

## **BELOW KNEE AMPUTATION**

### **GRADE 4 (SEVERE)**

#### **THESE STEPS COVER**

SHORT STUMP  
ZERO ANTERIOR  
LONG POSTERIOR  
MYOPLASTIC FLAP  
BELOW KNEE AMPUTATION (BURGESS)

FOR PERIPHERAL VASCULAR DISEASE

IRREVERSIBLE ISCHAEMIC CHANGES DISTAL TO THE MALLEOLI

FAILED FOOT OR TOE AMPUTATION

REDO BELOW KNEE AMPUTATION

#### **CONTRAINDICATIONS**

ABSOLUTE

ILIAC ARTERIAL BLOCK

FIXED FLEXION DEFORMITY IN THE KNEE

This will prevent an artificial limb being applied.

However, a below knee amputation in a bed-bound patient is better than an above knee one for mobility.

IRREVERSIBLE ISCHAEMIC CHANGES ABOVE THE MALLEOLI

These include:

Ulceration.

Red, blue, purple or black skin.

Ischaemic contracture of shin or calf muscle.

Ischaemic tenderness of shin or calf muscles.

Crepitus in the tissues.

CONTRAINDICATIONS RELATIVE

OEDEMA

LYMPHANGITIS

THESE STEPS DO NOT COVER

PRIMARY AMPUTATION FOR TRAUMA (See EMERGENCY  
STEP-WISE)

EQUAL FLAP AMPUTATION

LATERAL FLAP AMPUTATION

**SECTIONS**

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NUMBER

**1 PRELIMINARIES**

**8 ANAESTHESIA**

**9 POSITION**

**10 STANCE**

**11 SKIN PREPARATIONNN**

**14 TOWELLING UP**

**20 SKIN INCISION**

**26 CUTTING THE FIBULA**

**29 CUTTING THE MUSCLE**

**34 CUTTING THE TIBIA**

**43 TRIMMING THE MUSCLE**

**47 CLOSING THE MYOPLASTIC FLAP**

**56 CLOSING THE SKIN**

**63 FINAL TOUCHES**

**70 EQUIPMENT AND MATERIALS LIST (FRIARAGE HOSPITAL)**

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**1 PRELIMINARIES**

- READ ON

**2 CHECK YOU HAVE THE CORRECT PATIENT****3 CHECK YOU HAVE THE CORRECT LIMB****4 CHECK ISCHAEMIC TISSUE IS SEALED OFF**

Use clean occlusive towels fixed with 4 inch Elastoplast.

**5 CHECK THE OTHER LIMB IS PROTECTED**

Protect it from pressure or damage during the operation by means of soft padding, particularly under the heel.

**6 CHECK THERE IS NO OTHER PROCEDURE TO DO****7 CHECK THERE IS A DIATHERMY PAD****8 ANAESTHESIA**

- READ ON

General, or spinal etc., depending on anaesthetic preferences.

**9 POSITION**

- READ ON Supine

Have access groin to heel.

**10 STANCE**

- READ ON

Stand on the side of the amputation.

Have your one assistant opposite.

**11 SKIN PREPARATION**

- READ ON

**12 HAVE THE LEG HELD UP AT 45%**

Have an unscrubbed assistant holding the foot.

**13 CLEAN THE SKIN**

Clean the skin from the heel to the groin using 2 swabs on sticks with 0.5% Chlorhexidine in 70% Propanol and one to dry off.

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14 TOWELLING UP  
- READ ON

15 PLACE A LARGE SHEET ON THE OPERATING TABLE UP TO THE BUTTOCK

16 PLACE AN UPPER SHEET DOWN TO THE MIDTHIGH

17 CLIP THE UPPER SHEET ROUND THE MIDTHIGH  
Use a towel clip.

18 DROP THE FOOT INTO A LOWER SHEET

19 FOLD THE LOWER SHEET OVER THE FOOT  
Clip the sheet tightly around the lower calf with a towel clip.

20 SKIN INCISION  
- READ ON

21 MAKE THE ANTERIOR INCISION  
Use a scalpel with a 22 Swan-Morton blade.

Do not use a tourniquet.

