NHS
Royal Cornwall Hospitals
NHS Trust

Chronic total occlusion

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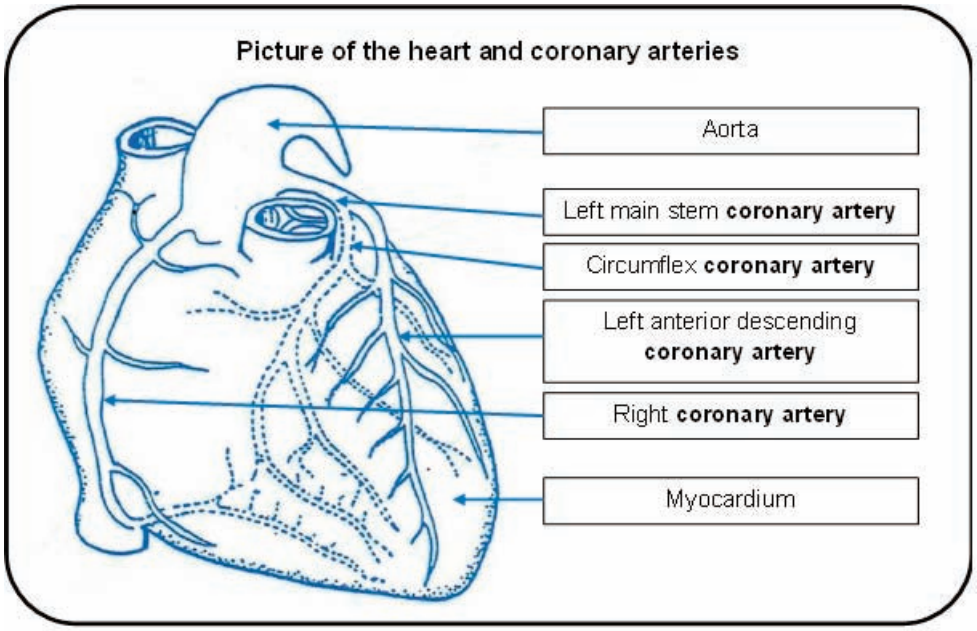
Who is this leaflet for?

This leaflet is for people who have been told by their consultant Cardiologist at the Royal Cornwall Hospital (Treliske) that they have **Chronic Total Occlusion (CTO)** of a **coronary artery**.

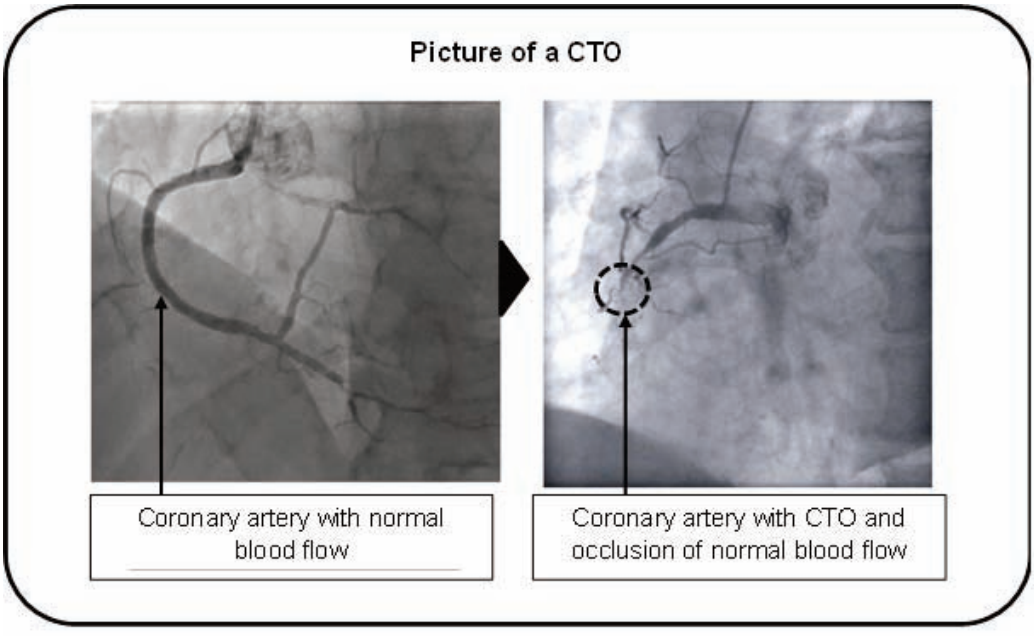
What are the coronary arteries?

