

# Surgical reconstruction options

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# Conflict of interest statement:


- ▶ I have no conflict of interest to disclose

# AUTOGENOUS GRAFTS

- ▶ subcutaneous anteromedial aspect of the tibia (structural autografts)
- ▶ Plateau of the tibia (cancellous bone)
- ▶ reamer-irrigator-aspirator (RIA): canal of the femoral and tibial shafts. (bulk cancellous autogenous graft) (mean volume harvested of  $47 \pm 22$  mL)
- ▶ proximal two thirds of the fibula
- ▶ middle one third of the fibula: vascularized free autograft based on the peroneal artery and vein pedicle
- ▶ iliac crest

# ALLOGENIC GRAFTS

- ▶ Small children
- ▶ Elderly
  
- ▶ Larger structural allografts:
  1. In revision total joint surgery
  2. Periprosthetic long bone fractures
  3. Reconstruction after tumor excision

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- ▶ Osteochondral allografts: distal femoral osteonecrosis
  - ▶ Large osteochondral allografts: in limb salvage procedures after tumor resection
  - ▶ Autogenous cancellous bone can be mixed in small amounts with allograft bone as “seed” to provide osteogenic potential.
  - ▶ Mixed bone grafts of this type incorporate more rapidly than allograft bone alone.

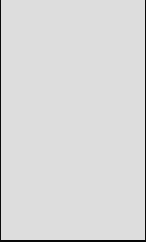
# BONE BANK

- ▶ Donors must be **screened** for bacterial, viral (including HIV and hepatitis), and fungal infections.
- ▶ Malignancy (except basal cell carcinoma of the skin), collagen vascular disease, metabolic bone disease, and the presence of toxins are all **contraindications** to donation.
- ▶ No system is perfect.

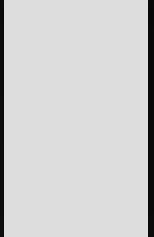
**TABLE 1.5****Bone Graft Activity by Type**


GRAFT	OSTEOGENESIS	OSTEOCONDUCTION	OSTEOINDUCTION	MECHANICAL PROPERTIES	VASCULARITY
<b>AUTOGRAFT</b>					
Bone marrow	++	±	+	—	—
Cancellous	++	++	+	+	—
Cortical	+	+	±	++	—
Vascularized	++	++	+	++	++
<b>ALLOGRAFT</b>					
Cancellous	—	++	+	+	—
Cortical	—	±	±	++	—
Demineralized	—	++	+++	—	—


From Kahn SN, et al: The biology of bone grafting, *J Am Acad Orthop Surg* 13:80, 2005.

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- ▶ It can be harvested in a clean, nonsterile environment;
  - ▶ sterilized by irradiation, strong acid, or ethylene oxide;
  - ▶ and freeze-dried for storage.
  - ▶ Bone under sterile conditions can be deep frozen ( $-70^{\circ}\text{C}$  to  $-80^{\circ}\text{C}$ ) for storage.
  - ▶ Fresh frozen bone is stronger than freeze-dried bone and better as structural allograft material.



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- ▶ Recombinant human bone morphogenic protein-2 (rh BMP-2) has been associated with an increased cancer risk.
  - ▶ A 16% complication rate involving soft-tissue inflammation also was noted in Tricalcium phosphate and calcium sulfate.

