

Open heart surgery with concomitant pulmonary resection

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With the increasing applicability of cardiac surgical procedures, particularly in older age groups, increasing numbers of patients will be encountered with concomitant diseases amenable to surgical treatment.¹ We present three patients who underwent pulmonary resection associated with various cardiac surgical procedures. One patient had severe bronchiectasis and mitral stenosis requiring mitral valve replacement with pneumonectomy. The other two patients had coronary artery disease and pulmonary neoplasms requiring pneumonectomy and bilobectomy concomitant with coronary bypass procedures. All patients survived and returned to constructive life. Operative techniques and therapeutic rationales are discussed.

The advisability of subjecting a patient to multiple concomitant surgical procedures has been a source of debate for decades. Unfortunately, the dilemma has never been categorically resolved; patients continue to present with unique problems that require individual consideration and careful surgical judgment. The addition of new surgical techniques only increases the probability of multiple surgically-correctable lesions. The fundamental consideration in these cases is

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whether the risk of simultaneous correction outweighs the risk of treating a single lesion, while permitting the untreated lesions to progress until they can be corrected at a later date. When a single disease process such as arteriosclerosis affects multiple organ systems, the performance of multiple procedures is reasonable, particularly if an operation in itself may precipitate the ultimate consequences of an uncorrected lesion. Bernhard and associates² have shown that, in the presence of occlusive disease affecting both arterial systems, concomitant coronary bypass and carotid endarterectomy carry less risk than either procedure alone. In the case of unrelated disease processes, only anatomic proximity would seem to indicate simultaneous treatment. If interdependent organ systems are involved, however, simultaneous treatment may be indicated or even demanded.

The following report details three cases that illustrate the above considerations. Although operations that require cardiopulmonary bypass ordinarily are considered hazardous enough to preclude concomitant procedures, the unique circumstances involved in these cases dictated otherwise.

Case Reports

Case 1

A 49-year-old woman reported an extensive history of pulmonary infections. Bronchography and bronchoscopy documented diffuse bronchiectatic changes in the right lung. Despite comprehensive medical treatment with antibiotics and supportive measures, she continued to deteriorate and finally presented with increasing dyspnea and cyanosis associated with cardiomegaly.

On physical examination, the patient's vital signs were within normal limits, but she appeared emaciated and chronically ill, with peripheral cyanosis and jugular venous distention. Although the left lung was clear, auscultation of the right lung revealed diffuse rales, coarse rhonchi, and expiratory wheezing. Precordial examination disclosed a right ventricular lift with a Grade 2 systolic murmur at the apex and an increased pulmonary second sound. The liver was palpated 4 cm below the right costal margin. Laboratory results were within normal limits, but sputum cultures developed *Enterobacter* and *Pseudomonas* organisms sensitive to gentamicin.

Cardiac catheterization documented severe calcific mitral stenosis. The pulmonary angiogram (Fig. 1) showed pulmonary fibrosis with cyst formation and thinning of the tertiary and quaternary arterioles of the right lung.

After the pulmonary infection had been brought under control, the patient underwent right pneumonectomy and mitral valve replacement with a medium Beall valve. Both procedures were carried out via an

