

## Thoracoplasty: The Indian Scenario

Shivakumaraswamy Siddalingaiah Tumkur<sup>1</sup>, Sathya Prakash S<sup>2</sup>, Shivaswamy Sosale<sup>3</sup>, Venugopal V.<sup>4</sup>, Supreeth Ballur<sup>5</sup>, Revathi<sup>6</sup>

**Authors Affiliation:** <sup>1</sup>Associate Professor, <sup>2</sup>Chief Anaesthetist, <sup>3</sup>Professor, <sup>4</sup>Specialist in Anaesthesia, <sup>5</sup>Assistant Professor, <sup>6</sup>Junior Resident, SDS Tuberculosis Research Centre & Rajiv Gandhi Institute of Chest Diseases, Bengaluru, Karnataka 560029, India.

### Abstract

**Background:** Thoracoplasty is the operative removal of the thoracic cage, which usually involves the subperiosteal resection of several ribs. By removing the skeletal support, the overlying chest wall will collapse to the visceral pleura, the remaining lung or mediastinum causing obliteration of pleural spaces. Thoracoplasty was originally described to treat the complications of pulmonary tuberculosis, but later it was widely applied to patients of chronic non tubercular pyothorax and bronchopleural fistulas secondary to various etiology. After the modern chemotherapy for tuberculosis, the indication for thoracoplasty drastically reduced, but its significance for the treatment of chronic non healing bronchopleural fistula has increased. Thoracoplasty is still widely performed where the burden of disease is high despite the advancement in chemotherapy for tuberculosis and incidence of post surgical bronchopleural fistula are commonly seen. **Patients and Methods:** patients who are treated between Jan 2015 to Dec 2018 with thoracoplasty for persistent residual space and bronchopleural fistula are included in this study. Totally 35 patients underwent thoracoplasty as a single stage procedure as a last resort after the failure of other modalities. Regular follow up of patients was done and data analysed. **Result:** Successful outcome is in the form of control of sepsis, closure of bronchopleural fistula, obliteration of space. The success achieved in all 34 patients with obliteration of space and cure of bronchopleural fistula. An average five to eight ribs removed in single sitting with preservation of first rib in all cases. One patient died and five patient had wound infection treated conservatively. **Conclusion:** Thoracoplasty is still an operation of continued relevance in Indian subcontinent and other countries where the complications of pulmonary tuberculosis is still prevalent despite the newer emergent chemotherapeutic drugs and regimens. Emergence of multidrug resistant non tubercular Pyothorax along with tubercular pyothorax causing severe debilitated and malnourished patients with the development of bronchopulmonary fistula make thoracoplasty to be performed more often.

**Keywords:** Thoracoplasty; Tuberculosis; Bronchopleural fistula; Pyothorax.

### How to cite this article:

Shivakumaraswamy Siddalingaiah Tumkur, Sathya prakash. S, Shivaswamy Sosale et al. Thoracoplasty: The Indian Scenario. J Cardiovasc Med Surg. 2019;5(2):89-92.

**Corresponding Author:** Shivakumaraswamy Siddalingaiah Tumkur, Associate Professor, SDS Tuberculosis Research Centre & Rajiv Gandhi Institute of Chest Diseases, Bengaluru, Karnataka 560029, India.

**E-mail:** shivakumaraswamyts@gmail.com

**Received on** 04.04.2019 **Accepted on** 04.05.2019

### Introduction

Thoracoplasty is the operative removal of the thoracic cage, which usually involves the subperiosteal resection of several ribs. By removing the skeletal support, the overlying chest wall will collapse to the visceral pleura, the remaining lung

or mediastinum causing obliteration of pleural spaces [1,5]. This procedure is indicated when repeated attempts by usual means fails to obliterate the persistent residual pleural space result from prior pulmonary resection, chronic pyothorax, bronchopleural fistula due to any etiology. This is operation that was originally devised as a collapse therapy in the surgical management of pulmonary tuberculosis began in 1885 with de Cereville. Thoracoplasty has evolved from many stages, starting from staged thoracoplasty procedure which successfully collapsed the cavities of pulmonary tuberculosis and then came the Schede procedure which aims at reducing intrathoracic spaces or filling them with living tissue implants followed by Bjork osteoplastic thoracoplasty, tailoring thoracoplasty and Andrews's thoracoplasty for chronic empyema with bronchopleural fistula.

