



Patient Guide to
Pediatric Chest Wall Clinic

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This booklet outlines the symptoms and treatments for pectus carinatum and pectus excavatum. These conditions result in chest wall deformities that can be treated at the American Family Children's Hospital Chest Wall Clinic.

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Pectus Carinatum

What is pectus carinatum?

Pectus carinatum is a common pediatric problem where the rib cartilage has grown too much. This causes the breastbone (sternum) and rib cartilage to protrude (stick out). It is also known as pigeon chest. Some children have social and physical concerns about the look of the chest wall. Often, they may not remove their shirt, swim or take part in other activities.

Pectus carinatum is four times more common in boys than girls. The cause is unknown; however, it may be genetic as it tends to run in families.

What are pectus carinatum symptoms?

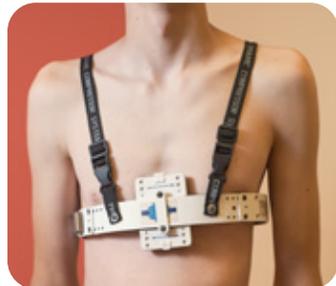
- Chest pain
- Shortness of breath with activity
- Chest wall trauma

How is pectus carinatum fixed?

The first line treatment for pectus carinatum is bracing. The brace used for children with pectus carinatum at American Family Children's Hospital is called the dynamic compression brace.

This bracing system corrects the chest shape and allows remodeling. It works by applying external compression (similar to the way braces correct crooked teeth), in conjunction with specific exercises.

The pectus brace uses the least amount of pressure needed to fix the chest in order to assure comfort. It needs to be adjusted (tightened) every 4 to 8 weeks until the chest shape looks normal.



Dynamic compression brace

The Brace

- Your child should wear the brace as much as possible (at least 20 hours a day, except during showering or sports) for the best results. After the shape of the chest becomes more normal, your child still needs to wear the brace about 8 hours a day. Based on his or her progress, a plan is set up to gradually decrease daily brace use until it is not needed at all.
- Most children say their chest is sore after the first brace fitting. This can be treated with ibuprofen (Motrin®) or acetaminophen (Tylenol®).
- We recommend that patients wear a thin, tightly-fitting shirt made from moisture-wicking material under the brace to increase comfort and keep the skin under the brace dry.
- Your child may have slight redness and pain at the site of deformity of the chest from the brace. This is normal. The brace should not, however, cause a scratch or an open sore. If this happens, take the brace off and call your doctor. If your child takes off the brace and the reddened area on the chest does not "blanche," (turn white when you press on it, then back to red when you let go) call your doctor. Do not put the brace back on until the reddened area blanches. If the problem persists, do not put the brace back on until your child can be seen in the clinic for adjustments.
- Girls should not wear an underwire bra with the brace. It may cause pain and a pressure sore. We recommend wearing a wireless sports bra.

What if the brace doesn't work?

If your child does not show progress after wearing the brace as prescribed for at least one year, we may think about surgery. The surgery we perform reshapes and takes out the abnormal rib cartilages while keeping their outer layer. This outer layer is left to allow for new cartilage to grow. An incision is made in the center of the chest or along the lower edge of the ribs to fix this. After surgery, drains (soft, flexible tubes) are in place for 3 to 6 days, and are removed when the drainage lessens. Children are often in the hospital for 3 to 5 days after surgery, and should expect strict activity restrictions for 2 to 3 months after surgery.

Pectus Excavatum

What is pectus excavatum?

Pectus excavatum is the most common problem of the chest in children. It is also known as “sunken chest” or “funnel chest” because it can look like a sunken area of the sternum (breastbone). It can be so deep the sternum nearly touches the spine. Abnormal growth of the rib cartilage causes the breastbone to be pushed inward. This sunken area in the breastbone may be even, or it may be more inward on one side than the other. The breastbone may be straight or rotated. As with pectus carinatum, some children and their parents report that they have major social and physical concerns about the look of the chest wall. Often, they will not remove their shirt, swim or take part in other activities.



For some children, pectus excavatum is found when they are babies. In others, it is not seen until a rapid growth spurt happens, usually during puberty. The cause is unknown; however, it tends to run in families. Twenty-five percent of patients report a family history of chest wall abnormality.

What are the symptoms of pectus excavatum?

- Shortness of breath that gets worse with exercise
- Decreased endurance with exercise
- Asthma-like symptoms treated with asthma medicines without relief
- Chest pain that gets worse with exercise

How is pectus excavatum fixed?

- **Non-surgical options:** Not all children with pectus excavatum need surgery. Some very mild forms respond to upper-body and breathing exercises designed to improve posture, strength, flexibility and breathing mechanics.
- **Surgical options:** Patients with a moderate to severe sunken area of the chest, or significant symptoms, may need a minimally-invasive surgery. Fixing your child's breastbone is done using the Nuss procedure. This involves placing a metal “pectus bar” to help reshape the chest wall. Small incisions are made on each side of the chest and just under the breastbone.

Surgery takes about 1 ½ to 2 ½ hours. The bar is left in place for 2 to 3 years to allow the chest to re-shape. After the chest has remodeled, the bar will be removed in a same-day surgery procedure.

Before and During Surgery

What can I expect before surgery?

