

Collapse Therapy in 21st Century an Experience of 50 Cases

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Objective: To observe the various indications of thoracoplasty and evaluate their management and outcome. **Study Design:** An observational descriptive study. **Place and Duration:** Department of Cardiothoracic Surgery, Postgraduate Medical Institute, Lady Reading Hospital from July 2001 to January 2004. **Subjects and Methods:** During two and a half years study period fifty patients needed thoracoplasty. M: F ratio was 36:14. Aged distribution was 23 – 57 with a mean age of 36.3 years. Indications for surgery were tubercular or parapneumonic empyema in 25(50%) patients, post lobectomy space infection, and broncho pleural fistula (BPF) in 10(20%), destroyed lung with hemoptysis in 8(16%), post pneumonectomy space infection in 4(8%) and upper lobe hemoptysis with poor PFTs in three (6%) cases. A standard subperiosteal extra pleural paravertebral surgical technique was used in all cases. Out of 50 cases 28 (56%) required full thoracoplasty and 22(44%) cases underwent partial thoracoplasty. Postoperatively all patients had a single chest drain on suction for 7 days. Both the drain and stitches were removed after 2 weeks and patients were advised to attend out patient department for follow-up. **Results:** Patients symptoms index showed remarkable improvement. 100% improvement was needed in patients regarding chest pain, fever, cough, weight loss, hemoptysis and ATT. Postoperative complications were noted in 10 (20%) cases. Four patients had wound infection, 2 had wound dehiscence, residual space in 3 and restricted shoulder mobility in one. There was 1(2%) mortality. This patient had borderline pulmonary functions and had to be ventilated for ventilatory failure. **Conclusion:** With the persistent problem of pulmonary tuberculosis in the developing countries, thoracoplasty is still an operation of continued relevance for space obliteration in cachectic patients, and as collapse therapy for bleeding lungs with poor PFTs. Most patients are definitively and rapidly cured with limited sequelae. **Key Words:** Thoracoplasty, Empyema Thoracis, Post resection space infection, Collapse Therapy

Thoracic surgery as a specialty has its beginning in the surgical treatment of pulmonary tuberculosis and its pleural space problems. The evaluation of thoracoplasty began with de Cereville (1885), who resected short lengths of two or more ribs anteriorly to collapse the chest wall over apical disease¹ Schede in 1890 described a thoracoplasty primarily for localized empyema that included not only multiple ribs but also the parietal pleura, periosteum, intercostal nerves resulted in cutaneous anesthesia and paresthesias of the abdominal wall. Even with aggressive a physical physiotherapy, the patient often has restricted motion of the shoulder and limited use of the ipsilateral arm². Gourdet (1912) obtained good results in treating nontuberculous empyema with relatively short resections of several ribs in the paravertebral gutter. These various approaches ultimately evolved into the classical throacoplasty described by Alexander in 1937^{3,4}. This remains the standard procedure and is accomplished in one stage. The magnitude of collapse procedure depends on the size of the empyema cavity or apical space. Ordinarily seven ribs are removed which allows extra costal musculature to drop into the space and helps to maintain the collapse^{5,6}. Special attention postoperatively must be paid to ensure proper functioning of ipsilateral shoulder girdle when an extensive thoracoplasty has been done. At present a thoracoplasty is rarely used primarily in the treatment of thoracic empyema except in cases in which insufficient or no remaining pulmonary tissue exists to obliterate the pleural space⁷. After the advent of

chemotherapy for pulmonary tuberculosis, the operation of thoracoplasty became rare in the developed countries. However this is not the case in developing countries like Pakistan.

We share our experience of fifty cases and to come up with recommendations in the light of the local pathology and resources.

Material and methods:

Over two and a half year period fifty patients underwent thoracoplasty. M: F ratio was 36:14. Age distribution was 23 – 57 with a mean age of 36.3 years. Indications for surgery were tubercular or parapneumonic empyema in 25(50%) patients, post lobectomy space infection, and broncho pleural fistula (BPF) in 10 (20%), destroyed lung with hemoptysis in 8 (16%), post pneumonectomy space infection in 4(8%) and upper lobe hemoptysis with poor PFTs in three (6%) cases. Out of 50 cases, 28 (56%) had full thoracoplasty while 22(44%) had partial (Table I). Out of 28, four had a post pneumonectomy space infection, four cases had a hydatid post lobectomy space infection, six had destroyed lungs with hemoptysis and poor PFTs, four had failed decortication and 10 were done primarily instead of decortication. Out of 22 partial cases 14 cases were combined with decortication while 6 had post lobectomy infected spaces and 2 had right upper lobe hemoptysis and poor PFTs. A standard subperiosteal extrapleural paravertebral surgical technique was used in all cases. Postoperatively all patients had a single chest

drain on suction for 7 days. Both the drain and stitches were removed after 2 hours.