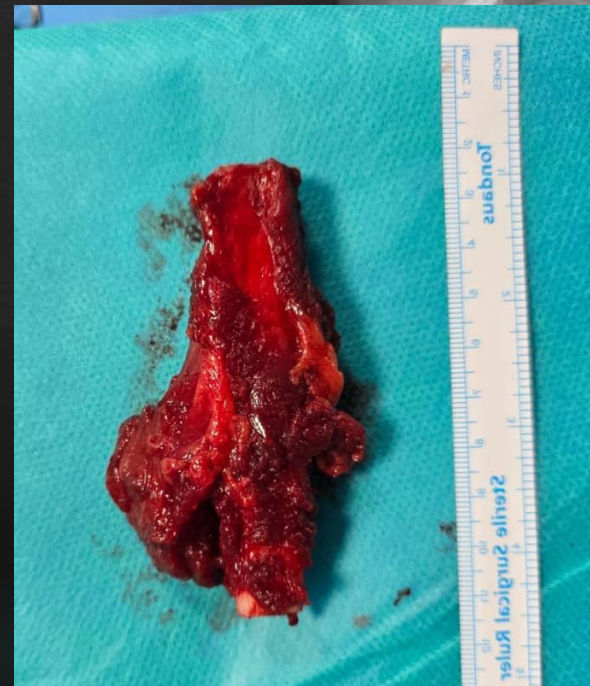
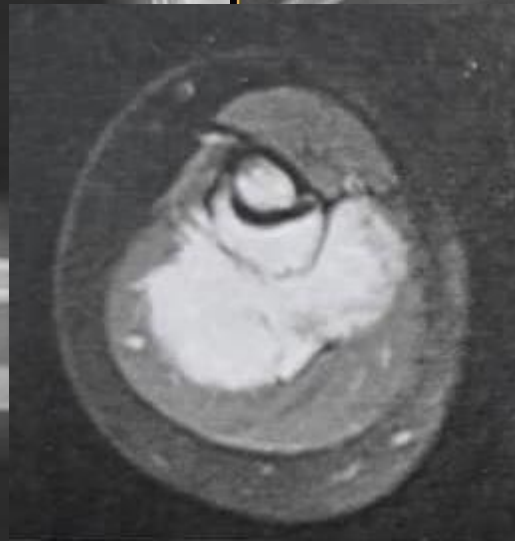
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- ▶ The use of bone graft substitutes containing **recombinant proteins** or **synthetic peptides** in younger patients with developing skeletons has **not** been approved by the U.S. FDA.
  - ▶ stem cells: FDA: “A major challenge posed by SC [stem cell] therapy is the need to ensure their efficacy and safety.

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- ▶ **Demineralized bone matrix** (DBM) is considered minimally processed allograft tissue and, therefore, does not require approval from the FDA for use.

