib resection was determined by a careful study of the posteroanterior and lateral chest films of the patient. A standard posterolateral thoracotomy incision as per the required length was given. This was followed by opening the empyema cavity by incising the layer of thickened pleura with electrocautery. Extent of the empyema cavity became clear at this stage. The number of ribs that need to be resected was determined by judging the extent of the space. After resecting each rib, the underlying thickened pleura was incised with cautery along the full length of the empyema cavity. Thus, the entire intercostal bundle fell into the empyema cavity. Back ends of the ribs were always resected completely. Occasionally, transverse processes were resected if deemed necessary. Though an attempt was always made to preserve the first rib, it had to be removed in 17 cases.

In patients with bronchopleural fistula, direct suture was attempted and, if necessary, a myoplastic flap created from intercostal muscles and adherent thickened pleura was sutured all around the fistula. In patients requiring surgery for control of upper zone cavity, the apex of the lung was freed and soft tissues were retracted downwards so as to obliterate the space. Closed drainage of the pleural space was carried out. Two layers of muscles in the chest wall were closed with vicryl suture and silk was employed to approximate the skin edges.

### *Post-operative Management*

Compression pads placed in axillary and anterior pectoral folds retained in position by Dynaplast were employed. The aim of compression was not only to minimize accumulation of blood but also to prevent any paradoxical movement of the chest wall in the post-operative period. Sufficient analgesia with narcotic drugs was maintained in the post-operative period. Physiotherapy in the form of active breathing, incentive spirometry and active shoulder movement was encouraged. Antibiotic regimen routinely consisted of cefuroxime tobramycin and meterogyl.

## Results

Out of 135 patients of empyema who underwent thoracoplasty, 102 had an uneventful post-operative course. Fourteen patients had post-operative wound infection which increased morbidity (Table). In two patients, there was a complete breakdown of the wound and recovery took about two months. In eight patients empyema space persisted and a re-do thoracoplasty had to be resorted to. Sinuses continued to persist in eight patients, despite treatment.

Eight patients who had post-operative bronchopleural fistula (three after lobectomy and five after pneumonectomy) had an uneventful post-operative course. As detailed earlier, intercostal muscle bundles were used to support the repair of the fistula. Air

**Table.** Results of surgery in 139 patients who underwent thoracoplasty

<i>Mortality</i>	
Early	0
Late	4 (due to persistent sepsis)
<i>Complications</i>	
Complete breakdown of the wound	2
Wound infection	14
Re-operation	08
Persisting sinuses	08
<i>Success of operation</i>	
Obliteration of space	123/135
Control of sepsis	123/135
Control of bronchopleural fistula	8/8
Sputum conversion	0/2
Control of haemoptysis	1/2

leak persisted for some time. However, in all the eight cases, fistulae closed completely and removal of the drainage tubes could be achieved in a period extending upto three weeks.

Two patients had bilateral pulmonary tuberculosis with a right upper zone cavity. They continued to be sputum positive inspite of multi drug treatment lasting over a period of two and a half years. Right sided thoracoplasty involving resection of first to fifth ribs along with apicolysis was carried out. These patients became sputum negative

after the procedure. However, they again became sputum positive within six months.

Another patient achieved control of recurrent haemoptysis occurring from post-tubercular right upper zone cavity. This patient was not taken up for resectional surgery because of the bilateral nature of fibrotic nodules. In another such patient, thoracoplasty failed to control haemoptysis.

There were four deaths in the entire series (Table). There was no early death. All the deaths were caused by persistent sepsis, septicemia and cachexia.

