



# Posterior interosseus artery flap Henk Giele, Oliver Harley

photographic series courtesy of Mark Pickford



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# Posterior interosseous artery flap: Anatomy

- **The PIA is the terminal branch of the common interosseous artery.**
  - enters the posterior compartment over the proximal border of the interosseous membrane about 1/3 down the forearm.
- **The PIA runs distally down the forearm on the dorsal surface of the APL and EPB**
  - accompanied by the PIN
  - anastomoses with the AIA through the interosseous membrane at the level of the commencement of the 4<sup>th</sup> extensor compartment.
- **The PIA flap is based on septocutaneous branches of the PIA**
  - runs in the septum between Extensor digiti minimi (EDM) and Extensor carpi ulnaris (ECU).

## 2-6-5-6

This is a useful aide memoire when planning the flap:

**2**cm proximal to DRUJ is the pivot point for the distally based flap (where PIA anastomoses with AIA)

**6**cm distal to elbow joint is the pivot point for the proximally based flap (this is also the proximal limit of the skin paddle the distal limit of skin is 4 cm proximal to DRUJ)

**5 – 6** the flap pedicle runs in the base of the septum between extensor compartments 5 (EDM) and 6 (ECU)

# Surgical Technique 1

- **Draw a line from the lateral humeral epicondyle to the DRUJ.**
  - This line should correspond with the palpable septum between ECU and EDM
- **Divide this line into thirds.**
  - cutaneous perforators are found in the middle and distal thirds.
  - Any flap must include some of these perforators
- **Plan in reverse using this line as the axis of the flap.**
  - The pivot point is the hollow 2cm proximal to the DRUJ

# **Surgical Technique 2**

- **Incise along the line distal to the planned flap**
- **Elevate the skin for 1-2 cm on either side of the line/incision.**
- **View the septum**
- **Incise through the deep fascia 0.5cm parallel to the septum on both sides.**
- **Confirm that the flap lies on the axis of this septum**

# **Surgical Technique 3**

- **ECU is retracted ulnar wards and EDM radially, exposing the PIA distal to the flap.**
- **The flap is raised on the radial side including the fascia.**
- **Preserve the fascia between EDM & ECU**
- **Follow the PIA vessel from distal to proximal, dissecting it from (and preserving) the PIN & the nerve to ECU & EDM**

# **Surgical technique 4**

- **Complete the flap elevation on its ulnar side over ECU**
- **Divide the PIA proximal to the most proximal perforator to the flap.**
- **Pass it distally through a subcutaneous tunnel**

# Indications and Complications

- **Indications:**

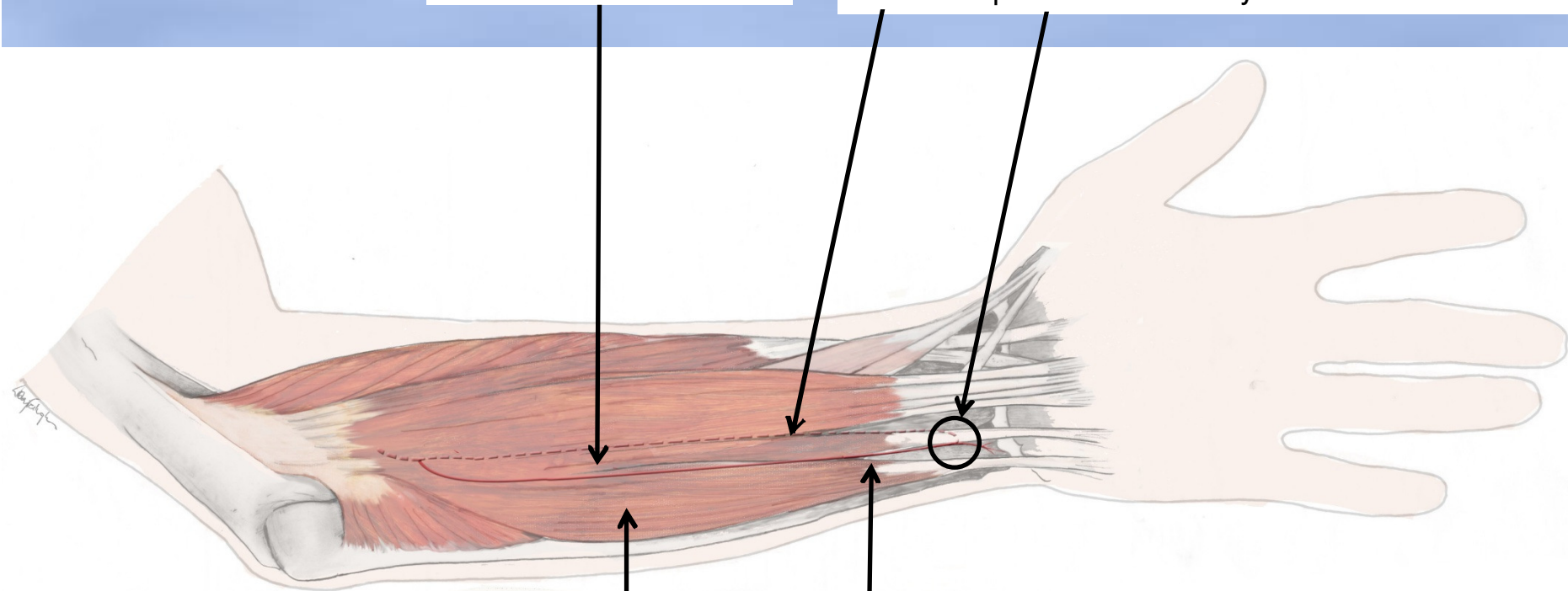
- The distal pedicle arc of rotation allows the flap to be used to cover the
  - first web space
  - MCP joints extending as far as the PIPJ's,
  - Palmar side of the wrist or palm.
- The proximal pedicle allows coverage of the olecranon.