Your coronary arteries are found on the surface of your heart muscle **(myocardium)**. The heart muscle needs a constant supply of blood – the coronary arteries provide the heart muscle with blood, oxygen and the nutrients it needs. Problems can sometimes happen when the coronary arteries become narrowed inside over time with fatty deposits. This is known as **atherosclerosis**, and is commonly referred to as **heart disease.**



What is a coronary artery CTO?

This is a complete or almost complete blockage of a coronary artery, due to atherosclerosis, for a minimum of three months or more. CTO is common and can happen in around 30% of people with coronary artery disease.



What are the symptoms of CTO?

Because your heart has a reduced blood supply, this can sometimes result in:

- chest pain **(angina)**
- shortness of breath
- tiredness.

In many people the heart muscle may develop small blood vessels that help to deliver a blood supply to the affected part of the heart muscle. These small blood vessels are known as **collaterals.**

Collaterals may not be adequate to give the heart muscle enough blood supply, which may result in the symptoms described above. In this instance, it may be that treatment is needed to improve your symptoms.

What are my treatment options?

In the past, patients with CTO and some of the symptoms described above may have been routinely referred for **Coronary Artery Bypass Graft Surgery (CABG)**. This is an invasive procedure requiring a **general anaesthetic** and **open heart surgery**. This procedure is still a very good option for some patients with coronary artery disease, with or without CTO.

Advances in medical technology mean that new procedures are available as potential alternatives to CABG for patients with CTO. Fewer patients with CTO are now being referred for CABG.

Your Cardiologist will discuss the treatment options that are best suited to your specific case. This may include:

Reviewing medications for your heart

The option of a minimally invasive procedure called ***CTO Percutaneous Coronary Intervention (CTO PCI)***

CABG if appropriate

What is CTO Percutaneous Coronary Intervention (PCI)?

CTO PCI – also known as CTO **angioplasty or stenting** – is a minimally invasive procedure. It:

- is performed under **local anaesthetic** by a Cardiologist. You will be awake for the procedure
- uses specialised equipment such as very fine wires, balloons and stents to try to re-open a CTO of a coronary artery
- often takes longer than standard PCI due to the complex nature of the disease progression inside the coronary artery.

What are the benefits of CTO PCI?

If successful, CTO PCI can improve quality of life by potentially:

- reducing symptoms of angina and/or shortness of breath
- improving exercise ability
- improving the function of the pumping chamber of the heart (**left ventricle**)
- improving long-term survival.

What happens if I decide to go ahead with a CTO PCI?

You will be placed on a waiting list for the procedure. Your Cardiologist may be able to let you know how long you could be waiting for it. You will then receive a letter through the post, which will tell you what date your CTO PCI procedure has been booked for.

Once you have been allocated a date to come into hospital for the CTO PCI, you will also receive a letter detailing the date and time of a telephone pre-assessment call with a cardiac nurse from the hospital. This telephone call is made usually approximately one week before your procedure day and lasts around 15 minutes.

This will discuss:

- the procedure (details overleaf) and any questions you may have
- where to go on the day of your procedure
- your medications and any medication allergies
- past medical history
- fasting instructions
- driving instructions
- current blood tests
- post-procedure care
- what to expect when you get home.

You will usually have an overnight stay in hospital so it is advisable to pack an overnight bag and bring any medications in with you.

What will happen on the day of my procedure?

Please report to the reception at the Cardiac Investigation Unit (CIU), 1st Floor, Trelawney Wing at Treliske hospital, where you will be admitted to the ward. A nurse will discuss your pre-procedure care and then carry out some checks, such as taking your blood pressure, recording an **ECG** and inserting a **cannula** (small plastic tube) into a vein in your arm. This is used for medication should you need it during the procedure.