The modern day thoracoplasty technique commonly performed today was that described by John Alexander [2,3]. This technique differs from that described by Schede, which involves the removal of ribs as well as the intercostal muscles and the often-thickened parietal pleura [4].

The indications for thoracoplasty are continuously decreasing, mainly due to development of effective chemotherapy for pulmonary tuberculosis and drastic advancement in lung resection surgery, decreased incidence of chronic pyothorax due to early diagnosis and intervention, use of newer generation of antibiotics and lack of acceptance by the modern world due to high morbidity and disfigurement after surgery [6,7].

This is not the scenario in India and other developing countries where thoracoplasty is performed more commonly due to high incidence of multi drug resistant tuberculosis, tuberculosis with HIV, multi drug resistance for other bacterial infection, malnutrition, malignancy, poor health care delivery system and lack of proper management at initial levels of health care and poor

patient compliance leading to drug resistance and complications [8,9].

### Patients and Methods

Patients who are treated between Jan 2015 to Dec 2018 with thoracoplasty for persistent residual space and bronchopleural fistula are included in this study. Totally 35 patients underwent thoracoplasty as a single stage procedure as a last resort due to failure of other modalities. The indications of thoracoplasty and other observations as follows.

Patients who are taken for thoracoplasty were evaluated preoperatively by routine blood investigations, bronchoscopy, chest X-ray (Fig. 1) (PA and lateral), computed tomography (Fig. 2a,b,c,d) (CT) thorax, pulmonary function tests, correction of the nutritional status, antibiotics according to blood, sputum, bronchial lavage, pus culture and sensitivity, in cases of pulmonary tuberculosis ATT was advised for at least 6 weeks before surgery. There were 10 female and 25 male patients aged between 20 yrs to 70 yrs in this study.

Adequate drainage of empyema space was achieved in all cases by intercostal chest tube drainage or by pleurocutaneous window till the discharge decreased to minimal. Bronchodilators and postural drainage, chest physiotherapy were continued even after surgery. Double lumen endotracheal tube with general anaesthesia in all cases with Patient in lateral decubitus position and by standard posterolateral thoracotomy incision as per the required length determined by pre operative radiological findings. (postero anterior and lateral chest films along with CT- thorax). The empyema cavity entered by incising the thickened pleura and number of ribs that need to be resected was determined by judging the extent of the space. The required ribs were excised posteriorly, from the neck and transverse process, anteriorly ribs are

Table 1:

Indications	Sex		Side		Death	Wound infection	Prolonged ICD >30 days	Average No of ribs removed
	Male	Female	Right	Left				
Tubercular empyema	8	3	7	4	0	01	1	5-8
Non tubercular pyogenic empyema	10	4	10	4	1	02	2	4-6
Post-operative empyema with Bronchopleural fistula	3	3	5	1	0	01	1	5-8
Drug resistant pulmonary tuberculosis	2	0	1	1	0	1	0	6-8
Post-treatment recurrent haemoptysis	2	0	2	0	0	0	0	5
Total	35 (25 + 10)		35 (25 + 10)		1	5	4	5-8



Fig. 1:

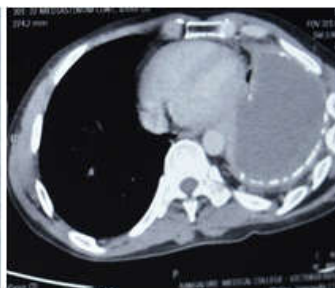


Fig. 2a:

