AMPUTATION

'Assessment & Early Rehabilitation'

Department of PMR

AMPUTATION

- Definition
- Causes
- Levels
- Pre-surgical management
- Surgical Procedure
- Postop management
- Complications
- Residual limb Assessment
- Ideal stump
- Prosthesis

AMPUTATION

Loss of part or all of an extremity as the direct result of trauma or by surgery

AMPUTATION – why ?

DEAD, DANGEROUS or DAMN NUISANCE

DEAD (or dying)

- Severe trauma
-Peripheral vascular disease
-Burns
-Frostbite

AMPUTATION – why ?

DANGEROUS

-- Malignant tumors

-- Potentially lethal sepsis

-- Crush injuries

AMPUTATION- why ?

DAMN NUISANCE—

When retaining the limb may be worse than being having no limb at all

--Gross malformation

--Recurrent severe infections

TYPES OF AMPUTATION

PROVISIONAL-

Done initially when primary healing is unlikely

DEFINITIVE-

Planned amputation

Amputation - Types

Guillotine

- All tissues divided at same level
- Terminal end – Scary

Indications

- Life saving
- Stuck limb
- Under war conditions

Amputation - Types

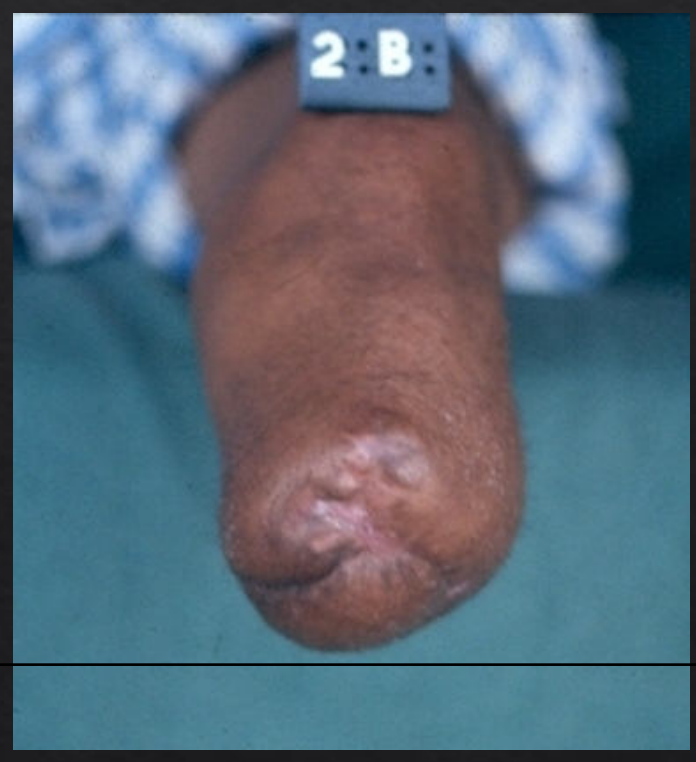
Myoplastic

- Muscles of opposing group sutured together at the end of the bone
- Stump – Bulky
- Muscles roll over the stump end

Amputation - Types

Osteoplastic

- Muscles sutured at the bone end
- Stump – Conical
- Bony terminal end



Amputation - Types

Osteomyoplastic

- Combination of osteoplasty and myoplasty
- Good stump
- Long posterior flap
- Skew flap

