

Cardiothoracic Surgery Department

Pectus Carinatum Repair

Information for patients and parents considering surgical correction of 'pigeon chest'

What is Pectus Carinatum?

Pectus carinatum is an uncommon birth defect in which a child's breastbone and several ribs protrude outward abnormally. This is caused by overgrowth of cartilage between the ribs and the breastbone. Sometimes the deformity isn't noticeable until after the adolescent growth spurt. This deformity occurs in approximately 1 out of 1500 children, often runs in families, and is seen more commonly in males than females.

Appearance is the main problem, and in most children the deformity does not cause any health risk.

Pectus carinatum is reported to occur less commonly than pectus excavatum; (a defect where the sternum is sunken in); however, this may be associated with disorders including heart disease, scoliosis, kyphosis and musculoskeletal defects. There can be asymmetry of the chest with one side more prominent than the other.



What does Pectus Carinatum surgery involve?

The pectus carinatum can be corrected surgically using the Modified Ravitch Procedure. This involves an incision across the chest, to open the chest wall and gain access to the ribs. The deformed cartilages are then removed from each side of the chest. In the majority of patients, an osteotomy (a break) in the sternum is done to allow the sternum to be positioned downward. The sternum can then be fixed into the usual flat position, and the chest closed. The wound is closed using dissolvable stitches.

The amount of time this operation takes depends on the severity of the deformity, but it can take up to 4 hours.

Over the next weeks and months the cartilage re-grows with a more normal appearance.

It is important to remember that it is not possible for us to say to what extent we will be able to improve the shape of your chest with surgery. Your surgeon will discuss this with you.

What are the advantages of the Ravitch procedure?

- It is a tried and tested method of correction for pectus carinatum. The surgery will improve the shape of your chest and this may improve your self-confidence and self-esteem. Research shows that 97 per cent of patients stated they are happy with the post-operative results.
- Once the procedure has been performed, it is extremely unlikely that the anomaly will re-occur
- It can also be used to correct complex pectus anomalies

What are the disadvantages of the Ravitch procedure?

- A large scar from the cut, although this normally fades over time to a thin line

Possible risks of the procedure

As with any surgery, the procedure has risks as well as benefits. Your surgeon will talk to you about these risks, and give you some idea about the chance of them happening:

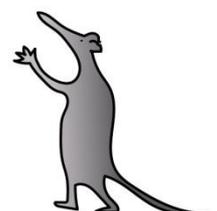
- Bleeding
- Infection
- Pain
- Keloid scarring – the scar being red, thickened and itchy
- Collection of fluid around one or both lungs (pleural effusion) rare
- Air leak from either lung (pneumothorax)
- Anaesthetic complications

When the risks and benefits of surgery have been explained, you will be asked to go home and think about whether you wish to have the operation or not. The procedure is cosmetic, and does not offer any health benefits, so you need to decide if you think the improvement in appearance is worth the risks involved.

When can the operation be performed?

The surgical correction of pectus carinatum can be performed at any age, but is recommended in mid to late childhood due to growth spurt that occurs in late childhood.

We also recommend late childhood as the correct age for pectus surgery so that you are developmentally mature enough to follow the post-op instructions and exercises required for recovery and able to comply with physical activity restrictions, such as restrictions on sports at school etc.



What to bring with you

- your admission letter, and any other information we may have sent you
- **medicines** or inhalers that you are taking at the moment
- toiletries
- nightclothes and a dressing gown
- Slippers or comfortable & supportive footwear.
- day clothes - a tracksuit or other comfortable clothes
- glasses or contact lenses (if you have both, please bring glasses as well as contact lenses)

PLEASE SEE THE ALDHERHEY WEBSITE FOR DIRECTIONS TO HOSPITAL AND FOR CAR PARKING TARIFF.

THE POST CODE FOR SAT NAV IS: L14 5AB.

What you need to do on the day of admission

When you arrive at Alder Hey you should go to 1C. They will prepare you for your operation, and you will be seen by your surgeon and anaesthetist.

The surgeon will explain the surgery again, discuss the risks involved and talk about any worries you may have. If you are under 16 years of age, you will be asked to confirm that you have given your consent for the operation, and your parents will sign the consent form. If you are over 16 years of age you and your parents can sign the consent form.

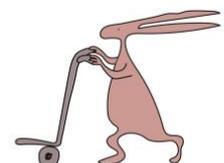
The anaesthetist will explain about the anaesthetic and discuss post-operative pain relief with you.

You will have routine MRSA swabs done to check for the presence of MRSA bacteria on your skin or in your nose. This test is done for all patients admitted to the hospital and is important in the control of hospital acquired infections

You will be started on a medicine called Gabapentin, which helps with the pain after the operation.