- **Complications:**

- denervation of EDM
- dehiscence of the donor site
- venous congestion.

EDM (5<sup>th</sup> compartment)

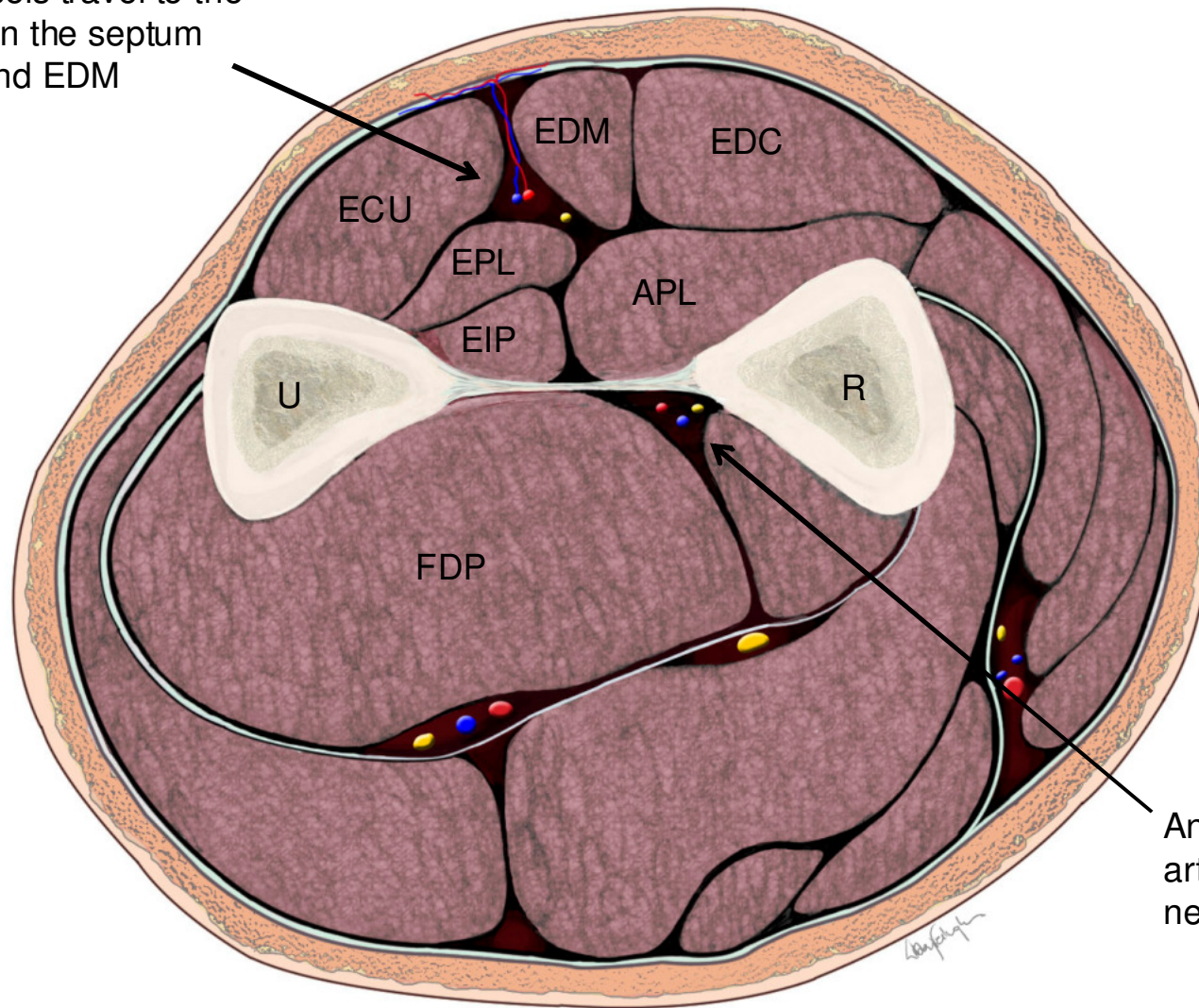
Anterior interosseous artery (AIA) lies in flexor compartment of forearm – it anastomoses with PIA 2 cm proximal to DRUJ; this anastomosis supports the PIA flap when it is distally based



