

Section 26.00 Femoral Embolectomy

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26.01 INTRODUCTION

This procedure may be needed at the end of an aortic aneurysm graft operation or as an independent procedure in its own right.

It comes from Section 26 in the Aortic-aneurysm-graft-Operationscript.

26.02 CLEAR THE GROIN AREA

Clear a space 8cm. above the groin crease (more for a fat patient), 10cm. below the groin and 20cm. wide, centered on the midinguinal point . ie the surface marking of the femoral artery.

Make sure the retractors are not interfering with this area.

If the adhesive plastic drape has torn or become unstuck:
Resterilise the skin with Povidone iodine,

26.03 INCISE THE SKIN

Use a No 22 blade on a large scalpel handle to incise the cutis.

Make a vertical incision in the midinguinal line, from 5cm. above the groin to 8cm. below it.

26.04 DEEPEN THE INCISION

Use the firestick to incise into the subcutaneous fat down to the fascia lata.

26.05 INSERT A SELF RETAINING RETRACTOR

Use a Cones self retaining retractor with the handle pointing towards the knee.

Retract the subcutaneous fat by prising the jaws open.

26.06 PALPATE THE FEMORAL ARTERY

This is easier to find when the artery is:
Pulsating.
Aneurysmal.
Atheromatous.

26.07 DEAL WITH OTHER STRUCTURES IF IN THE WAY

Coagulate or ligate veins running into the sapheno-femoral junction.

Elevate the inguinal ligament and the abdominal wall with a Langenbeck retractor in a fat patient.

Make sure there is no femoral hernia in the fatty tissue in the femoral triangle

Avoid damaging lymph nodes and lymphatic vessels to prevent lymphoceles postoperatively

Excise inguinal lymph nodes only if they are obstructing the exposure of the blood vessels.

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26.07 continued Beware of lymphoceles postoperatively if nodes are removed.

Avoid the femoral vein medially.

The vein may be confused with a nonpulsating femoral artery.

Avoid the femoral nerve laterally.

26.08 READJUST THE RETRACTORS

This will give a better view of the arteries.

26.09 START TUNNELLING UNDER THE INGUINAL LIGAMENT

This will give a good exposure of the common femoral artery as it emerges from under the inguinal ligament as a continuation of the external iliac artery.

Use finger dissection for 2cm. on the lateral side of the external iliac artery.

This will avoid damage to the femoral and external iliac veins which run medially.

26.10 EXPOSE THE THREE FEMORAL ARTERIES

These are:

The common femoral artery coming from under the inguinal ligament as a continuation of the external iliac artery.

It bifurcates into the superficial and deep femoral arteries at some point between the inguinal ligament and up to 10cm. more distally.

The superficial femoral artery running down as a continuation of the common femoral artery at its bifurcation.

The deep (profunda) femoral artery running initially medially and then behind the superficial artery to run into muscles laterally.

Variations with early branchings are common.

Use dissecting scissors.

The arteries have characteristic transverse vasa vasorum on their surfaces.

Dissect in a plane close to the artery, where the surface is shiny.

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26.11 DISSECT OUT THE ARTERIES

The aim is to clear all sides of the three vessels and every one of their branches so that they can be controlled with bulldog clamps and plastic threads (sloops).

The site of the incision in the bifurcation of the common femoral artery should be central to this dissection.

Clear 4cm. of each main artery and 2cm. of each branch.

The profunda artery may be obscured by a tributary of a profunda vein, which should be double ligated and divided for access.

Make sure you have found all the vessels.

Look under and behind all the vessels to make absolutely certain.

Use a small cholecystectomy forceps.

(HINT FOR TRAINEES:

Use a JAWS IN – JAWS OPEN – JAWS OUT-
JAWS SHUT technique to open the tissues behind
the vessels.

Avoid a JAWS IN – OPEN – SHUT – OPEN – SHUT
method which can damage the vessels.)

26.12 CONTROL MINOR BRANCHES

Use sloops.

Double loop a sloop around each vessel.

Hold the end of each sloop with an artery forcep.

26.13 PASS SLOOPS AROUND EACH FEMORAL ARTERY

Pass a small cholecystectomy forcep behind each vessel in turn.

Grasp a sloop in the jaws and pull it half way through.

Clip the two end of each sloop with an artery forcep.

26.14 CLAMPING AND ANTICOAGULATING EACH FEMORAL ARTERY

Read on.

26.15 START BY CLAMPING THE SUPERFICIAL FEMORAL ARTERY

Choose a bulldog clamp which is long enough and has a sufficiently strong spring to compress the artery.

Open the jaws of the clamp as wide as they will go.

Place the open clamp carefully across the artery at right angles.

Have 2mm.of each jaw protruding beyond the artery.