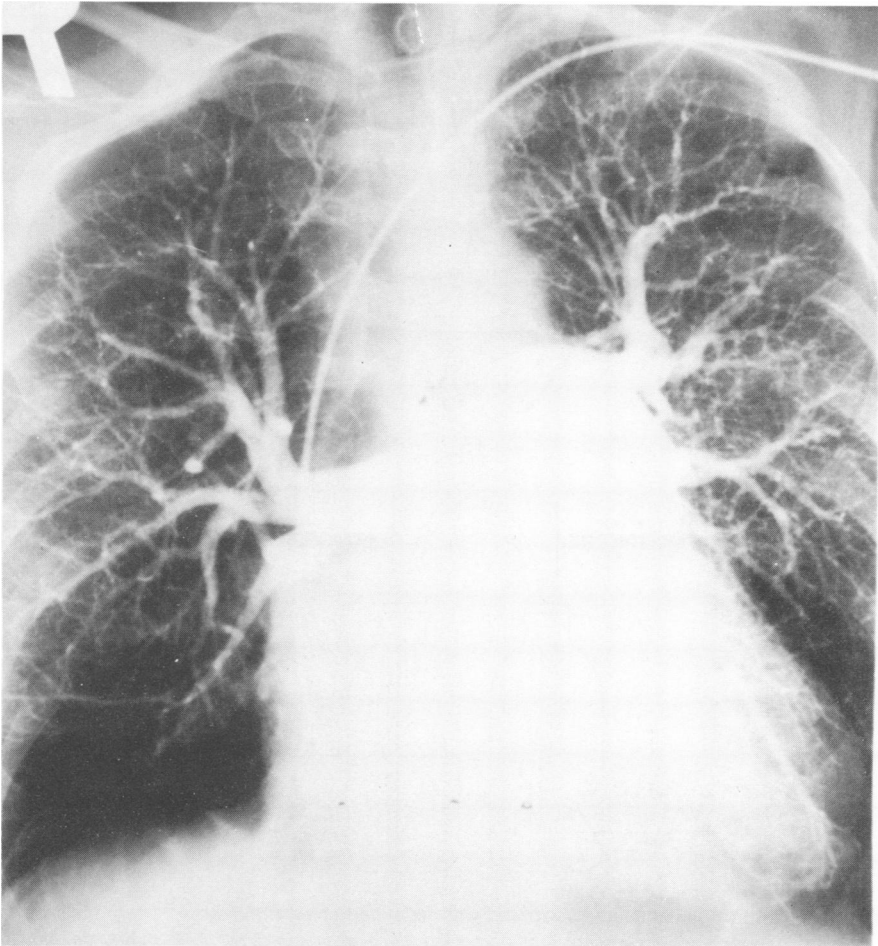


Fig. 1 Cyst formation and decreased vascularity of the left lung shown on pulmonary angiogram of Patient 1.

incision through the fourth intercostal space; pneumonectomy was performed first, followed by mitral valve replacement. Cardiopulmonary bypass was used during the pneumonectomy because efforts to mobilize the lung without bypass resulted in severe hypotension.

The patient was taken to the recovery room in a stable condition, but within 2 hours, she experienced hypotension and progressive cardiac failure unresponsive to adjustments in venous pressure and positive inotropic agents. The intraaortic balloon pump provided excellent diastolic augmentation, with progressive cardiac improvement and increased urine output. A balanced chest drainage system (Fig. 2) maintained the midline mediastinum. Arterial blood gases were satisfactory, as indicated by the volume ventilator. After 60 hours, the patient's

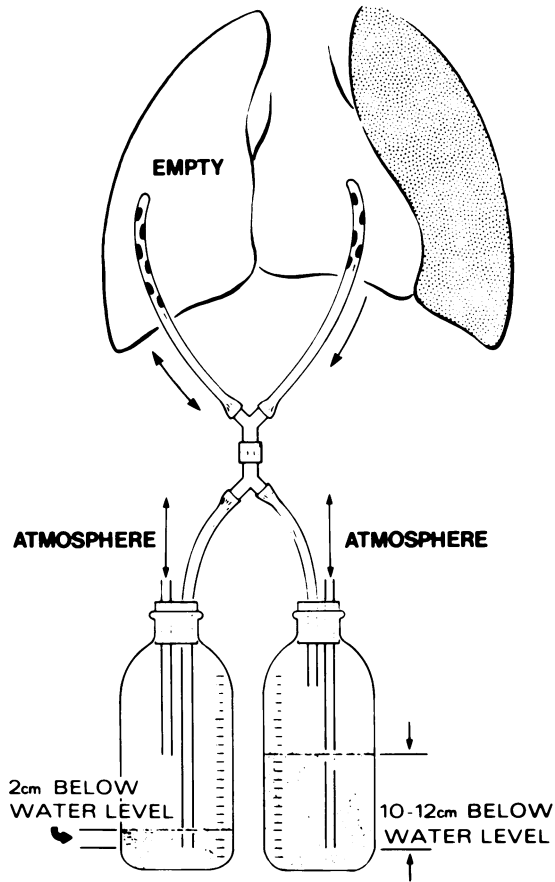


Fig. 2 Pressure relationships associated with balanced chest drainage.