## Discussion

The operative removal of the skeletal support of a portion of the chest is called thoracoplasty. It is usually accomplished by subperiosteal removal of varying number of rib segments to approximate the chest wall to the underlying lung or mediastinum to effect lung collapse or pleural space obliteration<sup>2</sup>. This operation has evolved along two lines : (i) *the Alexander procedure* which successfully collapsed the cavities of pulmonary tuberculosis and was used until it was supplanted by antimicrobial therapy and pulmonary resection, and (ii) *the Schede procedure* which aims at reducing intrathoracic spaces or filling them with living tissue implants. These indications for the operation of thoracoplasty are continuously decreasing as is evident from many published reports<sup>3,7</sup>. However, pulmonary tuberculosis and its complications are quite rampant in India. There are associated problems caused by poor patient compliance, drug resistance, poor health care delivery system and a certain amount of mismanagement at primary and secondary levels of health care.

Hence, the operation of thoracoplasty is still required fairly often at least in the Indian scenario. As thoracoplasty is somewhat mutilating, it is always carried out as a last resort. In our institution, thoracoplasty is carried out for a few specific indications.

The operation is used for the treatment of chronic thoracic empyema when there is either insufficient or no remaining pulmonary tissue to obliterate the pleural space. If the lung cannot be brought to the chest wall [which is the objective of tube thoracostomy, rib resection and decortication], the chest wall must be brought to the lung (or the mediastinum if no lung exists)<sup>1,7</sup>. In 1985, Hopkins and Co-workers<sup>6</sup> reviewed their experience with thoracoplasty and included in their indications for the procedure attempts to close persistent pleural spaces with and without infection and bronchial fistulae, both post-resection and in association with post pneumonic pleural suppuration. These indications are seen in limited numbers by western thoracic surgeons. Our experience suggests that a fairly large number of such patients exist in our community who are not suitable for decortication and could benefit from thoracoplasty.

Today, thoracoplasty as an operation for management of chronic pleural empyema is accomplished in one stage<sup>2</sup>, because paradoxical chest wall motion is not a problem in this clinical setting. By the time the patient is taken up for surgery, the mediastinum

and chest wall are fixed and hence the problem of frail chest does not arise in the post-operative period. We have resected even upto 10 ribs in a single setting without any untoward effect. Although staging the procedure has been employed by other authors with equally good results, we do not consider it essential in all cases.

For collapse of an infected empyema space, resection of the first rib may not be necessary, although this step is an essential part of apicolysis and thoracoplasty being done for collapse of upper lobe cavities. Some surgeons believe it should always be left in place to preserve the structural integrity of the neck, shoulder girdle and upper thorax. In our opinion, the first rib should be removed if there is any concern about a residual apical space. This situation almost always exists in cases of post pneumonectomy empyema. We have carried out removal of the first rib in seventeen cases as it was considered essential for complete space obliteration.

For drug resistant pulmonary tuberculosis, resectional surgery is the best answer provided the disease is localized. Routinely, we carry out lobectomy or pneumonectomy in these patients whenever feasible with fairly good results. However, two patients who have been included in this series of thoracoplasty had bilateral lesions with a right upper zone cavity. Hence, collapse therapy with right upper thoracoplasty was attempted which was successful in converting the sputum status only temporarily.

Cases of post treatment haemoptysis are best treated with lung resection if the disease is localized and the patient can tolerate lung resection. However, those patients who were judged to be unfit for resectional surgery were offered thoracoplasty with only partial success.

In the procedure of thoracoplasty, complete posterior resection including resection of transverse processes of the adjoining vertebrae has always been stressed. We also attach a lot of significance to adequate posterior resection. However, in some cases chronic pleural thickening and the resultant obliteration of the paravertebral gutter obviates the need to resect the transverse processes of the vertebrae.

The Claget's procedure aims at creating a thoracostomy through which pleural space is repeatedly irrigated with sterilizing solutions. We reserve this procedure for the patients who are unfit for thoracoplasty because of their poor general condition. Occasional success with complete pleural space obliteration has been achieved by this method also after a prolonged management.

In summary, tuberculosis and its complications are quite frequent in countries like India. Hence, the operation of thoracoplasty is required quite often. We believe that this procedure will continue to be required at least in the foreseeable future.

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