This is a simple transverse incision through the skin and the fat, 2 cms. below the tibial tubercle.

This is at the level of cutting the tibia.

Make it round the front half of the leg's circumference.

22 HAVE THE LIMB ELEVATED 45%  
Use your assistant holding the patient's foot.

23 PLAN THE POSTERIOR INCISION  
The posterior flap will need to fold forwards to join the anterior flap after the amputation without any tightness at all.

This means making a long skin flap extending down to 5cm. above the Achilles tendon, as wide as the posterior half of the calf.

Do not make the incision any higher or you will be in danger of

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having too short a flap.

You can always shorten the flap later, but you cannot lengthen it.

#### 24 CUT THE POSTERIOR FLAP

Make the flap with parallel sides and a curved lower end.

Incise the skin from the medial end of the anterior incision, parallel to the long axis of the limb until you are 20 cms. from the calcaneum.

Extend the incision in a semi-circle to within 10 cms. of the calcaneum.

Then run back onto the lateral side of the calf to the lateral end of the anterior skin flap.

This flap may look extraordinarily long, but it will contract by at least 30% over the next two weeks.

You cannot make a flap too floppy.

#### 25 CLAMP, AND DIVIDE THE LONG SAPHENOUS VEIN

Use artery forceps and scissors.

#### 26 CUTTING THE FIBULA

- READ ON

#### 27 EXPOSE THE UPPER END OF THE FIBULA

Cut through the anterior tibial and peroneal muscles.

Expose a 2 cm. segment of the fibula 1cm. above the anterior skin flap incision.

Retract the skin and fat with a Langenbeck retractor.

There should be very little bleeding if the operation is being done for arterio- sclerosis.

Clamp vessels with forceps as necessary.

#### 28 DIVIDE THE FIBULA

Use bone cutters to cut the fibula 1 cm. above the anterior skin flap incision.

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Cut the bone obliquely so that the outer side of the cut bone does not press on the skin.

If you are not strong enough, use a Gigli saw.

Trim off sharp edges of the bone with bone nibblers.

## 29 CUTTING THE MUSCLE - READ ON

## 30 DEVELOP THE POSTERIOR FLAP

Use a scalpel with a 22 Swan-Morton blade.

Start by deepening the distal end of the incision into the gastrocnemius and soleus.

Cut down to the posterior surface of the tibia and fibula.

Dissect upwards in this plane to make the posterior flap consisting of skin, fat, and most of the calf muscles.

Continue upwards to the level of planned tibial resection. ie. 2cm. below the tibial tubercle.

Do the dissection quickly to avoid excess blood loss.

Avoid your own and your Assistants fingers.

## 31 CONTROL MAJOR VESSELS

In particular, the popliteal artery, but also lesser arteries, soleal veins, any grafts, and the long saphenous vein.

Use artery forceps and 0 silk ties (Ethicon W224).

Cut the ends of the silk 3mm. long.

## 32 CUT THE SCIATIC NERVE

Pull the nerve down into the wound with an artery forcep.

Use a scalpel to cut the nerve straight across high in the wound.

Let the nerve retract upwards out of danger from postoperative adhesions.

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**33 REVIEW THE OPERATION SO FAR**

The tibia now should be fully exposed at the level of the anterior skin flap.

The posterior flap of skin and flexor muscles should be hanging away from the tibia at the level of the anterior skin flap.

The major vessels should be by now ligated.

**34 CUTTING THE TIBIA**

- READ ON

**35 ELEVATE THE ANTERIOR TIBIAL PERIOSTEUM**

Use a periosteal elevator to pull the periosteum of the anterior tibia back 2cm.

This will expose the tibia, free from periosteum and adventitia, ready for the oblique anterior part of the saw cut.

