Covered Endovascular Reconstruction of Aortic Bifurcation (CERAB)

What is this operation?

Covered Endovascular Reconstruction of Aortic Bifurcation (CERAB) is a new minimally invasive technique for treating extensive and/or recurrent aortoiliac occlusive disease. (See aortoiliac disease in Conditions section). The technique rebuilds the diseased aortic bifurcation and iliac arteries through the use of stent-grafts (stents with a material covering) introduced remotely through the groin or arm arteries. This new technology enables your surgeon to treat extensive, symptomatic aortoiliac disease that would otherwise require major arterial surgery.
(See figure 1)

Why is this operation being offered?

For the majority of clients CERAB is undertaken to treat severe, symptomatic aortoiliac disease; in other words, leg pain that significantly impacts on the quality of life or one's ability to work, non-healing leg ulcers, or a leg that is threatened due to a lack of blood supply (critical limb ischaemia). Aortoiliac disease may also cause impotence in men. (See LeRiche syndrome).

CERAB is increasingly preferred to major arterial surgery, e.g. aortobifemoral bypass, due to the benefits associated with its minimally invasive nature: it is associated with a lower complication rate and shorter length of recovery to that of open surgical reconstructions.

CERAB is particularly suitable for clients in their later years of life or who have other significant illnesses that would have otherwise prevented their aortoiliac disease from being treated prior to this technique being developed.

What happens before your operation?

Before you undergo your CERAB a number of essential investigations and assessments are performed to assess: a) the suitability of your disease for CERAB as well as your overall fitness, and plan your procedure (operative map). These include:

- Blood tests
- CT angiography: (see figure 1)
- Duplex Doppler ultrasound examination of the leg arteries
- Duplex Doppler ultrasound examination of your arm/shoulder arteries

- ECG

Once the decision has been made to proceed to CERAB an admission date will be agreed between yourself and your surgeon. A pre-admission visit may be required to complete paperwork and undertake blood tests or other allied tests required prior to undergoing a general anaesthetic. *Please bring all your medications to your pre-admission review.*

What happens on the day of admission?

You will usually be admitted the day before surgery so as to ensure all requirements prior to surgery have been adequately completed. Your surgeon will visit you and ask you to sign a consent form for your operation. You will also be visited by your anaesthetist.

Please do not stop any of your normal medications unless specifically instructed to by your surgeon

If you smoke we strongly encourage you to stop as soon as possible to reduce the risk of peri-operative complications.

What do I need to bring when I come into hospital?

You should bring the following items with you at the time of admission:

- All your normal medication
- Nightwear & slippers
- Toiletries
- A set of comfortable clothes for discharge
- A good book

What happens during the operation?

The first part of your operation involves giving you an anaesthetic. The majority of CERAB procedures are performed under general anaesthesia (with you asleep). Occasionally a CERAB may be performed under a spinal anaesthetic where an injection into your back numbs you from

the waist down for the duration of the procedure. In our experience clients prefer and find it more comfortable to undergo a CERAB under general anaesthesia.

Once you have been anaesthetised you will have a tube (catheter) inserted into your bladder to drain your urine. This facilitates accurate assessment of your hydration status during and immediately after the procedure. Occasionally the anaesthetist will decide to insert a small tube into an artery in your wrist to enable accurate measurement of your blood pressure during your operation; this will be discussed with you pre-operatively by your anaesthetist. Once the necessary monitoring equipment has been connected your surgical team will start the operation.

Due to the complexity of this procedure The Circulation Clinic undertakes all CERAB procedures as joint cases with two of our consultant surgeons operating together. This reduces the time taken to perform the operation and thereby the time you are under general anaesthesia. We strongly believe this improves our clients outcomes and reduces the risk of a variety of potential complications including heart attacks, kidney failure, respiratory complications and infection rates.

Your surgical team will commence by gaining access to the arteries in your groin creases (femoral arteries). The method through which this is undertaken is dictated by the presence or absence of disease affecting you femoral arteries. We often find clients with aortoiliac disease also have concomitant femoral artery disease and require concurrent femoral endarterectomies performed through groin incisions. For those clients with normal femoral arteries access is gained percutaneously; needle puncture access without the need for surgical incision. For the very extensive aortoiliac blockages your surgical team will often require access to an artery in your left arm/shoulder through a small incision in your upper inner arm or just beneath your collar bone.

Once access is gained to the required arteries wires are threaded through the narrowed/blocked aortoiliac arteries. This is accomplished by carefully 'drilling' through the blockages or passing a wire around the blockages in a different layer of the artery. Once your surgical team has successfully navigated the blockages stent-grafts are deployed to rebuild the aortoiliac bifurcation. Further stent-grafts may then be required to reconstruct any further downstream iliac artery disease that is contributing to your symptomatology. All these steps are performed under x-ray guidance. (See figure 2a & 2b & 3)

Once the aortoiliac artery segments are successfully recanalised the arteries that have been used for access are repaired and any wounds are repaired in layers with stitches. A drain is often inserted into the groins if open surgical access was required. Simple adhesive dressings are applied to the incisions or puncture wounds.

What are the risks?

