

FVFG for Bone Tumor Defects

Biological Reconstruction

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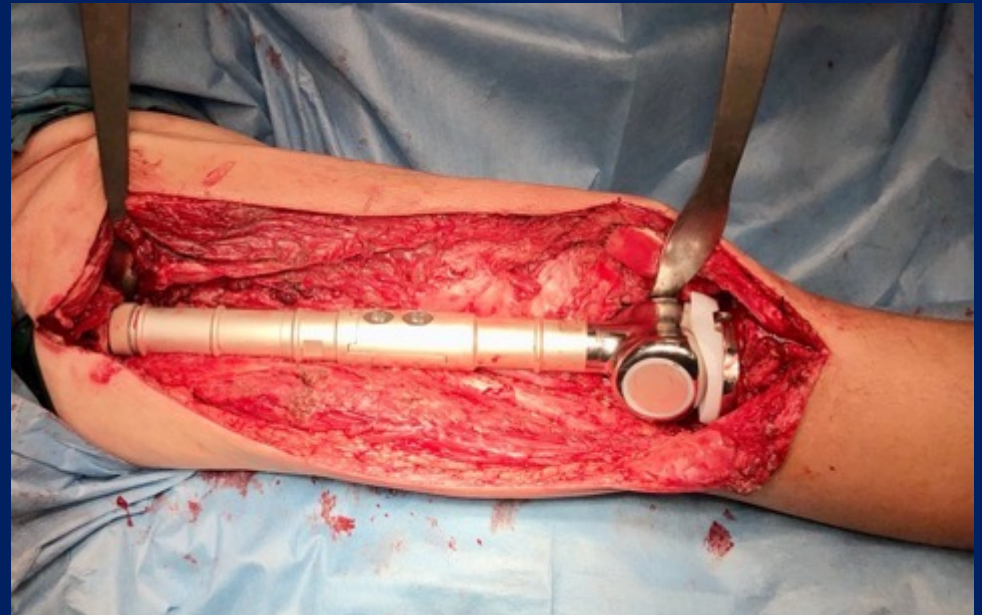
Bone Sarcomas Surgical Therapy

- Amputation before 80's
- Current status : Wide resection, + adjuvant therapies (Chemo - RT) for most Histologies
- Limb salvage > 90%



Treatment Consequences

- Bone defects and/or Soft tissue
- Functional defects





Biologic Reconstruction

Bone defects

- Bone Transfer
- Structural Allograft
- Cryosurgery-autograft
- Tumor RT - auto Graft (90Gy)
- Autoclaved bone
- Vascularized bone grafts
 - Vascularized ilium, FVFG, tibia
 - Allograft + FVFG





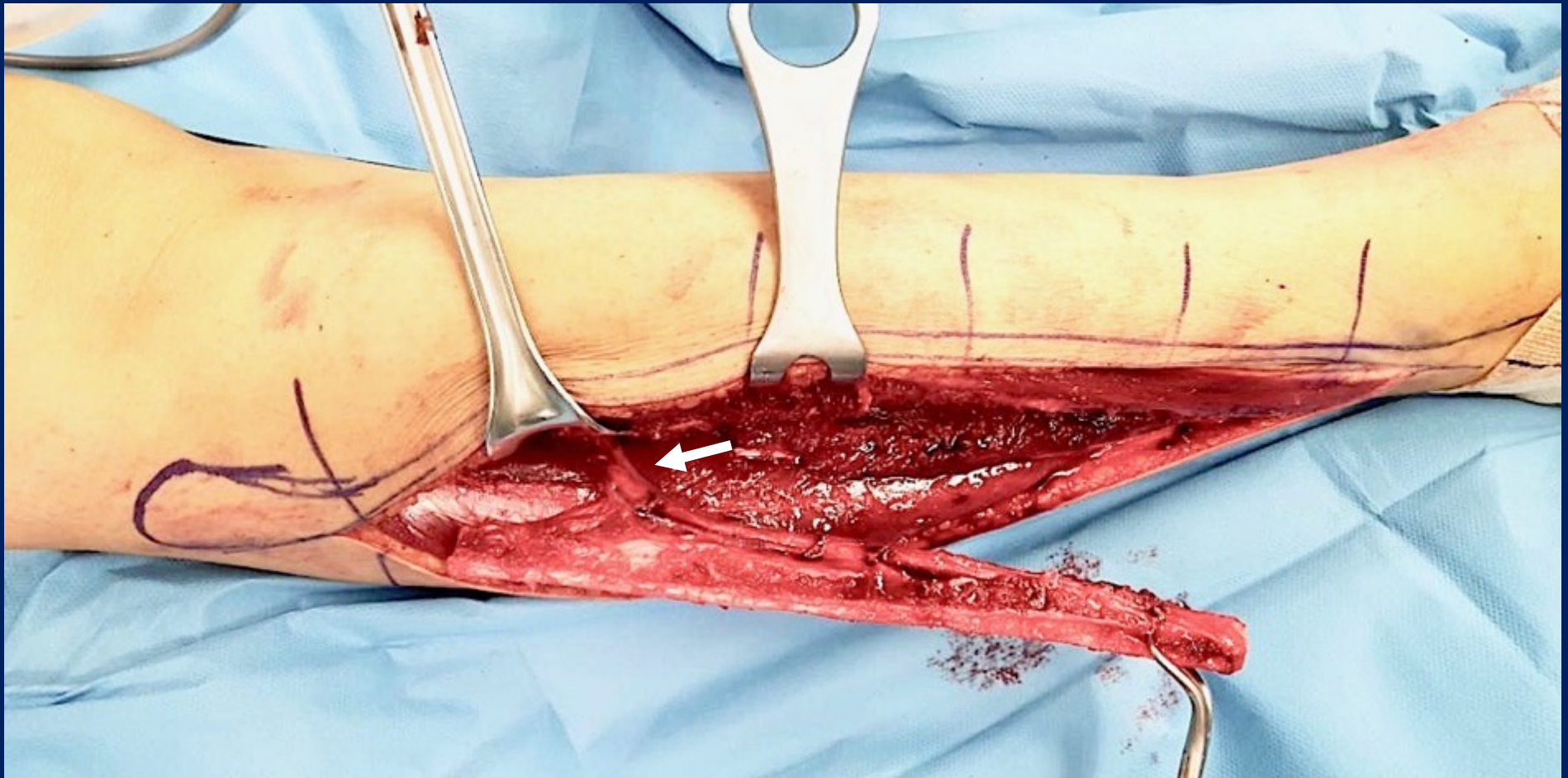
Biologic Reconstruction- FVFG

- Autologous living bone graft
- Based on Peroneal vessels
 - Anterior Tibial vessels for epiphyseal grafts
- First described for tumor reconstruction in 1977

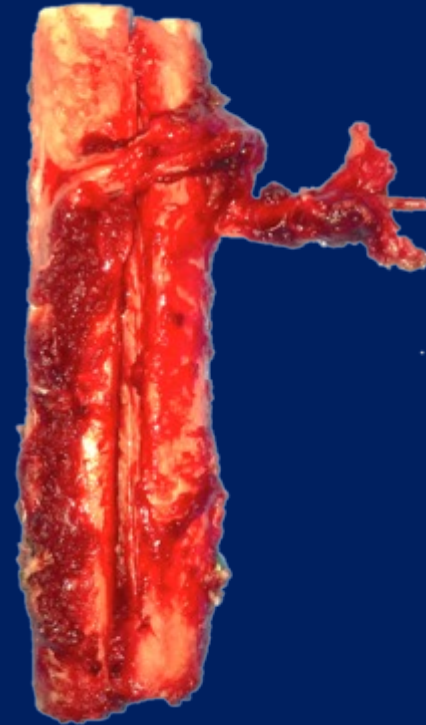
- 3,8% Absent Anterior tibial art.
- 1,6% Absent Posterior tibial art.
- 0,1% Absent Peroneal art.