**36 RETRACT SKIN, FAT AND MUSCLE**

Use an amputation retractor.

**37 MAKE THE FIRST SAW CUT**

Use an amputation saw.

Start 2 cm. below the tibial tubercle.

Angle the saw 45% downwards towards the heel.

Cut halfway across the tibia.

**38 MAKE THE SECOND SAW CUT**

Three cms. below the tibial tubercle, cut right through the thickness of the tibia with the saw held perpendicular to the long axis of the bone.

These 2 cuts remove an anterior wedge of tibia to reduce the pressure on the front of myoplastic flap.

**39 COMPLETE THE AMPUTATION**

Cut through residual muscle.

**40 DISCARD THE AMPUTATED PART**

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**41 TRIM THE BONE**

Use bone nibblers and a bone file to remove jagged edges and to round off sharp anterior surfaces on the tibia.

**42 EXAMINE THE STUMP**

Place a fresh towel on the operating table.

Lay the limb down on the fresh towel.

Plug any cortical bleeding with Horsley's bone wax.

**43 TRIMMING THE MUSCLE**

- READ ON

Use a scalpel to shave the muscle down to a 2cm. layer.

This muscle should fold over the lower end of the tibia to meet the periosteum of the anterior surface of the tibia.

Trim the muscle laterally and medially so that it does not bulge out of the wound.

This muscle shaving is of great importance.

Beginners are likely to leave too much muscle, which leads to tight flaps, necrosis and infection.

**44 CHECK THE LENGTH OF THE SKIN OF THE POSTERIOR FLAP**

The skin and fat of the posterior flap should fold forward and overlap the skin of the anterior flap by 3 cms.

This will allow for contraction of the flap in the next week or two.

If it looks as if the skin is twice as long as is needed, this is about right.

Remove any excess of muscle holding the skin of the posterior flap away from the skin of the anterior flap.

Remove any muscle squashing out at the sides.

Trim away excess skin cautiously; you probably do not need to do this.

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If there is any shortness of the skin, thin the muscle more.

If there is still shortness, the flap will probably fail. Consider an above knee amputation. (SCALPEL FAX FILE NAME SW-AKA)

#### 45 CHECK THE LENGTH OF THE MUSCLE OF THE POSTERIOR FLAP

The muscular part of the skin flap should be long enough to overlap the periosteum of the anterior tibia by 1cm.

Trim off excess length of muscle and aponeurosis.

If there is shortness, shave off some more muscle.

If there is still shortness, the flap will probably fail. Consider an above knee amputation. (SCALPEL FAX FILE NAME SW-AKA)

#### 46 CONTROL BLEEDING

Use 2\0 Vicryl ties (Ethicon W9025) or diathermy.

Oversew obstinate bleeding vessels in muscles with 2/0 Vicryl (Ethicon W9136).

#### 47 CLOSING THE MYOPLASTIC FLAP

- READ ON

#### 48 SUTURE THE MUSCLE LAYER OF THE POSTERIOR FLAP

Use interrupted 1 Vicryl (Ethicon W9251).

Stitch the muscle and aponeurosis of the posterior flap to the periosteum of the anterior tibial stump.

Insert the stitches at 1cm. intervals.

Cut the ends 3mm. long.

Trim off any muscle bulging out at the ends of the closure.

#### 49 INSERT A SUCTION DRAIN

Use a Portovac drain.

Run the drain along the space between the muscle and the inferior surface of the tibia.

Bring the drain out laterally 10 cms. proximal to the amputation in

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healthy tissue away from the contamination by perineal organisms.

Avoid vessels in the subcutaneous tissues.

#### 50 CUT THE DRAIN TO FIT INTO THE SPACE

Use stitch scissors.

#### 51 CUT THE SPIKE OFF THE DRAIN

Use stitch scissors to cut the drain at 45 degrees to allow easy insertion into the suction container.

#### 52 TUCK THE DRAIN INTO THE SPACE

Check the drain does not knot or press on delicate structures.