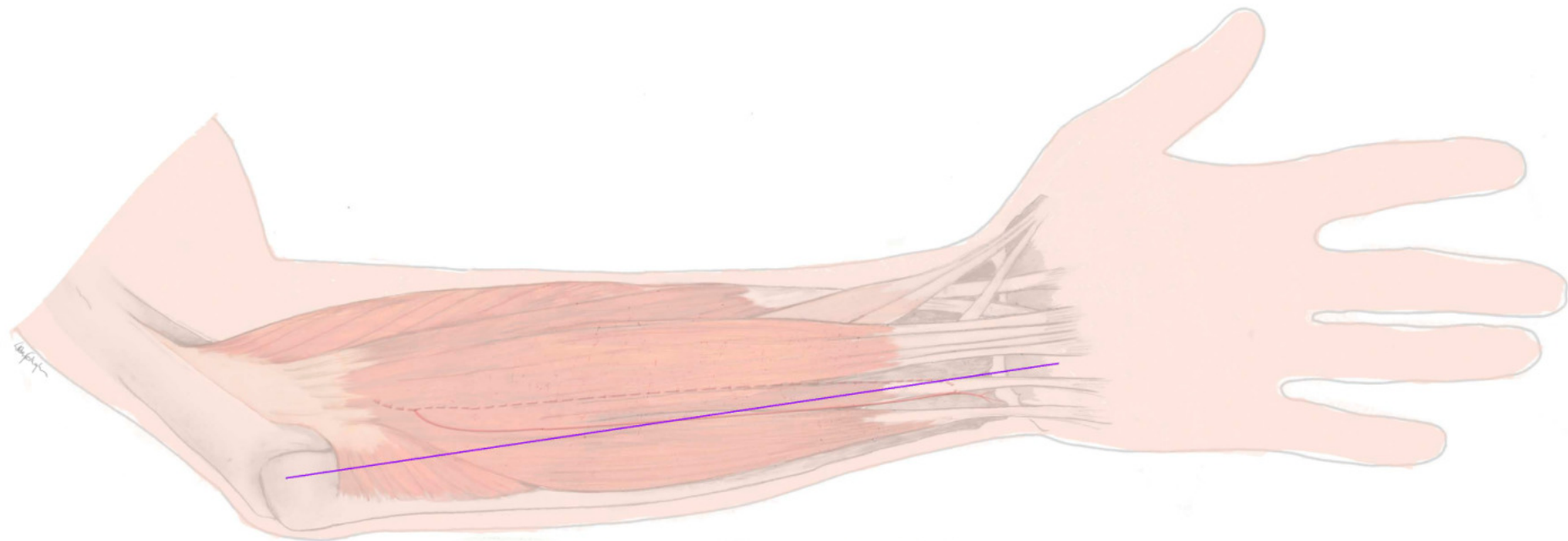
ECU (6<sup>th</sup> compartment)

Posterior interosseous artery (PIA)

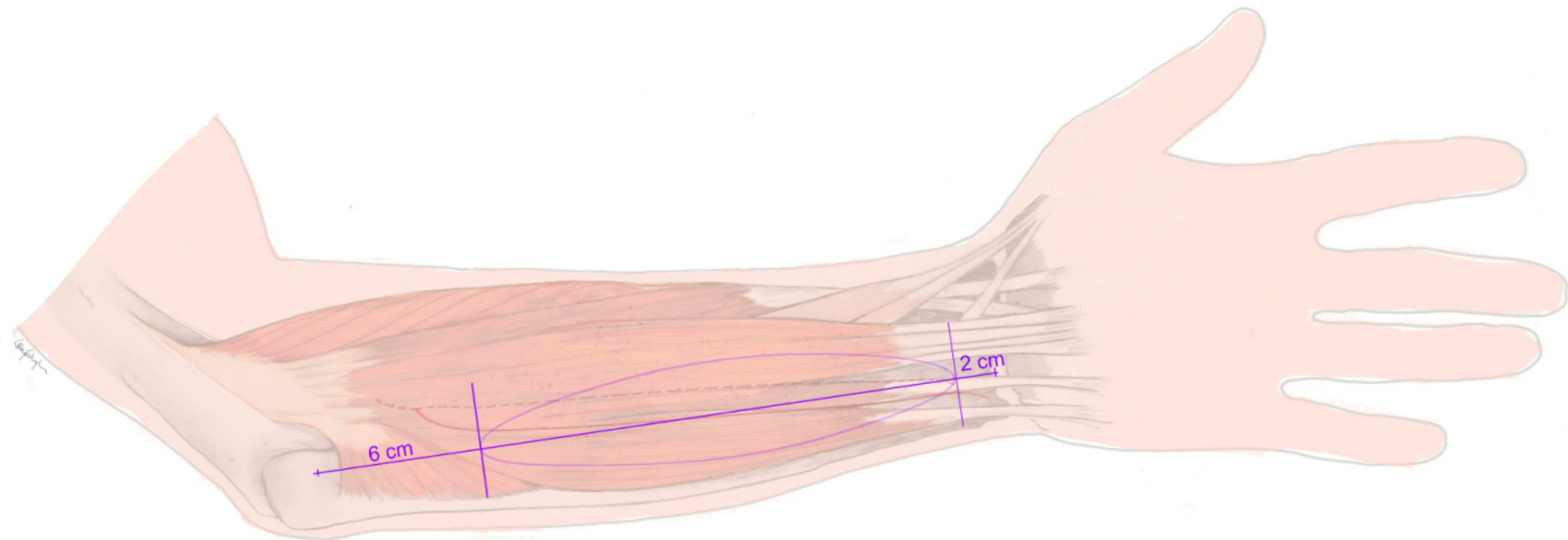
Posterior interosseous artery (PIA) and venae comitantes. Perforating vessels travel to the skin and fascia in the septum between ECU and EDM