improved cardiac state allowed removal of the intraaortic balloon. During her extended hospital stay, she improved progressively. Antibiotic regimens were changed according to serial cultures and the patient's clinical state, and anticoagulation was accomplished with sodium warfarin in a routine fashion. The patient was discharged on the fifty-third postoperative day (Fig. 3).

Throughout the following year, she improved progressively and experienced no cyanosis or pulmonary infection. Although still restricted in her activities, she was able to do housework, leave her home for extended periods of time, and enjoy a definitely improved quality of life. She continued to progress until 16 months after hospital discharge, when she suffered a cerebrovascular accident and died. Her death was presumed to result from a complication associated with her mitral prosthesis, but permission for post mortem examination was not granted.

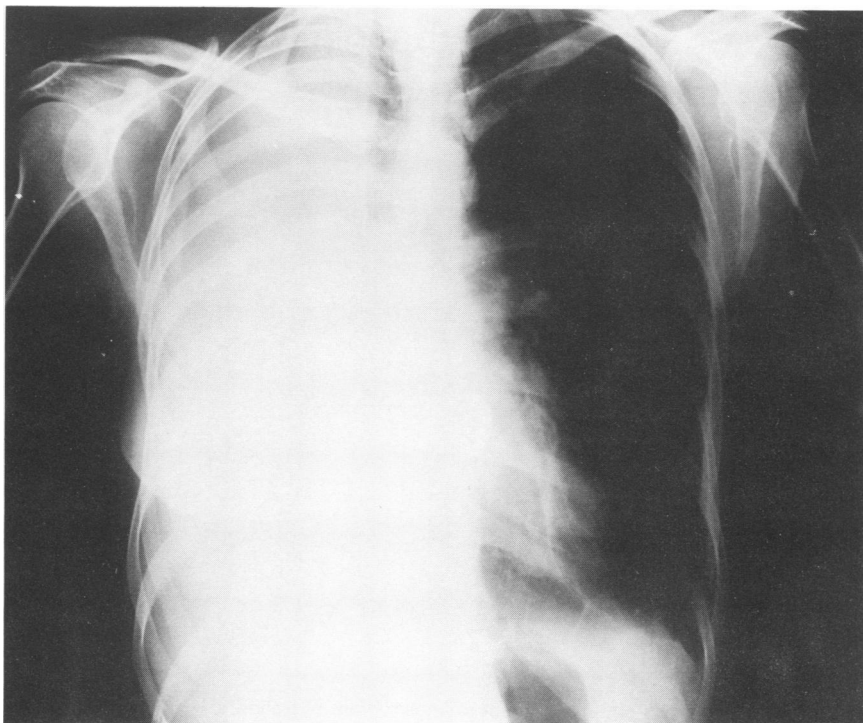


Fig. 3 Chest roentgenogram of Patient 1 at the time of discharge.

Case 2

A 70-year-old man, 1 month post myocardial infarction, was evaluated for a left hilar mass (Fig. 4). The results of physical examination and laboratory tests were within normal limits. Coronary angiography documented complete occlusion of the dominant right coronary artery, akinesia of the inferior left ventricular myocardium, and 90% occlusion of the left anterior descending coronary artery. The patient underwent concomitant left pneumonectomy and left anterior descending aorto-coronary bypass via a bilateral fourth interspace incision. Pneumonectomy preceded the bypass grafting. A histologic report of the operative specimen revealed squamous cell carcinoma without lymph node involvement. The patient was taken to the recovery room in good condition. Balanced chest drainage maintained a midline mediastinum, and blood gases were satisfactory. Recovery was uneventful, and the patient was discharged on the eleventh postoperative day (Fig. 5). He returned to active farming and remained asymptomatic until 33 months later, when the carcinoma recurred. He died 35 months postoperatively.