You will also be seen by a physiotherapist who will explain the exercises you will need following the operation. Compliance with physiotherapy can have a big impact on the rate of recovery following pectus repair surgery, so it is really important that the exercise programme is followed.

Certain procedures carry an increased risk if the patient is pregnant. All hospitals, including children's hospitals, are required to check for pregnancy before carrying out procedures such as anaesthesia, xray and surgery. This applies to girls aged 12 years or older.



The Operation

The operation will be done under general anaesthesia. This means that you will be put to sleep. The surgery could last up to 4 hours, depending on the severity of the deformity.

Pain relief following surgery

To help feel more comfortable after the operation, nerves may be blocked temporarily by injecting anaesthetic directly onto the nerve roots, near to the spinal cord. This blocks the pain signals and makes them numb. This will be inserted in theatre while you are still asleep.

Strong painkillers will also be given straight into the bloodstream. This will be through a cannula, which is a small plastic tube inserted into a vein, usually in the back of your hand. This is called a PCA (patient controlled Analgesia). The PCA will allow you to push a button which releases a small dose of pain medication. The machine is programmed to allow a specific dose and the timer on the machine controls how often the medication can be dispensed, even if you push the button more frequently. Oral (by mouth) painkillers will also be used regularly throughout the admission.

Pectus carinatum surgery is a painful operation and it may not be possible to take away all of the pain in the early days after surgery.

The medication will help, and things will become more comfortable as recovery progresses. However, you should be aware that you are unlikely to be completely pain free during the first few days after the operation.

On day 2 or 3 post operatively the nerve blocks will be removed by the nursing staff on the ward.

By about the 3rd or 4th day after surgery you should quite comfortable on regular oral medication (paracetamol, diclofenac and morphine).

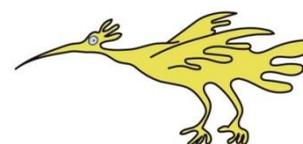
What to expect immediately after surgery

Following your surgical procedure you will be cared for in the recovery department until you are fully awake as you will feel quite drowsy from the anaesthetic. We will monitor your heart rate, blood pressure and oxygen levels and your pain will be assessed at this time. You will receive a chest x-ray whilst in the recovery department to check there is no air leak (pneumothorax) in either lung. You will then be transferred to 1C to continue your recovery.

Chest drain(s) will be inserted in theatre in order to drain out any fluids which may collect in the chest as a result of the surgery. The chest drain(s) may be in place for up to 5 days, depending on how much fluid is draining.

You will be encouraged to drink as soon as you have recovered from the anaesthetic. If you can take a drink without being sick, then you will be offered something to eat.

Nausea is a possible side effect of anaesthesia, and medication for nausea will be given to help with this, if necessary. You should be coping with a light diet within a couple of days of surgery. Intravenous fluids may be given until you are eating and drinking.



Post-operative recovery

Regular laxatives will prevent constipation. Constipation is common with intravenous pain medication and can be very uncomfortable following pectus carinatum surgery. We ask that parents encourage their children to take their laxative, even if you are reluctant to do so. You will be encouraged to drink plenty of fluids to help alleviate constipation.

You will be re-positioned regularly during the hours after the operation, and you will be encouraged to move around as soon as you are able. Exercises to help with breathing and circulation, plus upper limb and postural correction exercises will be started the day after your surgery. These will be progressed over the following days. You will be encouraged to sit out of bed on the day after surgery and then start walking around as soon as you are able.

Possible problems & complications

Minor problems can often occur after operations, including wound infections, chest infections etc. This may be unpleasant, but can easily be treated. Any of these post-operative complications should be completely resolved by 2-3 weeks after the operation.

The more serious complications that can occur with any surgical procedure will have been discussed with you. If any of these occur, the treatment will be explained to you by your surgeon.

Returning to usual activities

Being in hospital can disrupt normal day-to-day routine, so it can take some time to get back to normal. Physical activity is encouraged, but it is common to feel more tired than usual.

You will be given paracetamol and diclofenac to take home on discharge. Continue both regularly for the first 2-3 weeks after surgery. Each patient is assessed for their pain before discharge home and you may be given other pain medication to minimise any pain you may be experiencing. It is important to inform your nurse, and the pain team who will visit you regularly about your pain so that you are given the best pain relief for you.

Going home

Patients can usually be discharged 4-5 days after surgery. Physiotherapy will need to be happy with your mobility and upper limb range of movement before going home. If drains are still in place, and you live locally, you may be able to go home with your drains. You will just need to come back the next day for the drains to be emptied, and then removed when they are no longer needed.

It is very important that you continue with the exercises advised by physiotherapy when you return home. If you have any questions or queries you can contact the physiotherapy Department on: **0151 252 5862**.

You will be given paracetamol and diclofenac to take home on discharge. Continue both regularly for the first 2-3 weeks after surgery to minimise any pain.

