

Transtibial Amputation with Extended Flap and Bone Bridging

Skin/Flaps:

Bone cut level:

One very critical decision is where exactly to cut the tibia and fibula for this particular individual. Several factors must be taken into consideration when choosing where to cut the bone.

1. Historically, many surgeons recommended a tibial bone cut that was always one hand's breadth distal to the tibial tubercle. This gives a tibial length of between 10 and 15 cm depending on the size of the surgeon's hand.
2. Recently it has been recognized that additional tibial length may have some value up to a certain level.
3. It is almost always recommended to avoid amputation in the distal 1/3 to 1/4 of the tibia, as there is very little muscular tissue for padding in the distal most portion of the lower limb.
4. Calves vary dramatically in their anterior to posterior diameter, so ideally the tibia would be divided at a point where the distal edge of the appropriate length posterior flap would occur at the junction of the soleus muscle and the Achilles tendon.
5. When the transtibial amputee is standing up, the distance between the ground and the end of the residual limb allows adequate space for the liner, socket, proximal connector, pylon, distal connector, and foot.
 1. 4 to 6 inches of space allows for the use of most standard prosthetic feet and a pin lock suspension system.
 2. 6 to 8 inches allows for the addition of a shock absorbing component to the above standard prosthetic system.
 3. 8 to 10 inches is required for the use of most integrated high-impact foot/pylon/shock absorbing systems.
6. Practically, the tibial bone cut is planned to keep one third to one half of the length of the tibia. The exact location is based most commonly on the quality of the soft tissue envelope, the shape and size of the calf muscle, the overall height of the individual, and the location of scars, ulcerations or soft tissue defects.

Measure limb diameter:

Measure the anterior to posterior diameter of the limb, at the level of the tibial bone cut. In this case the diameter is 12 cm. The skin of the flap needs to rotate all the way from the posterior aspect of the limb up and over the distal end, to join the anterior skin in a tension free closure. This flap has an axis of rotation that is just posterior to the limb, not at the mid-limb as is still shown in some older texts. Therefore, the traditional flap length needs to be equal to the AP diameter of the limb, plus an additional cm to allow for the curvature of the tissue around the end of the limb.

In the case of the **extended** posterior soft tissue flap, an additional 5cm must be added to that measurement. Therefore, in this case the length of the flap is 18 cm. (the 12 cm diameter plus 1 cm for rotation plus 5cm of added length).

Draw incision lines:

The skin incisions are drawn out based on the proposed level of the tibial bone cut.

1. The **medial** and **lateral** extensions are drawn straight distally, and do not drift posteriorly. The length of the extensions is equal to the AP diameter of the limb at the proposed level of the tibial bone cut, plus 6 additional cm. The extended flap is approximately 5cm longer than the traditional posterior flap.
2. **Anterior** incision – down approx half diameter of limb. Medially this extends down to an inflection at the edge of gastrocnemius muscle. Laterally, this extends down to the posterior edge of fibula. The incisions curve very slightly from distal to proximal as it moves from anterior to posterior.
3. **Posterior** incision is drawn straight around the back of the leg, connecting the ends of the medial and lateral incisions.

Aesanguinate leg before applying the tourniquet

Incisions:

Incisions should be made in a decisive fashion to provide a clean and pure incision through skin, subcutaneous tissue, down to and through the fascia. One should avoid feathered or beveled edges, and avoid irregularly cut surfaces that can lead to devitalized tissue which may be a focus for non-healing or infection.

Lateral incision

Medial incision

Distal incision/Achilles transection

