

Department of Cardiothoracic Surgery

Information for patients undergoing heart surgery

These notes are intended to give you and your family information about your heart surgery. Much of this will have been discussed with you in the outpatient clinic but as it is often difficult to remember everything that was talked about at your appointment, we hope these notes will help to explain the need for the operation, how it is done and the potential problems which we occasionally encounter. They will also give some guidance about your recovery and return to normal activity after the operation.

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Coronary Artery Bypass Surgery

Heart bypass surgery (coronary artery bypass grafting or CABG) is done to relieve blockages in the blood vessels of the heart muscle.

The heart muscle works constantly with every heart beat and requires oxygen-rich blood which is delivered through small arteries (called coronary arteries). When fats and chemicals accumulate inside the small coronary arteries (atherosclerosis), there is less room for the blood to flow.



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When the heart muscle cannot receive adequate blood supply through the arteries, heart pain (angina) or heart attack (myocardial infarction) occurs.

Coronary artery bypass surgery is used to “bypass” the blockage and restore adequate blood flow to the heart muscle. We leave the narrowed area in place and bypass it and re-direct the blood around it to improve the blood supply to the muscle and hopefully take away the angina pain.

The operation is mainly done to relieve the symptoms of your angina pain. In many cases (depending on the location of the narrowing and strength of the heart muscle) having the operation will prolong your life, compared to the situation if we did not operate.

Coronary bypass surgery is commonly known as ‘open heart surgery’, (the chest is opened, but not the heart itself) and is a big and serious operation. Thankfully, modern techniques have made it a relatively common procedure which we now do well and with safety.

You will have a cut down the middle of your chest and the breast bone (sternum) will be divided. In many people we will use one or both of the arteries which lie next to the sternum (the internal mammary arteries) for one or more of the bypass grafts. A vein from the leg is also used. While one surgeon is working in the chest, another surgeon or surgeon’s assistant works on the leg, taking a length of vein (for the bypass) from either intermittent or long incisions in the leg. Alternatively, an artery from the forearm may be used as a bypass graft. Using an artery is a relatively new idea; it appears to be at least as good as a piece of vein from the leg. However, it is not suitable or appropriate to use this artery in everyone. We will decide together what we should use for the grafts in your operation.

The coronary arteries on the surface of the heart are between 1mm and 3mm in diameter. We will sew (by hand) the vein from your leg and the mammary arteries to the narrowed arteries on your heart. With the heart beating at 75 beats per minute, this is not an easy job! We will, therefore, stop your heart for a short time to allow us to do this part of the operation but we will continue to pump blood around your body (even though your heart has been stopped) by using the bypass machine (heart-lung machine). The heart is usually stopped for between ten and sixty minutes, depending on what needs to be done.

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After we have completed the bypass grafts, we start the heart beating again and separate you from the bypass machine so that your heart resumes pumping the blood around your body again. If the heart muscle is weak, we may need to give powerful drugs to strengthen the heart or use a machine called a balloon pump to help us with this part of the operation. People who have a normal strength heart muscle seldom have any problem at this point in the operation.

Once this part of the operation is finished we will close the sternum bone with stainless steel wires which will stay in forever. The sternum, like any broken bone, will take about 12 weeks to heal.

The skin incisions will be closed with a dissolving stitch placed under the skin edges and this stitch will just dissolve away once the wound has healed. There will be no stitches requiring removal once you have left hospital.

There will be three small cuts in the lower end of your chest for us to position chest tubes which will take away any blood and air from inside the chest after the operation; they will be removed the day following your operation. Some patients may have a small lead exiting through the skin in this area too. This is a temporary pacemaker wire which is needed in some cases to regulate the heartbeat and will simply be pulled out on the ward a few days before you go home.

The operation will take about four hours. Some operations take longer than others. In some patients we will be able to do the bypass operation with the heart still beating and without the need for a bypass machine. This is done by using a special stabiliser to keep small areas of the heart still while we operate on it, while allowing the rest of the heart to beat normally. This is a new technique, but may allow patients to recover faster than normal and may have reduced risks compared to the conventional operation described above. It is not suitable for everyone and often the decision can only be made once surgery is underway. This type of surgery is called off-pump coronary artery bypass (OPCAB). We will talk to you specifically about this if we feel you will be suitable for it.

