

Thrombolysis and thrombectomy: information for families

Blood contains cells called platelets and a substance called fibrinogen that allow the blood to clot. In normal circumstances, clotting is a good thing as it prevents blood loss from an injury such as a cut or graze. However, when a blood clot forms inside a blood vessel, it can cause serious problems. This information sheet from Great Ormond Street Hospital (GOSH) explains about how a blood clot is diagnosed and the various forms of treatment (thrombolysis and thrombectomy) that may follow.

Blood clots can disrupt blood flow, depriving the part of the body supplied by the blood vessel of oxygen, which could lead to tissue damage if untreated.

If a blood clot forms inside a vein and blocks it, the part of the body supplied by that vein becomes swollen as the blood is unable to flow back towards the heart. If one forms in an artery, the blood cannot reach the area supplied by the artery.

Blood clots can form for many reasons. Some people's blood is 'stickier' than others, because of other medical problems they have, or because of a family tendency to form blood clots. Clots can also form after an operation, particularly if a person cannot move around normally.

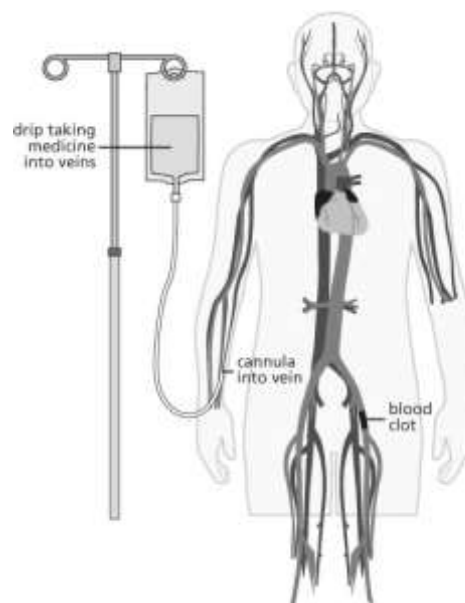
How is the blood clot diagnosed?

Often a blood clot is suspected while your child is still in hospital. If the doctors suspect your child has a blood clot, they will ask the doctors from Interventional Radiology to diagnose it using various imaging techniques. Usually they carry out an ultrasound scan first, or occasionally MRI or CT scans.

How are blood clots treated?

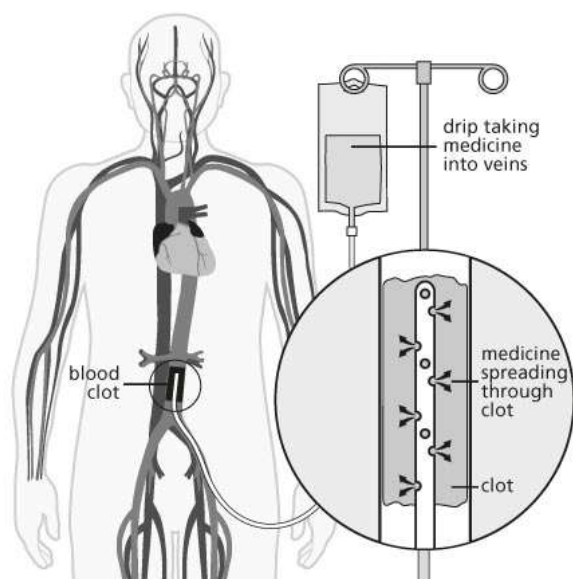
Once the clot has been identified, there are three ways that it can be treated:

Systemic thrombolysis – a clot-busting medicine is given through a cannula (thin plastic tube) into a vein in your child's hand or foot. The medicine travels through the blood vessels breaking up clots elsewhere in the body.