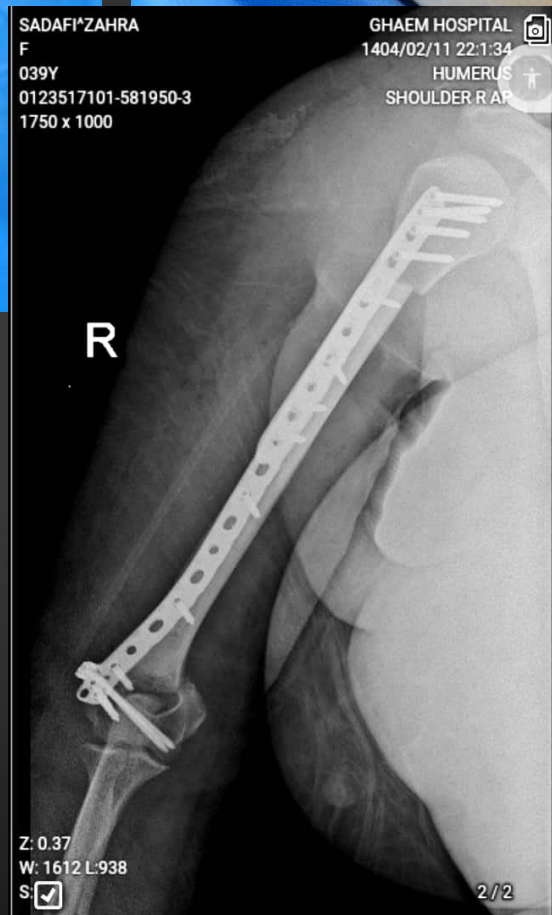
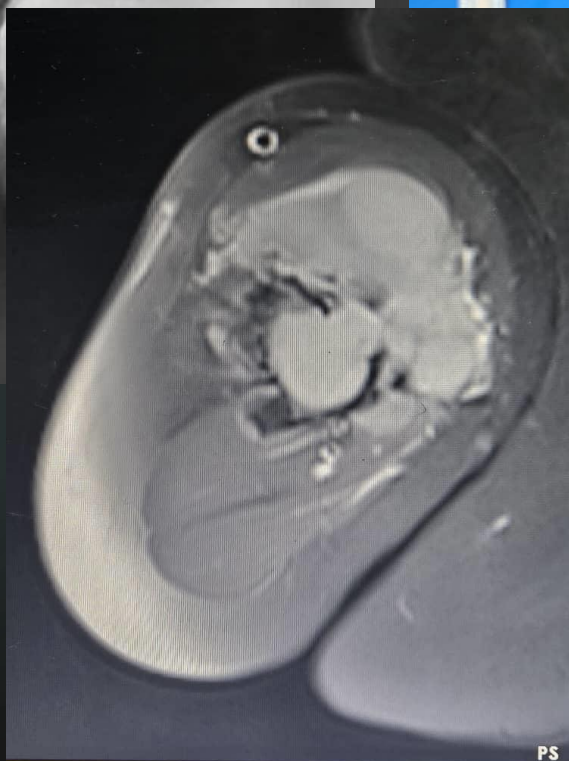
