



الجامعة المستقبالية



Al-Mustaqbal University

Collage of Engineering

Prosthetics and Orthotics Engineering

Third Stage

PROSTHETICS II

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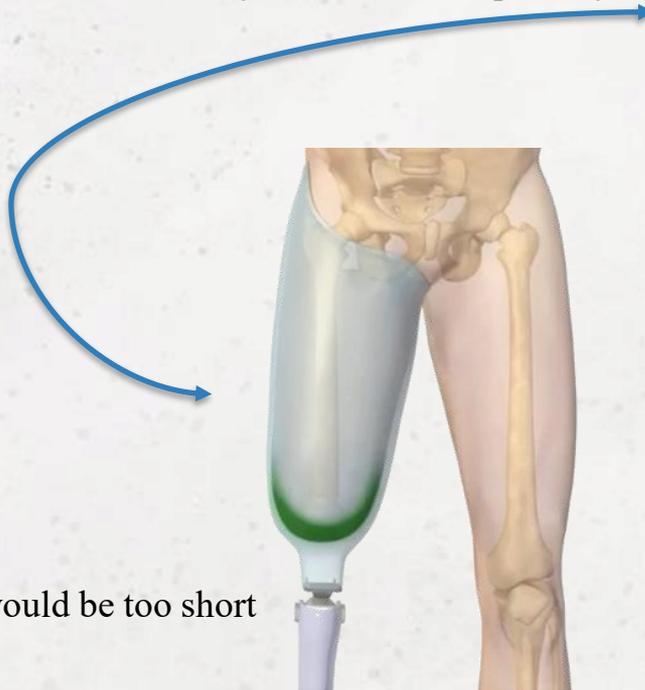


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Knee Disarticulation (KD) / Through Knee Amputation (TK)



- The amputation is performed directly at the knee joint line.
- The femoral condyles serve as the primary weight-bearing surface.



Indications

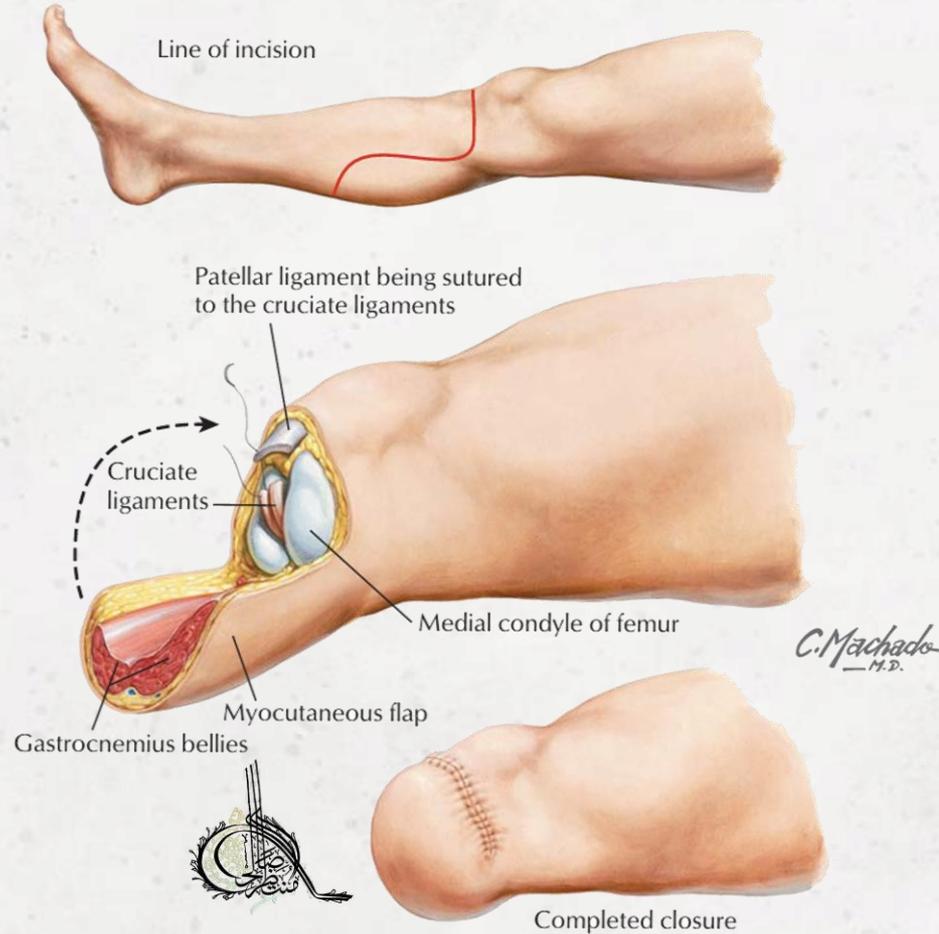
1. Trauma
2. Infections
3. Congenital deformity
4. Tumor
5. When transtibial (TT) stump would be too short
6. Dysfunctional knee joint

Advantages of Knee Disarticulation Surgery

1. End-bearing stump
2. Good rotational control
3. Effective suspension
4. Shorter surgical time
5. Reduced blood loss

2

(KD) / (TK) Amputation





Limitation

1. Difficulty in fitting a prosthetic knee joint

The stump is relatively long, which makes it challenging to align and fit an artificial knee at the distal end.