Heart Valve Surgery

Heart valve repair and heart valve replacement operations have become very common. These operations are done to improve the health, quality and longevity of life for those who have heart valve disease. There are four valves that control the flow of blood through the four chambers of the heart. They are like one-way doors that keep the blood moving in the right direction and prevent it from flowing backwards into the chamber from which it came. The valves are made of thin but very strong flaps of tissue that open and close as your heart beats. A human heart beats more than 100,000 times a day. The valves must flex, stretch and hold back pressure hundreds of millions of times in an average lifetime. As we age the valves can weaken and harden.

Although the heart has four valves, it is usually only the aortic valve and mitral valve which cause problems that need surgery. The aortic valve is the main outlet valve between the heart and the main artery supplying the body with blood (aorta). It can become narrowed and tight (stenosis) so that the opening becomes too small to allow the blood to flow freely out of the heart. Alternatively, it may allow the blood to leak back into the heart (regurgitation).

Sometimes both problems occur together. The mitral valve connects two chambers in the middle of the heart and protects your lungs from the high pressures of the main pumping chamber (left ventricle) of the heart. It too can become narrowed (mitral stenosis) or may leak (mitral regurgitation), or both can occur together.

At surgery, the same principles apply as previously discussed in the section on bypass grafting, i.e. the chest is opened through a cut down the middle of the chest and you are placed on a heart-lung bypass machine. The heart is stopped so that we can work on it safely. For the majority of valve operations, the heart is stopped for about an hour.

Heart valves may be either repaired or replaced, depending on the damage. Sometimes we can restore the valve to normal function by remodelling the tissue, removing the stretched tissue or sewing the edges. Artificial rings are used to narrow enlarged valves and to reinforce valve repairs. One advantage of a valve repair operation is that the persons own valve tissues are used.

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Heart valves which are seriously deformed or degenerated cannot be repaired. In these cases, the old valve is removed and replaced with a new artificial valve mechanism. The new valve is attached by sewing it to a rim of tissue kept from the original valve. There are different types of valve mechanism, but they fall into two categories:

Mechanical Valves

These are made of metal and carbon. They are very efficient designs and the rate of mechanical failure of the valve mechanism is very small. Most will last much longer than any of us will! The fact that you had a metal device in your heart would mean that blood clots could form on your new valve, and for this reason you would need to take Warfarin to thin your blood for the rest of your life. This would mean having regular blood tests to check the dose and would also mean that if you cut yourself at any time, you would bleed more as your blood would clot more slowly. The risk of bleeding on Warfarin is about 1-2% per year. However, doctors and nurses are well used to dealing with people on Warfarin and it is a very commonly taken medication. The final thing to say about mechanical valves is that they make a ticking sound. If you are the sort of person who hates taps dripping or clocks ticking – these valves are not for you!

Bioprosthetic valves (Animal valve)

These valves are made from the valves found in animal's hearts which are very similar to our own. Alternatively, valves may be manufactured from the sac (pericardium) surrounding the heart of an animal. The valves are specially treated and mounted on a plastic ring, so that we can implant them into your heart. They do not make a noise. Usually patients do not need to take Warfarin if they have a normal heart rhythm. The drawback is that these valves do not last forever. After ten to fifteen years this type of valve starts to degenerate and there is a possibility that another operation will be needed to replace the valve in the future.

The Risks of Heart Surgery

We will have explained the risks associated with having heart surgery in the outpatient clinic and they will be emphasised again when you sign the consent form. Complications after operations are always a possibility. The risks of heart surgery are not zero, nor will they ever be.

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This section of these notes is merely to explain some of the potential complications which can occur, so that you and your family are fully informed. However, we do not mean to worry you and your family – but simply to inform you truthfully of the potential consequences of having a heart operation. Please remember that the majority of patients (more than 90%) go through their operation without any major complications.