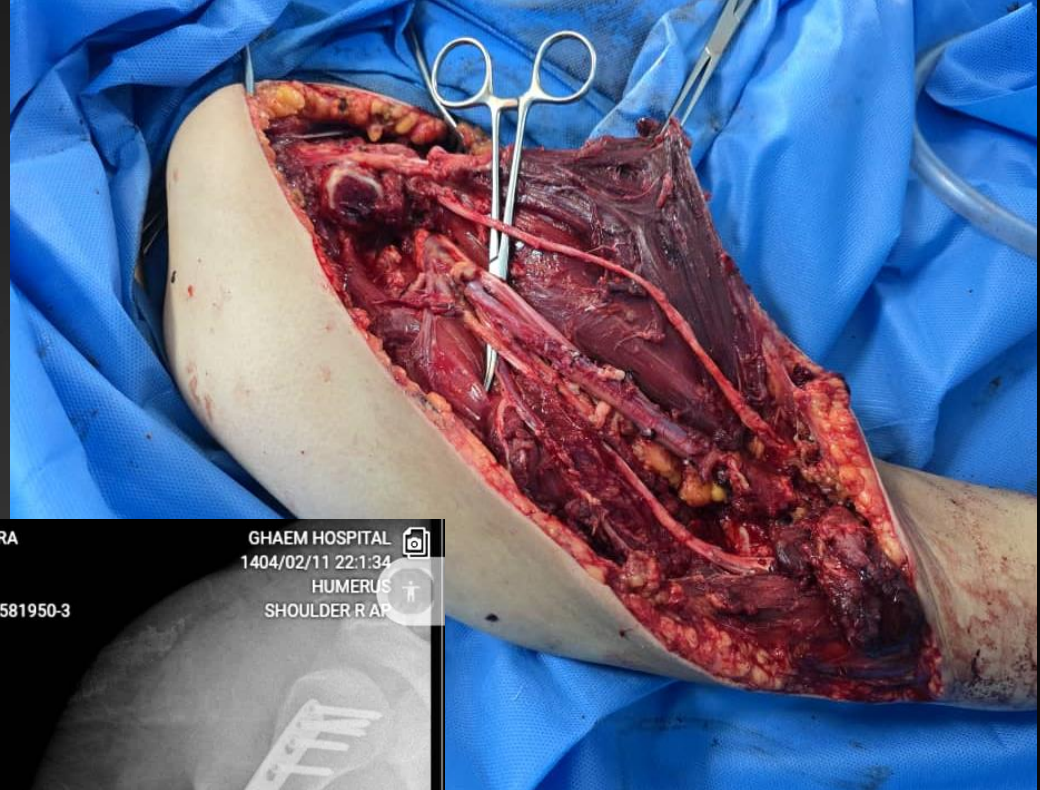
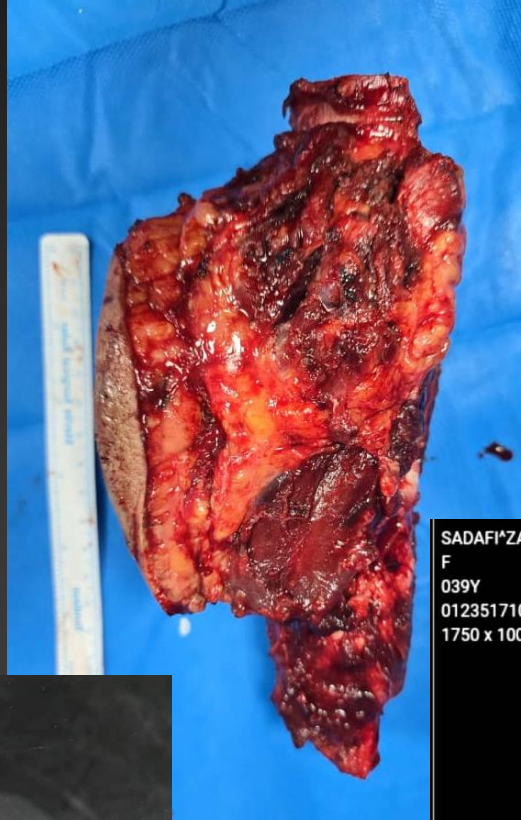
# The involved bone → Reimplantation