Kelly AN, AJR 2007

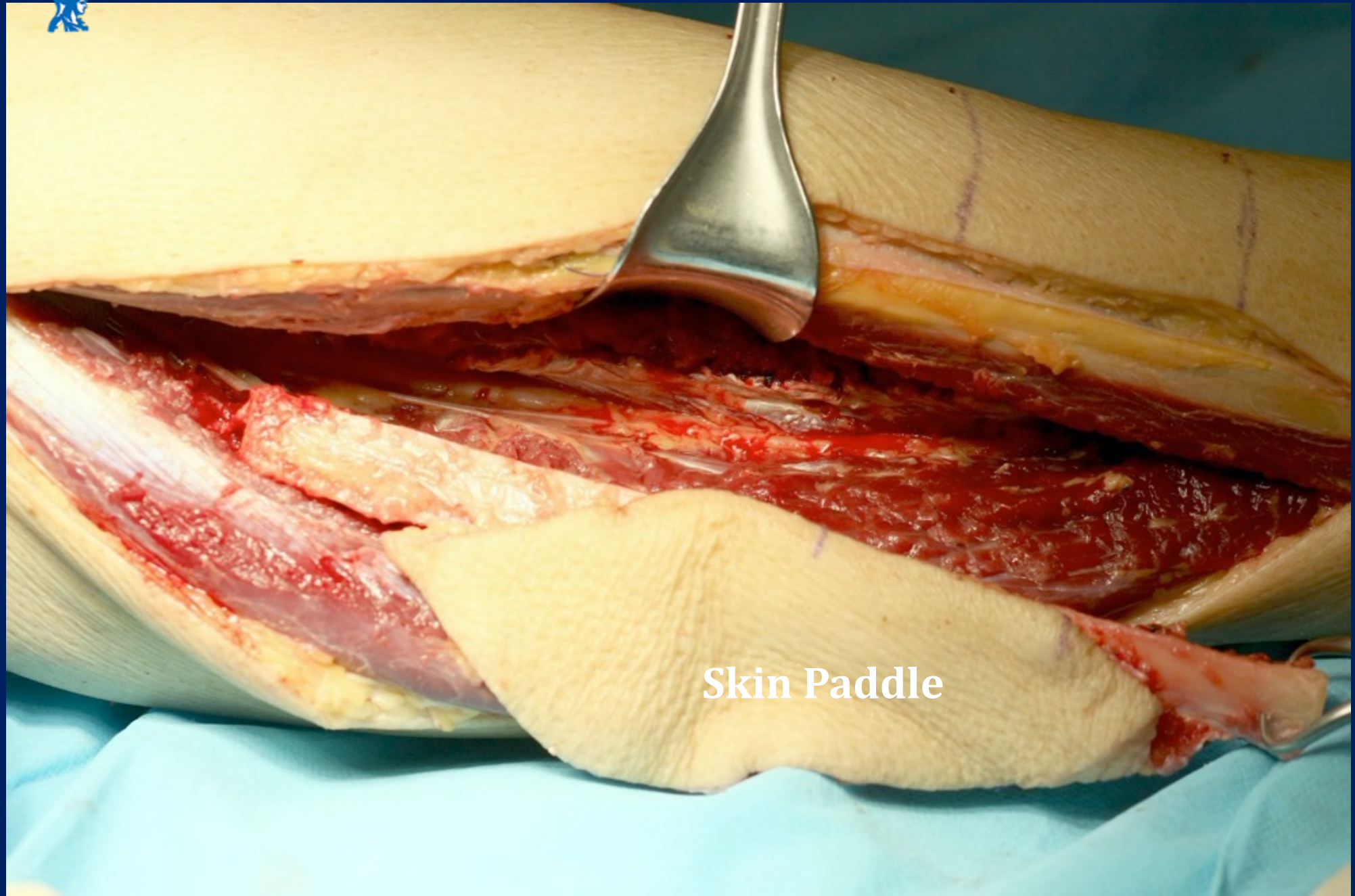




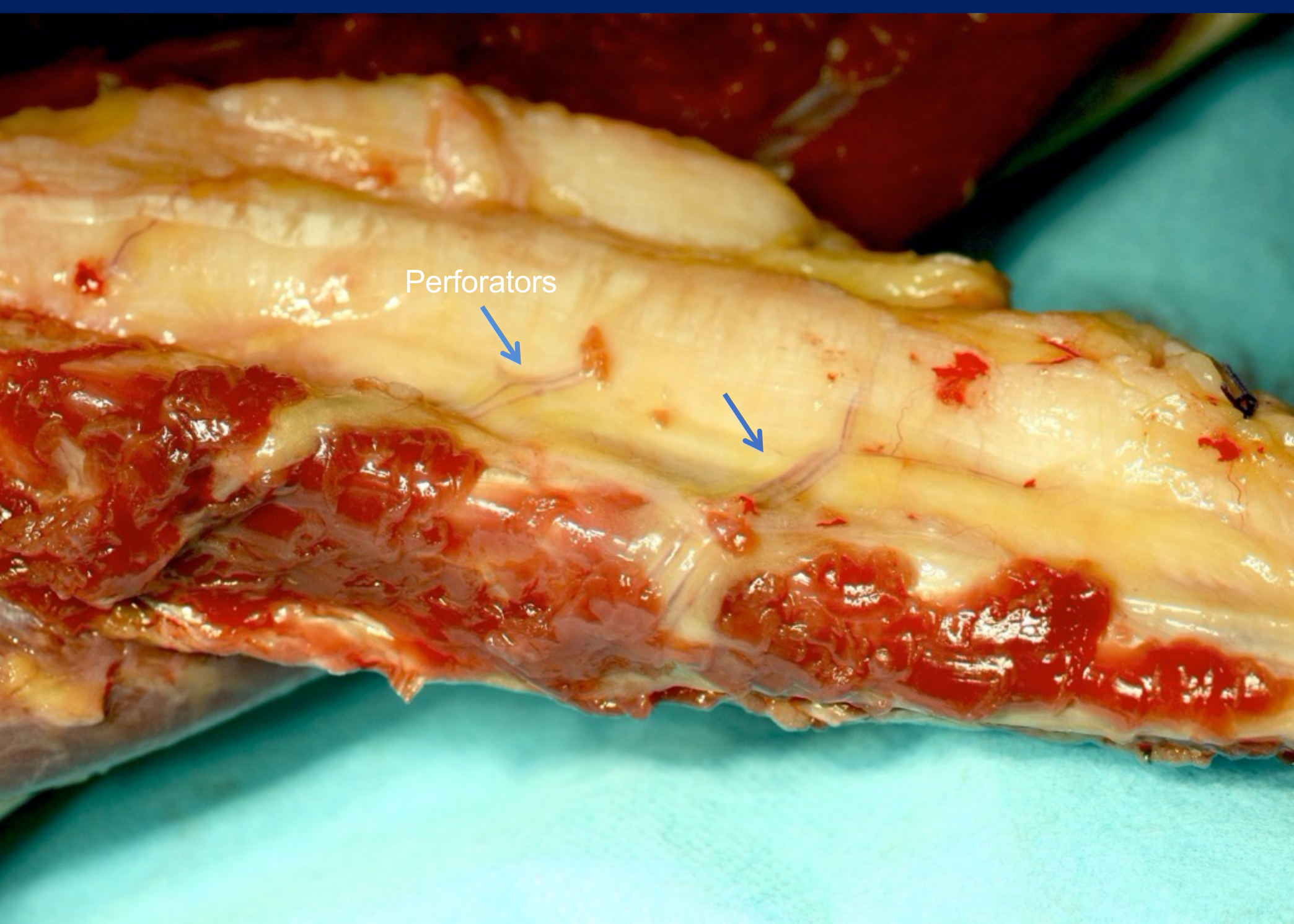
Double barrel FVFG







Skin Paddle



Perforators

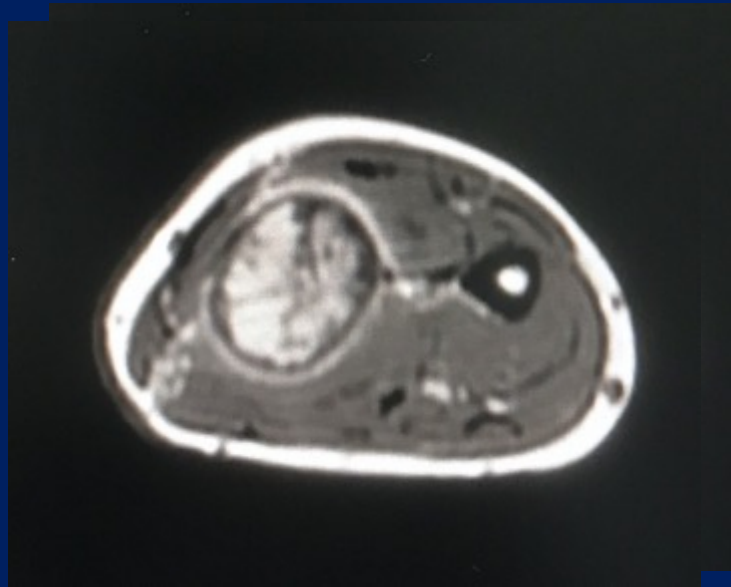




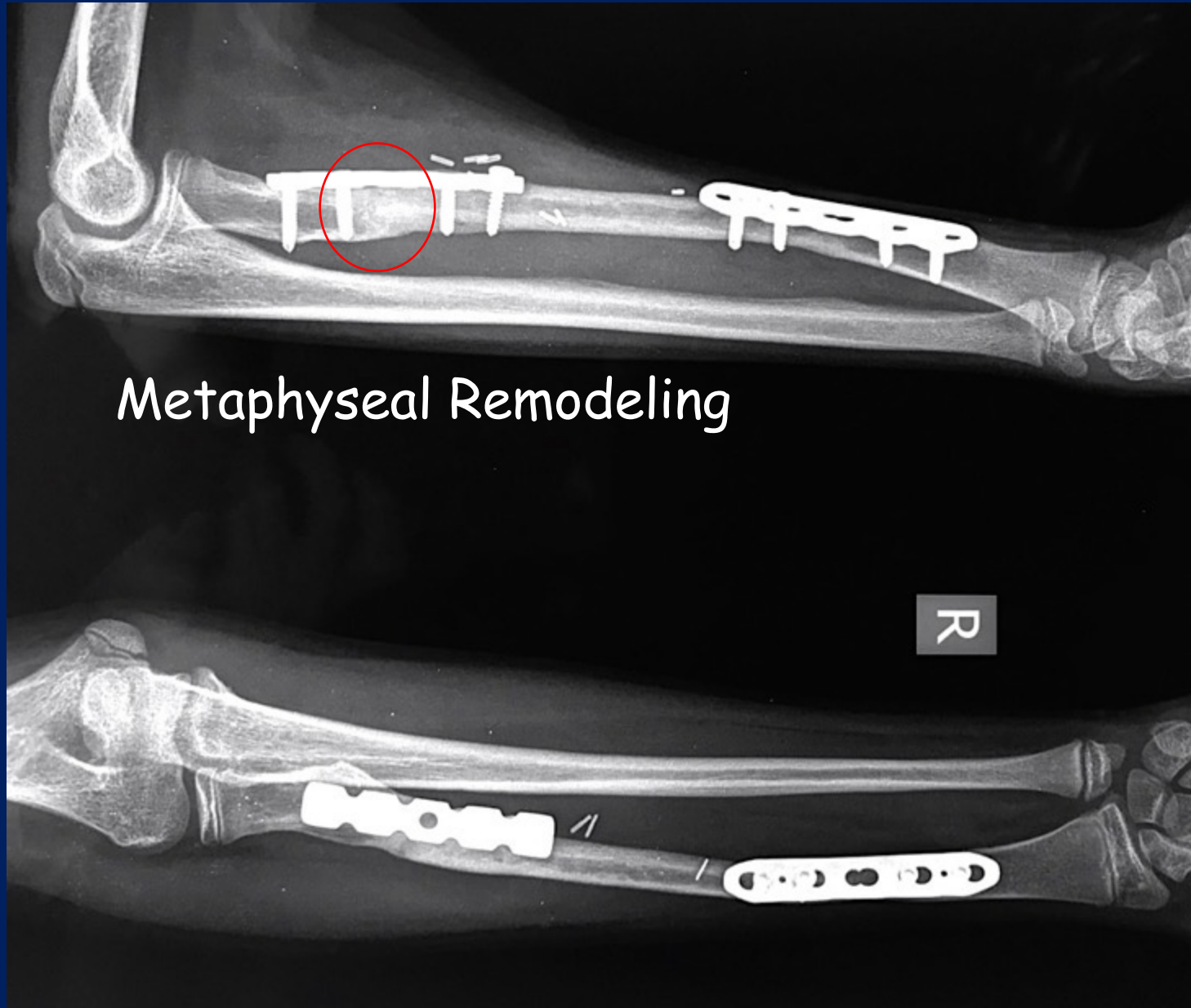
FVFG - Bone Tumor Reconstruction

- Intercalary reconstructions
- Resection arthrodesis
- Epiphyseal/physeal - Growing graft
- Allograft/fibula composite
- Allograft salvage