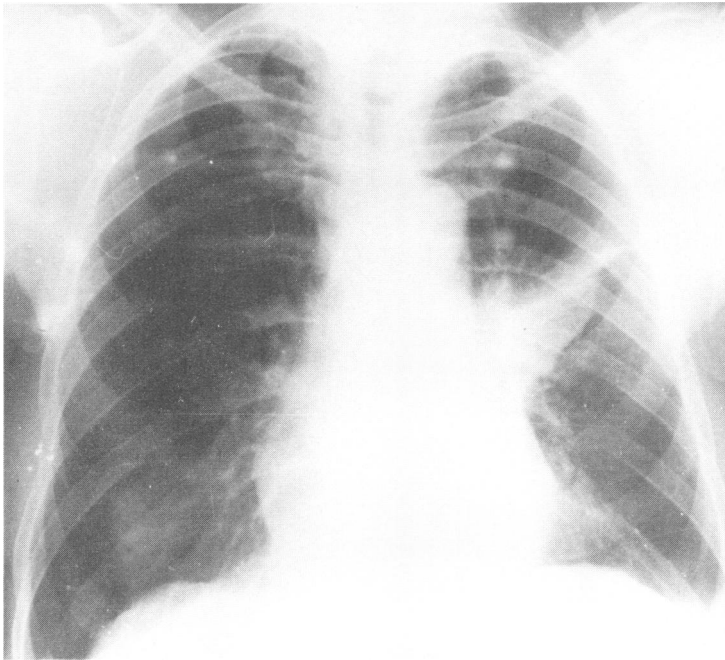


Fig. 4 A left hilar mass shown on chest roentgenogram of Patient 2.

Case 3

A 49-year-old man was admitted with preinfarction angina and a nodular lesion in the right mid-lung field (Fig. 6). Coronary angiography documented 90% lesions of the left anterior descending and first diagonal coronary arteries, 60% obstruction of the left internal carotid artery, and significant aortoiliac occlusive disease. Tomograms of the right mid-lung field confirmed a nodular lesion consistent with carcinoma. Saphenous vein bypass to the left anterior descending and first diagonal coronary arteries was performed concomitantly with a right upper and middle lobectomy through a midline sternotomy incision. Initially, the patient did well. However, on the third postoperative day, he developed tenacious profuse bronchial secretions that necessitated tracheostomy and volume ventilator support. His lung fields remained clear roentgenographically, although a low-grade fever was present despite tobramycin sulfate and cephalosporin therapy. After 10 days, the patient was weaned from the ventilator. He was discharged on the seventeenth postoperative day (Fig. 7). He improved steadily and underwent left carotid endarterectomy 7 months later. He remained free of angina pectoris and clinical evidence of carcinoma until 3½ years later, when he died of recurrent cancer.

