Al-Mustaqbal University

Collage of Engineering

Prosthetics and Orthotics Engineering

Third Stage

PROSTHETICS II

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1st term – Lecture 6

2025-2026

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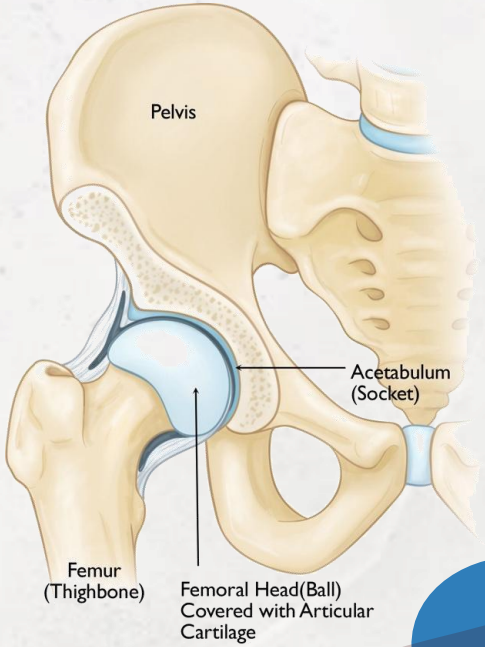
1 Hip Disarticulation & Hemipelvectomy

Hip Disarticulation (HD): A high-level amputation involving the surgical removal of the entire lower limb through the hip joint. The head of the femur is separated from the pelvic socket (acetabulum), resulting in the loss of the hip, knee, and ankle joints.



Etiology

This is a life-saving procedure, primarily for:

- Malignant Tumors
- Severe Trauma
- Life-Threatening Infections
- Vascular Disease

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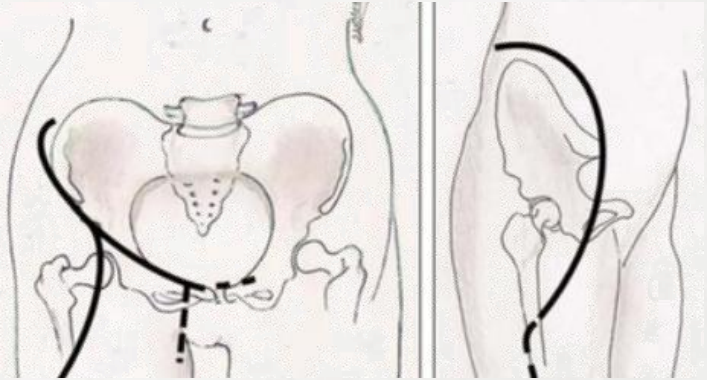
Hip Disarticulation & Hemipelvectomy

Hemipelvectomy (HP) (Transpelvic Amputation - Hemipelvis Resection - Emipelvectomy): A highly extensive surgical procedure that involves the amputation of the entire lower limb, plus a major portion of the corresponding pelvic girdle (ilium, ischium, and/or pubis).



Primary Classifications

- **External Hemipelvectomy (The Amputation)**

This leg and part of the pelvis are completely removed from the body.

- **Internal Hemipelvectomy (Limb Salvage)**

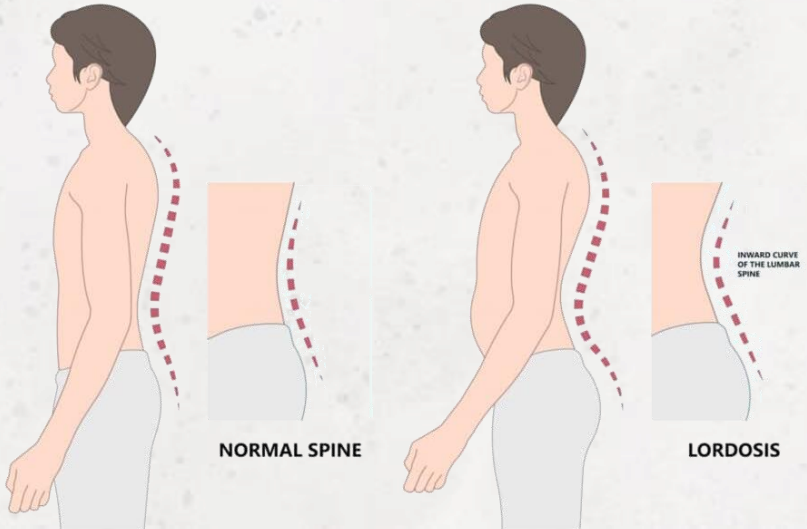
The surgeon removes the cancerous portion of the pelvic bone but saves the patient's leg.

3 Key Patient Factors for Prosthetic Success (HD/HP)

1- Active Pelvic Control (Lordosis)

With no residual limb to act as a lever, the patient must use their trunk and pelvis to control the prosthesis. Actively arching the lower back (lordosis) is the primary method to initiate knee flexion and advance the limb.

Requirement: Excellent core strength (abdominals, lower back) and good lumbar range of motion.