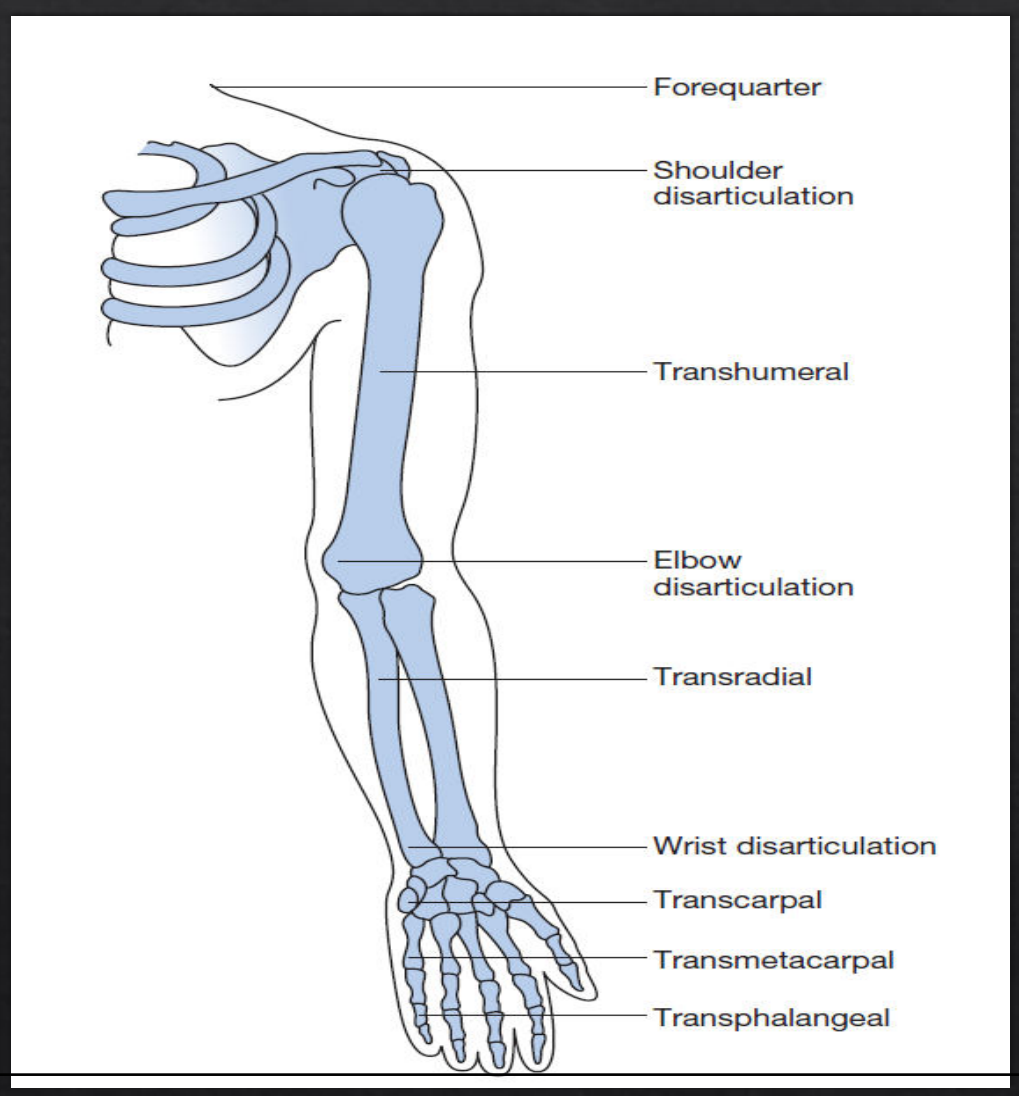
Upper limb amputation Levels

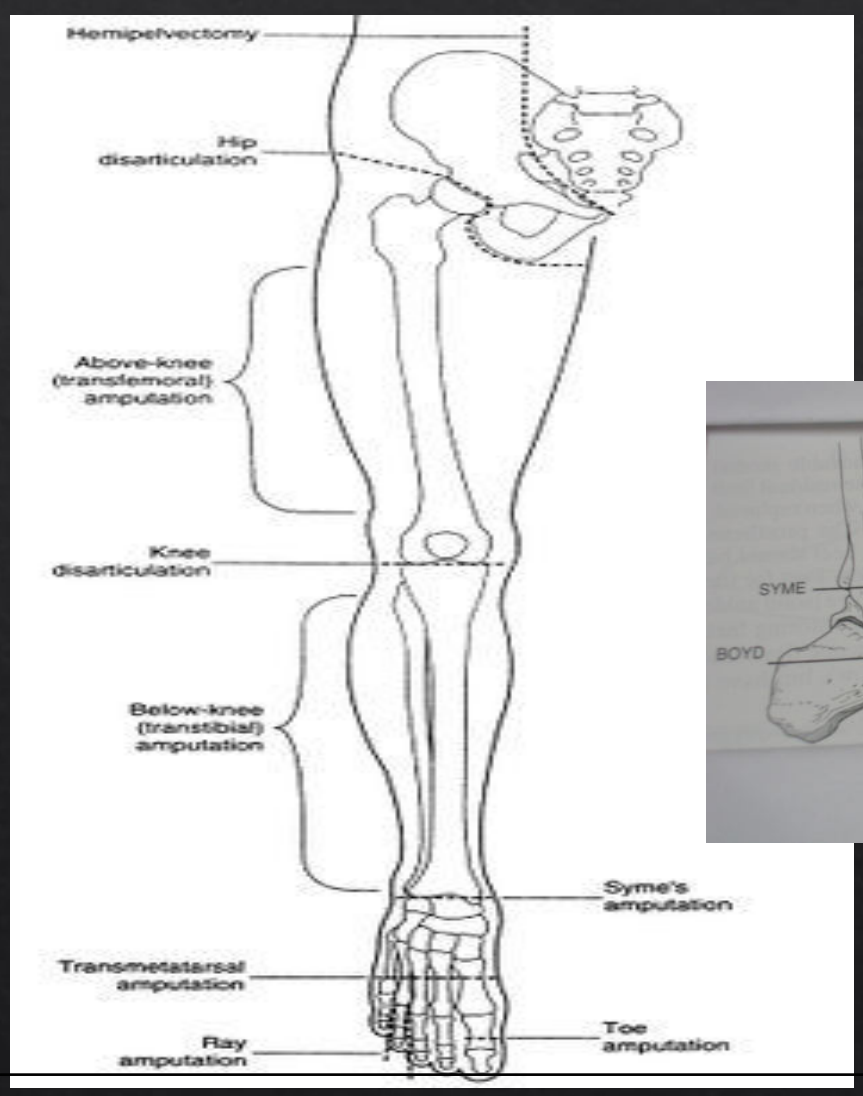
- Transphalangeal
- Transmetacarpal
- Transcarpal
- Wrist disarticulation
- Transradial (below elbow) amputation
- Elbow disarticulation
- Transhumeral (above elbow) amputation
- Shoulder disarticulation
- Forequarter amputation