Anterior interosseous artery (AIA), vein and nerve

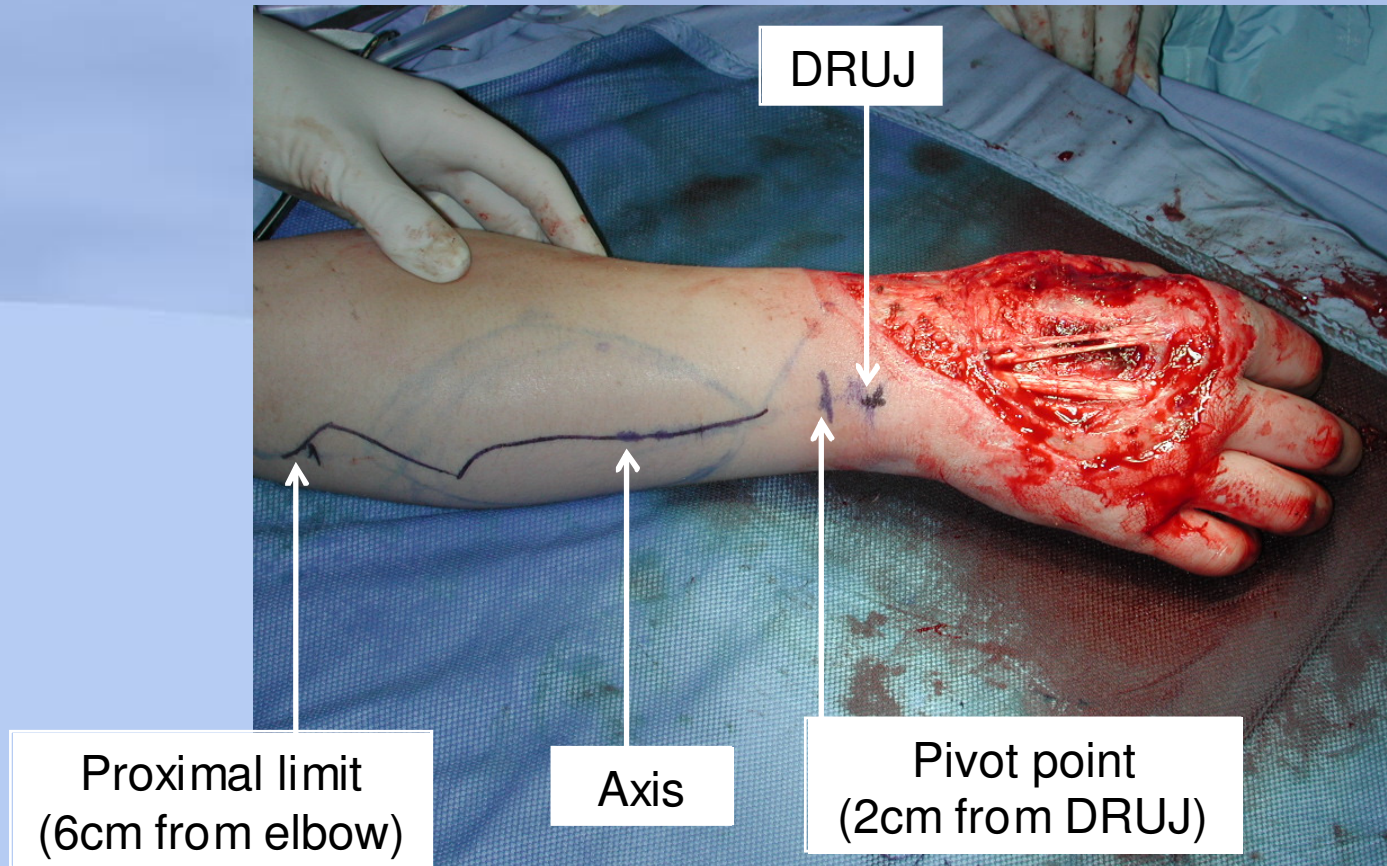


Axis of flap is a line between the DRUJ (distal radio-ulnar joint) and the elbow



Distal and proximal limits of the skin paddle are shown. A flap approximately 4 cm in width may be closed directly. Split skin grafting will be required to close the donor defect when larger flaps are harvested and flaps as wide as 10 cm have been described.