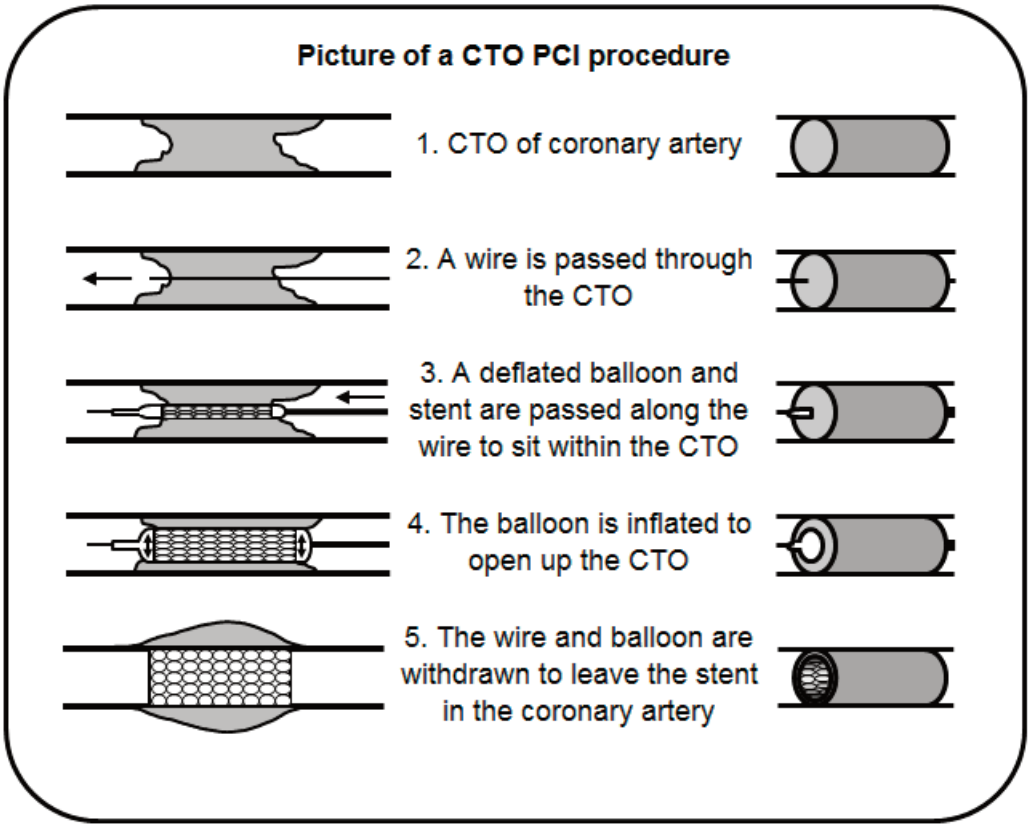
You will also be asked to change into a hospital gown and be given a consent form to read. This will give you some more information about the benefits and risks of CTO PCI. You will have the opportunity to discuss your procedure again with your Cardiologist – please make sure you ask any questions that you want. If you are happy to go ahead with the procedure, you will be asked to sign the consent form. You will be given a copy of this form to take home. The procedure may take anything from one and a half to four hours. This depends upon the complexity of the CTO. We appreciate that for your comfort during the procedure you may wish to discuss the option of a non-invasive urinary catheter or bedpan with one of the nursing team.

What does it involve?

A CTO PCI is similar to a **coronary angiogram** (which you should be familiar with if you are having a CTO PCI). It is carried out in the **Cardiac Catheter Lab** under X-ray conditions with a radiographer so that we can visualise the CTO using **contrast dye**. The consultant Cardiologist will be joined by a Cardiac Catheter Lab nurse for the procedure and both will work under sterile conditions, which aim to minimise the risk of infection. As well as local anaesthetic, there will be the option of light sedation should you be feeling a little anxious. This can be given **intravenously** through the cannula in your arm.

