Al-Mustaqbal University

Collage of Engineering

Prosthetics and Orthotics Engineering

Second Stage

PRINCIPLES OF PROSTHETICS AND ORTHOTICS

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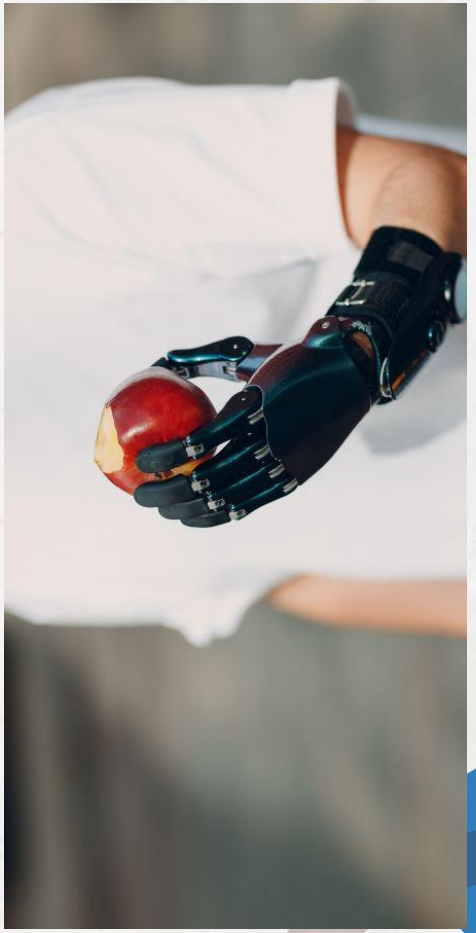


1 Standard Nomenclature for Amputation Levels

A standard nomenclature is needed for a global uniformity in understanding and management of amputations.

Old terminology	Current terminology
Below elbow	Transradial
Above elbow	Transhumeral
Below knee	Transtibial
Above knee	Transfemoral
Symes	Ankle disarticulation
Hemi pelvectomy	Transpelvic

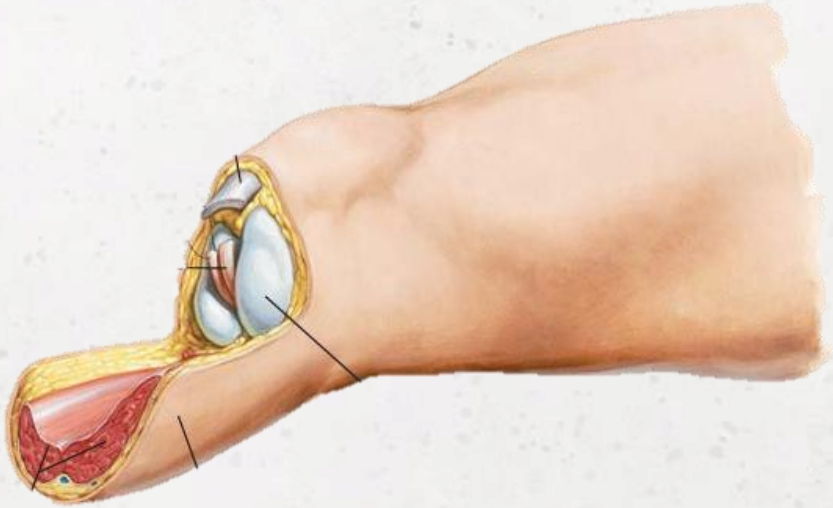
NEW

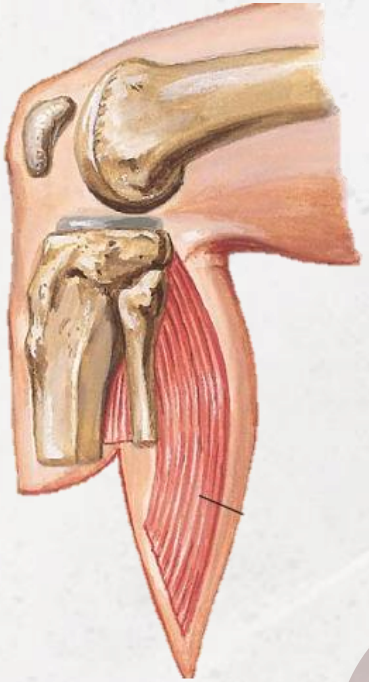
OLD

2

What is the difference between

disarticulation and trans-amputation?