- ▶ Autoclaving
- ▶ Extracorporeal irradiation
- ▶ Pasteurization
- ▶ Liquid nitrogen freezing

# 3D printing











4 yr OS







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4

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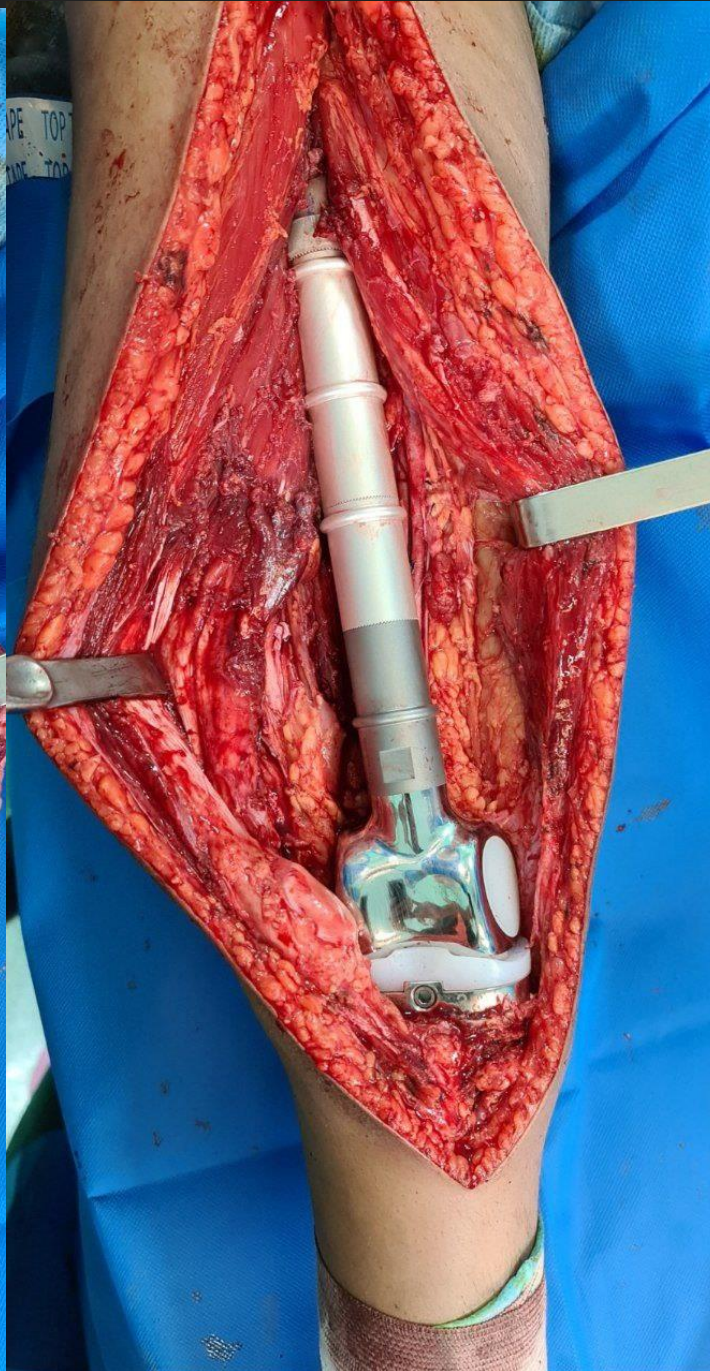
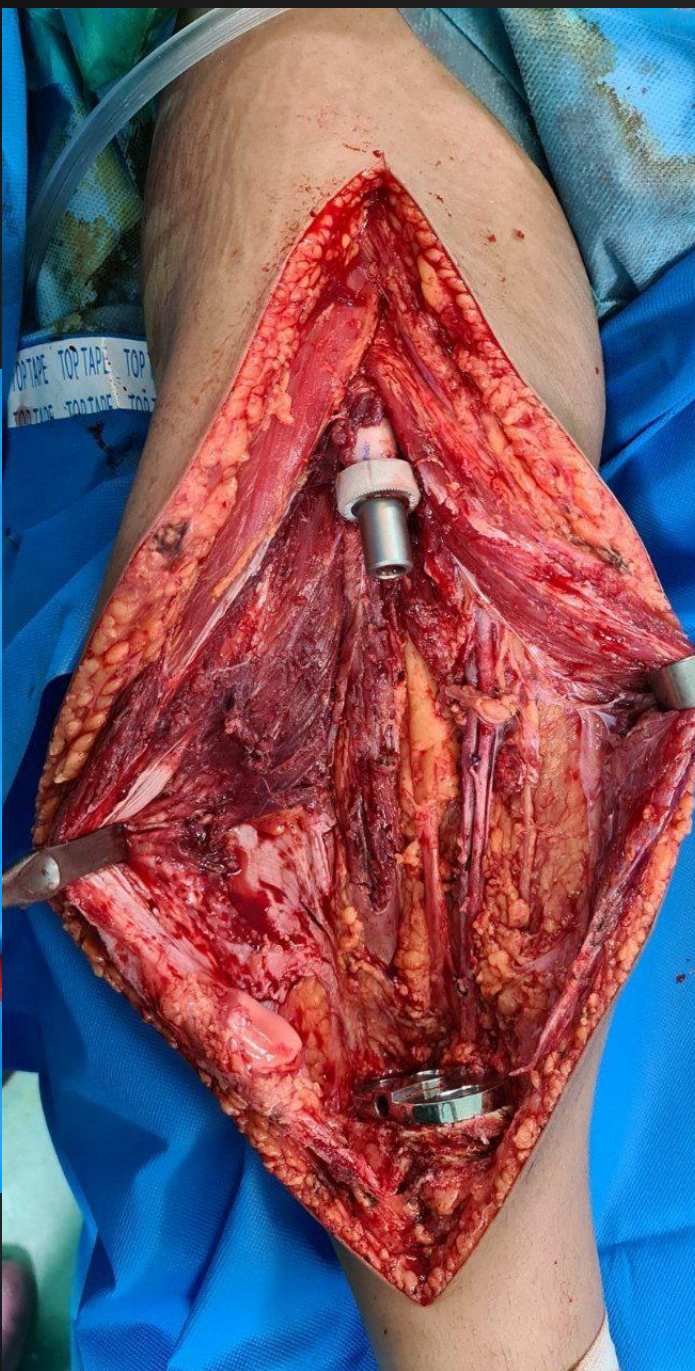
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