Intercalary reconstruction 10 y boy Vascular tumor



Graft Hypertrophy according to Wolf's law





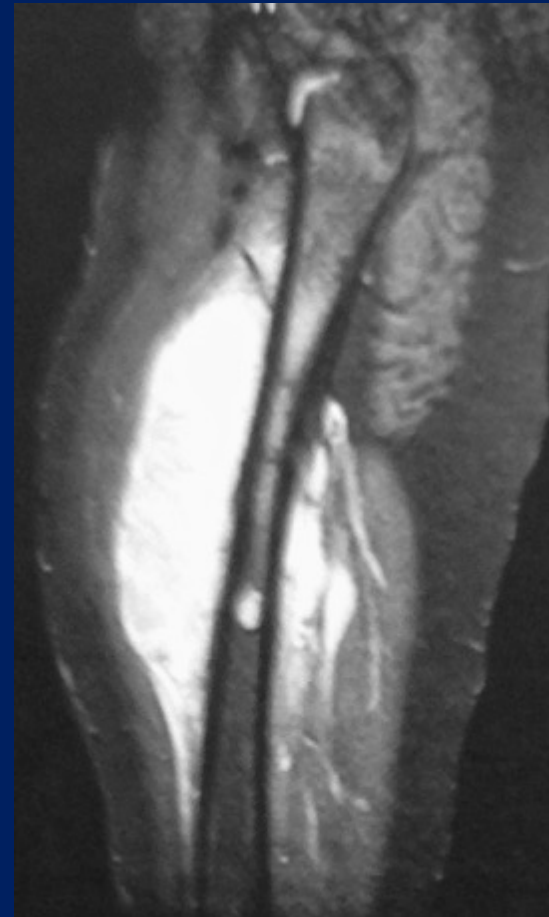
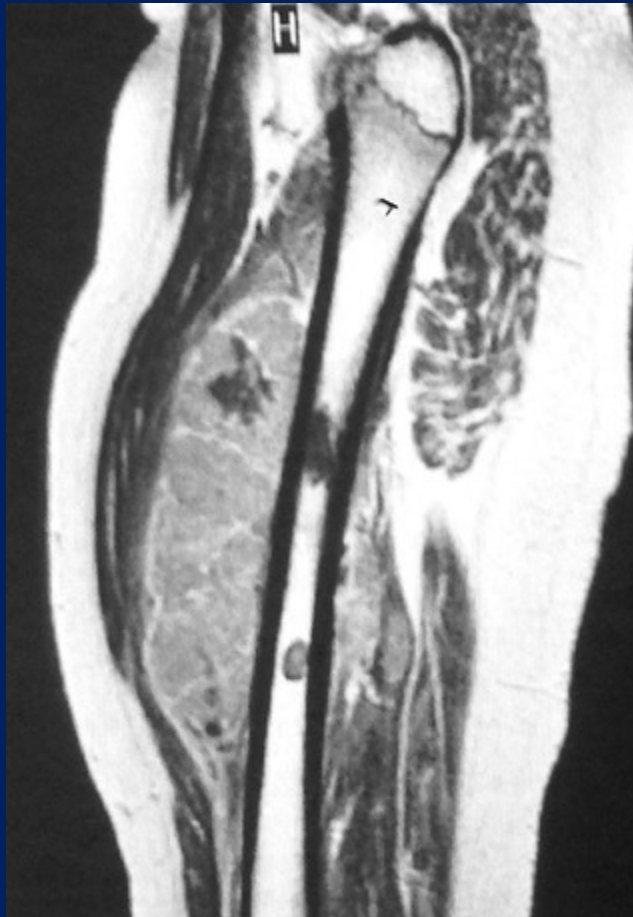
Allograft - FVFG composite / Indications

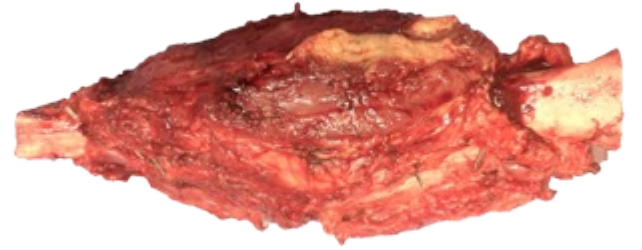
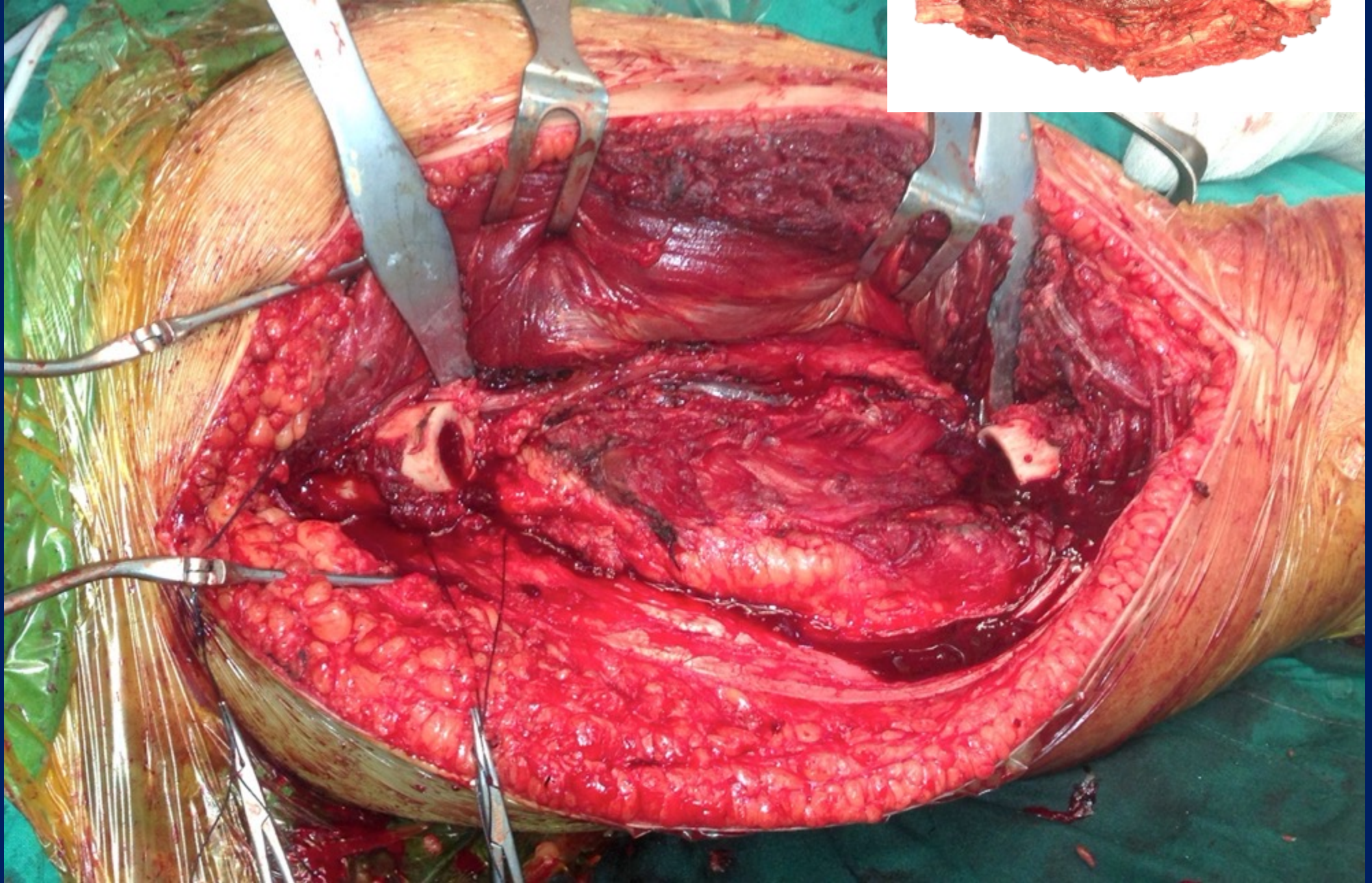
- Minimal residual bone stock
Metaphyseal / Intra-epiphyseal resections
- Long resections (>12-15 cm)