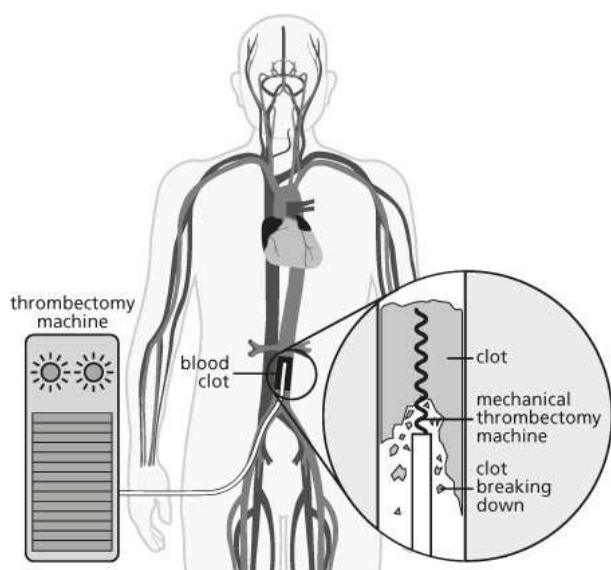


Catheter-directed thrombolysis – the clot-busting medicine is delivered into the centre of the clot over several hours or days. The medicine is given

through a larger cannula inserted into the clot in a short procedure under general anaesthetic in the Interventional Radiology department.



Mechanical thrombectomy – using tiny surgical tools, the doctor breaks down the clot into smaller pieces that can then be sucked out of the blood vessel.



Which method is used depends on your child's condition and any underlying problems. If the doctors decide that systemic thrombolysis is the best option, your child will receive an infusion of the clot-busting medicine through an intravenous drip while on the ward. This could take several days, and your child will have repeated blood tests and scans to check how well the medicine is

working and to minimise the risk of bleeding. Your child may be moved to a different ward for this treatment so they can be carefully monitored.

If the doctors decide that catheter-directed thrombolysis and/or mechanical thrombectomy is more suitable, your child will have an angiography or venography procedure in the Interventional Radiology (IR) department as part of that process. This procedure helps to 'map' the blood vessels and the position of the clot. Angiography means 'x-ray pictures of the arteries' and venography means 'x-ray pictures of the veins'.

What happens before the IR procedure?

The doctors from Interventional Radiology will explain the procedure in more detail, discuss any worries you may have and ask you to sign a consent form giving permission for your child to have the procedure. If your child has any other medical problems, please tell the doctors. As contrast is used in angiography/venography and this is removed from the body through urination (peeing), please tell the doctors if your child has any kidney problems.

Many of the procedures we perform involve the use of x-rays. Legally, we are obliged to ask any girls over the age of 12 whether there is any chance they might be pregnant. We may ask for a urine or blood sample to carry out a pregnancy test. This is to protect babies in the womb from receiving unnecessary radiation.

This procedure is almost always carried out while your child is under a general anaesthetic, because they need to lie very still throughout the procedure and it can take a while.

It is important that your child does not eat or drink anything for a few hours before the anaesthetic. This is called 'fasting' or 'nil by mouth'. Fasting reduces the risk of stomach contents entering the lungs during and after the procedure.

You will be informed the night before the procedure of the time that your child should be 'nil by mouth' – in other words, have nothing to eat or drink before the anaesthetic.

It is equally important to keep giving your child food and drink until those times to ensure they remain well-hydrated and get adequate nutrition. This may involve waking your child in the night to give them a drink which we recommend.

What does the IR procedure involve?

Once your child is under general anaesthetic, the doctor will use angiography/venography to map your child's blood vessels and identify the blood clot.

The radiologist will insert a needle into a blood vessel, using ultrasound to guide them. Some local anaesthetic is injected into the skin first, to make the area numb for a few hours, and a very small cut is made in the skin, through which the needle is placed.

A soft guide wire is threaded over the needle, which is then removed. Finally a catheter (thin plastic tube) is threaded over the guide wire into the artery, and the guide wire is removed.

The catheter is then threaded through the arteries or veins until it is in the area needed. X-rays and contrast are used at various points to guide the catheter in the right direction and to check that it has reached the area of the blood clot. The doctors will then place a catheter into the centre of the clot while your child is still under general anaesthetic.

The catheter will be connected to an infusion (drip) of clot-busting medicine and your child will be transferred to an intensive care or high dependency unit where the infusion will continue to be given.

