PHYSIOLOGIC IMPLICATIONS OFPECTUS EXCAVATUM

Reply to the Editor:

The physiologic implications ofpectus excavatum (PE) have for years been debated byphysicians. Most patients with PE evaluated for surgery have had symptoms, including exertional dyspnea, chestdiscomfort, palpitations, and exercise limitations.1,2 Other less common symptoms have included gastricfullness, dysphagia, reflux, and anxiety.1,2 In our series of more than 300 adults undergoing surgical repair,nearly 80% had documented cardiac compression associated with their symptoms.1 More publicationscontinue to support the evidence for significant cardiopulmonary implicatiOns that surgical repair canimprove.1,3-7

One clear mechanism of impairment is the mechanicalcompression of the right heart chambers, with ensuinglimitation of diastolic filling and stroke volume. Wepreviously demonstrated that PE surgery causes a significantincrease in right ventricular chamber size, with correspondingincreases in right ventricular stroke volume and cardiac output (Figure 1).3 This change resulted inan increase in right ventricular cardiac output of 38% in all adult patients with PE studied before and after surgical repair and a 65% increase in the older patient cohort (≥30 years).1,3 Others have reported significantlyimproved maximal anaerobic oxygen uptake, maximumaerobic capacity, and oxygen uptake per heartbeat after surgical repair.5-7 With most patients having noventilator limitations, improvements in aerobic capacity are suggested to be the result of improved cardiovascular adaptation at maximal workload.4-7 This improved adaptation may be due entirely to relief ofcardiac compression and improved cardiac output or may additionally be contributed to by improvingrespiratory mechanics. Patients with PE demonstrated significantly decreased chest wall motion and increasedabdominal contribution to respiration in one study.8 Impaired inspiratory muscle generation of negative pulmonary pressure may also contribute to the limitations ofvenous return and cardiac output. With exercise, these changes might impede further the heart’s ability to increase the stroke volume and meet increased metabolic demands.8 Surgical repair of PE has been documented to carry a sustained improvement of these abnormallylow maximum cardiac indices and pulmonary function variables.4,5,7 There are, however, no long-term (>5 years) studies or follow-up of patients with either repaired or unrepaired PE to document the course of PE over patient lifetimes. Further prospective studies and registries are thus indicated ultimately to answer the question, “What are the physiologic implications of PE and the benefits of surgical repair?”

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FIGURE 1. Transesophageal echocardiograms taken before (left) and after (right) Nuss pectus repair in a patient with severe pectus excavatum. The relative right ventricular outflow tract velocities are also shown. A significant increase in right ventricular flow is seen increasing with velocity time interval with increase from 40 to 120 cm/s after relief of cardiac compression.
References


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