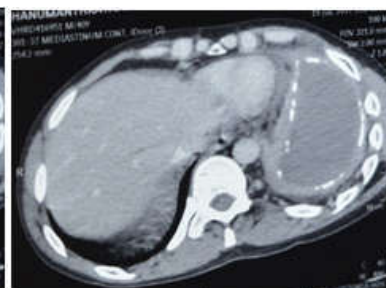


Fig. 2b:



Fig. 2c:



Fig. 2d:

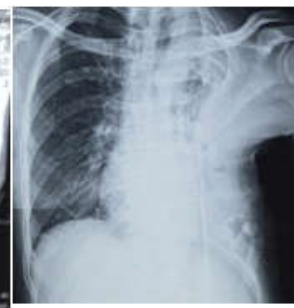


Fig. 3:

removed to “tailor” the collapse of the chest wall over the cavity. Underlying thickened pleura was incised along the full length of the empyema cavity. Intercoastal muscles were allowed to fall back to fill the space. Complete resection of back ends of the ribs were performed. If required transverse processes were resected and in all cases attempt was made to preserve the first rib. Myoplastic flap created in patients with bronchopleural fistula from intercostal muscles and thickened pleura sutured around the fistula. In patients with upper zone cavity, the apex of the lung was freed and soft tissues were retracted downwards so as to obliterate the space (apicolysis).

Closed drainage of the pleural space was carried out with two tubes and the chest wall was closed in two layers with vicryl suture and skin approximated by interrupted non absorbable sutures. Application of compression pad dressing using rolls of cotton and bandage was done in all cases. The axillary and an anterior pectoral cotton pad of sufficient bulk were retained in position till approximation was achieved (Fig. 3). The tube is placed along the full length of the cavity postoperatively and withdrawn slowly after fistula closure and after the infected cavity is obliterated. Chest Physiotherapy, breathing exercises, incentive spirometry, bronchodilators and active shoulder movement was encouraged postoperatively with adequate analgesia.

## Results

Out of 35 patients who underwent thoracoplasty, 30 patients had an uneventful post-operative course. Five patients had post-operative wound infection which settled without any intervention, one required wound resuturing. One patient died of sepsis in non tubercular pyogenic pyothorax group on 27<sup>th</sup> post operative day. In Four patients, there was a persistent drainage and air leak from drain needus to keep ICD in situ > 30 days. All these patients wdrainage tube were out of by the end of 50<sup>th</sup> day with good nutritional support physiotherapy and proper antibiotics as Per culture. The success achieved in all 34 patients with obliteration of space and cure of bronchopleural fistula. An an average five to eight ribs removed in single sitting with preservation of first rib in all cases.

## 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 [1,5,6,7]. It is stressed that the goal of thoracoplasty is to compress parenchymal cavities, and reduce or

obliterate the pleural space. When there is failure of medical treatment, surgical resection, decortication, muscle flap procedures, poor respiratory reserve, the presence of severe comorbidity, thoracoplasty with or without muscle flap is an option. Thoracoplasty is useful in patients with a persistent contaminated space problem following resection [8-12]. Success of thoracoplasty depends on adequate drainage of space for control of sepsis before operation, improving the nutritional status of the patient, aggressive control over the comorbid conditions like diabetes mellitus, cardiac failure, immunocompromise status, excision of sufficient number of ribs particularly posterior resection and if required, transverse processes of adjacent Vertebra to obliterate the space and Performing an extra fascial picolysis whenever space to be obliterated is located in the apex of chest [6,7,12]. Success of the operation as judged by control of space infection, space obliteration, and closure of the bronchopleural fistula [6,7,8,9].

Although staging procedure has been advised by many, single stage resection gives equally good results. There is a controversy regarding the removal of first rib during thoracoplasty. We always preserve the first rib for the fact that that it provides the structural support to the neck, shoulder girdle and upper thorax. In upper lobe cavity or space as seen mostly in post pneumonectomy cases first rib has to be removed as a part of apicolysis [5,6,8,10,11].