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continued Let the jaws close on the artery.

26.16 ANTICOAGULATE THE SUPERFICIAL FEMORAL ARTERY

Use 20ml. of heparin saline in a syringe with a green topped 21SWG needle.

Push the needle through the anterior wall of the superficial femoral artery 10mm. distal to the clamp.

Make sure the needle does not go through the back wall.

Withdraw on the piston to check that blood aspirates back into the syringe.

If blood cannot be aspirated

Pull the needle out of the artery and try to aspirate again.

Push the needle further in and reaspirate.

Insert the needle through a different site.

If you still cannot aspirate blood:

The vessel may be thrombosed or blocked with an embolus.

Continue anticoagulating the other vessels.

If you aspirate blood:

Inject the 20ml. of heparin saline into the vessel.

26.17 CLAMP THE DEEP FEMORAL ARTERY

Apply a clamp as for the superficial femoral artery.

The artery is often less accessible than the superficial artery.

Take care that the clamp crosses the artery completely.

26.18 ANTICOAGULATE THE DEEP FEMORAL ARTERY

Inject 20ml. heparin saline distal to the clamp, as for the superficial femoral artery.

26.19 CLAMP THE COMMON FEMORAL ARTERY

Apply a clamp as for the superficial femoral artery.

Place it 4cm. proximal to the superficial femoral clamp to make enough space for the arteriotomy.

Use a De Bakey clamp if a bulldog is not long or strong enough.

26.20 ANTICOAGULATE THE COMMON FEMORAL ARTERY

Inject 20ml. heparin saline as for the superficial femoral artery.

Hold a pledget on a sponge holder onto the injection site for 1 minute to control any bleeding.

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26.21 CHECK THE CATHETER

Check it is a No 4 French Gauge catheter. I.e 4mm. in circumference.

Check you have a spare No 4 catheter available.

Have the catheter brought to the operating table.

Make sure it does not flip onto unsterile areas.

Remove the central wire.

Test the balloon at the tip of the catheter.

Have 0.75ml of heparin saline inserted into a 2ml. syringe.

Check that there is no air in the syringe, which will upset the feel of the procedure.

Push the syringe onto the catheter until any creaking on the joint stops.

Inflate the balloon with the 0.75ml. of liquid.

Check that the balloon does not burst and the balloon is a regular sphere shape.

Check the balloon deflates on release of the syringe.

Replace the catheter if substandard.

r26.22 MAKE THE ARTERIOTOMY

Use a No 28 blade on a long handle.

Choose a site:

On the front of the distal common femoral artery.

On a healthy piece of artery if possible, 20mm. long.

Avoid dense calcified patches.

Make a transverse 28mm. cut.

This will be big enough for the inflated balloon to pass through.

Make sure the ends are cut cleanly to give the maximum length.

Avoid peeling the intima off the subintima, especially distally.

26.23 ASPIRATE BLOOD CLOT AND BLOOD

Use a vascular sucker.

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Avoid suction on the inside wall to prevent damage to the endothelium.

26.24 CHECK HAEMOSTASIS

Check the clamps are properly positioned and tightly closed.

Check you have not missed any branches.

26.25 PART OPEN THE CLAMP ON THE SUPERFICIAL FEMORAL ARTERY

26.26 PASSING THE FOGARTY CATHETER

Use the same technique as for the iliac artery.

As a reminder:
Follow these steps.

26.27 PASS THE FOGARTY CATHETER DOWN THE SUPERFICIAL FEMORAL ARTERY

Use your fingers to hold the catheter.

Use vascular forceps to hold the catheter in any awkward angle to pass down the artery.

Open the clamp a little more to let the catheter pass through.

Pass the catheter down ideally to beyond the popliteal trifurcation.

The catheter will pass through thrombus and embolus material.

If it meets an obstruction at about 20cm. i.e. at the adductor hiatus:

This may be due to a kink in a tortuous vessel,
Bend the distal 2cm. of the catheter.

Repass the catheter and rotate it to negotiate any kink.

Try to passing a narrower catheter.

If the catheter will still not pass:

The superficial femoral artery is probably blocked with atheroma.

Accept this situation and continue the embolectomy.

If the catheter passes to 30cm. or more:

Push the heparin saline into the balloon until resistance is felt.

The resistance is the wall of the artery.

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If you push too hard:

You can rupture the arterial wall, especially when it is healthy. This will most likely be in the vessels below the trifurcation.

The balloon will suddenly inflate easily.

This sudden inflation can happen also if the balloon bursts.

Withdraw the balloon.

If it has burst:

Replace it.

Be more gentle with the new balloon.

If you think you have ruptured the vessel:

Plan to examine the limb at the end of the operation.

Explore and repair the vessel as needed.

Pull the catheter steadily out of the artery with your left hand.