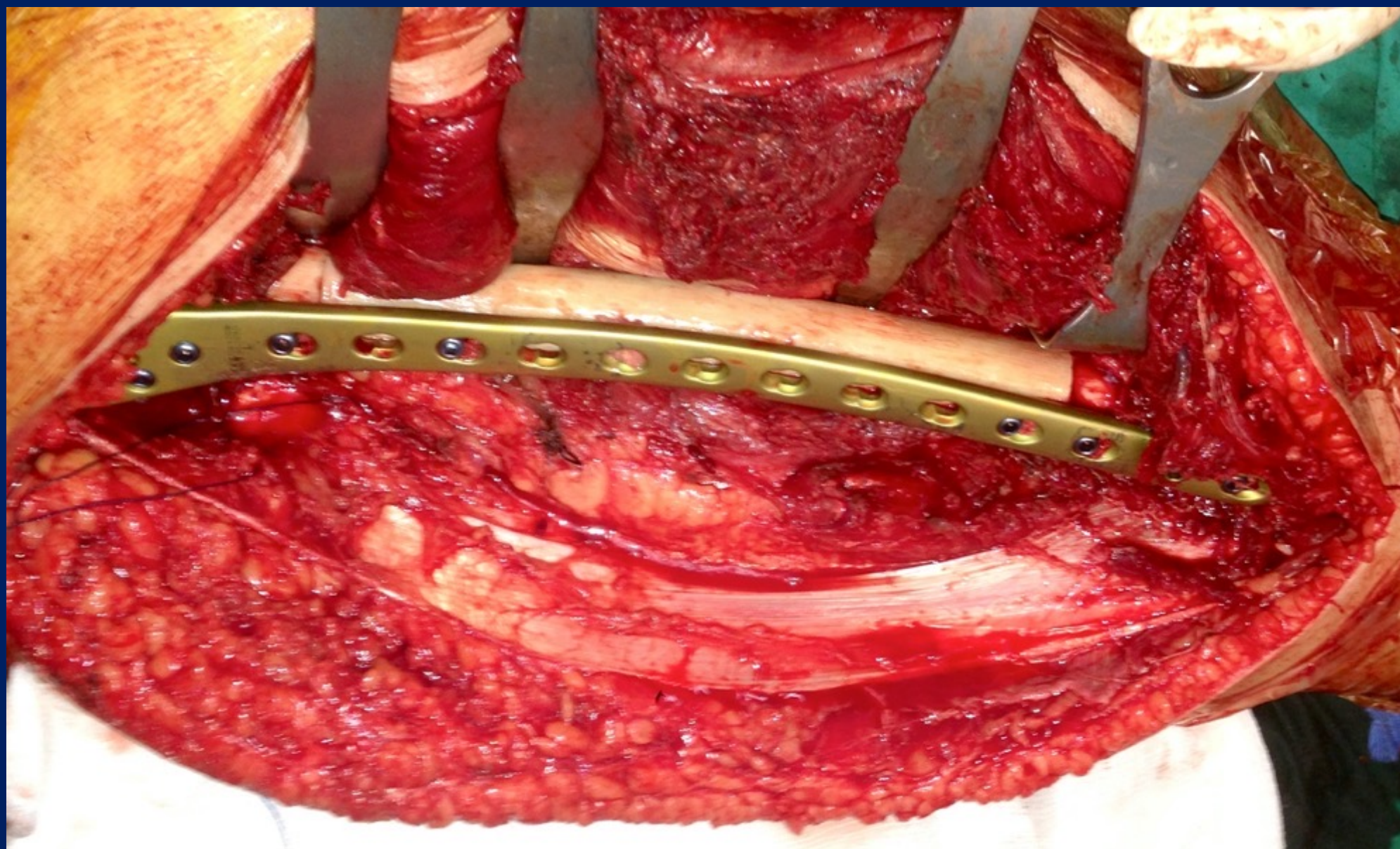


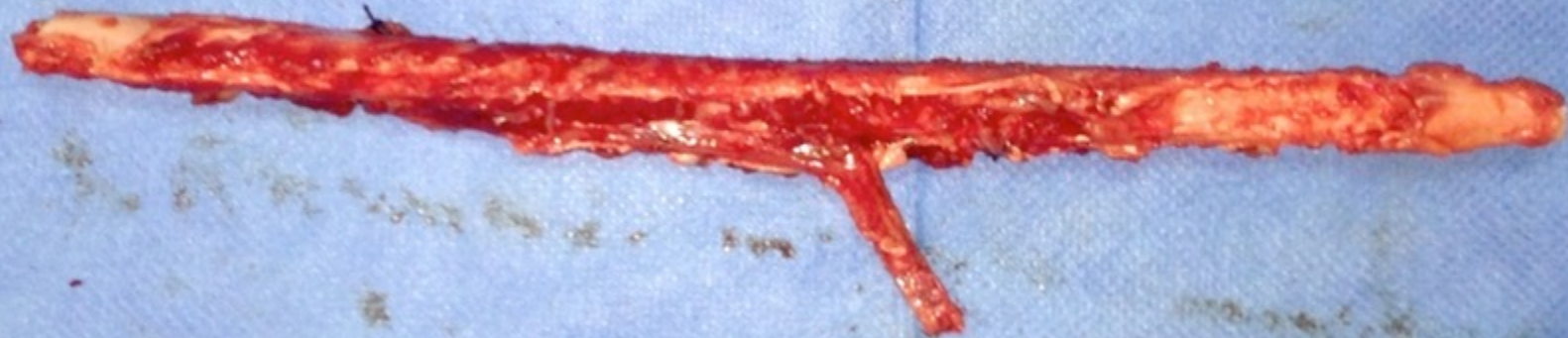
Allograft + FVFG On-Lay

12 y old Ewing Sarcoma Femur



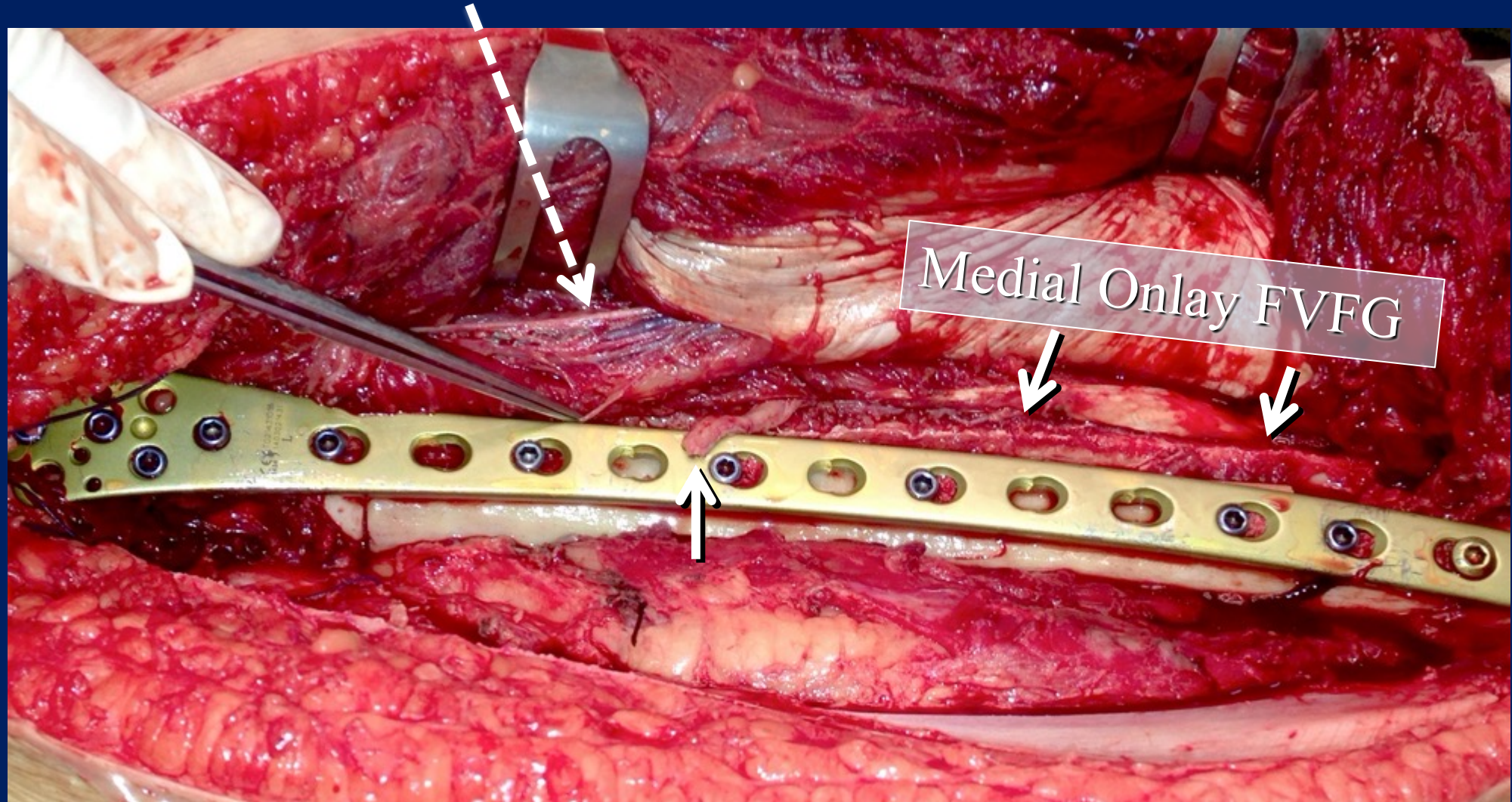






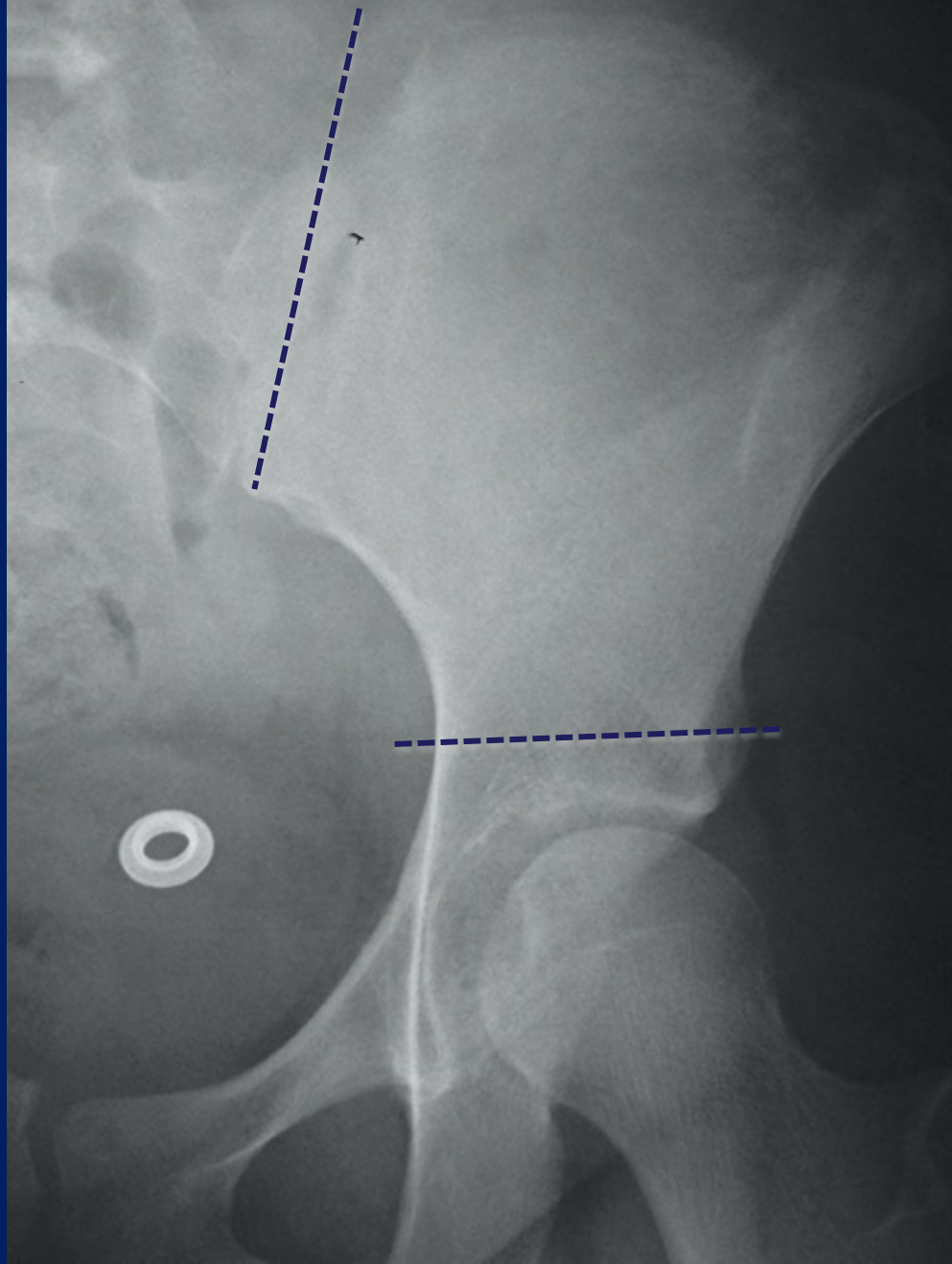
22 cm