Major Risks

Stroke

The operation may lead to a stroke which may leave you with a weakness down one side and/or speech problems. Many people recover fully (with time) after a stroke, while others are unfortunately left with some residual weakness. Strokes are a result of many things but are usually caused by microscopic fragments of the hardened arteries (atherosclerosis) becoming dislodged and travelling to the brain where they cause the stroke. We always do everything we can to minimise the chance of this happening. Elderly patients, those who have had a previous stroke and those with carotid (neck) artery disease are at most risk of a stroke. In otherwise normal, fit patients the risk of stroke is about 1-2%. The risk may, however, reach 10% for patients in a high risk group. We have a very good relationship with the physicians in this hospital and in the event of a stroke we can get the best possible treatment and rehabilitation organised very quickly. Thankfully, we rarely need to do this.

Heart Attack

Sometimes a heart attack can occur either just before or during heart surgery. Usually the heart attack is small and of no consequence, but sometimes they can be large and may significantly weaken the heart muscle. This may cause problems in the Intensive Care Unit after surgery. You will be carefully monitored for this potential complication. Overall, about 5% of patients have a heart attack around the time of surgery (1 patient in 20).

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Bleeding

This is relatively common and affects about 5% (1 in 20) of our patients. Since the operation involves a lot of stitching around a lot of blood vessels it is possible for a 'leak' to develop after the operation has finished. Also, in order to stop your own blood clotting in the tubing of the bypass machine, we have to thin your blood. This, together with some of the effects of the bypass machine, means that in some people their blood does not form clots and they will have excessive bleeding after the operation. This is one of the things we watch for after the operation. If there is excessive bleeding from the chest tubes after the procedure, we may try giving medication which will help the blood to clot in the hope that the bleeding will cease. This often works but it may take a few hours to become effective. If the bleeding continues, we may need to take you back to the operating theatre for another exploratory operation to find the source of the bleeding. This is seldom life-threatening and usually takes about one or two hours to do, but it will be our last resort. Fortunately, you will still be asleep under the original anaesthetic while all this is going on, but it is important that your relatives are aware that it is a possibility. We will contact them if this becomes a problem and let them know if we need to take you back to the theatre. Remember 19 out of 20 patients are fine and this does not happen very often.

Infection

In all operations of every kind there is a risk of infection in the wound, no matter whether you are having a hernia repaired, varicose veins stripped or major heart surgery. The risk of an infection in your wounds is about 1-2%, i.e. 98 people out of a hundred will not have a problem.

Although the overall infection risk remains unchanged, all hospitals have been recently informed of new guidance from Public Health England (PHE) (November 2015) regarding a new infection risk associated with all heart and/or lung surgery that requires the use of a cardiopulmonary bypass machine. This new risk is extremely small and is due to a bug called Mycobacterium species (which is a type of bacteria that is common in the environment but does not frequently cause human infections).

Approximately 1 in 10,000 patients having this type of surgery might be affected. This level of risk is so small that surgery should not be delayed, as the risks of delaying surgery are greater than proceeding.

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It is also possible to get other infections; chest infections (pneumonia) can occur and it is important that you breathe deeply, cough (supporting your chest) and have physiotherapy to ensure that this does not happen; urinary tract ('water works') infections also occur from time to time, but these are easily treated with a course of antibiotics.

Abnormal Heart Rhythm

About one patient in every four may develop an abnormal heart rhythm after their surgery. This is called atrial fibrillation or 'AF' for short. The heart beats quite quickly and irregularly, and sometimes patients feel unwell when it happens – others don't realise anything is wrong. Don't worry if this happens to you. We are very familiar with it and know what to do. It is not a risk to your life. It is easily treated in 90% of cases with tablets which you will need to take for about six weeks. We can stop them if your heart is in a normal rhythm when we see you in the outpatient clinic.

A few people continue to have atrial fibrillation, despite our best efforts at treatment. If this happens there is a small chance of blood clots forming in the heart, so we will start you on the blood thinning medicine called Warfarin. This takes a couple of days to work, but once we have established you on a regular dose we can send you home to be seen by your cardiologist a few weeks later, at which time they can check to see if you are still have atrial fibrillation and give you appropriate treatment. If your heart has gone back into normal rhythm, then you will be able to stop taking the Warfarin tablets.