Once discharged, you will be expected to slowly resume normal but restricted activity. Most children are able to return to school within two weeks, with exercise restrictions.

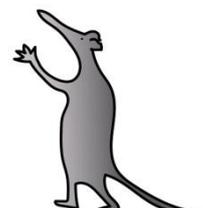
You will need to take it easy for the first four to six weeks after surgery.

- Do not fully stretch both arms together behind your back, at the same time.
- Do not lift or push up from a chair / bed using your arms for 3 months.
- No karate, judo, gymnastics, rugby or other physical / contact sports for the first six months.
- Swimming and jogging can resume after 3 months following surgery.
- Avoid lifting or pushing of heavy objects for the first three months.
- No backpacks for three months.
- Do not drive for three months following surgery. You will need to discuss when you can return to driving with your surgeon and your insurance company.
- You must wear a seatbelt at all times – there is no medical conditions which Justify automatic exemption from the law.
- We strongly encourage walking for exercise and should be done frequently to build up your strength. You should begin walking as soon as they get home.
- After the operation and for the first month home, remember to bend at the hip. Do not slouch or slump down when sitting...
- You will need to sleep on your back for the first month after surgery – avoid sleeping on your stomach.
- You may bathe or shower once you are out of bed and stable on your feet.
- Wound dressings and (Steri-strips) on the incisions can be completely removed 5 days from day of discharge.

Follow-up Arrangements

You will be given an out-patient appointment for 2-3 weeks after discharge.

Further appointments will be given at 3 months, 6 months and 12 months at this point if yourself / parents and your surgeon are happy with your recovery you will be discharged.



Important information for Parents

When should I call the office?

If your child is having any problems and you are worried and would like advice, call Mr Dhannapuneni's secretary:

Mrs Emma Burns, Monday - Friday during the day on 0151 282 4514

After hours and on weekends call 0151 228 4811 and ask the hospital Operator to bleep (309) for the surgical registrar on call.

IF YOUR CHILD IS SHOWING SIGNS OF:

- Temperature greater than 38°C
- Redness, swelling, drainage or bleeding from the incision site.
- Worsening chest pain, especially with deep breaths
- Pain not controlled with pain medications
- Problems with breathing
- Cough that does not go away
- Injury to the chest that may have caused the inner stitches to break.
- Sudden onset of chest pain or difficulty breathing.

**YOU SHOULD ATTEND A & E TO BE ASSESSED
OR CALL 999 AND GET AN AMBULANCE IN AN EMERGENCY.**

Our aim is to provide a high quality service to our patients and we welcome any suggestions you may have to help improve our service.

BEFORE SURGERY



AFTER SURGERY



Numbers of Pectus surgical procedures performed by Mr Dhannapuni At Alderhey Children's Hospital

	Nuss Procedure For Pectus Excavatum (Bar Insertion)	Ravitch Procedure For Pectus Carinatum	Bar Removal	Other Pectus Surgery
April 11 - March 12	21	19	5	2
April 12 - March 13	16	7	10	2
April 13 - March 14	12	18	20	2
April 14 - Mar 15	16	24	19	1
April 15 – March 16	16	19	13	4
April 16 – March 17	9	9	10	1
April 17 – March 18	25	16	17	4
April 18 – March 19	19	17	16	3

Less number of pectus operations performed in 2016/17 due to high demand on providing more cardiac operations during that year.



Mr Ram Dhannapuneni

Qualifications

- MBBS: Andhra University, India,
- MBA (Health): Keele University
- FRCS: Royal College of Surgeons in Edinburgh
- FRCS Cardiothoracic: Royal College of Surgeons in Edinburgh.

Memberships

- Society of Cardiothoracic Surgeons in Great Britain and Northern Ireland.
- British Congenital Cardiac Association.
- Chest Wall International Group.
- European Association for Cardiothoracic Surgery.

If you have any Questions or Concerns, please contact:

Mr Ram Dhannapuneni, Consultant Paediatric Cardiothoracic Surgeon:

Tel: 0151 282 4514

This leaflet has been written by Marlene Riley, Surgical Care Practitioner, Cardiac Surgery.

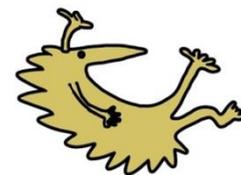
Further information is available from www.pectus.org.

A leaflet is also available from The National Institute for Health and Clinical Excellence (NICE) explaining the guidance it has given on the use of the Nuss procedure for the correction of pectus excavatum surgery. This can be accessed on their website: www.nice.org.uk

This leaflet only gives general information. You must always discuss the individual treatment of your child with the appropriate member of staff. Do not rely on this leaflet alone for information about your child's treatment. This information can be made available in other languages and formats if requested.

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