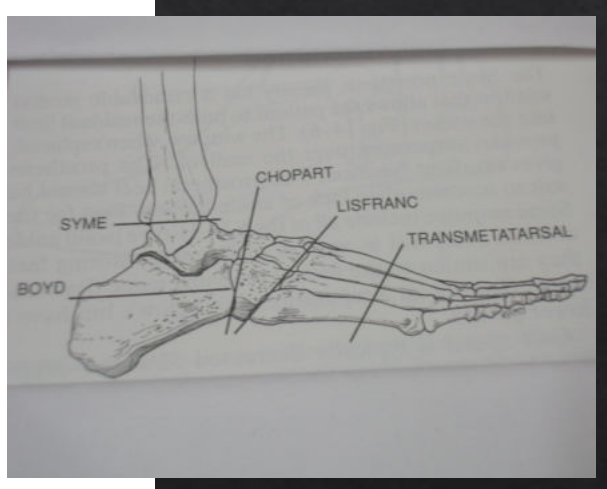
Lower limb amputation Levels

- Toe amputation
- Ray resections
- Transmetatarsal amputations
- Tarsometatarsal/ Lisfranc amputation
- Transtarsal/ Chopart amputation
- Syme amputation/ Ankle disarticulation
- Transtibial amputation
- Knee disarticulation
- Transfemoral amputation
- Hip disarticulation
- Hemipelvectomy

Levels







Pre-surgical Management

Rehabilitation should begin as soon as amputation is considered.

The primary goals of pre-surgical period-

- Medical stabilization
- Patient assessment for amputation level
- Pain control
- Psychological support
- Initiation of a functional rehabilitation program.

Early Post-op care of Amputee

The GOALS of treatment in the early post-op phase are

a) Prevention of post-op complications

b) Promotion of wound healing

c) Prevention of the development of contracture

d) Maintenance of strength and mobility of the whole body

e) Maintenance of psychological support

Prevention of post-op complications

- Breathing exercise
- Anti-embolic exercises e.g.

a) B-K amputee must imagine performance of alternate PF/DF

b) T-K or A-K amputee must perform alternate hip flexion/extension and hip adduction/abduction.

These active exercises must be performed at regular intervals throughout the day- 10 repetitions performed hourly is a useful guideline

Promotion of wound healing

Wound healing is a dynamic process and is adversely affected by many factors including

- Wound infection
- Poor blood supply
- Edema
- Systemic disease e. g. DM
- Prior infection
- Poor Nutrition

Promotion of wound healing

One natural response to trauma, whether accidental or surgical is **EDEMA**. In the amp., the post-op wound dressing is chosen by the surgeon. The external support that the dressing provides is an important element in shaping the amp. Stump.