Please ensure that you tell us of anything that you need during the procedure so that we can make you as comfortable as possible – this is important to us!

1. On arrival to the Lab, you will be asked to lie on a narrow X-ray table where the cardiac physiologist will place sticky dots upon your chest and leg to monitor your heart rate and rhythm (ECG).
2. Your doctor will have previously discussed with you which **arterial** entry sites he wishes to use (ie. wrist and/or groin) and these will be cleaned and draped accordingly.
3. It is very common to have two entry sites so that the Cardiologist can inject contrast dye into two different coronary arteries at the same time through separate hollow tubes called **catheters**. This can help us to visualise the CTO, and select the appropriate kit and equipment to help us to unblock the CTO and monitor progress.
4. The Cardiologist will attempt to pass a fine wire through the blockage, either from the front or back of the artery.
5. Should either of these be successful, the Cardiologist will then attempt to re-open the CTO using small balloons and then stent/s.



When the procedure is complete, if your wrist artery has been used a pressure band will be placed here to stop any bleeding. This will usually be removed after two to three hours. If the groin artery has been used, we can either close it by using a dissolvable collagen plug called an Angioseal, or by a nurse who will use manual pressure on CIU.
You will then be returned to CIU for observation and monitoring. The Cardiologist will come and speak with you later that day to discuss the outcome of the procedure.

What are the risks of CTO PCI?

In general, the risks can include:

- **kidney injury from the contrast dye** – if you have significant previous kidney impairment you will be given pre-hydration on CIU before the procedure to minimise the risk of injury
- **bleeding from the puncture sites at the wrist or groin** – puncture sites will be closely monitored by the CIU nursing team post procedure, who will ensure appropriate levels of pressure are applied accordingly
- **radiation exposure** – your Cardiologist and radiographer will inform you if you have received a particularly high radiation dose. Unfortunately this is a risk due to the nature of the length of CTO PCI procedures.
- **small tear in the lining of the coronary artery**.

In rare cases:

- **stroke**
- **heart attack**
- **death**.

Your Cardiologist will be able to give you a more individual indication of the level of risk for your procedure. The pre-procedure consent form will also have information of the risk of CTO PCI.

My individual level of risk for CTO PCI

affix patient label

What happens when I am discharged from hospital?

Providing that the Cardiologist/CIU team are happy that you are pain-free and stable, and that you have had an uncomplicated recovery, you will be able to make plans to go home the day after your procedure.

- Your Cardiologist will tell you if there are any changes to your medications.
- You will be told of any further outpatient appointments or treatment needed.
- Avoid any strenuous activity/heavy lifting for at least 48 hours.
- You should not drive for 1 week.
- If you are working, your Cardiologist will advise you on the recovery time required.
- Should you be treated successfully with CTO PCI, you will receive a follow-up telephone call from a Community Cardiac Nurse who will then arrange to see you. You will have the opportunity to access support and advice on areas such as medications, lifestyle risk factors and exercise.

We hope that this leaflet has been useful in helping you to prepare for your procedure.

My Questions and notes

(Please bring this to your appointments to ensure that we can discuss any concerns)