Descending Circumflex D. Femoral Artery

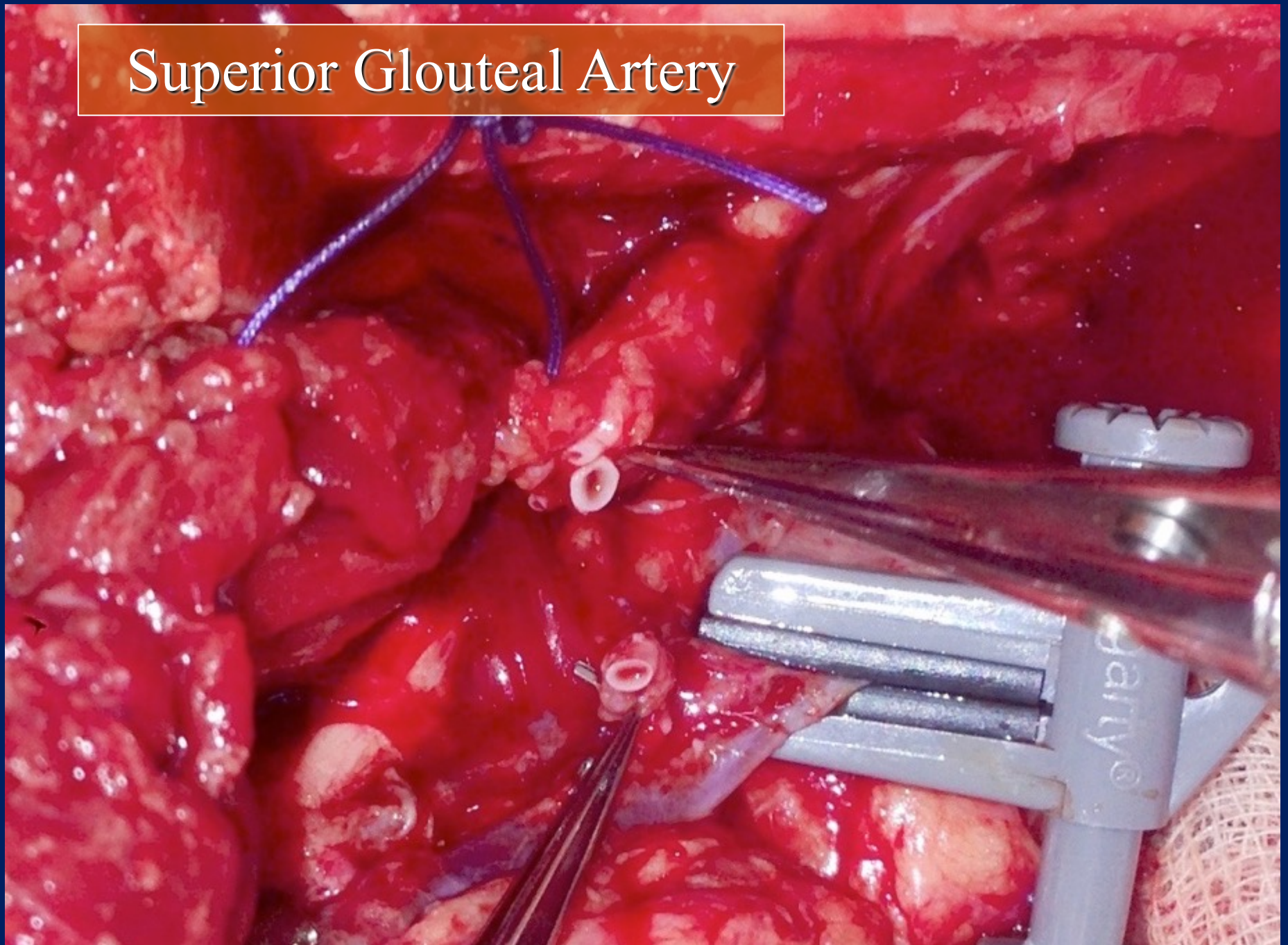




22 y Female. Pelvic Ewing Sarcoma



Superior Gluteal Artery

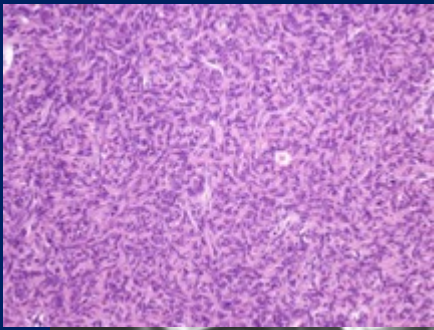


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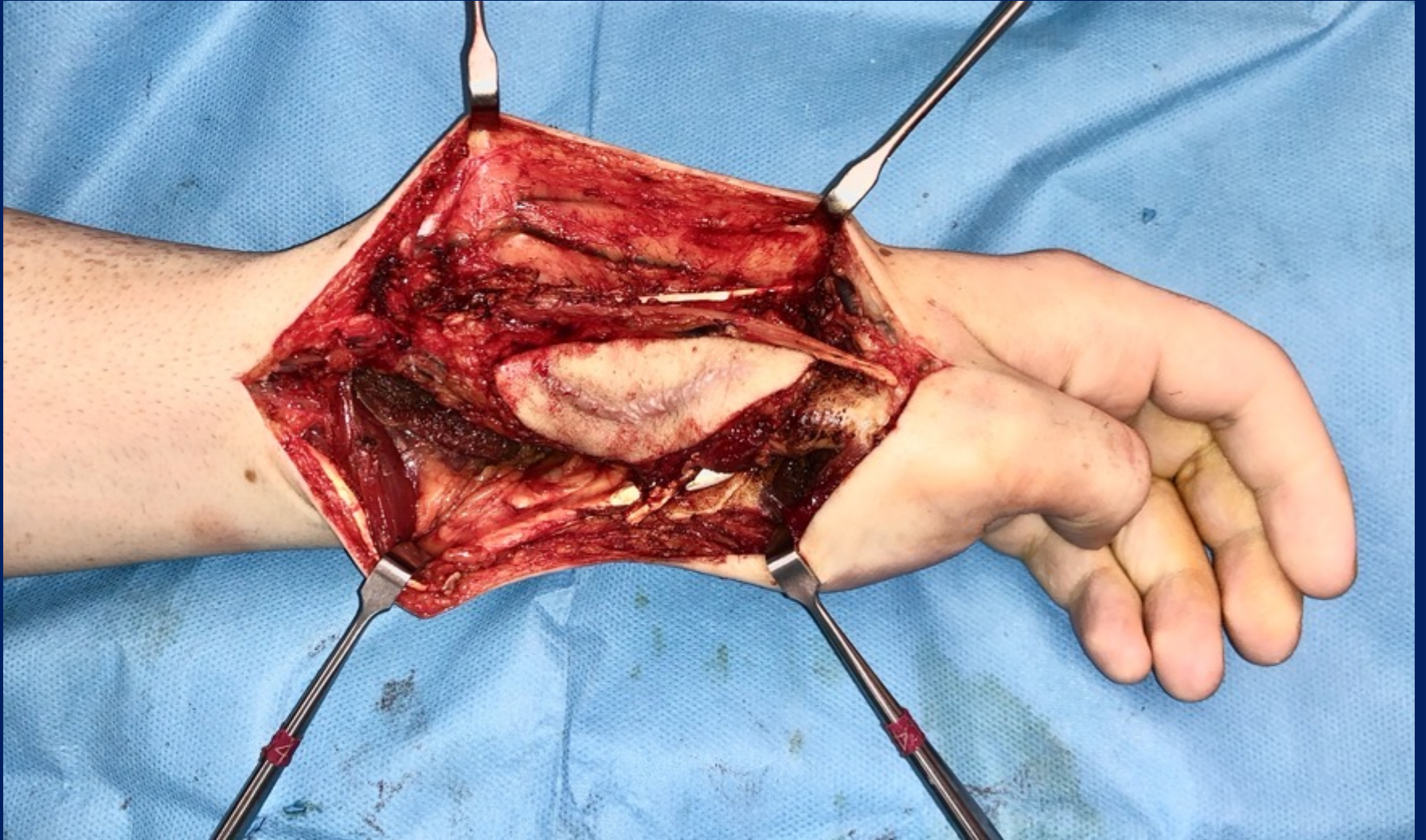