These indications for the operation of thoracoplasty are continuously decreasing in other parts of developed countries [6,7,8]. In India prevalence of pulmonary tuberculosis and its complications are more common with associated problems like poor patient compliance, drug resistance, poor health care delivery system and failure to address the situation at early stages made the thoracoplasty still a required procedure [8,9,12]. If the lung cannot expand to occupy chest wall either by tube thoracostomy, rib resection and decortication, the chest wall made to fall on remaining lung or the mediastinum [3,7,8]. As thoracoplasty is somewhat mutilating, it is always carried out as a last resort when there is either insufficient or no remaining pulmonary tissue to obliterate the pleural space.

### Conclusion

Thoracoplasty is still an operation of continued relevance in Indian subcontinent and other

countries where the complications of pulmonary tuberculosis is still prevalent despite the newer emergent chemotherapeutic drugs and regimens. More number of complicated pyothorax cases are seen now a days because of association of tuberculosis with HIV and immunosuppressive patients due to various causes, multiple comorbid conditions like diabetes mellitus, cardiac, renal, CVA, malnutrition, poor patient compliance and emergence of multidrug resistant non tubercular pyothorax causing severe debilitated and malnourished patients with the development of bronchopulmonary fistula make thoracoplasty to be performed more often.

### References

1. Langston HT. Thoracoplasty: The how and the why. *Ann Thorac Surg.* 1991;52:1351-53.
2. Alexander J. *The Surgery of Pulmonary Tuberculosis.* Philadelphia, PA: Lea & Febiger, 1925.p.59.
3. Alexander J. *The Collapse Therapy of Pulmonary Tuberculosis.* Springfield, IL, C.C. Thomas, 1991;193752:1351-53.
4. Schede M. *Die hehandlind der empyeme.* Verh Cong Inner Med Wersb, Vienna, Austria, 1890.
5. Barker WL. Thoracoplasty. *Chest Surg Clin North Am.* 1994;4:593-615.
6. George Peppas, Thomas F. Molnar, Kumarasingham Jeyasingham, and Alan B. Kirk. Thoracoplasty in the Context of Current Surgical Practice. *Ann Thorac Surg.* 1993;56:903-9.
7. Hopkins RA, Ungerleider RM, Status EW, et al. The modern use of thoracoplasty. *Ann Thorac Surg.* 1985;40:181.
8. Dewan RK, Singh S, Kumar A, Meena BK. Thoracoplasty: An Obsolete Procedure? *The Indian Journal of Chest Diseases & Allied Sciences;* Set 1999;41:83-88.
9. Dr. Dheeraj Sharma, Dr. Anula Sisodia, Dr. Sanjeev Devgarha, Dr. Rajendra Mohan Mathur. Thoracoplasty: A 15 Year Single Centre Experience. *IOSR Journal of Dental and Medical Sciences.* 2017 Mar;16(3 Ver. VI):124-127.
10. Thomas Pezzella, Wentao Fang. Surgical Aspects of Thoracic Tuberculosis: A Contemporary Review – Part 1. *Curr Probl Surg.* 2008 Oct;45:675-758.
11. Pezzella AT, Fang W. Surgical Aspects of Thoracic Tuberculosis: A Contemporary Review - Part 2. *Curr Probl Surg.* 2008 Nov;45:771-829.
12. Ravindra Kumar Dewan, A Thomas P. Surgical aspects of pulmonary tuberculosis: an update. *Asian Cardiovascular and Thoracic Annals.* 2016 Jul 28;835-46.

## RITA - LITA 'Y' Conduit in an Asymptomatic Left Subclavian Artery Stenosis: A Safe Alternative

Varadaraju R<sup>1</sup>, Ramesh HC<sup>2</sup>, Chandra Sena M<sup>3</sup>, Umesh S<sup>4</sup>

**Authors Affiliation:** <sup>1</sup>Associate Professor <sup>2</sup>Assistant Professor <sup>3</sup>Resident, Dept of Cardio-thoracic and vascular surgery, <sup>4</sup>Associate Professor, Dept of Cardiac Anesthesiology, Sri Jayadeva institute of Cardiovascular Sciences and Research, Bengaluru, Karnataka 560069, India.