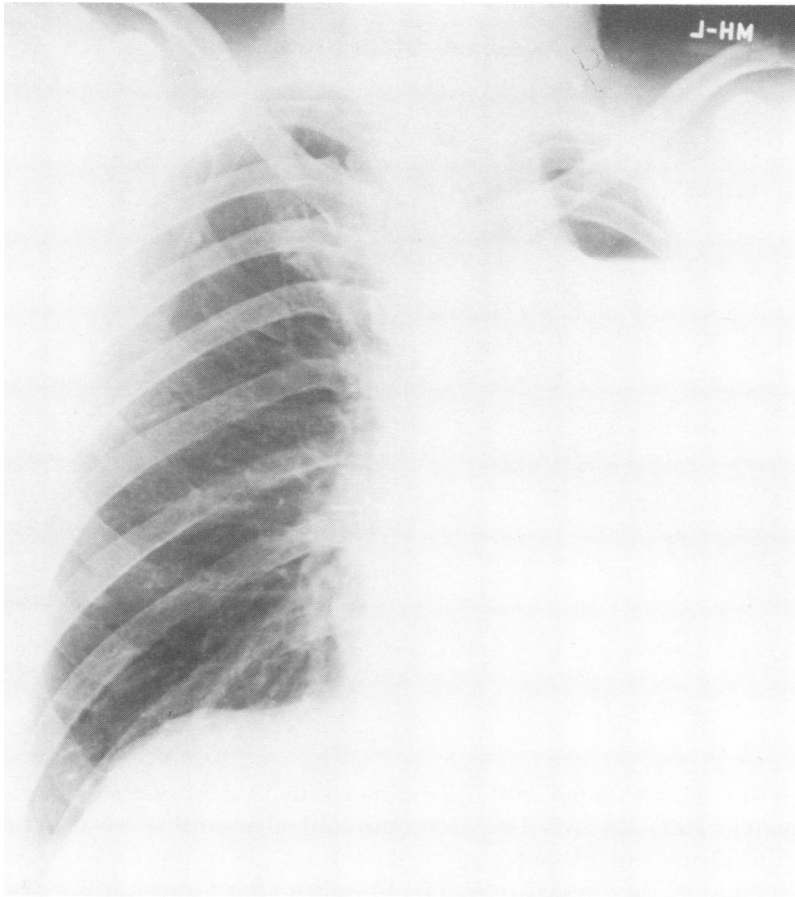


Fig. 5 Chest roentgenogram of Patient 2 at time of hospital discharge.

Discussion

Each of the foregoing cases presented a dilemma in management that was resolved by simultaneous surgical treatment of the various disease processes. The patient in Case 1 was desperately ill and required two major procedures. Mitral valve replacement was necessary to relieve cardiac decompensation, while pneumonectomy was indicated to eliminate the source of persistent pulmonary infections and the shunting that was responsible for desaturation. It was clear that success would be an all or nothing phenomenon. The patient would never have tolerated pneumonectomy without an improvement in her cardiac state, and valve replacement without treatment of her persistent pulmonary infections would surely have produced an infected prosthesis. In cases 2 and 3, myocardial revascularization was considered a positive factor that dimin-

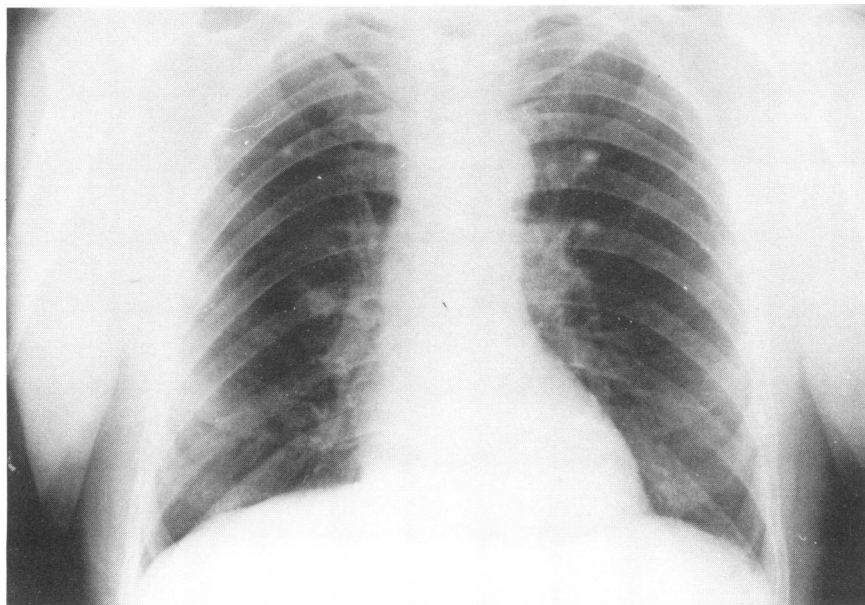


Fig. 6 Chest roentgenogram of Patient 3 shows a nodular lesion in the right mid-lung field.

ished the risk associated with pneumonectomy in the presence of severe coronary artery disease. The 35-month and 41-month survival periods seem to justify our efforts.