Some people have a very slow heart rhythm after the operation and may need a pacemaker temporarily. If the heart rate does not pick up, we may ask your cardiologist to see you and consider putting in a permanent pacemaker. This is very rare after bypass grafting but more common after valve replacements.

Renal Failure

Your kidneys are very sensitive organs and may not work properly after your surgery. This is particularly the case if you have had kidney problems in the past. Often the problem will resolve after a few days but occasionally dialysis treatment may be needed for a short time. The vast majority of patients do not have this problem and we will warn you if we think that the risk is greater in your particular case.

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Death

Sadly, with any heart operation there is the possibility that the operation may lead to your death. This occurs in about 1-2% of non-urgent straightforward cases. In other words, if we do 100 operations, tragically one or two patients may die as a result. But, looking at the figures the other way round, 98 people out of 100 will sail through with no problem. If the heart has been weakened by previous heart attacks, or if other procedures such as valve replacement need to be done, then the risks increase. They may be as high as 10-25% in the worst cases. We have a risk prediction calculator which gives a rough idea of the risk from your operation. This is approximately the figure we will quote you for the risk of your individual operation.

What happens now?

Following your outpatient appointment, you are put on the waiting list for surgery.

What you can do in the meantime:

- Keep appointments with your GP and cardiologist. They will help to keep you informed and in the best possible shape before your operation.
- If you are still smoking – **Stop**. We know that smokers have more complications after surgery, may spend longer in Intensive Care and have a worse long-term result from the operation.
- Exercise regularly, perhaps walking for half an hour to an hour every day, if you can.
- If you are diabetic, make sure that your sugars are as well controlled as possible.
- Consult your GP if there is anything at all that concerns you about your health while you are waiting for your operation.
- Please make sure that you visit your dentist. Infections from the teeth can sometimes affect your heart valves. This is particularly important if you are going to have a valve replacement operation.
- If you feel that anything has changed since you were seen in the clinic, especially if you think that your angina is getting worse, let your GP know – they will relay the information to us.

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Coming into Hospital

We will try to give you as much notice as possible about when your operation will take place, but three to four days notice is usual. Occasionally, operating slots become available at very short notice, and if you would like to be considered for one of these please let us know.

We will send you information about your admission to hospital and what you need to bring with you. You will be asked to come to the Cardiothoracic Ward. This is our admissions ward, where all patients for heart and lung surgery come on the day before their operation. This gives us a chance to do routine tests such as blood tests, x-rays and ECGs. The Ward Manager and her team will let you know exactly where to go and what to do; all you have to do is be there. The excellent team of nurses is very experienced in all aspects of cardiac surgery – if you have any questions or concerns they will be able to help you.

One of our cardiac nurse practitioners or doctors will see you to check you over, and your consultant will see you again. A consultant anaesthetist will also see you before your operation. The anaesthetist is one of the most important doctors taking part in your operation and will be involved not only in putting you to sleep safely but also with the conduct of the bypass machine and your care in the Intensive Care Unit. The anaesthetist will talk to you about the aspects of your care for which he/she will be responsible and will answer any questions you may have. Please do not be afraid to ask questions at any time throughout your stay.

When your consultant sees you he will discuss the operation again and will do his best to allay any concerns you may have. In particular, he will want to review the risks of the operation to make sure you and your family are fully informed. He will confirm any contact telephone numbers for your family at this stage.

At this point it is time to try and get a good night's sleep, ready for the busy day ahead. If you need a sleeping tablet to help you (and most people are understandably apprehensive!) we can give you one – just ask the nurse who is looking after you.

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The Surgical Team

Your consultant surgeon is responsible for all aspects of your care. Working with him are a Specialist Registrar and Foundation Doctor.

Our Specialist Registrars are senior doctors in training who have specialised in cardiac and thoracic surgery and will soon become consultants themselves. They are experienced surgeons and work closely with your consultant in the theatre, in the clinic and on the wards.