Some of the factors considered when choosing a post-op dressing are

Wound Healing & Edema Control

- **Soft dressings**
- **Rigid dressings**
  - Rigid dressing without immediate prosthesis (IPOP)
  - IPOP – Immediate Post op Prosthesis
  - Removable Rigid Dressing (RRD)
- **Compression therapy**

Soft Dressings

- This is the conventional manner of treating the stump after surgery.
- A sterile dressing is applied snugly with proper padding of all bony prominences.
- It is done by using –

Elastic Bandaging

Stump shrinkers

Soft Dressings

Soft Dressing

- A soft conventional dressing is indicated in cases in which an amputation wound requires frequent observation e.g. infection
- Major disadvantage is that it permits the formation of edema which produces pain and compromises wound healing
- More chance of knee flexion contracture

Rigid Plaster Dressing

- Total contact, POP cast applied in the operating room immediately following wound closure
- Purpose is to reduce edema, promote healing & to rest the amputated limb
- Immediate / early ambulation is the target of this method but not an essential part.

  -Rigid plaster dressing without IPOP (Immediate post-operative prosthesis)

  -Rigid plaster dressing with IPOP

Rigid Plaster Dressing

Advantages

- Shorter rehabilitation time
- Decreased edema, pain and healing times
- Increases tolerance to weight bearing/early ambulation
- Holds knee in extension → prevents flexion contracture

Rigid Plaster Dressing

Disadvantages

- Difficult to inspect wound
- Tissue damage – mechanical trauma (particularly vascular patients)
- Need a dedicated team/ highly skilled
- Unskilled application could lead to disaster

Rigid Plaster Dressing with IPOP

- **Advantages**
- Similar benefits of non IPOP plus:
- Weight bearing within 24 hours
- Emotional/ self imaging benefits

Risks of IPOP

Not all patients are good candidates for IPOPs.

- Damage to the wound can occur from excessive weight bearing too soon after amputation.
- Some patients may develop infected or non-healing surgical wounds.
- In these patients, IPOP use is discontinued while the problem is being resolved.