Technically, the procedures were straightforward and not unreasonably lengthy. The median sternotomy and bilateral thoracotomy approaches provided excellent exposure. Postoperative management was difficult in Cases 1 and 3, but Case 2 was no more difficult than it might have been with either procedure alone. The balanced drainage system provided adequate chest drainage and eliminated mediastinal shift.

With the increasing application of coronary angiography for the evaluation of coronary artery disease, we believe that more and more elderly patients with pulmonary neoplasms will become candidates for simultaneous myocardial revascularization. Perhaps this is one way in which the mortality associated with pulmonary resection can be lowered.

Summary

In the three unusual cases reported here, carefully individualized therapy included major pulmonary resection combined with a cardiac surgical procedure. We do not advocate the general application of concomitant procedures, but with an experienced surgical team, the results can be gratifying in selected cases.

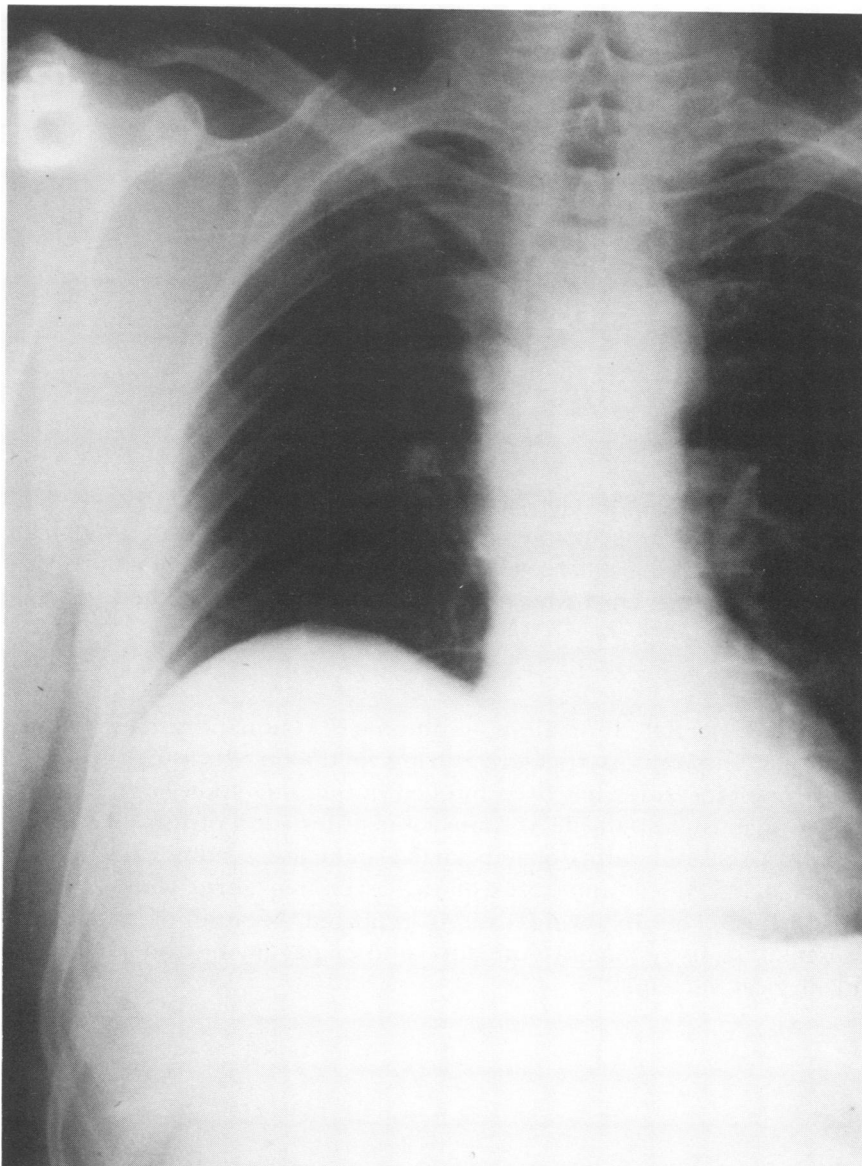


Fig. 7 Chest roentgenogram of Patient 3 at the time of hospital discharge.

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