At the same time, with your right hand, increase or decrease the amount of liquid in the balloon.

The aim is to match the diameter of the balloon with that of vessel being swept clear of the thrombus or embolus.

You will probably feel the narrowing of the superficial femoral artery at the adductor hiatus (about 30cm. from the arteriotomy).

You will feel the roughness of atheromatous plaques on the arterial wall.

As the balloon of the catheter approaches the arteriotomy:

Get the first assistant ready with a vascular sucker to remove thrombus or emboli.

If you bring up thrombus or emboli:

Repeat passing the catheter until no more material is obtained.

You should have a steady stream of back bleeding if the blockage is relieved.

Flush 60ml of heparin saline down the superficial femoral artery.

Reclamp the superficial femoral artery.

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If there is no back bleeding and the catheter pass to 30cm. or more:

The limb may not be viable below the knee.

However, the patient may eventually lose part of the left limb from ischaemia.

Flush 60ml of heparin saline down the superficial femoral artery anyway.

Reclamp the superficial femoral artery.

26.28 EMBOLECTOMISING THE DEEP FEMORAL ARTERY

This is the same technique as for the superficial femoral artery.

The catheter needs careful fiddling round the turns in the deep artery.

The deep femoral artery is rarely thrombosed or embolised and is usually healthier than the two other femoral arteries.

26.29 EMBOLECTOMISING THE VESSELS PROXIMAL TO THE COMMON FEMORAL ARTERY

Use the same technique as above.

There is likely to be more blood loss due to higher pressures proximally.

The catheter should pass into the graft.

Release of thrombus and emboli is likely to cause a whoosh of blood.

Warn your assistants to keep out of the way of the blood.

Be very quick to close the common femoral clamp to minimise blood loss and loss of heparin saline.

If there is no vigorous flow of blood down from the iliac artery:

Try passing the catheter higher up above the graft.

Consider reexploring the graft and anastomoses.

26.30 CLOSING THE FEMORAL ARTERIOTOMY

Flush out the isolated section of common femoral artery with 20ml. of heparin saline.

Use a 4/0 polypropylene vascular suture with one needle removed (eg Ethicon W8953).

Place a first stitch 1mm. from the distal end.

Pass the needle though the upper edge of the artery 1mm. from one lateral end.

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Pass the needle from outside to inside.

Pass the needle through the corresponding edge of the lower edge from inside to outside.

This should prevent intimal delamination.

Tie the first stitch with 4 throws.

Cut the end 10mm. long.

Continue the closure with continuous stitches 2mm. apart.

Maintain a 250gm. tension.

Insert the final stitch 1mm from the proximal end.

Tie off the stitch.

Use 4 throws.

Cut the ends 10mm. long.

26.31 OPEN THE SUPERFICIAL FEMORAL ARTERY CLAMP

26.32 OPEN THE DEEP FEMORAL CLAMP

26.33 PART OPEN THE COMMON FEMORAL CLAMP

If there is spurting:

Insert extra 4/0 vascular stitches.

If there is minor bleeding:

Cover the arteriotomy with a swab and wait 3 minutes.

Continue until the arteriotomy is dry.

26.34 CHECK THE FEMORAL ARTERY IS PULSATING

If not:

Consider a recatheterisation.

26.35 CHECK HAEMOSTASIS IN THE REST OF THE FEMORAL WOUND

26.36 INSERT A DRAIN

This is often omitted.

Use a medium Portovac drain.

Pass the spike introducer through the lateral wall of the wound from inside out.

Check that the drain:

Does not damage the arteries.

Pull the drain through the wound edge until the black localising mark appears at skin level.

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Cut the drain to include 5cm. of perforations.

Tuck the drain into the wound.

Suture the drain in place in the skin.

Use No 1 silk on a hand needle (eg Ethicon W9173).

Make a bite into the nearby skin.

Tie the suture with 4 throws.

Wrap the silk 4 times round the drain.

Tighten the suture to make a waist in the tubing.

Tie the suture with 4 throws.

Cut the ends 4cm. long.

26.37 CLOSE THE SUBCUTANEOUS FAT

Use continuous 2/0 vicryl (eg Ethicon W9125)

26.38 CLOSE THE SKIN

Use continuous 3/0 Vicryl (eg Ethicon W9890).

26.39 CHECK THE FEMORAL PULSE AGAIN

If the pulse is absent:

Consider repeating the embolectomy.

26.40 PERFORM A FEMORAL EMBOLECTOMY ON THE OTHER SIDE

If needed.

Use the same technique as for the first side.

26.41 CHECK THE PULSES AND THE PERFUSION OF THE LOWER LIMBS

If blood flow is poor and there is evidence of a distal occlusive disease:

Consider further assessment with angiography.

End of operation.