### Abstract

Patients with symptomatic left subclavian artery stenosis (LSA), often undergo intervention. The need for intervention in incidentally detected LSA stenosis in patients undergoing coronary artery bypass grafting (CABG) is controversial. We evaluated an elderly male with triple vessel coronary artery disease and borderline stenosis in LSA. Bilateral internal thoracic artery (ITA) conduits were harvested and right ITA - left ITA 'Y' grafting was done. This approach can be considered as an alternative for patients undergoing bypass surgery with asymptomatic LSA stenosis to prevent coronary subclavian steal syndrome.

**Keywords:** Left subclavian artery (LSA) stenosis; RITA- LITA 'Y' configuration; Coronary Subclavian Steal.

### How to cite this article:

Varadaraju R, Ramesh H C, Chandra Sena M et al. RITA - LITA 'Y' Conduit in an Asymptomatic Left Subclavian Artery Stenosis :A Safe Alternative. J Cardiovasc Med Surg. 2019;5(2):93-94.

### Introduction

Prevalence of LSA stenosis in patients undergoing CABG is 0.2-6.8% [1]. Most of these patients have undergone intervention with either angioplasty

or stenting, either prior to or post CABG surgery. Surgical bypass of LSA can also be an alternative. When using pedicled left ITA graft in stenotic LSA, there is a possibility of coronary subclavian steal later in the life as the stenosis can progress even in asymptomatic patients. Treating asymptomatic LSA stenosis thus can be avoided with right ITA - left ITA 'Y' configuration and the stenosis tackled when symptomatic.

**Corresponding Author:** Ramesh HC, Assistant Professor, Dept of Cardio-thoracic and Vascular Surgery, Sri Jayadeva institute of Cardiovascular Sciences and Research, Bengaluru, Karnataka 560069, India.

**E-mail:** [ddr.hc.ramesh@gmail.com](mailto:ddr.hc.ramesh@gmail.com)

**Received on** 01.11.2018 **Accepted on** 08.04.2019

### Case Report

An elderly gentleman presented to our department with history of left sided chest pain with no significant past history. Troponin - T was negative. NSTEMI was diagnosed. On routine echocardiography, ejection fraction of 45% with

moderate mitral regurgitation was demonstrated. Coronary angiogram revealed triple vessel disease (TVD) with < 50% occlusion of left SCA. CT Arch Aortogram showed 50% stenosis of LSA with other arch vessels showing normal caliber. (Figs. 1,2) On careful blood pressure recording of bilateral upper limbs, 5 mmHg differences in pressure was noted. In view of absent upper limb claudication, insignificant LSA stenosis and trivial upper limb pressure difference, we decided do CABG for triple vessel disease and address the mitral valve with conservative management for LSA stenosis. He underwent right ITA- left ITA 'Y' configuration grafting; with right ITA to left anterior descending, left ITA to obtuse marginal and vein graft to posterior descending artery. Mitral valve repair with 28 Carpentier Edwards ring was performed. Patient was shifted to recovery with stable hemodynamics.



Fig. 1: CT arch aortogram with stenosis of proximal left subclavian artery (arrow head).