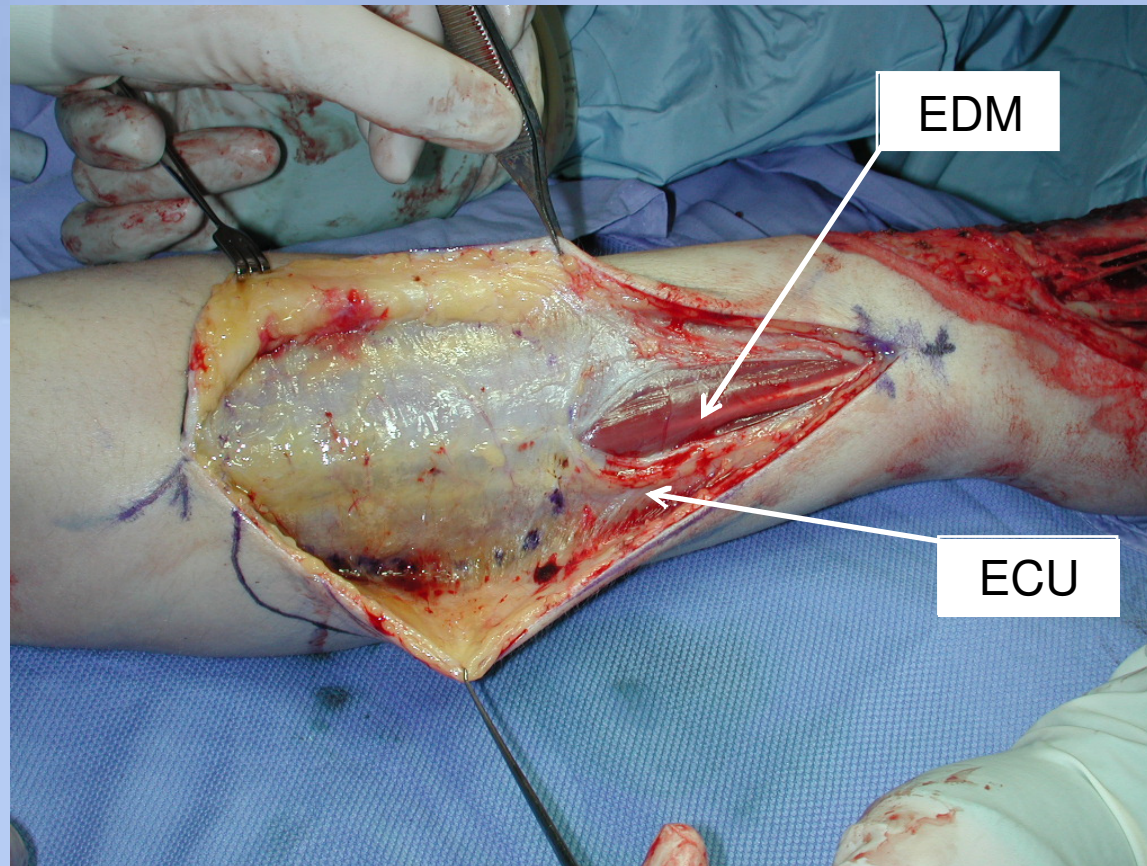


## Planning distally based fascial PIA flap

Full thickness dorsal skin loss to hand with exposed tendons

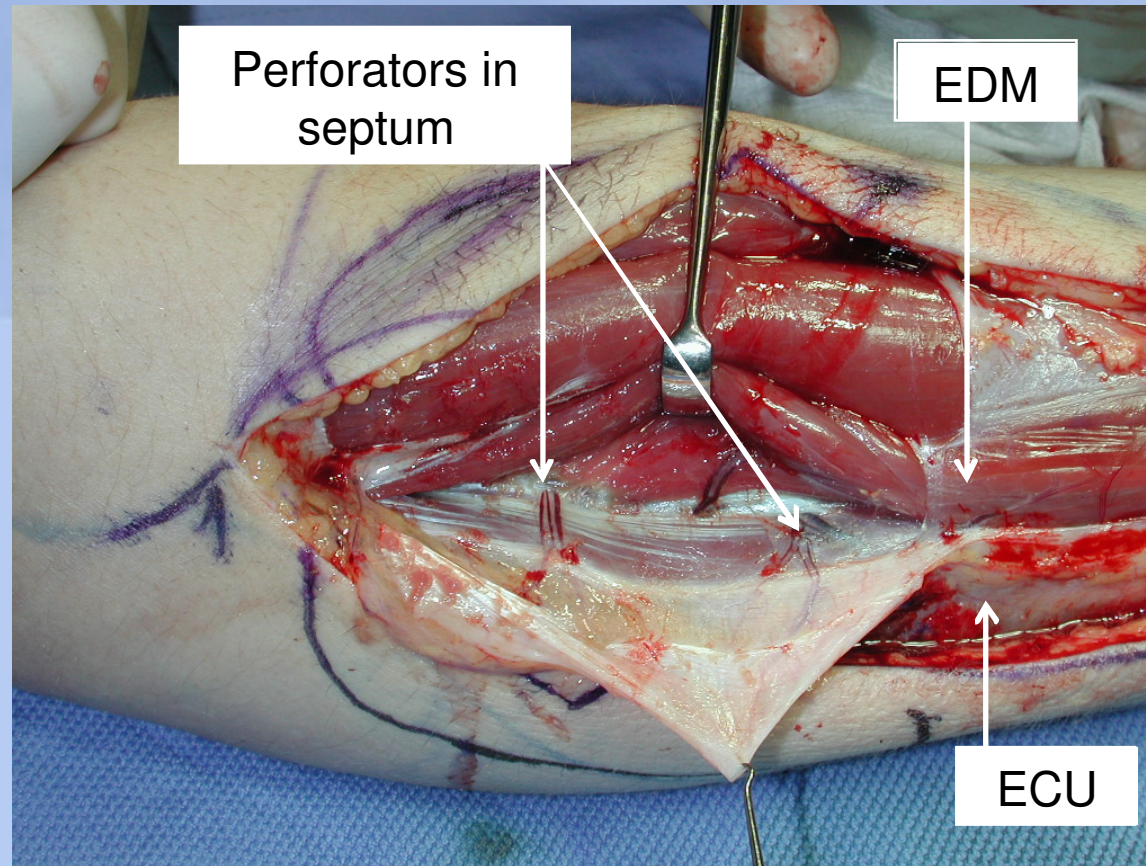
Distal pivot point located 2cm proximal to DRUJ.