- If our care team believes that surgery may help your child, we may order additional tests, such as an MRI or CT scan to measure the chest and the sunken area in the breastbone. Other tests we may order include an echocardiogram to look at the heart or a V02 max test, which measures how well your child's lungs work while they are exercising. These tests can sometimes show abnormalities in kids with pectus excavatum. This result often provides more assurance that surgery may improve your child's condition. Most children who have this surgery have a bar inserted in the chest that is made out of nickel. Because some children are allergic to nickel, we test each child before surgery and instead use a titanium bar for any child who is allergic to nickel.
- Some children may receive other tests if requested by the surgeon or the insurance company.
- About a month before your child's surgery, we will schedule a pre-op appointment with a nurse practitioner to explain the surgery and answer all of the family's questions. Another pre-op appointment will be set up with our physical therapist. Before surgery, the therapist will teach your child exercises to increase strength and mobility in the upper body and to improve breathing mechanics and posture.

Additional Considerations Before Surgery

Most of the patients who have this surgery are in their pre-teen or teenage years. Acne is common in this age group. It can present a problem if there is acne on the chest or back as it may increase the risk for bar infection. If your child has acne, or has a breakout before surgery, it is important to call and tell your surgeon as soon as possible. This is to prevent your child's surgery from being cancelled when you arrive.

If your child has a hard time swallowing pills, it is a good idea to practice before surgery using TicTacs® and a cup of water.

The surgeon will offer you the option of a pain control technique used during the NUSS surgery called cryoanalgesia. This technique temporarily freezes the nerves along the rib cage in front of the chest, causing them to feel numb. The nerves will stay numb for about 6 to 12 weeks. This helps kids recover from surgery faster and with much less pain. Because of the improved pain control form cryoanalgesia, most patients requires less pain medicine after surgery.

Plan for your child to be in the hospital for 1 to 3 days. Your child may also need a few extra days to recover at home before returning to school or work. Most kids return to school within a week after surgery. If your child

has surgery during the school year, it may help to let your child's school know of this extended absence. You will get a letter excusing your child from school and sports activities during your child's hospital stay, and outlining activity restrictions for eight weeks after surgery.

Starting Medicine before Surgery

It is very important for your child to start taking MiraLAX® before surgery. MiraLAX® softens stool and makes it easier to pass, so starting it before surgery helps to prevent post-op constipation. MiraLAX® is taken daily with liquids. It has no taste and dissolves easily and completely in drinks such as water, juice or tea. Your child should take 1 capful, twice a day, for 3 days before surgery.

MiraLAX® is available in 7-, 14-, and 30-dose sizes plus in pre-measured single dose packets. You can get them at national drugstore chains or supermarkets. There are also generic versions. Please see your pharmacist at your local pharmacy for more information and for possible substitutes.

After Pectus Excavatum Surgery

Care of Incisions after Surgery

Your child's incisions will be dressed with white steri-strips covered by a type of tissue glue. Do not pull these off. The strips will curl up and fall off on their own as the incisions heal. If steri-strips are still on after one week, you may gently remove them.

All surgical incisions are closed using dissolving stitches that are under the skin. The incisions are pink at first, then gradually fade over the next year. You should inform your child's doctor if there is any redness, increased swelling or drainage from the incisions.

Your child may need to take prescription pain medicine for the first week or two after surgery. After this time, you should be able to control your child's pain with ibuprofen (Motrin®/Advil®) or acetaminophen (Tylenol®). Some patients do not require any prescription pain medication after they leave the hospital.

Going Back to School

- Usually children need to be home for a few days after surgery. Your child may return to school when energy level and pain control permits.
- Your child may not participate in gym class or recess for the first 2 months or carry heavy books because of pain. You may want to arrange for books to be placed in the classroom or use a rolling backpack.
- Walking up or down stairs is ok anytime.

Activity after Surgery

- Activity is very limited during the 2 months after the surgery, so the bar is not dislodged.
- Your child is not allowed to lift anything that weighs more than 25 pounds during this time.
- Contact sports are not allowed for at least 2 months. After that, any activity restrictions are directed by your surgeon.
- After your child has recovered, chest strengthening and breathing exercises should be restarted and your child may return to physical therapy if needed.
- Good posture is very important.

Pain and Constipation

One of the main side-effects of prescription pain medicine is constipation. Though they may not like to talk about it, it is important that children are aware of this common and troublesome side effect. Children may report nausea and trouble eating and drinking 4-5 days after surgery. If your child is not able to eat, it will be hard to tolerate the pain medicine. This usually happens in children who were not able to have a bowel movement since before surgery.

The best way to promote a bowel movement at this stage is an enema. If your child is in the hospital, the nursing staff will help give the enema. If your child has been discharged, you can buy an over-the-counter Fleet® enema.

Follow-up

We will see your child for follow up several times in the year after surgery: at 2-4 weeks, 8 weeks, 6 months, and one year post-op. After that, your child is seen every year until the bar is removed.

Call your child's surgeon if:

- The incision is red, swollen, very painful or has drainage.
- You think the bar has become dislodged (chest changes shape, your child has been hit forcefully in the chest).
- Your child is still having trouble having bowel movements after an enema.
- Your child develops a fever after surgery
- You have questions or concerns.

Additional Post-surgery Information

- You may want your child to wear a medical bracelet or necklace. The inscription should state: “Steel bar in chest, CPR more force, cardiac defibrillation ant/post pad placement.”
- No chest or thorax MRIs are allowed. If an MRI of the lower body is needed, talk with the radiologist first to make sure it is safe to do an MRI with the steel bar in place.
- Antibiotic prophylaxis is not needed for dental procedures unless your child has a history of mitral valve prolapse.
- We will provide a medical travel letter which your child may need in passing through security devices at airports, etc.

More information

Please call us with your questions or visit us on the web for more information at uwhealthkids.org/chestwall

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References

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