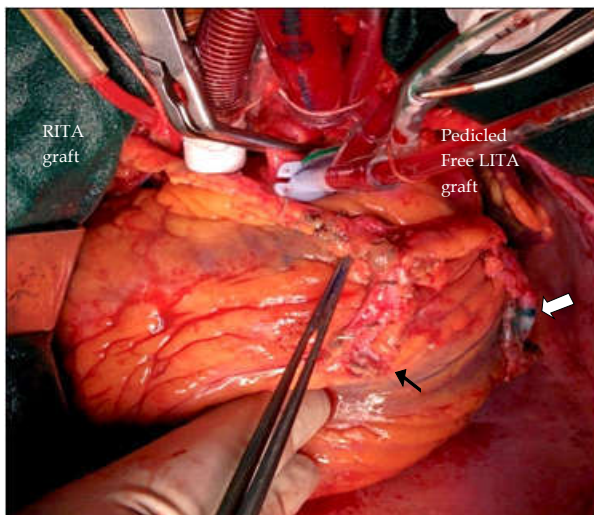


Fig. 2: RITA-LITA 'Y' with RITA to LAD (black arrow) and LITA to OM (white arrow).

## Discussion

Coronary artery disease and peripheral artery rarely co-exist simultaneously. LSA stenosis is more commonly observed. Subclavian artery stenosis usually affects the brain and upper extremities. Atherosclerosis is the most common cause of this condition, but other etiology also needs importance.

Symptomatic LSA stenosis needs intervention with options of surgical or endovascular approach depending on the urgency. If an ITA conduit is being planned for CABG, stenosis can be treated prior to or after the procedure [2]. Controversy still exists over the approach towards asymptomatic LSA stenosis. The need for intervention has not shown benefit over medical therapy in asymptomatic patients [3]. Stenosis in LSA was left without any intervention in our patient as the upper limb pressure difference was <10 mmHg, no vertebrobasillar or upper limb claudication symptoms and CT angiography showing <50% stenosis.

A free ITA graft or the contra-lateral in situ ITA can be used provided the parent vessel is free of significant disease. Graft patency rates of right and left ITA are similar. Patency rates of radial artery are inferior when compared to ITA [4]. The incidence of coronary subclavian steal post CABG is reported more frequently in busy cardiac centres [5]. We performed Y grafting with free pedicled left ITA to right ITA in view of progression of stenosis and prevention of coronary subclavian steal.

*Conflict of Interest:* None.

*Funding:* None.

## References

1. Prasad A, Prasad A, Varghese I, Roesle M, Banerjee S, Brilakis ES. Prevalence and treatment of proximal left subclavian artery stenosis in patients referred for coronary artery bypass surgery. *Int J Cardiol.* 2009;133:109-11.
2. Rogers JH, Calhoun RF. Diagnosis and management of subclavian artery stenosis prior to coronary artery bypass grafting in the current era. *J Card Surg.* 2007; 22:20-5.
3. Schillinger M, Haumer M, Schillinger S, Mlekusch W, Ahmedi R. Outcome of conservative versus interventional treatment of subclavian artery stenosis. *J Endovasc Ther.* 2002;9:139-46.

4. James Tatoulis, Brian F Buxton, John A Fuller. The Right Internal Thoracic Artery: The Forgotten Conduit—5,766 Patients and 991 Angiograms. *Ann Thorac Surg.* 2011;92:9-17.
  5. Thomas J Takach, George J Reul, Denton A Cooley, J Michael Duncan, James J Livesay, David A Ott, Igor D Gregoric. Myocardial Thievery. The Coronary-Subclavian Steal Syndrome. *Ann Thorac Surg.* 2006;81:386-92.
-

# REDKART.NET

(A product of RF Library Services (P) Limited)

(Publications available for purchase: Journals, Books, Articles and Single issues)

(Date range: 1967 to till date)

The Red Kart is an e-commerce and is a product of RF Library Services (P) Ltd. It covers a broad range of journals, Books, Articles, Single issues (print & Online-PDF) in English and Hindi languages. All these publications are in stock for immediate shipping and online access in case of online.

**Benefits of shopping online are better than conventional way of buying.**

1. Convenience.
2. Better prices.
3. More variety.
4. Fewer expenses.
5. No crowds.
6. Less compulsive shopping.
7. Buying old or unused items at lower prices.
8. Discreet purchases are easier.

URL: [www.redkart.net](http://www.redkart.net)