Results:

Patients symptoms index showed remarkable improvement, 100% improvement was recorded in patients regarding chest pain, fever, cough, weight loss, hemoptysis and ATT (Table II). Postoperative complications were recorded in 10(20%) patients. Four patients had wound infections. Two patients had wound dehiscence and had to be resutured. Residual space was noted in 3 cases while one case had diminished shoulder mobility (Table II). There was one (2%) mortality in our series (Table III). This patient had borderline PFTs and developed respiratory distress postoperatively.

Table I Surgical procedures & indications (n=50)

Indications	n=	%age
Empyema (tuberculous & parapneumic)	25	50
Postlobectomy space infection with BPF	10	20
Destroyed lung with hemoptysis	08	16
Upper lobe hemoptysis – poor PFTs	03	06
Procedure		
Full thoracoplasty	28	56
Partial thoracoplasty	22	44

Table II: Mortality and morbidity (n=50)

Mortality & morbidity	n=	%age
Deaths	01	02
Complications	10	20
Wound infection	04	
Wound dehiscence	02	
Residual space	03	
Diminished shoulder morbidity	01	

Table III. Outcome (n=50)

Patients symptoms index	n=	%age
Hemoptysis	2/50	Nil
Fever	50/50	Nil
-Weight loss	50/50	Nil
Discharge	15/50	Nil
Chest Drain	16/50	Nil
Return to work	Nil	50/50
ATT	25/50	Nil

Discussion:

Cardiothoracic Unit at Lady Reading Hospital is a 36 bedded tertiary referral center for the whole of NWFP and Afghanistan. Over a 2.5 years period more than 2800 thoracic procedures (Major & Minor) were performed, out of which 50 i.e. about 1.6% were throacoplasties. Initially the choice of thoracoplasty was made perforce, but as the numbers increased and the encouraging results came forward, more and more were done electively as planned procedures. The main indications were:

1. Space obliteration in cachectic patients. These patients either had a decortication done previously which had failed, giving rise to a 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 since we anticipated a residual space, and the nutritional status of the patient was not conducive to muscle flaps, we would primarily do either a full thoracoplasty or combine a decortication with a partial thoracoplasty. This in no way reduces the role of decortication. The best thing to fill the pleural space is expanded lung tissue. If the lung is functionally deficient and can't 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 very select group of cachectic patients with persistent infected spaces we advocate thoracoplasty. In our study this group of patients was less than 2% of our thoracic operative workload.
 2. Patients with total or partially destroyed lungs and poor lung function, and hemoptysis. Ideally these patients need a lung resection either in the form of a lobectomy or a pneumonectomy, this is what most patients had. However again there was a specific group of patients who on top of hemoptysis due to a destroyed lung, had very poor pulmonary reserve and were not fit for a lung resection. In these select groups of patients we resorted to collapse therapy, in the form of a total or partial thoracoplasty. The collapse therapy resulted in collapse and fibrosis of the affected lobe or lung resulting in symptomatic relief. In addition to symptomatic relief it also took care of the AFB's. Out of our total 50 cases, 20 cases were on ATT of which 9 were on 2nd line drugs. Thoracoplasty by collapsing and fibrosing the affected lobe or lung, converted these patients (9 of which were MDR TB) to sputum negative. 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.
- Harrigan⁸ in his study also proposed the use of thoracoplasty in infected pleural spaces in 1990. Phillip⁹ in 1999 reported his experience of 23 cases of thoracoplasty in post pneumonectomy empyema. Treasure¹⁰ in 1995 advocated the use of thoracoplasty in resistant TB. Jaretzki¹¹ in 1991 the use of thoracoplasty in selected cases of chronic empyema, as did Ali and Pirolo⁵ in 1990.
- The immediate physiologic sequelae of a standard paravertebral thoracoplasty are related to the development

of an area of paradoxical motion of chest wall. The cough mechanism is reduced in effectiveness as a result of the inability to generate a high positive pressure in the pleural space because of the unsupported portion of the chest wall¹². The late physiologic changes are scoliosis, sacrifice of the intercostal nerves result in paresis of abdominal wall, and average reduction of 30% in both vital capacity and maximum voluntary ventilation^{5,13,14}.

Postoperative morbidity after thoracoplasty is related not only to the type of procedure used but also to the disease process present. The complications directly related to a conventional thoracoplasty are those caused by injury of the vessels or nerves during removal of upper ribs or injury to thoracic duct and septic complications^{15,7}. We had four cases of wound infection and two wound dehiscence.

Death after a thoracoplasty is most often related to the underlying chronic disease process rather than to the operation^{4,16}. Mortality has been reported as 2% to 6%^{5,10,17}. Mortality in our study was 2% i.e. one death. This was a patient with borderline pulmonary functions and needed ventilation for ventilatory failure.

Conclusion:

To conclude there is still a role for this once obsolete procedure in selected cases of persistent infected pleural space, with little or no viable lung tissue, and patients with insufficient pulmonary reserve for lung resection. An added spinoff is converting persistently sputum positive cases, even MDR, to sputum negative. These is a definite role for this procedure but the indications are very selective and it's use should in no way undermine the role of more conventional procedures, like decortication, lung resection, pneumonectomy, muscle flaps etc.

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