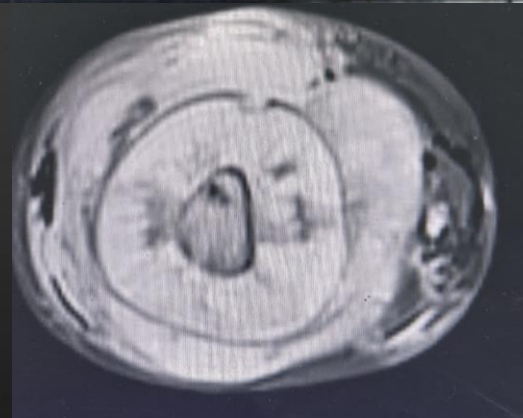
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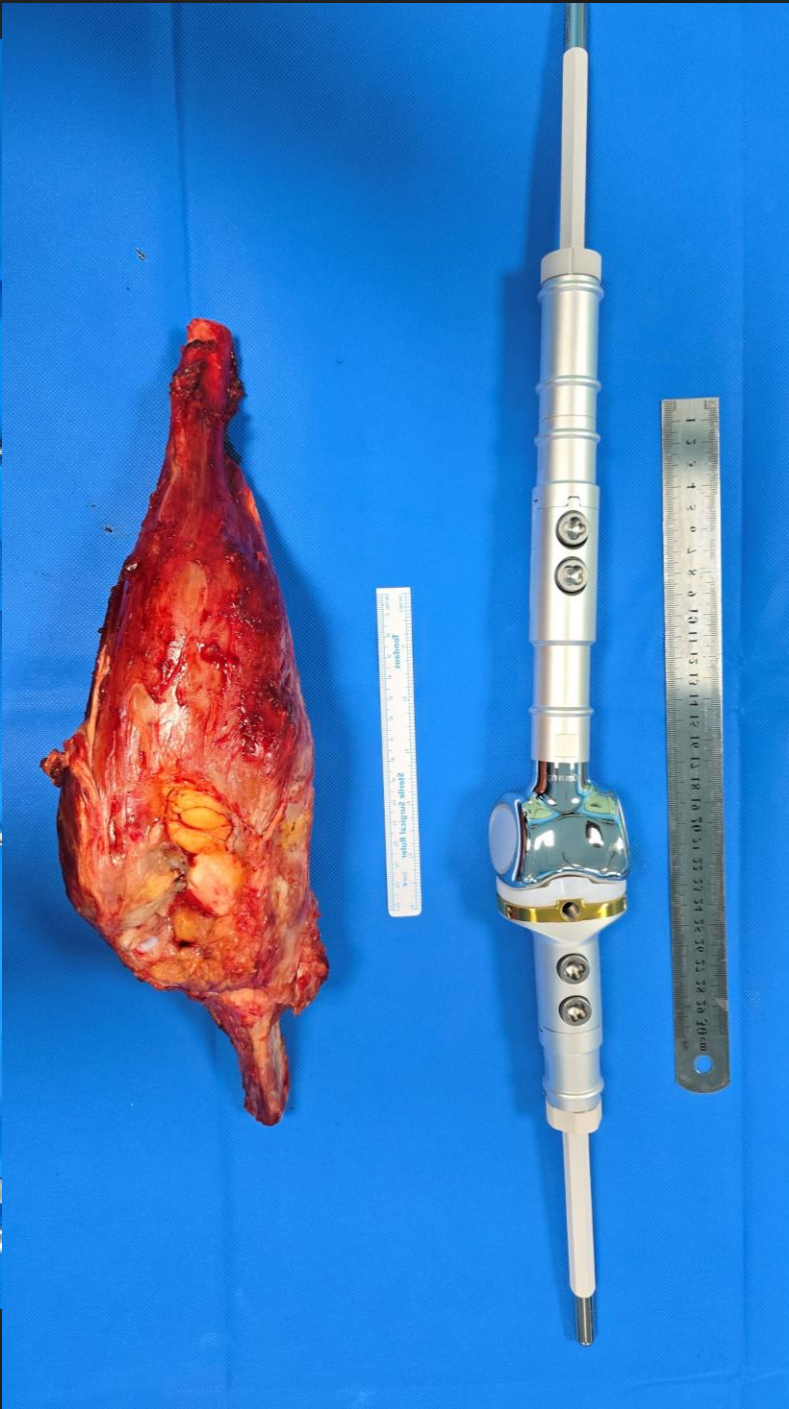
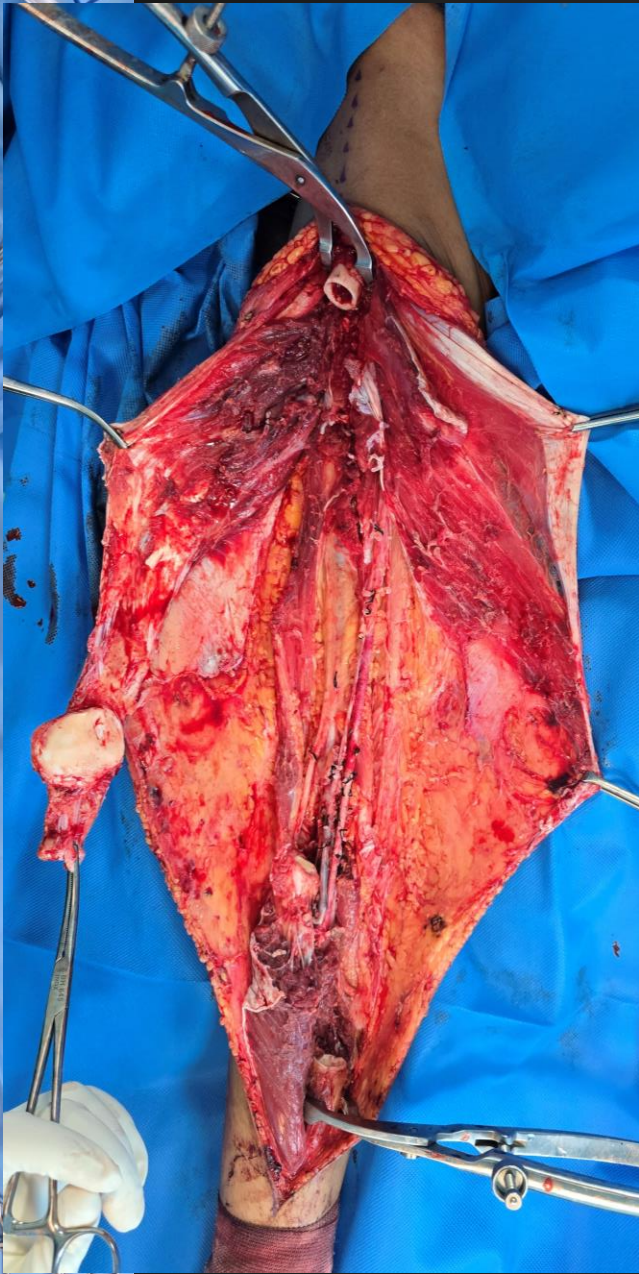




