Original article

Thoracoplasty: Not an obsolete procedure in developing countries

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ABSTRACT

OBJECTIVE
To assess that thoracoplasty is still a useful space obliterating collapse procedure.

MATERIAL AND METHODS
This retrospective observational study was conducted in Thoracic surgery unit Lady Reading Hospital, Peshawar from Jan 2003 to Sep 2010. One hundred and seventy four patients who had thoracoplasty done as a collapse therapy in these seven years and nine months were included in this study. Patients who had other space obliteration procedures like muscle interposition, pleural tenting, were excluded from the study. The demographic data, operative findings, outcome of procedure in terms of postoperative complications, 30 day mortality and duration of ICU and hospital stay were recorded from the data base of patient's record of the ward. The data was entered and processed on the SPSS10 version.

RESULTS
Study included 110 male and 64 female patients, whose age ranged from 12 years to 70 years (mean age 31 years). Out of 174 patients, 114 had complete thoracoplasty, while 60 had partial. Nineteen patients had post operative complications (10.9%). One patient had complete break down of wound, 12 patients had wound infection, 2 patients with partial thoracoplasty were re-opened to do complete thoracoplasty and 4 patients had persisting sinus. Four patients expired (2.2%); 2 did not recover from anesthesia, and 2 of them had persistent sepsis, septicemia and cachexia. Mean ICU stay was 2 days and mean hospital stay was 5 days.

CONCLUSION

There is still a role for this obsolete procedure in selected cases of persistent infected pleural space, with little or no viable lung tissue. The indications are very selective and its use should in no way undermine the role of more conventional procedures, like decortications, lung resection, pneumonectomy, muscle flaps etc.

KEY WORDS
Thoracoplasty, Decortication, Collapse therapy.

INTRODUCTION

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 Pakistan, the original indication of this operation, *viz.* pulmonary tuberculosis remains rampant.

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 ours.

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 ribs or rib segments to approximate the chest wall to the underlying lung or mediastinum to effect lung collapse or pleural space obliteration. 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.

Indications for the procedure are 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. The purpose of every extrapleural thoracoplasty of whatever degree is to close cavities and to put the diseased lung at rest. It is not directed toward limiting the function of an undamaged lung. Too often, in the collapse of any cavity, some good lung tissue is compressed. Selective thoracoplasty does the least amount of damage to healthy lung tissue.

MATERIAL AND METHOD

This retrospective observational study was conducted in Thoracic surgery unit Lady Reading Hospital, Peshawar from Jan 2003 to Sep 2010. 174 patients underwent thoracoplasty at Lady Reading Hospital, Peshawar. Pre-operative preparation of patients for thoracoplasty consisted of standard measures including adequate drainage of the empayema 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. 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 were 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 first rib was always preserved. In patients with bronchopleural fistula, direct suture was attempted

and, if necessary, a myoplastic flap created from intercostal muscles and adherent thickened pleura were sutured all around the fistula.

Compression pads placed in axillary and anterior pectoral folds. 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. Appropriate Antibiotics and low pressure suction applied.

RESULTS

Out of 174 patients, there were 110 men and 64 women, age ranged from 12 years to 70 years (Mean age 31 years). One hundred and fourteen patients had complete thoracoplasty, while 60 had partial. (Table 1) Out of 114, 92 had failed decortication, 10 had been done primarily instead of decortication with bronchopleural fistula, 5 had post lobectomy space infection, and 4 had destroyed lung with hemoptyses and poor PFTs, and 3 patients with post pneumonectomy space infection. Of the 60 partial thoracoplasties, 34 were combined with decortication, 10 had failed decortication, and 16 had post lobectomy space obliteration.

Out of 174 patients who underwent thoracoplasty, 155 had an uneventful post-operative course. Twelve patients had post-operative wound infection which increased morbidity (Table 2). In one patient, there was a complete breakdown of the wound and recovery took about two months. In two patients empyema space persisted after partial thoracoplasty and a re-do complete thoracoplasty was done. Sinuses continued to persist in four patients. Ten patients, who had pre-operative bronchoplerual fistula, had an uneventful post-operative course. As detailed earlier, intercostal muscle bundles were used to support the repair of the fistula. Mean ICU stay was 2 days and mean hospital stay was 5 days.

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

Four patients achieved control of recurrent haemoptysis occurring from post-tubercular upper zone cavities. These patients were not taken up for resectional surgery because of the bilateral nature of fibrotic nodules. .