IPOP – Different types

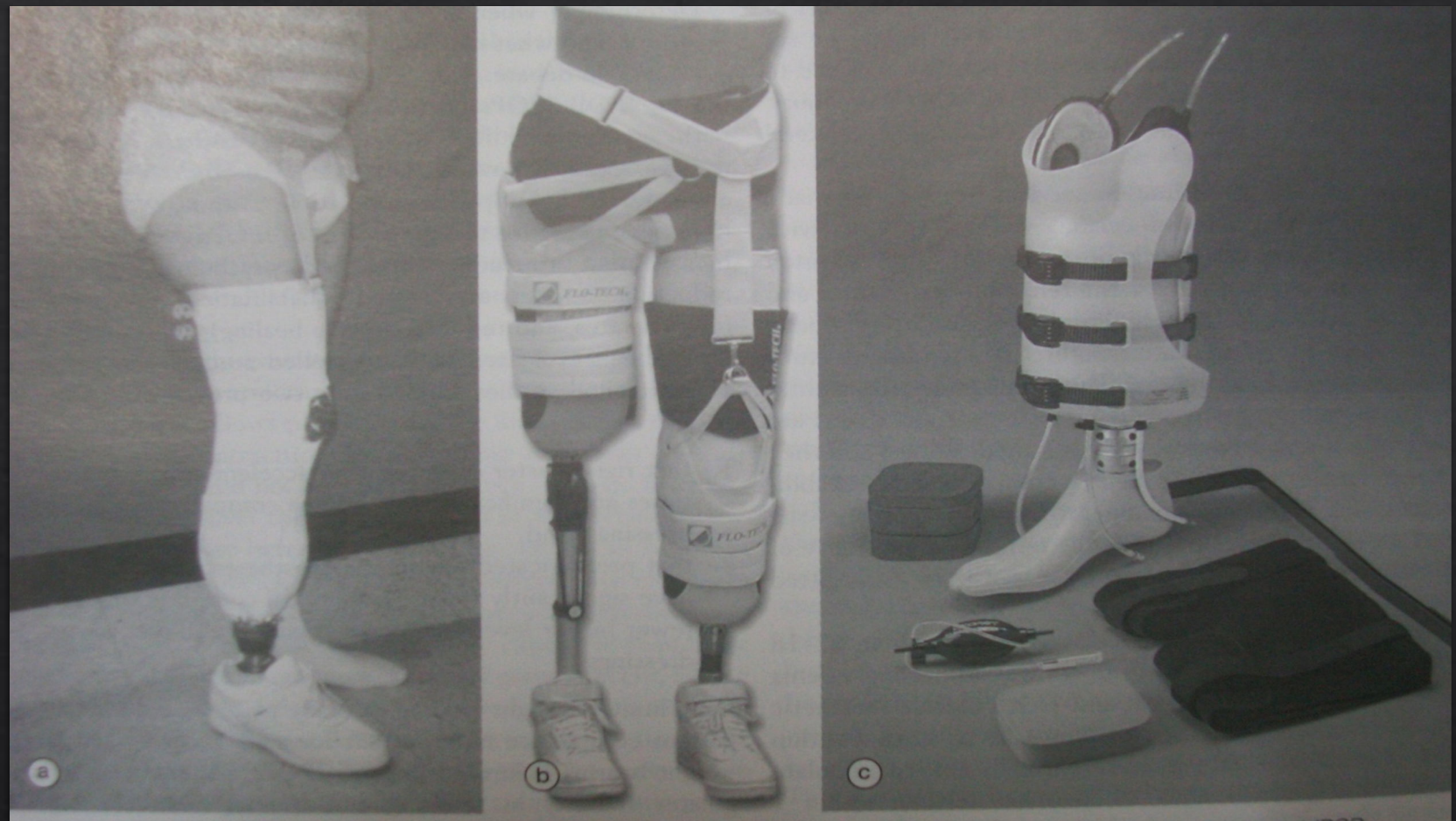


Figure 14-5 Examples of immediate postoperative prostheses (IPOPs) for transtibial amputees. (**b**) Custom-made full-length cast IPOP. (b) Prefabricated adjustable socket IPOPs. (**c**) Prefabricated IPOP with air-cell interface. (a, Photo courtesy of Prosthetic Research Study; b, photo courtesy of Flo-Tech O&P Systems; c, photo courtesy of Aircast.)

Removable Rigid Dressings (RRD)

Similar benefits of non IPOP plus:

- Healing more rapid than IPOP
- Ability to remove and inspect wound
- Patient learns donning and doffing
- Permits knee flexion
- Ability to adjust fit

Removable Rigid Dressings (RRD)

Prevention of contractures

Contractures tend to develop in the amputee as a result of

a) Muscular imbalance caused by the surgical division of muscles which normally act in balance around the joint and

b) Previous disease or poor postural habits of long duration

Bed posture control in the post-op phase

1. Elevation of the amputation limb, through raising the bed, to control edema; pillow should never be put under the residual limb

2. Maintenance of a level pelvis when the patient is lying supine

3. Changing the patient's position frequently

4. Initiation of active exercise and movement of joints through their full ROM. Early ambulation inhibits contracture development