Contact telephone numbers and further information

Royal Cornwall Hospitals NHS Trust Treliske: 01872 250000

www.royalcornwall.nhs.uk

Cardiac Investigation Unit: 01872 252226

British Heart Foundation website: www.bhf.org.uk

HeartSWell – local heart charity website: www.heartswell.org.uk

NHS Choices website: www.nhs.uk

Glossary of Relevant Terms

Term	Description
Angina	A type of chest pain caused by reduced blood supply from the coronary arteries to the heart muscle.
Angioseal	A small dissolvable collagen plug used to seal a puncture in a femoral artery.
Aorta	The main and largest artery in the body. It originates at the top of the left ventricle of the heart.
Arterial	Relating to the arteries, which carry blood around the body
Atherosclerosis or Heart Disease	Refers to the build-up of fats, cholesterol and other substances inside a coronary artery. This can reduce the blood supply to the heart muscle, potentially causing angina and other symptoms.
Cannula	A thin plastic tube inserted into a vein for the administration of medication or fluids.
Cardiac Catheter Laboratory	Often referred to as 'Cath Lab' for short. A room in which diagnostic clinical imaging can be used to visualise the coronary arteries using x-rays and potentially treat any coronary artery disease.
Cardiac Catheters	Thin, long, hollow plastic tubes used to access a coronary artery through an artery in your wrist or groin. Enables the doctor to pass wires, balloons, stents and other kit to a coronary artery.
Cardiac Rehabilitation	An exercise and education programme offered to patients with heart disease. This can help them understand and manage their condition. It can include sessions on making changes to lifestyle to help improve heart health, exercise, medications and stress management.
Chronic Total Occlusion (CTO)	Refers to the long-term blockage of a coronary artery which is older than 3 months.
CTO PCI	A minimally invasive procedure performed by a Cardiologist that uses specialised kit such as very fine wires, catheters, balloons and stents to try and re-open a coronary artery.
Circumflex coronary artery	The coronary artery which splits off from the Left Main Stem to supply the left and back walls of the heart.
Collaterals	Often referred to as 'nature's bypass', these are small vessels that grow after a CTO has developed. They aim to provide an improved blood supply to the heart muscle but are not adequate enough to meet demand.
Contrast dye	A colourless fluid that can be injected into a vein or artery in the body so that the vessels can be seen under x-ray conditions.
Coronary angiogram/ Cardiac catheterisation	An invasive diagnostic procedure which enables a Cardiologist to look at the coronary arteries of the heart using x-rays. It provides information about the coronary arteries and structure of the heart.

Coronary angioplasty	A minimally invasive procedure which uses small balloons and stents to widen narrowed or blocked coronary arteries.
Coronary arteries	Refers to the blood vessels on the surface of the heart. This network provides the heart muscle with blood and oxygen.
Coronary artery bypass grafting (CABG)	Open heart surgery performed under general anaesthetic. A surgeon will use a vein or artery to 'bypass' a narrowed section of a coronary artery. This aims to improve the blood supply to the heart muscle. The nearest centre to offer this service is Derriford Hospital, Plymouth.
ECG (Electrocardiogram)	A simple, non-invasive test to determine heart rate and rhythm. Sticky dots are placed on the chest, arms and legs. The ECG machine has leads which are attached to the dots. The machine can then read the electrical activity of the heart and print out a graph to aid diagnosis of heart conditions.
General anaesthetic (GA)	A state of medically induced loss of consciousness. An anaesthetist will use anaesthetic drugs and gases to achieve this in a controlled, safe environment. Operations such as CABG can only be performed using a GA.
Femoral artery	The main artery in the thigh which supplies the thigh and leg with arterial blood.
Intravenous (IV)	Commonly refers to the administration of a drug or fluids into a vein.
Left anterior descending coronary artery (LAD)	The coronary artery which splits off from the Left Main Stem artery to supply the front wall of the heart.
Left Main Stem coronary artery (LMS)	The coronary artery which originates from the aorta. It splits into the Left Anterior Descending and Circumflex coronary arteries.
Left ventricle	One of the four chambers of the heart. It receives oxygenated blood from the lungs and pumps this out under high pressure through the aortic valve and aorta to the rest of the body.
Local anaesthetic	A technique using anaesthetic drugs to temporarily numb a small area of the body during a medical procedure. In the Cath Lab this will be by injection to the wrist or groin.
Myocardium	Relating to the heart muscle.
Open Heart Surgery	Surgery which involves cutting the breastbone to open the chest. The surgeon is then able to operate on the heart muscle, coronary arteries or valves.
Radial artery	One of the main arteries in the forearm. Commonly accessed at the wrist for coronary angiogram/angioplasty procedures.
Right Coronary Artery (RCA)	The coronary artery that splits off from the aorta to supply the right wall of the heart.
Stent	A small mesh, tube-like structure used to open a coronary artery. This acts as a permanent scaffold to improve blood supply to the heart muscle.

If you would like this leaflet in large print, braille, audio version or in another language, please contact the General Office on 01872 252690

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