Axis of flap marked (DRUJ to lateral epicondyle)



**Identifying the axis of the flap  
between EDM (5) and ECU (6)**

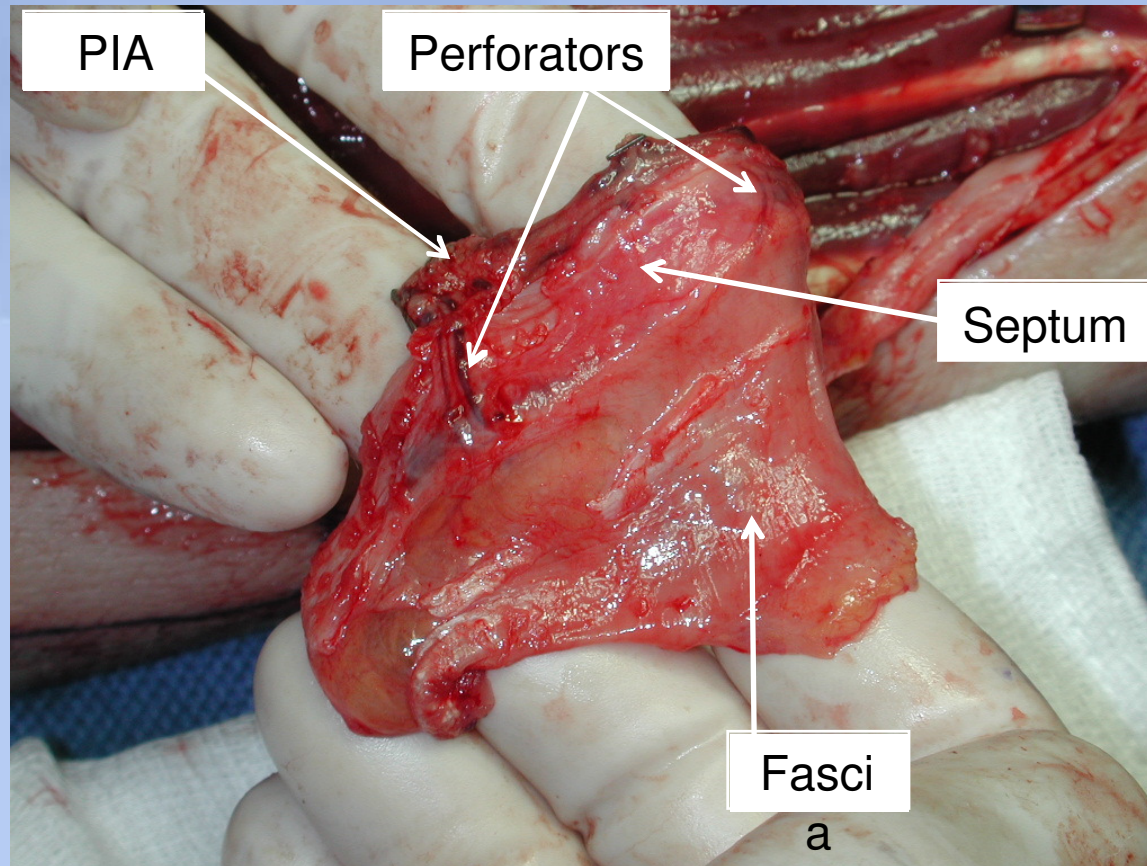
In this case the flap is designed to include only fascia therefore skin and subcut fat are reflected to expose fascia