Do's

No pillows or *one* pillow

Arms positioned wherever comfortable for patient

Stump lying flat (with knee straight if b/k) *no pillow*

Nurse call bell placed within patient's reach

Head turned to sound side

Patient wearing a watch to time period prone

Both hips completely flat on bed

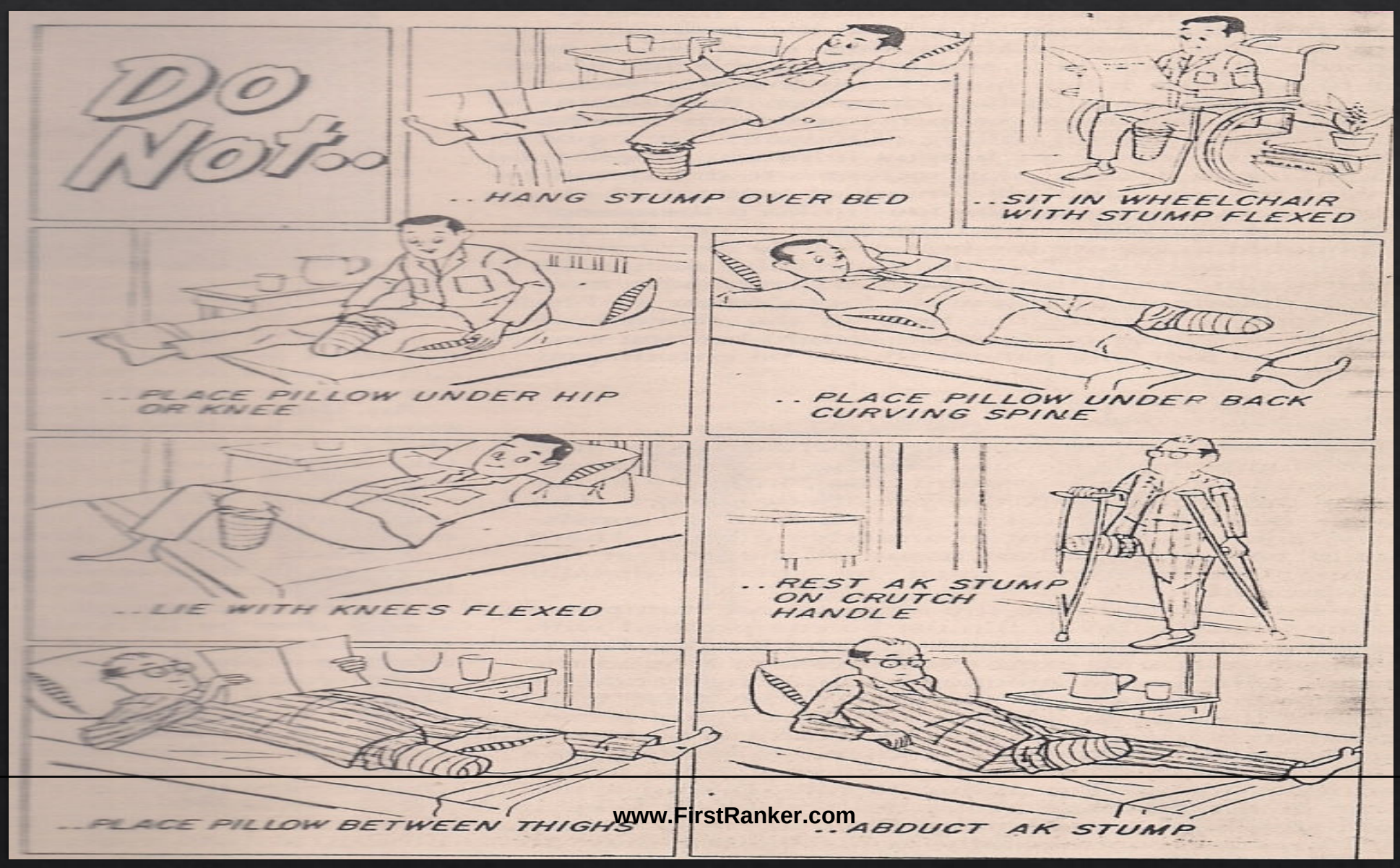
Remaining leg supported on a pillow to prevent toes from digging into bed