CERAB is a complex procedure which although is less invasive than traditional open surgical reconstruction is still associated with a potential risk of complications. The requirement for concomitant femoral endarterectomiesheightens those risks specifically in relation to the potential for wound complications. (See femoral endarterectomy in Treatments section)

Complications of surgery can broadly be categorised according to when they occur (during the surgery or hospital admission) (early) or following discharge (late) and whether or not they occur at the site of surgery (local) or affect the entire body (systemic).

Some possible complications of CERAB include;

- Early complications:

- Local or stent-graft related
  - Wound or puncture (if percutaneous) site related (see also femoral endarterectomy)
    - Bleeding
    - Infection
    - Wound breakdown
    - Fluid collection
    - leakage from the wound, collection or leg swelling
    - Arm/shoulder access complications: Where access has been gained to an upper limb artery bruising to nerves that wind around these arteries may occur resulting in numbness, pins and needles and/or rarely weakness in the arm and hand. The. majority of such occurrences resolve over a period of months without complication.
  - Failure to successfully rebuild the aortoiliac segment
  - Embolisation (clot going into arteries beyond the artery treated) requiring re-intervention
  - Tear of the aorta or iliac arteries during the process of traversing the aortoiliac disease resulting in bleeding
    - This is treated though the deployment of the stent-grafts which cover the tear and prevent bleeding
    - Very rarely your surgical team may need to convert to an open operation if bleeding does continue after stent-graft deployment
  - Early stent-graft occlusion requiring re-intervention (rare)
  - Blood clot in leg veins (deep vein thrombosis)
  - Limb loss (very rare)

- Systemic
  - Heart related
    - Heart attack

    - Irregular heart rhythm
  - Lung related
    - Pneumonia
    - Fluid on the lungs
    - Clot on the lung (pulmonary embolus)
  - Kidney related
    - Kidney failure that may require temporary kidney support
  - Radiation injury: CERAB is performed under X-ray guidance and thus you are susceptible to the effects of X-rays particularly when the procedure is very complex requiring extended periods of X-ray usage.
    - Our surgeons are fully trained in radiation safety (IRMER) and take all precautions to minimise your exposure to radiation.
    - Complications of X-rays include skin reddening and blistering
    - Some people worry about the risk of developing cancer following radiation exposure. The likely effects of radiation exposure during CERAB on one's lifetime risk of developing cancer is very, very small.

- Late complications
  - Stent-graft related
    - Stent-graft narrowing: ~10-15% of CERAB procedures will require a secondary procedure (often an angioplasty as a day case procedure) to treat a narrowing within 2 years of the initial procedure
    - Graft blockage
      - >90% of CERABs are patent and functional at 2 years post-procedure
  - Long term complications related to femoral artery surgery (see femoral endarterectomy).

All these potential complications are understandably concerning to our clients. Rest assured our surgeons make every effort to ensure your risk is reduced to the lowest level possible through our expertise and experience. The overall risk of you suffering from a major complication that either threatens your life or leg is very low (<5%). When complications do occur we pride ourselves in dealing with them rapidly and appropriately.

What happens after the operation?

The majority of clients remain in hospital for 3-5 days for monitoring and recuperation. Occasionally this is longer particularly if you have undergone a combined procedure e.g. femoral endartectomy or a staged procedure e.g. CERAB with leg bypass.

During this period of convalescence, you will initially be confined to bed and a chair for 24 hours post-surgery. Then we begin to mobilise you so that by the time of discharge you are able to walk independently and perform your daily ablutions unaided. Sometimes, clients require further rehabilitation and will remain in hospital for longer than one week to regain strength. Throughout this period of recuperation there will be discomfort at the site of any wounds which we treat with pain medication.

What happens when I go home?

Although at the time of discharge we ensure you are safe to go home we ask that there is an responsible adult with you for the first few days following discharge.
You will be able to have a shower at 48 hours post-surgery but we ask you to refrain from bathing until any wounds are fully dry.

For the first few weeks post-surgery there is often an element of leg swelling as they become accustomed to the sudden increase in blood supply. We ask our clients to elevate their legs whenever possible such that their heels are higher than their hips with their legs straight. This helps reduce leg swelling.

You may feel physically exhausted doing relatively minor activity, rest assured this entirely normal and improves with time.

The majority of clients are able to return to work within 4-6 weeks of discharge, but this does depend on the nature of your employment, the type of CERAB you have had and how well you recuperate from your surgery. If in any doubt, please wait until you have been reviewed in clinic by your surgeon.

When Will I be able to drive?

You are able to drive when you are able to perform an emergency stop and are able to concentrate fully on driving. Overall, we advise you to not drive a car for the first 4 weeks post-surgery or until you have pain free movement of your foot and knee, and are able to stamp your foot on the ground. Different rules apply for different ‘Group’ license holders and we recommend contacting the DVLA and your car insurance company for further advice.

Will I need to see the surgeon again?

We review all CERABs in clinic approximately 6 weeks following discharge.

We recommend all clients who have undergone a CERAB to undergo regular stent-graft graft surveillance to help prevent graft failure through early identification of stent-graft or native artery narrowing.