## Raising the flap

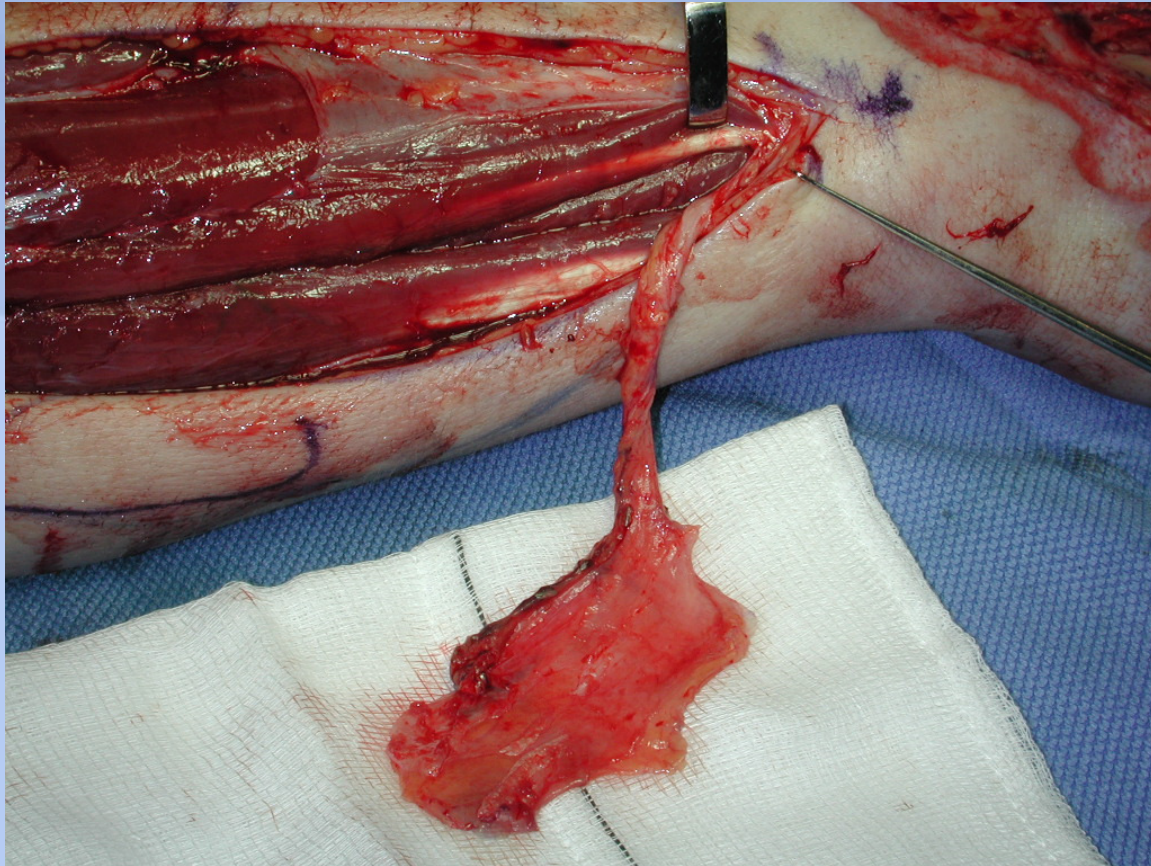
Fascial paddle elevated and reflected maintaining communication to PIA via septum and perforating vessels which travel in it.

As dissection of the pedicle progresses posterior interosseous nerve and branches to ECU and EDM should be identified and protected whilst fascia, septum and perforating branches and the PIA are raised.