Footboard and bedclothes turned right back out of the way

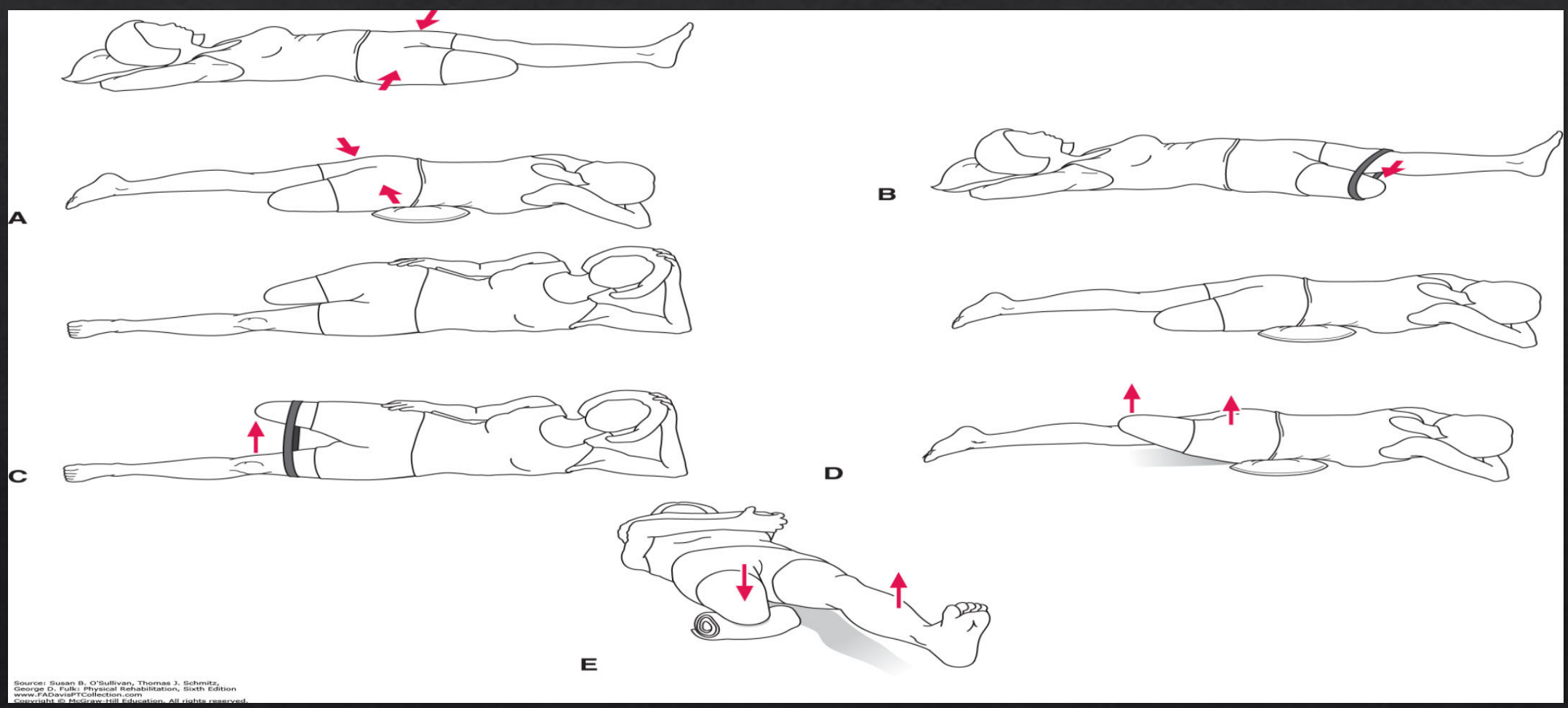
POINTS TO REMEMBER

1. To roll prone, the patient must turn towards the sound side, the nurse ensuring that the stump is lowered gently.
2. Initially the patient lies prone for about 10 minutes.
3. The patient should then build up to lying prone for ½ hour three times a day.

Don'ts



Active exercise



Complications

- Skin Problems
- Pain
- Phantom Pain
- Neuroma
- Contractures
- Edema
- Ulceration
- Infection

Assessment of Patient

FORMAT can be maintained e.g.

- General information and history
- Residual limb information including cast in situ
- Unaffected limb information
- Remaining body information
- Ambulation and independence level information – pre-amp and post-amp
- Treatment plan

Residual Limb Assessment

1. Side:

- Right
- Left
- Both

2. Level of amputation:

Residual Limb Assessment

3. Length of the residual limb from nearest proximal joint:

…… (centimeters)

◈ *Limb length on sound size:*…… (centimeters)

4. Girth :

◈ Point of Reference : Terminal end of residual limb

◈ Every 5 cm from reference point

Residual Limb Assessment

5. Shape of residual limb

□ Cylindrical □ Conical □ Bulbous □ Others

6. Redundant tissue

□ None □ Present: Dog ears/others

Residual Limb Assessment

7. Scar on residual limb

Well healed: □ Clean operated □ Irregular

Unhealed: (…. x …cm)

Bone exposed: □ Yes □ No

Adherent to: □ Muscle □ Bone □ None

Scar Hypertrophy: □ Yes □No

Scar tenderness: □ Yes □ No

Position: □ Anterior □ Posterior □ Skewed

□ Others □ Extent …… (cm)

Residual Limb Assessment

8.Wound

□ None □ Eschar □ Slough

□ Granulation tissue

Discharge:

□ None □ Serous □ Serosanguinous

□ Bloody □ Purulent □ others

Odor:

□ None □ Present

Residual Limb Assessment

9. Skin of residual limb :

□ Undamaged □ Red □ Verrucous □ Others

10. Skin Infection:

□ None □ Folliculitis □ Infected ulcer □ Others

Residual Limb Assessment

11. End of residual limb:

□ Rounded-well protected bone (good coverage of skin)

□ Pointed-poorly protected bone (Bony Spicules)

□ Others

Residual Limb Assessment

12. Proximal joint :

Pain: □ No □ Yes ….

Range of motion: □ Full □ Restricted ……

Stiffness: □ No □ Yes ….