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Synovial Sarcoma Incomplete excision



Pre-op Chemo and RT



FVFG + skin paddle



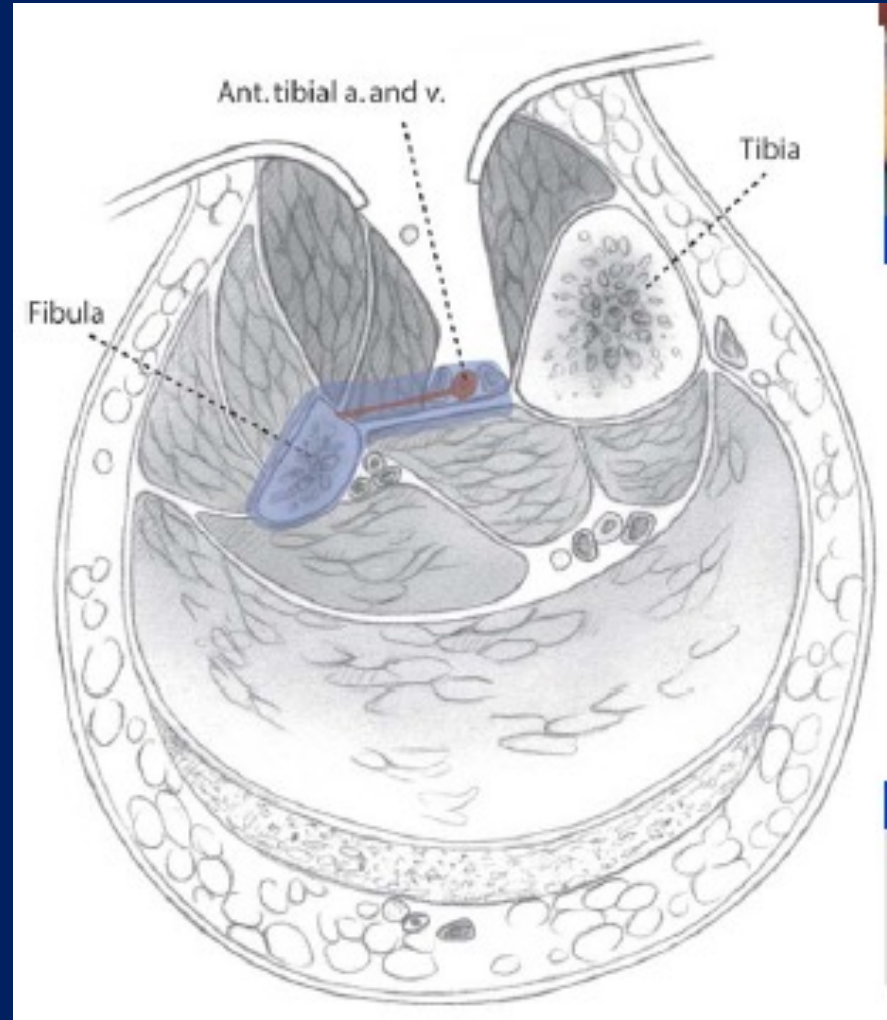
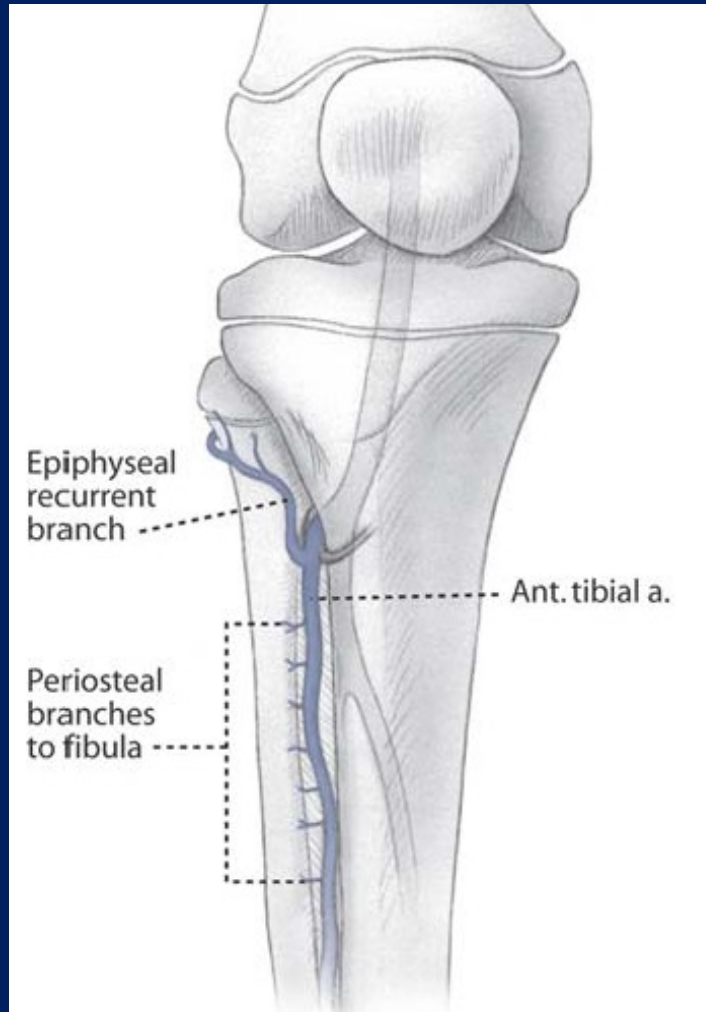
Wrist Arthrodesis