#### 53 STITCH THE DRAIN TO THE SKIN

Use No.1 silk (Ethicon W799).

Tie 4 half hitches at skin level.

Wrap the tie tightly around the drain 4 times at skin level.

Tie 4 more half hitches to finish.

Cut the silk ends 4 cms. long.

#### 54 STITCH THE SUBCUTANEOUS FAT

Use continuous 1 Vicryl (Ethicon W9251).

Make allowance for the longer posterior flap perimeter than the anterior.

At this stage the amputation may look rather like an elephant's foot, with a great excess of skin and subcutaneous tissue in the posterior part.

This will all shrink up within the next one to two weeks.

The flap should be quite loose and floppy for optimal healing.

#### 55 CHECK THE SWAB, NEEDLE, AND INSTRUMENT COUNTS.

#### 56 CLOSING THE SKIN

- READ ON

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

57 SPRAY THE WOUND

Use an acrylic spray (Nobecutine).

58 CHECK THERE IS NO OTHER PROCEDURE TO DO

59 APPLY A SKIN DRESSING

Use a compliant dressing (Mepore).

60 DRESS THE WOUND DRAIN

Use a compliant dressing (Mepore).

Apply a crepe bandage only if the patient is likely to disturb his wounds.

Continue protecting the other limb from pressure and trauma.

61 CONNECT THE SUCTION SYSTEM

62 START THE SUCTION SYSTEM

Compress the vacuum chamber and close the plug on it.

63 FINAL TOUCHES

- READ ON

64 CLEAN THE SKIN SURROUNDING THE DRESSING

Use 0.5% Chlorhexidene in 70% Propanol.

65 GIVE ANTIBIOTICS

Continue antibiotics for any previously identified organism.

OR give AMOXYCILLIN 250MG. and FLUCLOXACILLIN 250MG. intravenously or orally for five days unless there is a Penicillin allergy.

66 PRESCRIBE CALCIUM HEPARIN

Give 5000 units subcutaneously b.d. until the patient leaves hospital.

67 CHECK THE WOUND DRAIN IS WORKING.

68 WRITE LEGIBLE OPERATION DETAILS

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69 FILL IN THE SURGICAL AUDIT FORM

70 DICTATE AN OPERATION LETTER TO THE  
GENERAL PRACTITIONER PLUS A COPY TO  
THE REFERRING PHYSICIAN

71 EQUIPMENT AND MATERIALS (FRIARAGE HOSPITAL)

BASIC PACK ORTHO KNEE

INSTRUMENTS

2 SPONGE HOLDERS

CHARNLEYS P.E.

2 NEEDLE HOLDER

SBONE FILE

4 LANES TISSUE FORCEPS

BONE CUTTER

20 CURVED JOLLS FORCEPS

BONE NIBBLER

ASS TOWEL CLIPS

BLAKES RETRACTOR

ASS SCISSORS

AMPUTATION KNIFE

1 NONTOOTHED DISSECTING FORCEPS

2X NO 4 KNIFE HANDLES

1 AMPUTATION SAW

2 LARGE LANGENBECKS

PREPARATION

HIBITANE WET X2, DRY X1, ETHER METH X1

SUTURES	NO	MATERIAL
TIES	2X W9052	2/0 VICRYL
FASCIA	2X W9251	1 VICRYL
FAT	1X W9251	1 VICRYL
SKIN	1X W9890	3/0 VICRYL
DRAIN	1X W793	1 SILK
OTHER		

BLADES

2X C

DIATHERMY

MONOPOLAR, FLEX, HOLDER, MEDIUM FORCEPS

DRAINS  
1X PORTOVAC

PATIENT'S POSITION  
SUPINE

TABLE FITTINGS

WOUND ANTIBIOTIC 0

WOUND INFILTRATION 0

SPRAYS  
NOBECUTAINÉ

CATHETERS 0

DRESSINGS PRIMAPORE

ADDITIONAL ITEMS