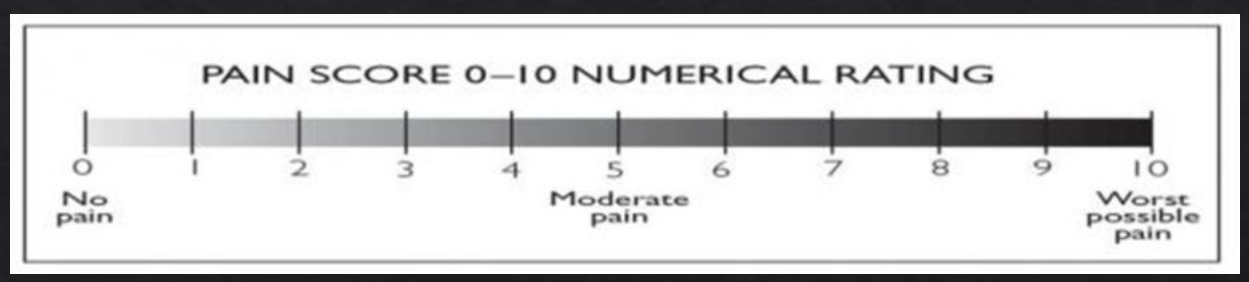
Deformity: □ No □ Yes ….

Strength of muscles around the joint: Manual muscle testing

Residual Limb Assessment

13. Residual Limb Pain :

□ None □ Little □ Significant local □ Significant diffuse



Residual Limb Assessment

14.Phantom Pain:

□ None □ Interferes in ADLs

□ Sleep □ Hampers usage of prosthesis

Residual Limb Assessment

15. Neurological Evaluation

Protective sensation using 10-gm Semmes-Weinstein monofilament:

□ No □ Yes …….

128Hz tuning fork test for peripheral neuropathy:

□ No □ Yes …….

Pinprick sensation test: □ Intact □ Impaired □ Absent

Tinel's test on the residuum if a neuroma is suspected:

□ Negative □ Positive

Residual Limb Assessment

16. Vascular Evaluation:

Peripheral pulse: □ Absent □ If Present Volume …
□ Character …..

Skin colour:

Skin temperature:

The "IDEAL" Stump

For optimum results the stump should be :-

- SHAPE- Conical
- SIZE - Proper length to fit with a prosthesis
- Should be covered by healthy skin
- Must have proper skin & joint senses.

The "IDEAL" Stump

- SKIN- healthy, should not be adherent or too loose
- SCAR- painless, non-adherent, dry & non-hypertrophic
- MUSCLE POWER- adequate
- ROM- Full (or at least desirable)

- Presently the length of the stump is not that important as various new suspension methods and socket designs are available
- The ideal lengths were as follows :
- Above the knee, 10 to 12 inches (25-30 cms) from tip of greater trochanter;
- below the knee, 5.5 inches (14 cms) from the medial edge of the tibial plateau ;
- above the elbow, 8 inches (20 cms) from the tip of the acromion ;
- below the elbow, 7 inches (18 cms) from the tip of the olecranon.

PHANTOM PAIN

- If the sensation of the absent limb is painful and disagreeable with strong paresthesia, it is referred to as PHANTOM PAIN.

MUST BE DISTINGUISHED FROM PHANTOM SENSATION, RESIDUAL LIMB PAIN & REFERRED PAIN.

- 1/3rd to ½ of amputees complains of phantom pain at some time.

PHANTOM PAIN

- CRAMPING, CRUSHING, BURNING, SHOOTING type. Continuous or intermittent, frequently waxing or waning in cycles of several minutes.

IT IS LOCALISED IN THE PHANTOM, NOT IN THE STUMP.

PHANTOM PAIN

MANAGEMENT :

- Desensitization technique (massaging, tapping, slapping, wrapping, friction rubbing).
- Amitryptiline, nortryptiline, mirtazapine (antidepressants), gabapentine, carbamazepine, phenytoin, oxcarbamazepine, topiramate (anticonvulsants) can be used.
- Stress relaxation technique, biofeedback, TENS.
- Neurosurgical procedures : Anterolateral cordotomy. Surgical ablation of the cerebral somatosensory cortex.

NEUROMA

Formation of scar tissue around the distal end of the severed nerve. Every time a nerve is cut it forms a neuroma.

- A painful neuroma is palpable most of the time, & pressure over it reproduces the symptoms.

NEUROMA

MANAGEMENT :

- Desensitization techniques, prosthetic modifications, & at times use of flexible materials with windowed frame construction to decrease pressure over neuroma.
- Neuropathic pain medication.
- Injection with a mixture of local anaesthetics & a corticosteroid reduce the scar tissue. Can be repeated several times at 6 to 8 wks intervals.
- Surgical removal of the neuroma.

For optimal prosthetic fitting a best possible stump is needed.

THANK YOU