FVFG with proximal physis transfer

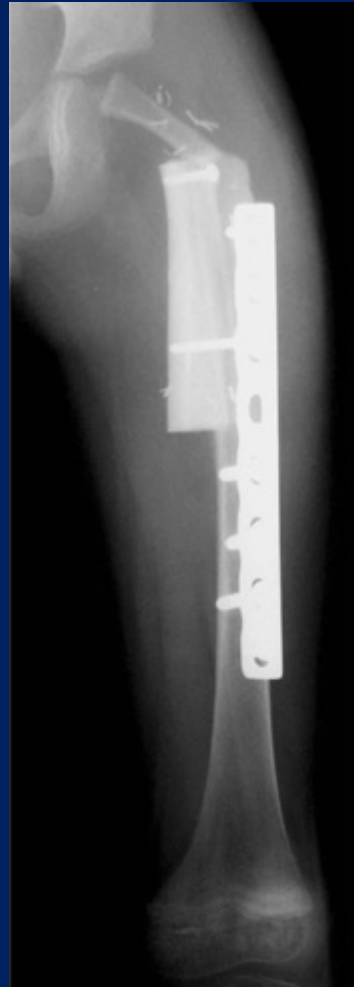
Innocenti M. JBJS Am. 2005



FVFG with proximal physis transfer



Innocenti M. JBJS Am. 2005



Petersen M. Sarcoma 2010



Massive Allografts: the problem

- Poor revascularization
- Repair and remodeling responses are essentially nonexistent
- Immune reactions to the allograft <1%



