SECTION EDITOR: GRACE S. ROZYCKI, MD

Image of the Month

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AN OTHERWISE healthy 16-year-old high school student had a 6-month history of decreased exercise tolerance. Significant findings on physical examination included a depressed sternum with posterior chest wall displacement. The patient had poor chest wall expansion with deep inspiration. A computed tomographic scan of the chest (**Figure 1**) and a chest radiograph (**Figure 2**) are shown.

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What Is the Diagnosis?

A. Pectus carinatum
B. Pectus excavatum
C. Sternal clefts
D. Congenital absence of the pectoris major muscle

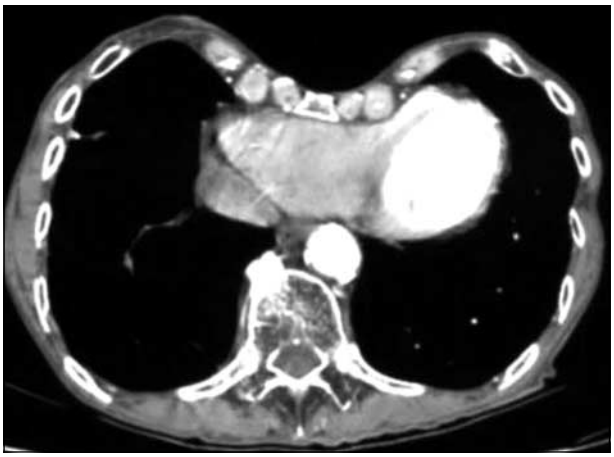

Figure 1.

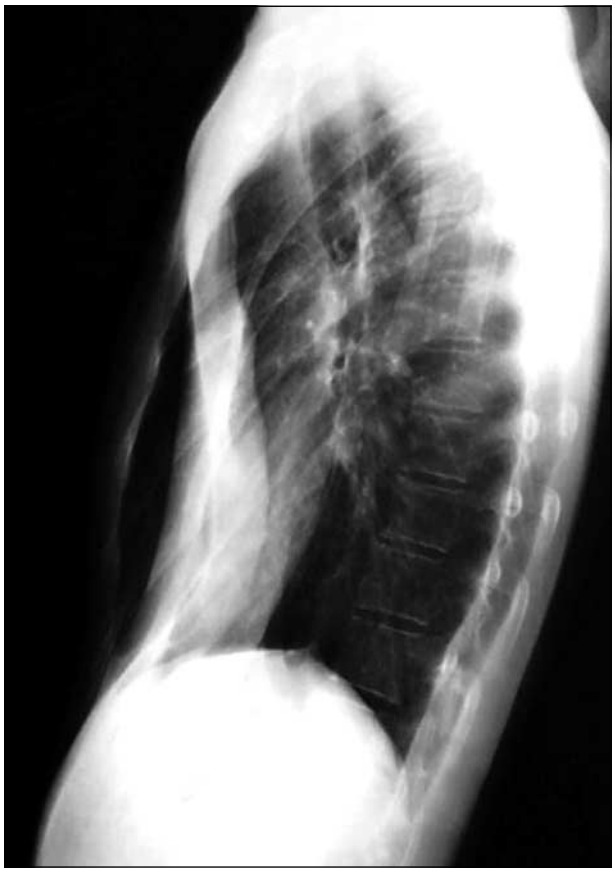

Figure 2.

Answer

Pectus Excavatum

Figure 1. Computed tomographic scan of the chest showing a depressed sternum that is compressing the underlying mediastinal structures.

Figure 2. Plain chest radiograph of a depressed sternum.

Pectus excavatum, or funnel chest, is the most common congenital chest wall deformity, accounting for more than 90% of such defects. It is characterized by a posteriorly displaced sternum caused by overgrowth of the costal cartilages. The defect typically begins at the junction of the sternum and manubrium and becomes progressively deeper toward the xiphoid process.[1]

The classic appearance of pectus excavatum was first described by Ravitch,[2] who noted a centrally depressed sternum; rounded, sloped shoulders; dorsal kyphosis; protuberant abdomen; and paradoxical sternal retraction on inspiration. The deformity may also be associated with physiological and psychological sequelae. Patients most often seek treatment because of the cosmetic defect, but they frequently are found to have other symptoms, including impaired cardiopulmonary function and scoliosis.

Pectus excavatum is diagnosed by physical examination of the chest wall and identification of the posterior displacement of the sternum. Possible associated anomalies, such as scoliosis, should also be considered. The chest wall deformity can be clearly identified on chest x-ray film and computed tomographic scans, which demonstrate the typical radiographic appearance of posterior sternal displacement (Figures 1 and 2).

While objective improvement in cardiopulmonary status has been difficult to prove consistently following operative repair, the majority of patients with pectus excavatum report significant postoperative improvement in exercise tolerance. Chest cosmesis is the most frequent reason for evaluation of a patient with pectus excavatum.[3] The psychological stress associated with pectus excavatum can be an indication for repair even in the absence of objective cardiopulmonary compromise.[4] In operative repair, a midline sternal incision is made, then the sternal perichondrium is elevated to expose the deformed cartilages. A complete subperichondrial resection of all deformed cartilages is performed. A transverse sternal osteotomy is performed, the posterior cortex of the sternum is fractured, and the sternum is mobilized anteriorly and fixed in place with nonabsorbable suture in a slightly overcorrected position.[5] In older patients, internal fixation with a Steinmann pin is used to support the sternum in the corrected position, and the pin is removed under local anesthesia in 6 months. The pectoral and rectus muscles are closed over the sternum, and the skin edges are reapproximated.

Operative repair should be considered in patients with moderate to severe chest wall deformities because of improvement in exercise tolerance, prevention of scoliosis, and maintenance of psychological well-being. Infants with pectus excavatum should be observed because of occasional spontaneous regression. Regression becomes less frequent after 3 years of age and is very unlikely in patients older than 6 years. Long-term results tend to be optimized in patients who undergo surgery before the age of 6 years.[5] Some suggest that the best age for repair is 3 to 5 years,[3] but successful repairs can also be achieved in adolescents and older patients.

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5. Robicsek F. Surgical treatment of pectus carinatum. *Chest Surg Clin N Am.* 2000;10:357-376, viii.

Submissions

The Editor welcomes contributions to the Image of the Month. Send manuscripts to Grace S. Rozycki, MD, Department of Surgery, Emory University School of Medicine, 69 Butler St SE, Atlanta, GA 30303; (404) 616-3553; fax (404) 616-7333 (e-mail: grozyck@emory.edu). Articles and photographs accepted will bear the contributor's name. Manuscript criteria and information are per the "Instructions for Authors" for *Archives of Surgery*. No abstract is needed, and the manuscript should be no more than 3 typewritten pages. There should be a brief introduction, 1 multiple-choice question with 4 possible answers, and the main text. No more than 2 photographs should be submitted. There is no charge for reproduction and printing of color illustrations.