Mechanical thrombectomy may also be carried out during the procedure. This involves the use of a very small mechanical device mounted on a soft plastic catheter. The catheter is placed inside the blood clot in the artery or vein. The mechanical device is controlled by a machine outside the body. It travels along the blood vessel breaking down and sucking out the clot. This often allows the clot to be broken down more quickly than by just relying on the clot-busting medicine. In many cases, the doctors will use mechanical thrombectomy during the procedure and follow this up afterwards with catheter-directed thrombolysis on the ward.

After the procedure and during the on-going clot-busting medicine infusion on the ward, your child will be closely monitored for side effects, due to the risk of bleeding. The doctors will come to check your child's progress regularly and will give you some information about what they have done during the procedure.

Your child will need blood tests every three to four hours and repeated imaging scans in the Interventional Radiology department to see if the clot is dissolving as planned. These scans are usually done while your child is awake, by injecting some contrast (dye) through the infusion catheter in the blood vessel.

They will also need to wear special knee or thigh length socks which compress the legs preventing further clots forming. These can be uncomfortable, particularly when putting them on or taking them off, but work very well. Other medicines, sometimes given by injection, may also be needed.

Once it is clear that the clot is dissolving and the clot-busting medicine has finished, your child will be moved out of the intensive care or high dependency unit back to a normal ward, and the catheters will be removed.

Are there any risks?

Every anaesthetic carries a risk, although this is extremely small.

Risks associated with thrombolysis

The clot-busting medicine used in systemic or catheter-directed thrombolysis works by activating the proteins in your child's blood that normally break clots down and therefore the risk of this medicine is bleeding. Any recently formed blood clot in the body will be broken down by this medicine and therefore there is a greater risk of bleeding within a few days of surgery as the body will not have healed yet.

As the drug can cause significant changes in how the blood clots, your child will need blood tests every four hours while they are receiving the medicine. If the medicine is given via a cannula into a vein, we tend to give the drug for around six hours and then re-assess how well it has worked before possibly repeating the infusion.

If the medicine is given through a catheter directly into the centre of the clot, we are able to use a much smaller dose and therefore we can keep the

medicine going for longer, but still need to do frequent blood tests. While your child is receiving the clot-busting medicine, if they have any bleeding symptoms or the blood results are significantly abnormal, we will stop the medicine straight away.

Are there any alternatives to thrombolysis and thrombectomy?

The main alternative is to leave the clot in place and treat with anticoagulation with either heparin (injections) or warfarin (tablets) which prevent the clot from increasing and allow the body to gradually deal with the clot and open up other blood vessels around it. However, long term blockage of a blood vessel can cause long term damage to the limb. If the blood clot formed because your child has had to have frequent central venous access devices, leaving the clot in place could reduce future access to the blood vessels.

Occasionally, the blood clot may need to be removed using open surgery, but this carries additional risk of bleeding and infection.

Further information and support

If you have any questions, please telephone 020 7405 9200 and ask for the ward from which your child was discharged.

Having a blood clot removed



When you hurt yourself, your blood clumps together to stop bleeding. If your skin is hurt, you get a scab. If the blood clumps together inside your body, this is called a clot. Clots inside the body can be a problem.



If you have a clot in your leg, it will feel hot and might swell up a bit. It could also be sore.



The doctors will use an ultrasound (said: ull-tra-sow-nd) scan to find the clot and measure it. They will put some gel on your skin for the scan - this will feel cold but will not hurt. Once the doctors know where the clot is and how big it is, they can plan your treatment.



You might have a medicine given through a cannula (said: cann-yoo-la). This is a thin plastic tube, usually put in the back of your hand.



The medicine destroys the clot so it will not cause any more problems.



The doctors may put the medicine inside the clot with a syringe and a bendy plastic tube.



The doctors may put a tiny machine inside your vein to break up the clot into little pieces. These are sucked away through another tiny tube.



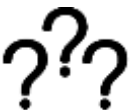
You might have an anaesthetic (said an-ess-thet-ick) for the procedure. You will not be able to feel anything or know what is happening.



The doctor may need to carry on breaking up the clot for a few days, either using medicine or the tiny machine. They will check you regularly to make sure you are getting better.



You may need to wear special long socks after the operation. These are very tight and make sure you do not get another clot.



Please ask us if you have any questions.