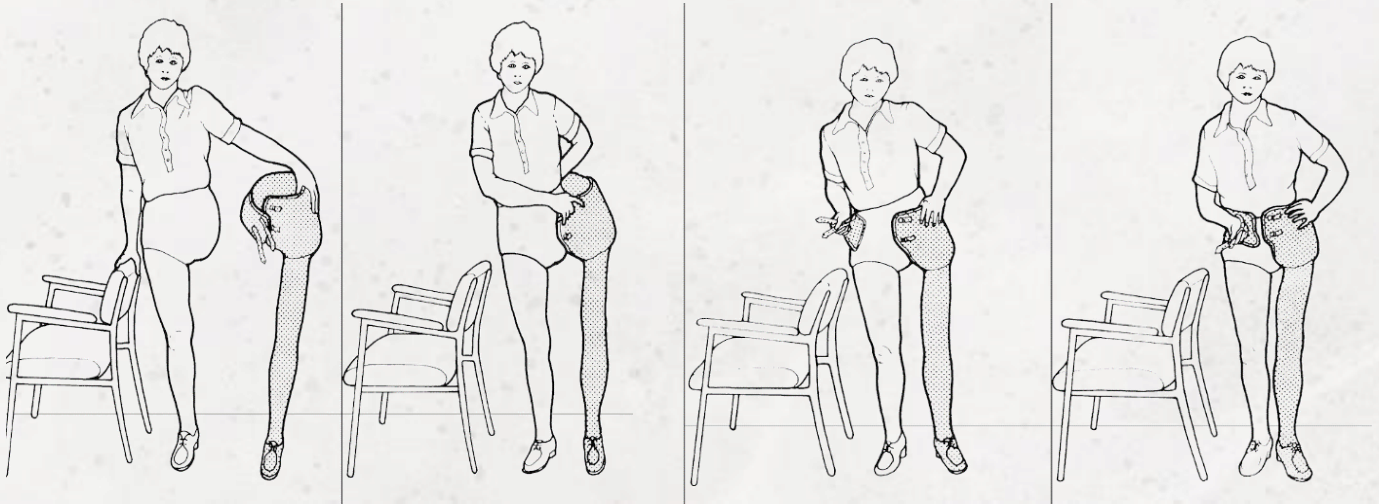


4 Key Patient Factors for Prosthetic Success (HD/HP)

2- Single Leg Balance

The ability to balance securely on the sound leg is fundamental.

Requirement: Essential for independent donning and doffing (putting on/taking off) the prosthesis and for safe walking, reducing reliance on crutches.



5 Key Patient Factors for Prosthetic Success (HD/HP)

3- Effective Soft Tissue Containment

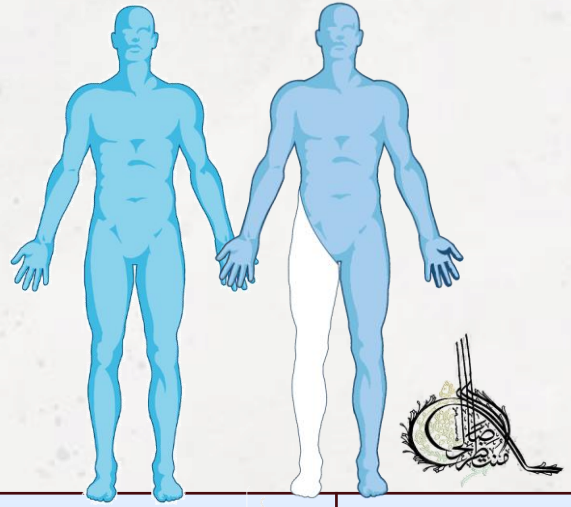
The socket must firmly contain the abdominal tissue to effectively transfer forces and capture the pelvic movements that control the prosthesis.

Requirement: Good abdominal muscle tone leads to a more stable and responsive socket interface, resulting in better overall prosthetic control.

Key Challenges in HD & HP Prosthetics

- **Socket Discomfort:** A poorly fitting, heavy, or uncomfortable socket is the single most common reason a patient will reject or abandon their prosthesis.
- **Massive Energy Cost:** Prosthetic walking can require up to 200% more energy than normal, which often leads users to prefer crutches as they are far more energy-efficient.
- **Patient's Physical Condition:** Advanced age or poorer overall health can significantly decrease a patient's stamina and ability to manage the heavy prosthesis throughout the day.
- **Upper Limb Overload:** Constant reliance on crutches or walkers, even with the prosthesis, frequently leads to chronic pain and overuse injuries in the patient's shoulders, elbows, and wrists.
- **Skin Breakdown:** The high pressures and large surface area of the socket create a significant and constant risk for skin sores and irritation, which often limits daily wear time.

Hip Disarticulation & Hemipelvectomy



Feature	Hip Disarticulation (HD)	Hemipelvectomy (HP)
Anatomy	Intact Pelvis	Partial Pelvis Resection
Weight-Bearing	Directly on the Ischial Tuberosity (sit bone) of the amputated side.	On soft tissue and the contralateral side (sound side of the pelvis).
Socket Design	Compact Socket "Hugs" the pelvis.	Large "Basket" Socket Extends up the torso for stability.
Key Challenge	Securing a firm grip on the pelvis for rotational control.	Creating a stable and comfortable fit without direct bony support.


Thank
you