Pectus excavatum (PE) is a deformity of the cartilaginous portion of the anterior ribs where they attach, causing the sternum to be pushed inward and resulting in a caved-in or sunken appearance. The most common chest wall deformity, PE is 3–5 times more likely to occur in males than females.

Patients may present either at or shortly after birth, or during the prepubertal growth spurt. Concavity of the sternum may result in compression of the heart or cause restrictive lung disease. Despite common cardiac compression, younger children and teens may display minimal symptoms due to the flexibility of the chest wall and enhanced compensatory mechanisms of youth.

**ASSESSMENT**

Perform a standard history and physical examination with probing questions around cardiopulmonary symptoms. Look for an indentation of the chest wall. Assess the back for associated scoliosis. Assess for hypermobility and other signs of Ehlers-Danlos or Marfan’s disease. Question patient regarding psychosocial issues including disturbed body image, depression, and/or social isolation.

Cardiopulmonary symptoms may progress with age as the chest wall becomes less flexible and the patient’s ability to compensate for the fixed pressure on the heart decreases. Significant cardiopulmonary dysfunction associated with PE may increase with age and severity of the defect and can be improved through repair.

**WHEN TO REFER**

Refer any patient with concerns for a chest wall condition whenever it is identified on clinical evaluation to Cincinnati Children’s Chest Wall Center for further evaluation and treatment.

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**FAST FACTS**

1 in 300–400 prevalence of pectus excavatum

80:20 male to female ratio of pectus excavatum patients

15.2 years mean age at surgery

40% family history of pectus

10–20% of patients with pectus have associated connective tissue disease

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If you have clinical questions about patients with pectus excavatum, email chest-wall-center@cchmc.org

If you would like additional copies of this tool, or would like more information, please contact the Physician Outreach and Engagement team at Cincinnati Children’s.

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Tool developed by Cincinnati Children’s physician-hospital organization (known as Tri-State Child Health Services, Inc.) and staff in the James M. Anderson Center for Health Systems Excellence. Developed using expert consensus and informed by Best Evidence Statements, Care Practice Guidelines, and other evidence-based documents as available. For Evidence-Based Care Guidelines and references, see www.cincinnatichildrens.org/evidence.
# Pectus Excavatum

## Inclusion Criteria
- Patient with sunken chest wall

## Patient Presents

### Standard Workup

<table>
<thead>
<tr>
<th>Situational History</th>
<th>Family History</th>
<th>Physical Exam</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Chest pain</td>
<td>- Marfan's syndrome</td>
<td>- Sunken chest wall</td>
</tr>
<tr>
<td>- Shortness of breath</td>
<td>- Ehlers-Danlos syndrome</td>
<td>- Irregular heartbeat, heart murmur</td>
</tr>
<tr>
<td>- Exercise intolerance</td>
<td>- Noonan syndrome</td>
<td>- Abnormal spinal curvature</td>
</tr>
<tr>
<td>- Fatigue</td>
<td>- Postural orthostatic tachycardia syndrome</td>
<td>- Generalized hypermobility</td>
</tr>
<tr>
<td>- Palpitations</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Psychological impact</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## HPE (History and Physical Exam) Red Flags
- Chest pain
- Shortness of breath, at rest or with exertion
- Irregular heartbeat
- Exercise intolerance
- Fatigue

- Abnormal spinal curvature
- Generalized hypermobility
- Other symptoms of Ehlers-Danlos, Marfan’s, Noonan, or postural orthostatic tachycardia syndrome

**Refer all patients with concern for pectus excavatum to Cincinnati Children’s Chest Wall Center for consultation.**

At consultation, recommendations for treatment will be made based on age, severity of defect, and symptoms.

## Expected Management Depending on Child’s Age and Severity of Defect

**Age 0–6 years**
- Reassure
- Annual follow-up

**Age 6–10 years**
- Annual follow-up
- Vacuum bell (non-surgical treatment)—first line therapy
- Surgery (minimally invasive Nuss procedure)—only for severe, symptomatic defects in this age group

**Age 11–16 years**
- Annual follow-up
- Vacuum bell (non-surgical treatment) if milder defect and chest wall remains flexible
- Surgery (minimally invasive Nuss procedure)—most common in this age group

## Standard Preoperative Evaluation for Pectus Excavatum

<table>
<thead>
<tr>
<th>Test</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac MRI</td>
<td>To assess depth of pectus, cardiac compression, anatomy and function</td>
</tr>
<tr>
<td>EKG</td>
<td>To assess heart rhythm</td>
</tr>
<tr>
<td>Cardiopulmonary exercise test</td>
<td>To rule out cardiac or pulmonary limitation to exercise</td>
</tr>
<tr>
<td>Pulmonary function test</td>
<td>To evaluate lung function</td>
</tr>
</tbody>
</table>

For urgent issues, or to speak with the specialist on call 24/7, call the Physician Priority Link® at 1-888-987-7997.