

# "Mini-Sternotomy" for Bilateral Pulmonary Wedge Resections

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**A mini-sternotomy is described that allows access to both thoracic cavities. This technique offers excellent exposure for lung resections from chest cavities without the invasiveness of a formal thoracotomy.**

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A "T"-type mini-sternotomy was used to gain access to both thoracic cavities. The exposure permits resection of lung nodules from any lobe of the left and right lungs. This incision saves time compared with bilateral thoracotomies, because the patient is not turned from one side to the other and redraped. A mini-sternotomy is less invasive than a full sternotomy, appears better tolerated, and improves the patients' postoperative course.

The patient was a 75-year-old man who had a cystectomy with ileal loop for transitional cancer of the urinary bladder in March 1994. He presented with three distinct noncalcified nodules identified on a computed tomography scan. These nodules were located in right upper lobe, left upper lobe, and right lower lobe. Needle-guided biopsies of these multiple sites were reported as nondiagnostic. A follow-up chest roentgenogram done 3 weeks later revealed an increase in size of the right upper lobe mass. The oncologist advised surgical biopsy of all nodules. In March 1998, the patient underwent a "T" mini-sternotomy for wedge resection of the multiple lung nodules. Left and right upper lobe excisional biopsies proved to be metastatic transitional cell carcinoma. The right lower lobe biopsy site was reported as benign organized pneumonia. Two chest tubes were placed. His postoperative course was uneventful and he was discharged home on postoperative day 4. He is currently receiving chemotherapy.

The patient is anesthetized and intubated with a double-lumen endotracheal tube for selective ventilation. A midline incision is made from the sternomanubrial junction to the xyphoid process, which is removed. The insertion site of the pectoralis major muscle over the sternum is elevated between the second to the fifth intercostal space using the electrocautery. The sternum is divided transversely at the level of the third intercostal space with the oscillating saw and subsequently longitudinally

from this space to the distal end to allow insertion of the sternal retractor (Fig 1). Both internal mammary arteries are preserved. Mammary retractors are used to lift the appropriate sternal half and enter either thoracic cavity as needed.

The pleural spaces are opened sequentially and the chest cavities are entered. While the opposite lung is ventilated, the collapsed lung is elevated with moist sponges placed posteriorly and by manual retraction. Wedge resections can be easily performed. Closure is accomplished using stainless steel wire (Fig 2).

## Comment

Minimally invasive surgical techniques have been used increasingly in cardiothoracic surgery. Thoracoscopic-assisted surgery is a common minimally invasive procedure and has been combined with median sternotomy for resection of left lower lobe lesions [1]. We did not expose the left lower lobe, since there were no lesions identified in the computed tomography. But we feel that by dividing the inferior pulmonary ligament, the left lower lobe can be mobilized sufficiently to provide access for wedge resection. We have applied the "T" type median sternotomy used for minimally invasive valvular and coronary artery surgery as an alternative for bilateral thoracoscopic or open chest surgery. This technique is less expensive, can be performed in shorter operative time, and decreases standard postoperative stay. The incision preserves the integrity of the manubrium and is less invasive.

Median sternotomy incision predates coronary artery bypass graft operation by five decades [2] and was used to approach the anterior mediastinum. Use of the median sternotomy has been extensively documented for a wide range of operative procedures [2]. The first documented case of median sternotomy performed for bilateral pleural abrasion was performed in 1973 [2].

There is significant physiologic advantage comparing a median sternotomy with thoracotomy. The injury resulting from a thoracotomy incision significantly decreases chest wall compliance, which results in a decrease in key pulmonary function indices such as lung compliance, vital capacity, minute ventilation, and maximum expiratory flow rate. The overall physiologic end result of a thoracotomy incision is a hypoventilating patient with a depressed ability to expectorate secretion effectively. This deterioration of pulmonary function may last as long as 10 days [3].

Patients undergoing sternotomy preserve most of the

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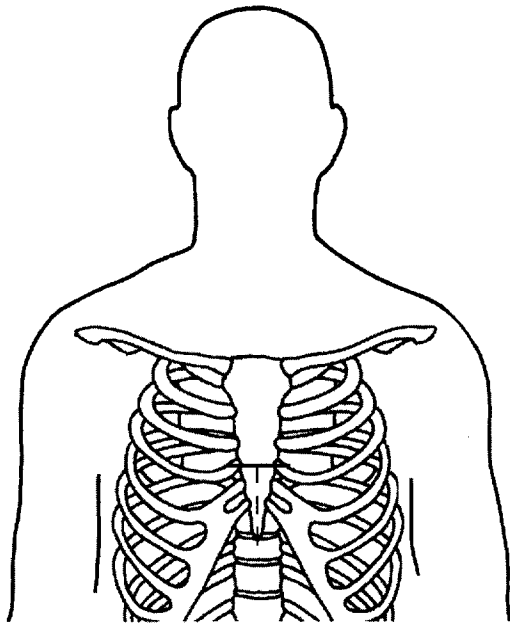


Fig 1. Outline of the divided sternum.

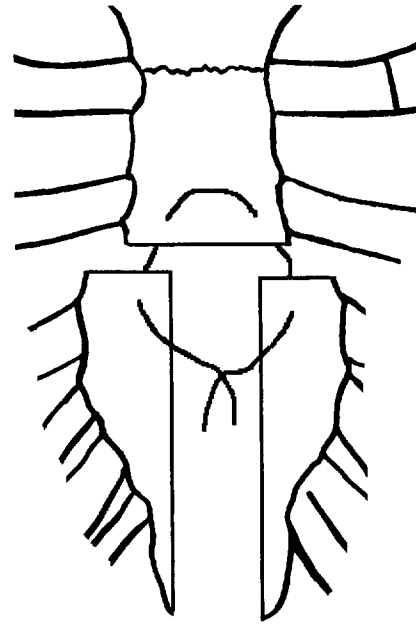


Fig 2. Inverted "U" steel wire closure.

key pulmonary function indices. There is very little disturbance or division of the major muscle groups involved with the respiratory cycle. The change in the pulmonary function tests between thorocotomy patient and the sternotomy patient becomes statistically significant after the fourth postoperative day [3]. The "T" mini-sternotomy achieves these benefits as it results in decreased operative trauma.

We have applied "T" mini-sternotomy to a selected population for access to both thoracic cavities for multiple pulmonary nodule resections at one setting. It may

also be applicable to bilateral resection of bulla and pleurodesis with less operative trauma.

#### References

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