2. Poor cosmesis (appearance)

In some cases, the prosthesis may look bulky or less natural compared to other levels of amputation.

3. Challenges in donning and doffing

Wearing (donning) and removing (doffing) the prosthesis can be more difficult because of the bulbous shape of the femoral condyles.

4. Pressure issues on the condyles

If the femoral condyles are very prominent, this can lead to pressure points, discomfort, or skin problems inside the socket.



➤ **End-bearing capacity:**

- The KD stump can usually support the patient's full body weight at the distal end.

➤ **Bulbous distal end:**

- The end of the stump is typically bulbous, which makes cast removal more difficult.
- A plastic tube or strip should be placed on the stump before casting to allow safe cast removal.

➤ **Suspension by condylar shape:**

- The bulbous femoral condyles provide a natural shape that can be used for suspension of the prosthesis.

➤ **Protection of proximal stump:**

- The proximal area of the stump must be protected from excessive socket edge pressure.
- A quadrilateral brim can offer this protection.
- The brim edges (lower than in transfemoral quadrilateral sockets) should be flared.
- The ischial seat should be positioned about 1.5 cm below the ischial tuberosity.



The socket level depends on the weight-bearing capacity at the distal end of the stump.

Full weight bearing by femoral condyles

- The femoral condyles bear the body weight and provide suspension for the prosthesis.
- The socket is designed with a thin, flexible brim that ends below the ischium.

Ischial weight bearing

- A quadrilateral socket is used, providing weight-bearing through the ischium.
- Suspension is achieved with a soft socket liner and a supracondylar buildup.

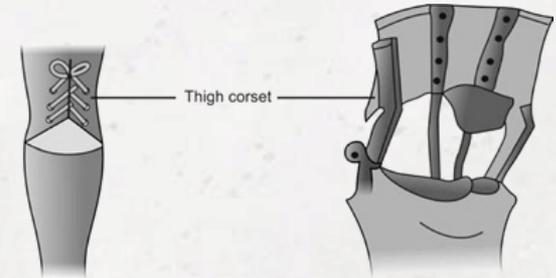


1- Active Adults:

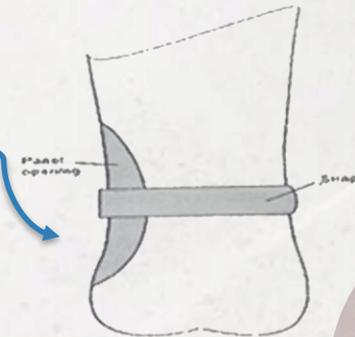
- Supracondylar cuff: Simple and inexpensive.
- Suction suspension: Provides better fit but more costly.

2- Unstable Knee / Overweight / Elderly:

- External knee joint with thigh corset for added stability.

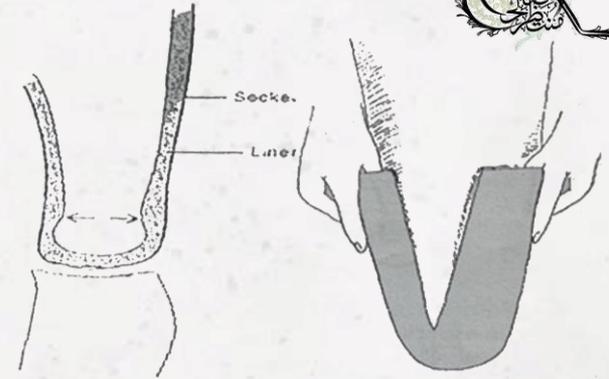
**3- Removable Panel:**

- Side panel removed to allow stump insertion past narrow supracondylar area.
- Panel re-inserted to grip the stump securely.

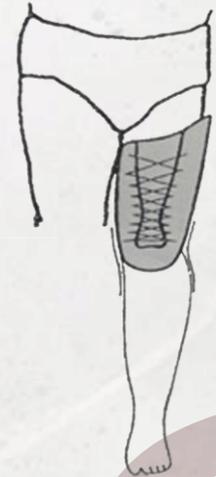


4- Push-Fit Liner:

- Flexible liner shaped to stump, outer liner conical.
- Slight narrowing (~3 mm) at supracondylar region for suspension.
- Outer socket fits over liner.

**5- Lacing:**

- Socket split anteriorly, joined by laces.
- Stump inserted, laces tightened for suspension.

**6- Conventional / Alternative Methods:**

- For patients who cannot tolerate supracondylar suspension.
- Options include **Silesian belt** and other solutions.



Knee Joint in Knee Disarticulation Prosthesis

1. Polycentric Knee Joint:

- Suitable for active young adults.
- Provides natural motion and stability during walking.
- Mimics the knee's natural axis of rotation, reducing walking fatigue.

2. External Knee Joint (Locked / Manual Lock):

- Suitable for elderly patients or those with hip extensor weakness.
- Can be locked for stability during standing and walking.

Length Issue:

- In KD, the distal end of the stump is longer than a typical TF amputation.
- Fitting a knee joint can be difficult due to the short distance between the femoral condyles and the ground.
- Use a suitable polycentric or external knee joint and design the socket to maintain proper limb length and knee axis alignment.