There were four deaths in the entire series (Table 2). Two early deaths both did not recover from anesthesia and two deaths were caused by persistent sepsis, septicemia and cachexia.

DISCUSSION

Thoracic surgery unit at Lady Reading Hospital Peshawar is a 36 bedded tertiary level referral center for whole of KPK and Afghanistan. 174 thoracoplasties were performed in 7 years and 9 months.

The main indications for thoracoplasty which we performed in our unit were space obliteration in cachectic patients. These patients had either decortication done previously which had failed, giving rise to persistent infected space or else had a post pneumonectomy space infection and other more conservative measures like drainage and stoma had failed. As our experience with the technique grew we started doing thoracoplasty primarily for empyema patients whose lung on the table, after full mobilization, did not inflate sufficiently to obliterate the space. In these cases as we anticipated a residual space, and the nutritional status of the patient was not conducive to muscle flaps, we did either a complete thoracoplasty or combine decortication with partial thoracoplasty.This in no way reduces the role of decortication.The best thing to fill the pleural space is expended lung tissue. If the lung is functionally deficient and can not fill the space then next best are muscle flaps if the patient is nutritionally sound and has sufficient muscle tissue. If that too is not available then in a much selected group of cachectic patients with persistent infected spaces we advocate thoracoplasty.

Patients with totally or partially destroyed lungs and poor lung functions, and hemoptysis ideally need a lung resection either in the form of lobectomy or pneumonectomy, and this is what most patients had. However again there was a specific group of patients who on top of hemoptysis due to destroyed lung, had very poor pulmonary reserve and were not fit for lung resection. In this select group of patients we resorted to collapse therapy, in the form of partial or complete thoracoplasty .The collapse therapy resulted in collapse and fibrosis of the affected lobe or lung resulting in symptomatic relief. It is again emphasized that the primary treatment for hemoptysis due to destroyed lung is lung resection, either lobectomy or pneumonectomy, and not thoracoplasty. Only in those few selected cases where the pulmonary reserve is insufficient for a lung resection, should thoracoplasty be considered.

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[1]. 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[3, 4, 7]. However, pulmonary tuberculosis and its complications are quite rampant in Pakistan. 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.

Various surgical procedures, mostly developed in the days of surgery for tuberculosis before the advent of antituberculous chemotherapy, have been reported. Resection

procedures in the presence of previous chronic lung disease are fraught with complications, such as persistent air leak, bronchopleural fistula, and space infection resulting from the non-expansion of the fibrotic residual lung. Technically the procedures are complicated and difficult because of the extensive induration and fibrosis. As a result of the poor general health of the patients and their immunocompromised state the postoperative period is often complicated by infection. Consequently the mortality of such procedures has been as high as 34%.[2] Lesser procedures such as thoracoplasty, and muscle transposition have therefore gained popularity as either an initial or a concomitant procedure.[3, 4]

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) [5, 6, 7]. In 1985, Hopkins and Co-workers[8] reviewed their experience with thoracoplasty. 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.

Harrigan[9] in his study also proposed the use of thoracoplasty in infected pleural spaces in 1990. Phillip[10] in 1999 reported his experience of 23 cases of thoracoplasty in post pneumonectomy empyema, Treasure[11] in 1995 adocated the use of thoracoplasty in resistant TB, Jaretzki[12] in 1991 advocated the use of thoracoplasty in selected cases of chronic empyema, as did Ali and Pairolereo[13] in 1991.

CONCLUSION

There is still a role for this obsolete procedure in selected cases of persistent infected pleural space, with little or no viable lung tissue. There is definite role for this procedure but the indications are very selective and its use should in no way undermine the role of more conventional procedures, like decortications, lung resection, pneumonectomy, muscle flaps etc. Tuberculosis and its complications are quite frequent in countries like Pakistan. 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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TABLE 1

Gender ratio, age range and type of procedures

M:F	110:64
AGE	12-70 (Mean 31 years)
Complete Thoracoplasty	114
Partial thoracoplasty	60

TABLE 2

Results of surgery in 174 patients who underwent thoracoplasty

Mortality	04
Early	02
Late	02 (due to persistent sepsis)
Complications	19
Complete breakdown of the wound	01
Wound infection	12
Re-operation	02
Persisting sinuses	04
Success of operation	
Obliteration of space	172/174
Control of sepsis	172/174
Control of bronchoplerual fistula	10/10
Control of haemoptysis	4/4