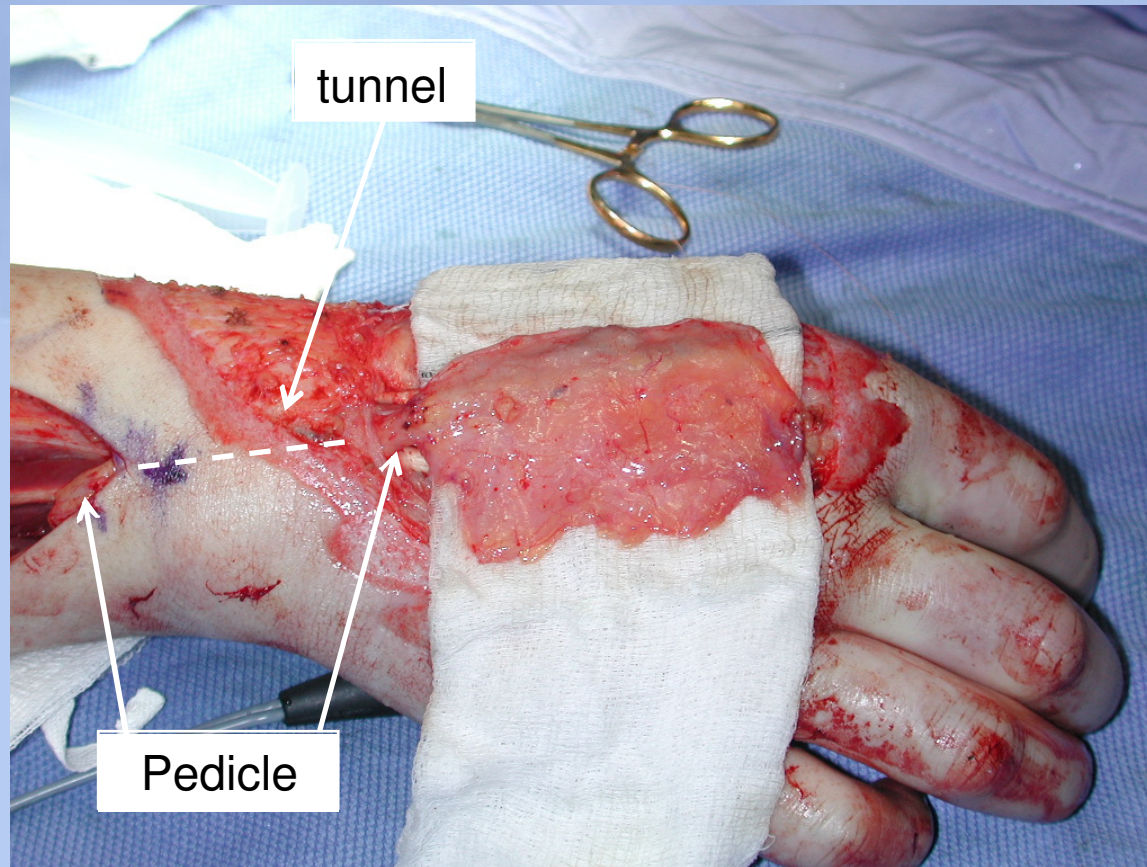
## Flap raising is complete

photo demonstrates the fascia, septum, perforators and Posterior Interosseous Artery



## Flap Raised

Another view of the raised flap.  
Subcutaneous tunnel is planed



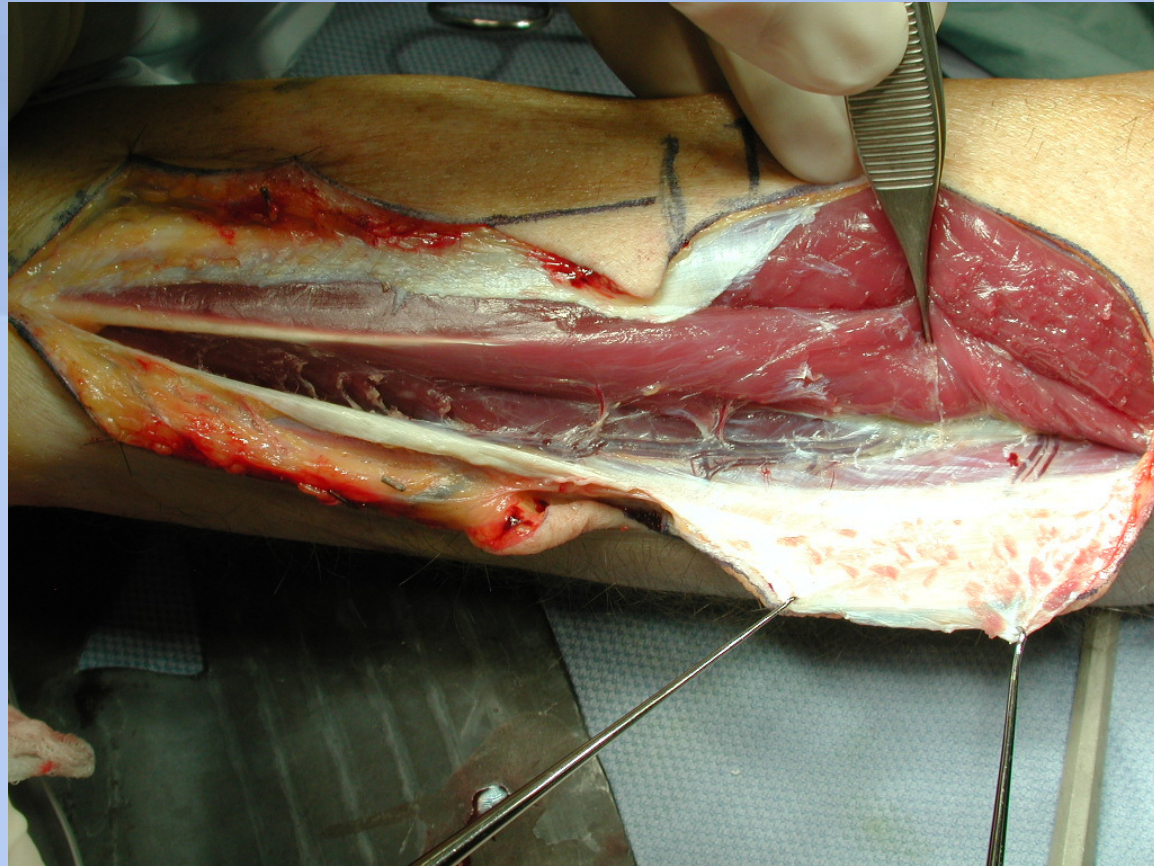
**Flap has been delivered through tunnel**



**Flap inset**



**Sheet split skin graft to close wound**



## **Another case – fasciocutaneous pedicle**

This is another illustration of the PIA pedicle and perforators running in the septum between EDM and ECU



## **Fasciocutaneous PIA flap raised**

Flap raising is complete and the PIA, septum, perforators are demonstrated in the base of the fasciocutaneous paddle.