Cost Containment in a Hospital Program for Home Oxygen Therapy

To the Editor:

Longterm home oxygen therapy for patients is costly. This led our hospital to formulate a clear and consistent policy to administer such a program.

Medical audit of home oxygen therapy administered by the Veterans Administration Medical Center in Phoenix in 1977 indicated that 56 percent of total patients received the therapy inappropriately, and presumably, without benefit. Thus, for 100 patients who received therapy appropriately, there were an additional 126 patients who received it inappropriately. After 1977, a management protocol was instituted. Documentation of arterial Po2 below 60 mm Hg was required. For patients with borderline results or for the study of patients for sleep or exercise hypoxemia, consultation with the pulmonary specialists was available and their concurrence for home oxygen therapy was necessary. Medical audit in 1979 indicated that implementation of the management protocol resulted in complete elimination of inappropriate therapy. Thus, with 100 patients receiving therapy, there was no additional expense incurred by inappropriate therapy. Based on existing costs to the Veterans Administration Medical Center in Phoenix for oxygen tanks (average cost of $634 per patient per year) and for therapy equipment ($175 per patient per year), it is estimated that implementation of the management protocol resulted in annual savings of more than $100,000. One hundred patients were treated in the 1979 period, at a cost of $80,900 in contrast to a cost of $182,834 which would have been incurred if 126 additional patients had received therapy inappropriately as in 1977. This represents a savings of 56 percent.

Oxygen inhalation is being used by patients for symptomatic relief from various forms of respiratory distress in the absence of arterial hypoxemia. There is no evidence that any physiologic benefit accrues from this type of use of supplemental oxygen.1 Longterm treatment with oxygen is costly and often public money is expended to sustain this. These considerations demand that we have clear therapeutic objectives in mind and make ourselves accountable for our decision when we employ longterm oxygen therapy. Beneficial effects from longterm oxygen therapy in patients with severe chronic obstructive pulmonary disease have been reported in the literature.2-4 An excellent review of patient selection may be found in an editorial by Neff.4 We have tried to keep our program quite simple so that physicians and patients understand and accept it. This acceptability by all has made it easier to administer. The vast majority of our patients have severe chronic obstructive lung disease. We feel that reduction in the number of patients on home oxygen therapy more than compensates for the time needed to administer the program with the established guidelines and also to conduct the audits. Money saved on an annual basis has been substantial.

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Perforation of Thoracic Aortic Aneurysm
A Complication of Mediastinoscopy

To the Editor:

We wish to bring to your readers' attention a hitherto unreported complication of mediastinoscopy.

CASE REPORT

Mediastinoscopy was performed in a 58-year-old man with clinical and radiologic evidence of bronchogenic cancer and sputum cytology suggesting oat cell carcinoma. While dissecting the pretracheal space, a sudden "give" was felt, as the finger penetrated some barrier. This was followed by massive bleeding through the cervical incision. Immediate exploration of the mediastinum through a median sternotomy, followed by left lateral thoracotomy, failed to disclose the source of bleeding. The bleeding was eventually controlled by inserting a pack of gauze through the cervical incision. The patient received 8 pints of blood. His vital signs remained stable throughout the procedure and for the following eight days. The chest tubes were removed on the sixth postoperative day. On the ninth day, large amount of blood gushed sudden-

Figure 1. Aneurysmal dilatation of the ascending aorta with a 6 cm transverse tear on the intimal side.

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ly out of the neck-and-sternal incision and the patient died within minutes. Autopsy disclosed an aneurysmal dilatation of the ascending aorta, with a 2 cm transverse irregular tear on its posterior aspect, 4 cm from the aortic valve. In the intima, the tear extended to 6 cm length (Fig 1). Microscopic examination of the aortic arch showed focal destruction of the elastic fibers in the media with scarring and increased vascularity, focal lymphocytic infiltrations in the adventitia and media, and thickening of the intima in some adventitial arterioles. The findings were typical for luetic aortitis.

**DISCUSSION**

Aneurysm of the ascending aorta is an absolute contraindication to mediastinoscopy. Unfortunately, in this patient the aneurysm was not suspected. Nothing in his past history suggested syphilis. The clinical and radiologic evidence, including widened mediastinum, wide carina and sputum cytology, provided overwhelming evidence favoring the diagnosis of bronchogenic cancer and an indication for mediastinoscopy. The complication was thus unavoidable.

Extreme care in performing mediastinoscopy is urged. To minimize complications, the possibility of mediastinal vascular abnormalities must be kept in mind. Serology test for syphilis is mandatory in every patient whose mediastinum appears widened on chest roentgenograms.

**REFERENCES**


**Pulmonary Arterial Laceration Secondary to Subclavian Vein Catheterization**

**To the Editor:**

We wish to report a patient in which attempted infraclavicular subclavian puncture resulted in distal pulmonary arterial bleeding resulting in massive hemorhorax requiring thoracotomy for repair.

**CASE REPORT**

A 69-year-old woman was transferred to Henry Ford Hospital because of fever of unknown origin. Though initially stable, disorientation and hypotension developed 12 hours after admission. Attempts at infraclavicular subclavian vein catheterization were unsuccessful, and a right internal jugular line was then inserted. Fluids were administered and the blood pressure stabilized.

Fifteen minutes later, the patient developed left chest pain and shortness of breath. A chest x-ray film (Fig 1) revealed a large hydrothorax and possible pneumothorax. A chest tube was inserted and drained 4 liters of dark blood in less than one hour. An emergency thoracotomy was performed, and the subclavian vessels were found intact. The apex of the left lung was lacerated and brisk arterial bleeding was identified at this site. Hemostasis was easily achieved.

**FIGURE 1.** Chest x-ray film demonstrates large left hydrothorax and associated pneumothorax.

Postoperatively, the vital signs were stable and the chest tube drainage minimal. Twelve hours later, hypotension again developed with evidence of sepsis. Despite vigorous efforts, the patient continued to deteriorate and could not be resuscitated following cardiac arrest.

**DISCUSSION**

Hemothorax and hydrothorax are among the common major complications of subclavian venous puncture. These may result from either a lacerated subclavian vessel or from the direct infusion of fluid through a catheter that has migrated extraluminally or was never secured within the vein. The delayed development of a hydrothorax, though rare, may result from the gradual breakdown of the vein wall by the catheter.

Only one other case of hemothorax associated with pulmonary arterial bleeding has been described. The previous case differs in that the supraclavicular approach had been employed, and complicating apical pleural adhesions, pulmonary hypertension, and prior anticoagulation were identified as predisposing factors. Only minimal pulmonary hypertension could be identified in the present patient. Because no puncture marks were seen on the subclavian vessels, it must be surmised that the needle had been inserted quite inferiorly and posteriorly. Subclavian vein catheterization remains a useful procedure, but serious complications can occur without proper attention to anatomic and technical details.

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