Our Foundation Doctors are junior doctors who are training in surgery. They are also experienced doctors and will be directly responsible for your care on the ward, day and night. They assist in the operating theatre and are learning and training in many branches of surgery.

In addition, we are lucky to have nurse practitioners who are very experienced in all aspects of cardiothoracic surgery. They have been trained to do many of the tasks of the medical team. They are very thorough and conscientious, and may well be directly involved in your care before and after your operation.

After your operation the Specialist Registrar will see you twice a day – once in the morning and again in the evening. The team will do a ward round together at least two or three times while you are in hospital to check on your progress. Although your consultant may not see you personally every day (he may be operating, doing a clinic or lecturing), he will know exactly how you are getting on from the Registrar and the ward staff. However, if he is away, one of his consultant colleagues will have taken charge in his absence and will be responsible for your care. You will be informed if this happens.

A note on teaching

The University Hospitals Coventry and Warwickshire NHS Trust enjoy a sound reputation for teaching and training surgeons who will be the next generation of consultants both at home and abroad. We are also involved in a number of research programmes designed to help future patients undergoing surgery.

Certain operations, or parts of operations, may be performed by a surgeon in training who will be under constant supervision. If a training surgeon

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performs any aspect of your operation, it will be performed to the same standard as if it had been done by your consultant.

You may also be asked to help with a research project while you are with us, and the doctors involved with the particular study will speak to you about the details of their work. While we always appreciate the help of our patients in furthering cardiac surgical research, which will ultimately benefit future patients, you are always at liberty to decline the offer to participate and we would fully respect your wishes.

This Trust is affiliated with the Medical Schools of the University of Warwick and the University of Leicester and, as such, medical students and students in related disciplines may wish to observe cardiac surgery. It is important that they are introduced to cardiac surgery during their training, but they will play no active part in your operation – they are merely there to watch and learn. Similarly, you may be visited by medical students on the ward, so that they can talk to you about your heart disease and learn from your experience.

After the Operation

After the operation you will be kept under the anaesthetic and transferred from the operating theatre to the Intensive Care Unit (ITU). All patients undergoing heart surgery will spend at least their first day and night in this area. This is routine procedure, and does not mean that anything has gone wrong with you or that we are unduly worried about you. It allows us to monitor the heart and other organs as well as the rate of bleeding from the chest tubes to ensure that all is well.

If you wish, a designated member of your family can telephone the Intensive Care Unit to enquire about how things have gone and how you are progressing. They can then relay this information to other family members.

During your stay in the Intensive Care Unit, you will have your own nurse looking after you. You will have a nurse with you for 24 hours a day. These nurses are very highly skilled in looking after patients who have had heart and lung surgery. There will also be a surgeon and anaesthetist available in the ITU 24 hours a day. You are therefore in very good hands.

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If everything is satisfactory the next day, you will be transferred out of the Unit into the ward. Many of the drips, lines and drains will be removed before you are transferred. The nurses on the wards are excellent and will take extremely good care of you. They are very experienced and familiar with people recovering from heart surgery. They will guide you through your recovery on the ward and watch for any of the problems that occasionally occur. You should be able to walk a short distance e.g. to the bathroom, on the day following your operation. You will be seen by physiotherapists and other health professionals who will also be involved in your after-care, to ensure that you continue to progress satisfactorily. All these staff work as a very close team to monitor you and advise on the best care for you as an individual.

You should be able to increase your level of activity, so that by the 4th or 5th day after your operation you will hopefully be able to climb a couple of flights of stairs.

You will usually be discharged from hospital on the 5th day after your operation. You will be given a letter for your GP and any medication that you need to take with you.

If any help is needed (district nurse, social services etc.) we will organise this for you before you leave us.

Once you are home, should you have any queries or concerns about your operation or your recovery please feel free to call the ward you were on for advice. Alternatively, you could call your GP or contact your consultant's secretary. We will give you appropriate contact numbers before you leave the ward.