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Causes of Amputation

Trauma
Road traffic accident/Train accidents
Industrial accidents
Fracture complications
Burns–Thermal, electrical and chemical

Infections
Leprosy
Actinomycosis
Filariasis
Gas gangrene

Vascular
Thromboangiitis obliterans
Arteriosclerosis-Senile
Frost bite
Diabetic

Tumors–Malignant
Bone—Osteosarcoma
Soft tissue—Fibrosarcoma

Congenital Limb Deficiency

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Definitions of Prosthetist and Orthotist

The prosthetist is the professional who designs, fabricates, and repairs prosthetic devices (artificial limbs).

The orthotist is the professional who designs, fabricates, and repairs orthotic devices.

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Classification of Orthoses

Orthoses are categorized into three main groups: 1. Upper Limb Orthoses 2. Spinal Orthoses 3. Lower Limb Orthoses

1. Lower Limb Orthoses (LL)

Orthoses are named according to the joints they encompass.

- **FO** → Foot Orthosis
- **KO** → Knee Orthosis
- **HO** → Hip Orthosis

Combined Orthoses:

- **AFO** → Ankle-Foot Orthosis
- **KAFO** → Knee-Ankle-Foot Orthosis
- **HKAFO** → Hip-Knee-Ankle-Foot Orthosis
- **RGO** → Reciprocating Gait Orthosis

2. Upper Limb Orthoses (UL)

- **HdO → Hand Orthosis**
- **WO** → Wrist Orthosis
- **EO** → Elbow Orthosis
- **SO** → Shoulder Orthosis

Combined Orthoses:

- **WHO** → Wrist-Hand Orthosis
- **EWHO** → Elbow-Wrist-Hand Orthosis
- **SEO** → Shoulder-Elbow Orthosis
- **SEWHO** → Shoulder-Elbow-Wrist-Hand Orthosis

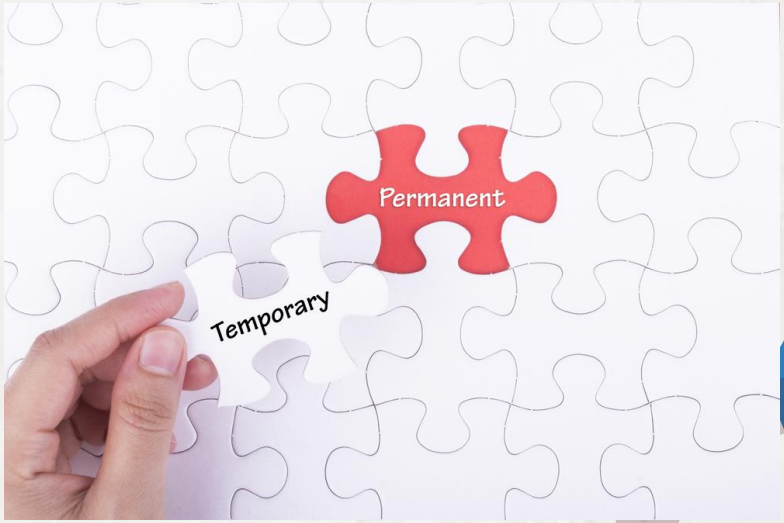
Types of Orthosis

Temporary Orthosis: Used for a certain period after injury or surgery.

Permanent Orthosis: Used long-term when there is muscle weakness, paralysis, or a deformity that cannot be corrected.

Static Orthosis: Does not allow movement.

Dynamic Orthosis: Allows controlled movement.



Indications for Orthotic Devices

- **Pain relief**
- **Limit motion**
  - Immobilization after surgery
  - After traumatic injury
  - Compression management
  - Kinesthetic reminder to avoid certain movements
- **Correct deformity**
- **Relieve symptoms of a disease**
- **Reduce axial loading / mechanical unloading**
- **Improve function in a specific body segment**
- **Assist and improve movement and function**
- **Reduce muscle tone**
- **Protect against injury**
- **Provide rest**

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Design Characteristics of an Orthotic Device

- **Weight of the orthosis**
- **Adjustability**
- **Functional use**
- **Cosmesis**
- **Cost**
- **Durability**
- **Material**
- **Ability to fit various patient sizes**
- **Ease of putting on (donning) and taking off (doffing)**
- **Access to tracheostomy sites, PEG tube, or other drains**
- **Access to surgical sites for wound care**
- **Aeration to prevent skin maceration from moisture**

Limitations of Orthoses

- **Limit mobility and range of motion (ROM) of the joint**
- **Restrict rotation around a joint**
- **Movement is usually limited to certain directions**
- **Weakness of muscles in the opposite direction**
- **Device is subject to wear and tear**
- **Requires maintenance, care, cleaning, repairs, and frequent shoe changes**

Maintenance of an Orthosis

Patients should be taught to:

- **Clean the leather**

- **Oil the joints**

- **Wash the orthosis when possible**


Thank
you