Amputation

Amputation was mentioned by Hipprocates of Cos as one of the most ancient of all surgical procedures. It was also used as a punishment and occurred often during wars. It is a condition where a limb, part thereof or more than one limb are either congenitally or surgically removed.

Congenital abnormalities:

- Surgical revision of malformed extremity.
- Absence of part of the extremity.

Acquired amputations due to trauma and/or disease (e.g. malignancy)

- Vascular insufficiency
  - Diabetes Mellitis
  - Peripheral vascular disease
  - Buergers disease
  - Deep vein thrombosis
  - Nerve injuries - trophic ulcers
  - Infections - gangrene
  - Injury - thermal burns / frostbite, electrical burns, limb severance.

Determining the level of amputation:

- Doppler indices
- Xenon xe 133 - indicates level of healing
- Oxygen tension measurements
- Laser doppler measurements
- Skin fluorescent studies
- Skin perfusion pressure measurements
- Skin temperature
- Arteriography
Levels of amputations

- **Upper Limb:**
  - Digital amputations - no prosthesis
  - Below elbow amputations - functional and / or cosmetic prosthesis
  - Above elbow - functional or cosmetic prosthesis
  - Shoulder disarticulation - only cosmetic prosthesis.

- **Lower Limb:**
  - Digital - shoe insert
  - Transmetatarsal (forefoot) - heel stays in tact. When healed properly it can bear weight.
  - Symes amputation - disarticulation of ankle joint. The patient can bear weight through stump.
  - Below knee - the lower the level, the better control of the stump, as well as proprioception and sensation. Functional activities e.g. stairs, walking, balance and co-ordination benefit more form a longer lever.
  - Knee Disarticulation - can be used as end weight-bearing stump. Proprioception of femur is also preserved.
  - Above knee amputation - stump control and walking benefit most from a l longer lever action. Proprioception, sensation as well as balance and walking speed are affected.
  - Hip disarticulation - amputation through hip joint.
  - Hemipelvectomy - mostly for patients with malignant tumours.

Preparation for amputation
Diabetes Mellitis, heart failure, infection, hypertension and cholesterol levels should be controlled.

Protein-calorie malnutrition affects healing of amputation sites.

Extensive pre-operative evaluation by the medical team is advised.

Both the patient, family members and caregivers must receive counselling and emotional support.

Weightloss must be encouraged in obese patients.

Stop smoking

The condition of the remaining muscle, joints and limbs must be monitored (prevent muscle weakness, contractures)

Adequate analgesic treatment.

Skincare - especially when vascular impaired.

Sensory, auditory and visual disabilities must be identified and dealt with.

Complications

Haematoma - could delay healing and serve as culture medium for infection.

Infection - more common in diabetics. Adequate drainage and antibiotics are essential.

Necrosis - circulation is vital

Contractures - positioning of stump and exercises are crucial. Gentle stretching, wedging casts or surgical release can be used.

Neuromas - on the end of cut nerve.

Phantom sensations - it feels as if the amputated part is still resent. It may be disturbing but not necessarily painful.

Immediate Post-Operative Treatment

Reduce swelling / oedema (lift bottom feet of bed)

Never use a pillow underneath stump.

Early mobilisation

Positioning of stump - weight of limb is reduced, which may lead to specific alterations in joint positions.

This can lead to contractures, which impairs functions.

Normal woundcare nursing

Mobilize as soon as patient is medically stable, with doctors consent. A variety of walking aids may be used - it can even be practised beforehand.

With lower limb amputations patients must lie prone for 30 - 60 minutes everyday to prevent hip contractures.

Positioning in bed (A)
- Above knee amputations: hip extension adduction and medial rotation.

Positioning in sitting (B)
- Above knee amputations: adduction important. Stump must rest in fully on seat.
- Below knee amputations: a length of wood can be cut to support the limb.

Lower Limb Stump

**Bandaging of stump and woundcare**

Patients and their families must be well educated in woundcare and stump bandaging. Bandaging hastens healing, shrinkage and maturation of the stump. It would be done everyday and be worn for the entire day. The Elzette bandage may be used as soon as the wound closure properly healed. Even if the patient has no prosthesis, bandaging protects the skin during transfers.

Upper Limb Stump

**Bandaging**

The bandage must be slightly tighter around the distal end of the stump to obtain a proper cone form.

**Stumpcare:**

1. Wash stump daily with soap and water.
2. Rub it dry with towel to improve circulation.
3. Keep skin soft and supple by applying oil or lanolin cream.
4. Wear a clean dry sock everyday. Handwash and flat drying is essential for keeping its
elasticity.

5. Do not darn a worn sock and do not wear a sock with holes in it - it causes chafing and injury.

6. Do not shave the stump

**The remaining limb:**

1. Do not sit too close to fires / heaters, especially vascular patients.
2. Shoes must fit properly (no chafing)
3. When wearing new shoes, examine foot regularly during the day for redness and pressure points.
4. Check feet, skin everyday for small lesions.
5. Check shoes for foreign objects etc. Do not walk barefoot.
6. Wash and dry foot and toes properly.
7. Protect your limb from banging on doors, corners etc.
8. Nail care is important to prevent ingrown toenails and infections.
9. If the patient cant do it properly by himself, a caregiver must be taught the correct way.
10. Check water temperature of bath with hands first.
Who qualifies for prosthesis

Patient requirements:

Patients must be able to work very hard. Therefore problems like angina myocardial infarctions and dispnea limits a patients ability severely.

General

- Patient must be able to stand and walk with crutches without assistance. Balance and coördination are crucial.
- No vascular impairment must be present, especially when having bilateral amputations and / or above knee amputations.
- The patient must have work through and accepted the disability.
- Excellent vision necessary.
- Muscle strength must be optimal. Proprioception is important, and the lack of it could hamper mobility.

Other leg

- Must be strong and have optimal muscle strength.
- No contractures must be present.
- Good circulation.

Stump

- Wound must be healed properly, with adequate bloodcirculation.
- Stump must be desensitised so it can bear weight.
- Hardening of skin to prevent chafing and blisters.
- No contractors, normal or optimal muscle strength is required.
- Shape of stump must be correct for prosthesis.
- Further it is important to look at the patients age, social background, cognitive ability, responsibility as it could hamper the rehabilitation process.

Strengthening exercises

- General arm strengthening to ease crutchwalking
- Stomach and trunk muscles strengthening for balance in sit, stand and kneeling.
- The remaining leg must be very strong

Stump exercises

- Lie on back and bend healthy leg towards chest and clasp arms around it. Place stump on a thick towel or 2 telephone directories (height 18cm)
- Press stump into bed to lift buttocks of ground. Hold for 3-5 seconds.
Lie on side of healthy leg keep that leg bent up. It is not allowed to rest on the bed. Stump presses inwards to help lift hips.

- Lie on amputated side - same as above
- Stump press outwards to lift hips from bed/ground.

Knee disarticulation and additional exercises and below knee amputation

- Rock from side to side and walk on knees. Ensure the stump is properly bandaged for protection.

General exercises for improving circulation

- Flexion of the feet up and downwards
- Active hip and knee flexion
- Straight leg raises
- Active open / close legs (for hip movements)

Weightbearing areas of amputations

- Transmetatarsal, symes and knee disarticulation all bears weight on stump end.
- Below knee amputations bear weight on patellar tendon, the lateral part of the lower limb.
- There should be no pressure on either the fibula head, tibial plate, hamstrings or end of stump as this might cause severe pressure sores.