Recovery

When you go home you will already be pretty active. You will have gone up at least two flights of stairs and been encouraged to exercise. When you get home the worst thing that you can do is sit in a chair or lie in bed all day. For your own sake, keep active. Try to walk one or two miles a day if you can by four to six weeks.

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To give the breast bone a chance to heal, do not do any heavy lifting or carrying for eight to ten weeks.

The full benefits from the operation may not be fully established until three to six months after surgery. All activities that do not cause fatigue are permitted, but don't try to do too much too soon. We will advise you on diet and activity before you go, but in general:

- Don't smoke;
- Eat a low fat, low salt, high in fibre diet;
- Exercise regularly.

You will be seen in the outpatient clinic approximately six to eight weeks after the operation to see how you are getting on. Your cardiologist will also want to see you at around this time to make sure your medications are at the best level for you.

Long Term

In 90% of cases your angina will disappear completely or at least become significantly better than before the operation. In most cases you should live longer after having the operation, as it will have reduced the risk of a large and potentially fatal heart attack. However, it is advisable to bear in mind that the good effects of the operation may not last forever. Some patients return with a recurrence of their angina ten to fifteen years after surgery because the bypass grafts we put in have themselves furred up. In rare cases the grafts block sooner than this. We can re-do bypass grafts; the operation is bigger and a little more risky, but it can be done.

Technology is improving all the time, and new treatments for angina and heart attacks are being developed constantly. There are many exciting developments on the horizon. Who knows what we will be able to do ten years from now?

Many people ask whether or not they will be able to drive following heart surgery. If all is well when you are seen in the outpatient clinic six to eight weeks after the operation, then you should be able to go back to driving. Make sure that you can wear a seat-belt comfortably and can do an emergency stop without any problem. Inform the DVLA if you have a HGV

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or PSV licence and always inform your insurance company that you have had heart surgery.

Cancellations

Sometimes, after you have been admitted to the ward for your operation, it may have to be cancelled at short notice. This is obviously distressing for you and your family, and it is enormously frustrating for us, the surgical team, since we want to get your operation done as soon as possible for you.

Why does this happen?

There are a number of reasons – the main one is the lack of an available bed in the Intensive Care Unit. We have a fixed number of beds in this unit and if patients who had their operations the previous day are not well enough to leave the unit and go to the ward on the day of your operation, then we have no bed for you to go into after your operation. We cannot go ahead with your operation unless there is an intensive care bed available for you. Sometimes emergency cases may have to be done during the night or early hours of the morning, so Intensive Care Unit beds get occupied in this way. Unfortunately, by their very nature, we are unable to predict these situations. Also, if the surgical team and/or the anaesthetist scheduled for your operation have been working all night and have had no sleep, then we are sure you would prefer that we postpone your operation until another time.

Finally

Feeling anxious is very natural when considering any type of operation. You can reduce your anxiety by eating well, taking exercise within your own limitations and talking to the health care professionals who are looking after you. Having the operation explained to you, voicing your concerns and getting your questions answered will help to put you at ease. Being well informed will help you feel more relaxed as the date for the operation draws near.

We hope that these notes will help you to recall some of the things which have been discussed previously with you and also give you some additional information.

Patient Information

**With best wishes for a speedy recovery,
Your cardiac surgical team.**

For more information:

Listed below are the contact numbers of people who will be able to answer any queries you may have:

Patient Care Advisor 024 7696 5804

Cardiac Liaison Team 024 7696 5803

You can also get more information about heart surgery from the British Heart Foundation. Contact 0300 330 3311 or view their website at www.bhf.org.uk/

For more detailed information you can access the website of the Society of Cardiothoracic Surgeons for Great Britain and Ireland at www.scts.org and click on patient information

This information has been adapted from documentation produced by Mr. S. Clark, consultant cardiothoracic surgeon of the Freeman Hospital, Newcastle and has been reproduced with his kind permission, for the benefit of the patients of the University Hospitals Coventry and Warwickshire NHS Trust.

The Trust has access to translation and interpreting services. If you need this information in another language or format, please contact 024 7696 5804 and we will do our best to meet your needs.

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