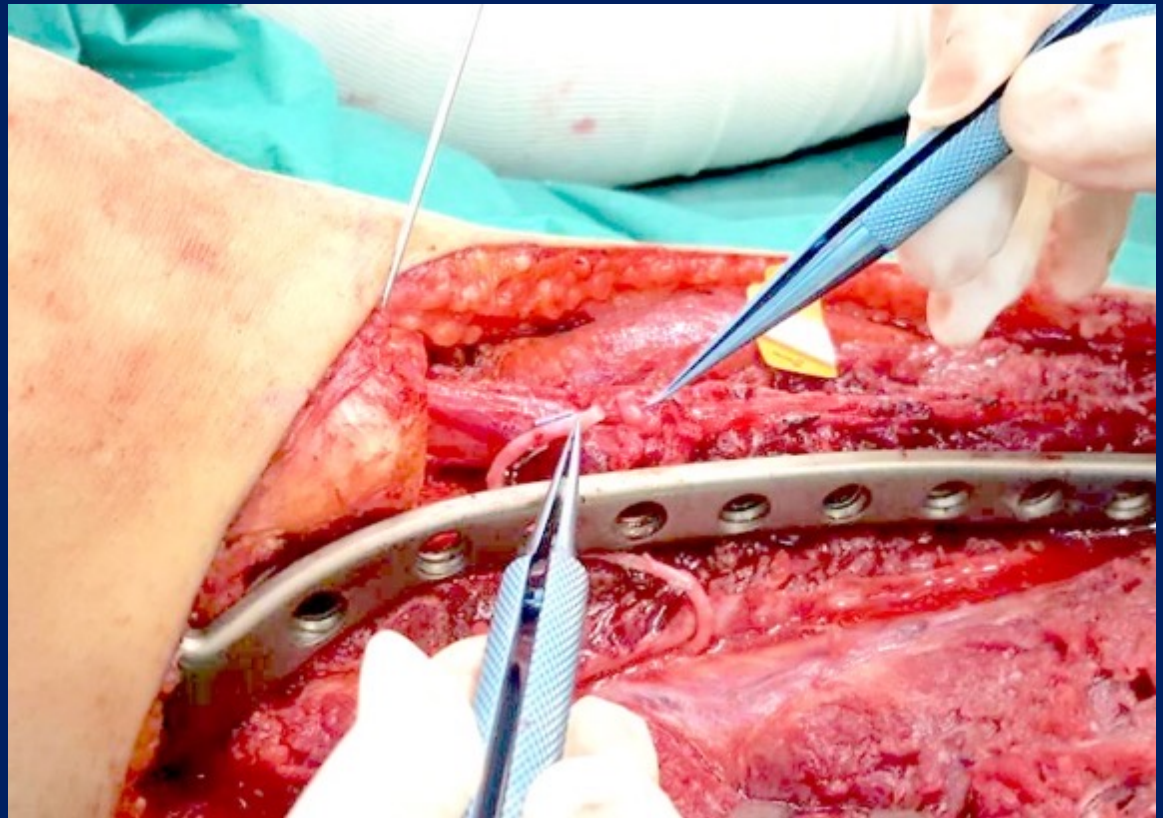
Massive Allograft complications

50-60%

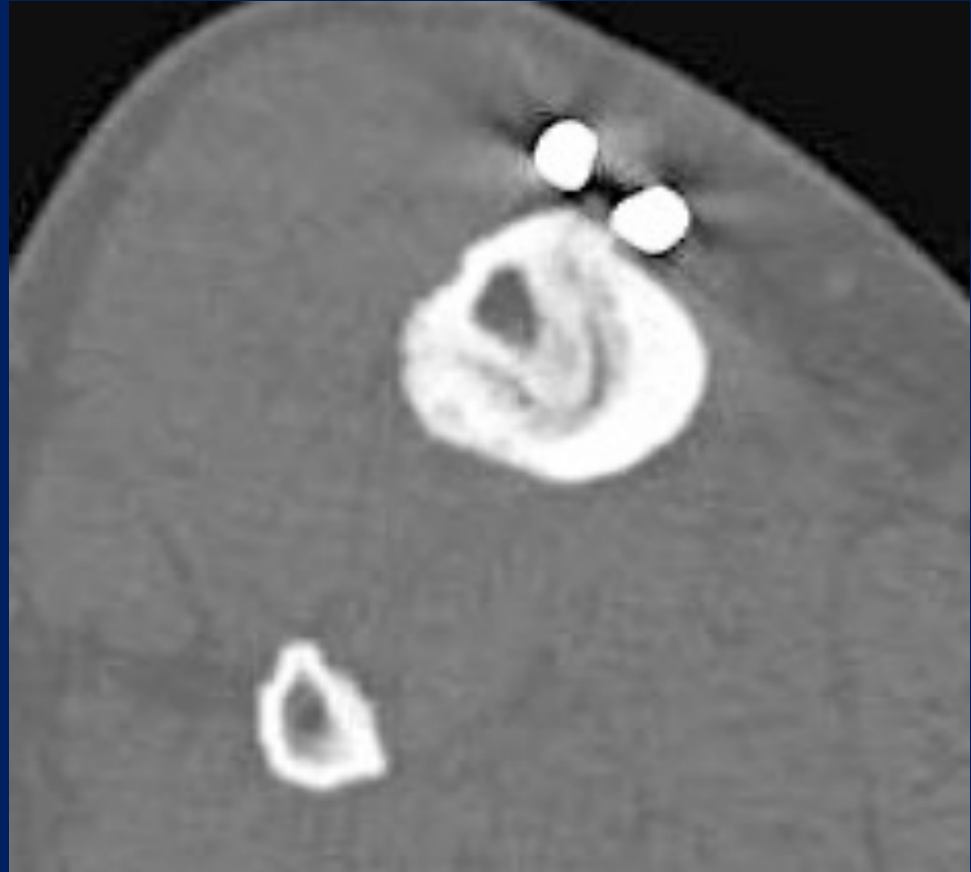
- * Infection
- * Fracture
- * Nonunion



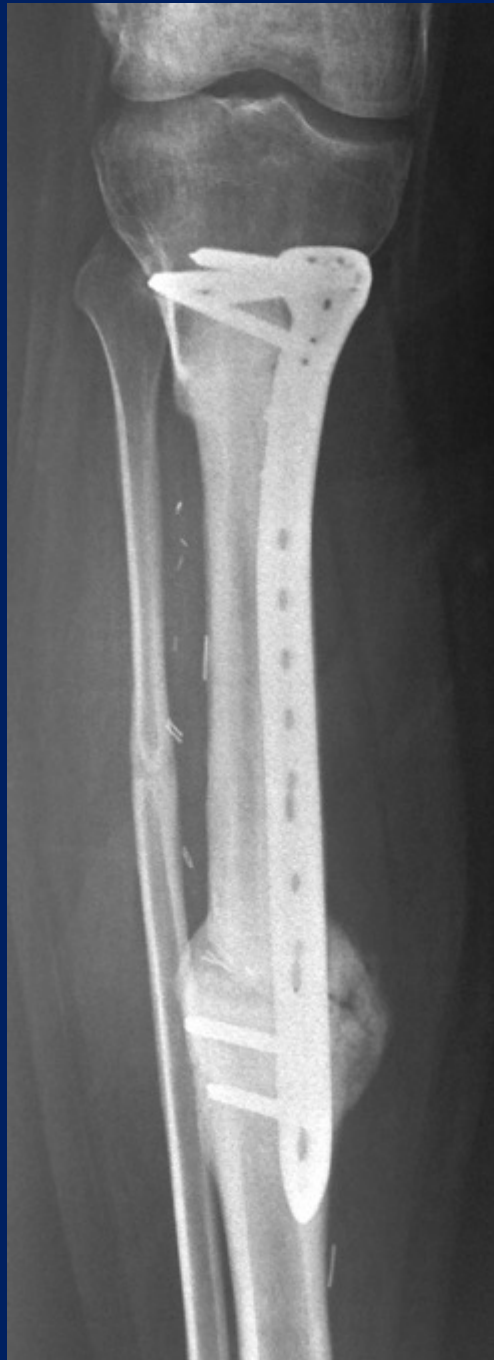
Allograft + FVFG In-Lay Adamantinoma



12 m post op

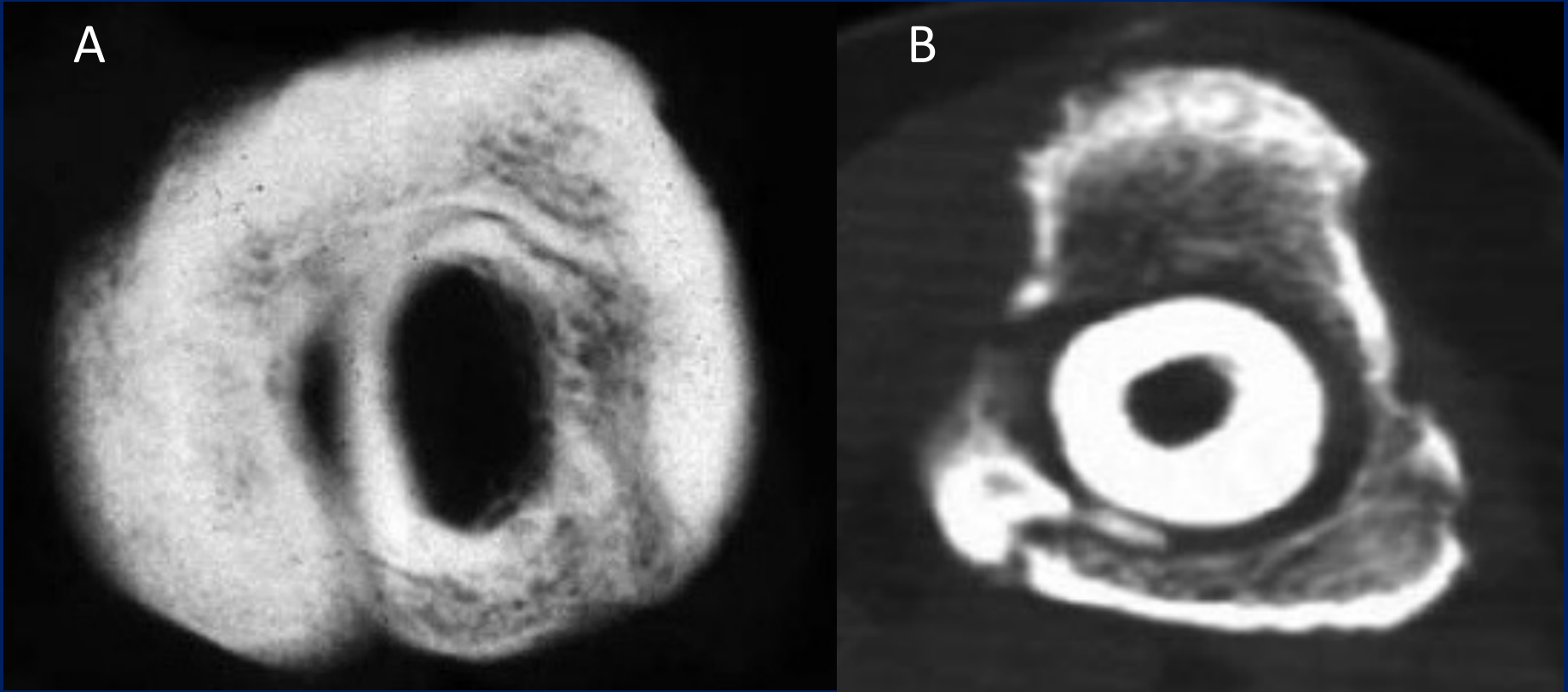


Allograft + FVFG
VS Single FVFG
12 m post op





Types of incorporation



A. The endosteum of the allograft is vascularized

B. Allograft fractures. The fibula hypertrophies

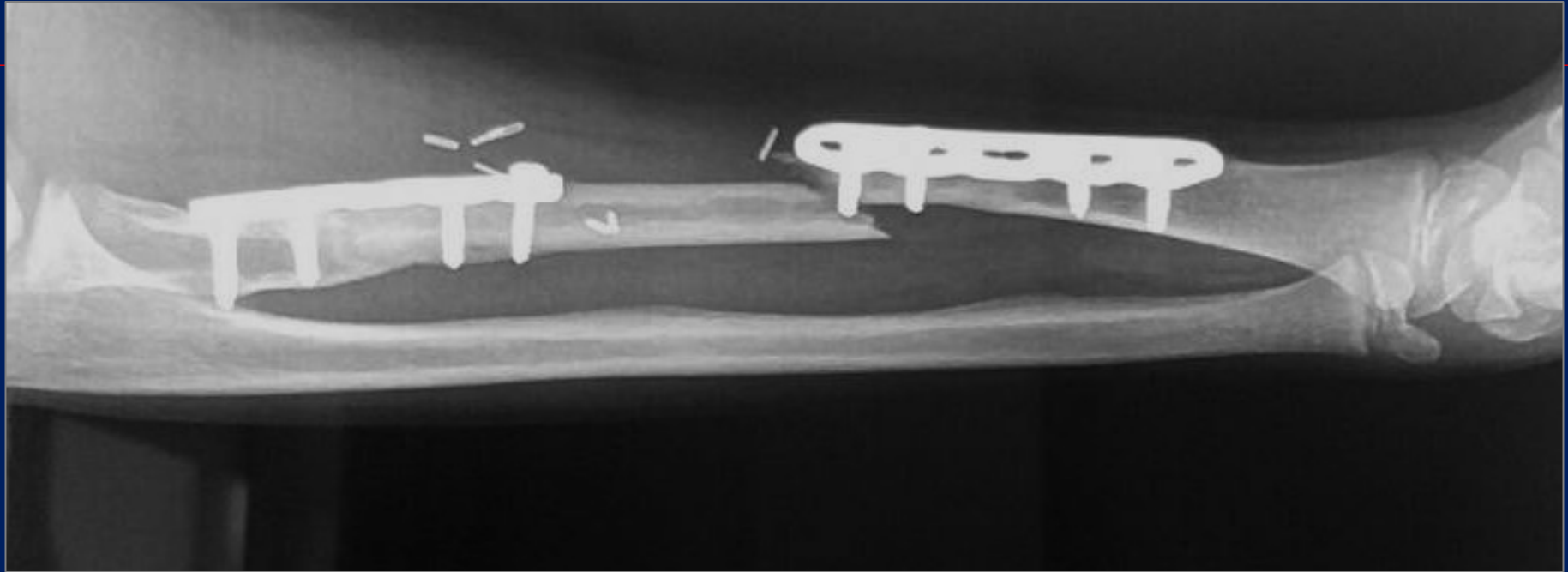


FVFG for allograft complications





FVFG and treatment results



- Graft Fracture or Stress fracture 15%
- Reoperation rate 40%



FVFG - delayed, non-union

- Revision osteosynthesis
(stable and adequate + bone graft)
- Re-Operation index of 1.33
- Meant time to union 9m



Message of the study

- Biologic component of FVFG is not enough.
- Mechanical stability is important to achieve primary bone union



Summary

- Stable and adequate osteosynthesis is necessary
- Increased number of complications are anticipated
- However, successful management is the rule
- Final outcome is preserved in the long term