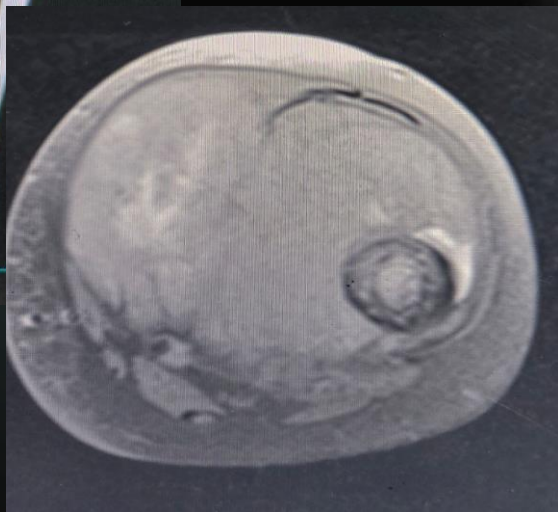




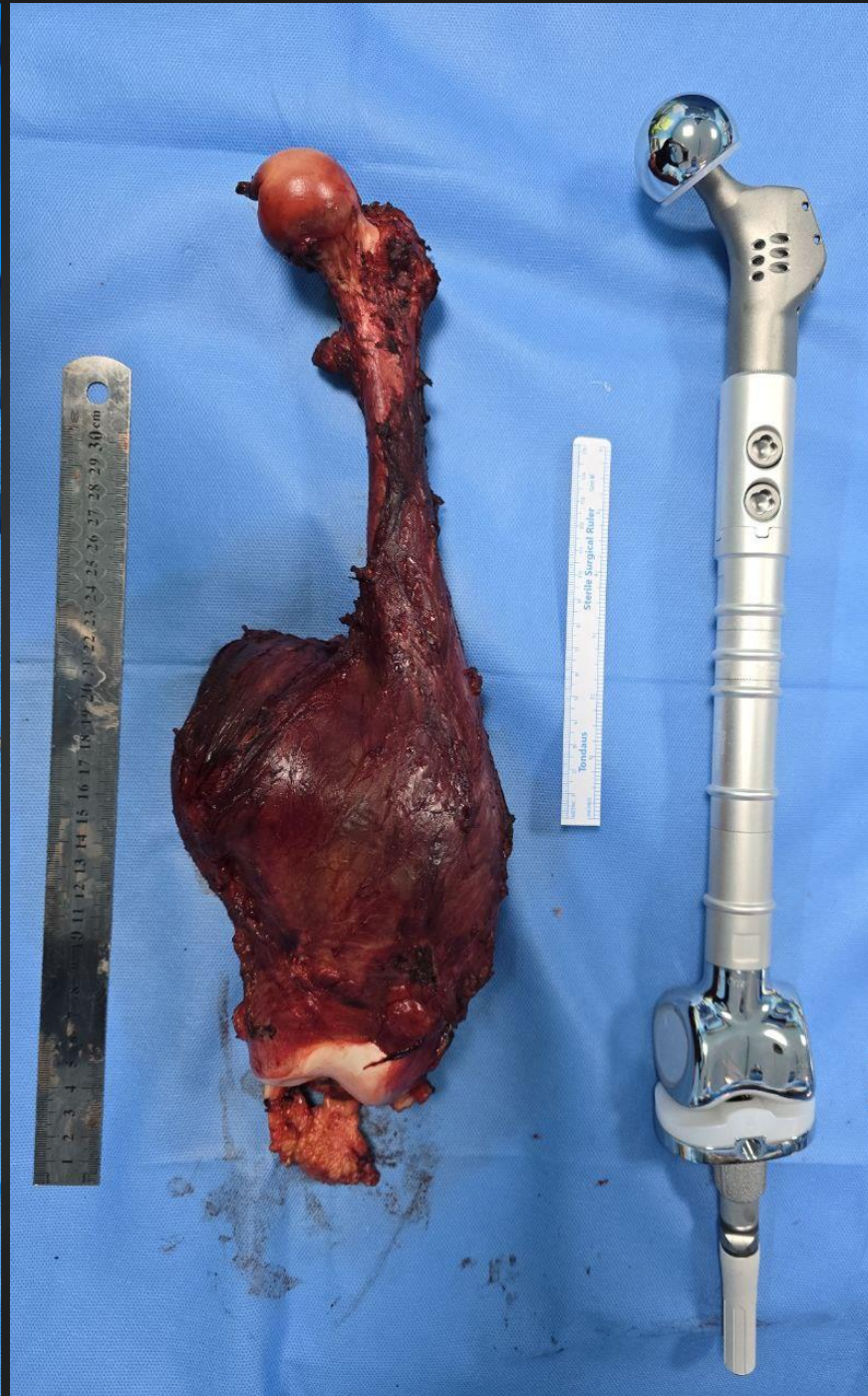




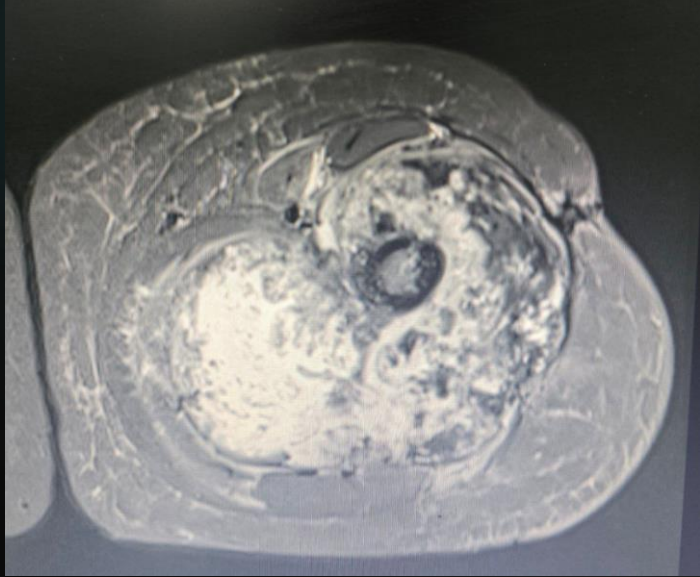
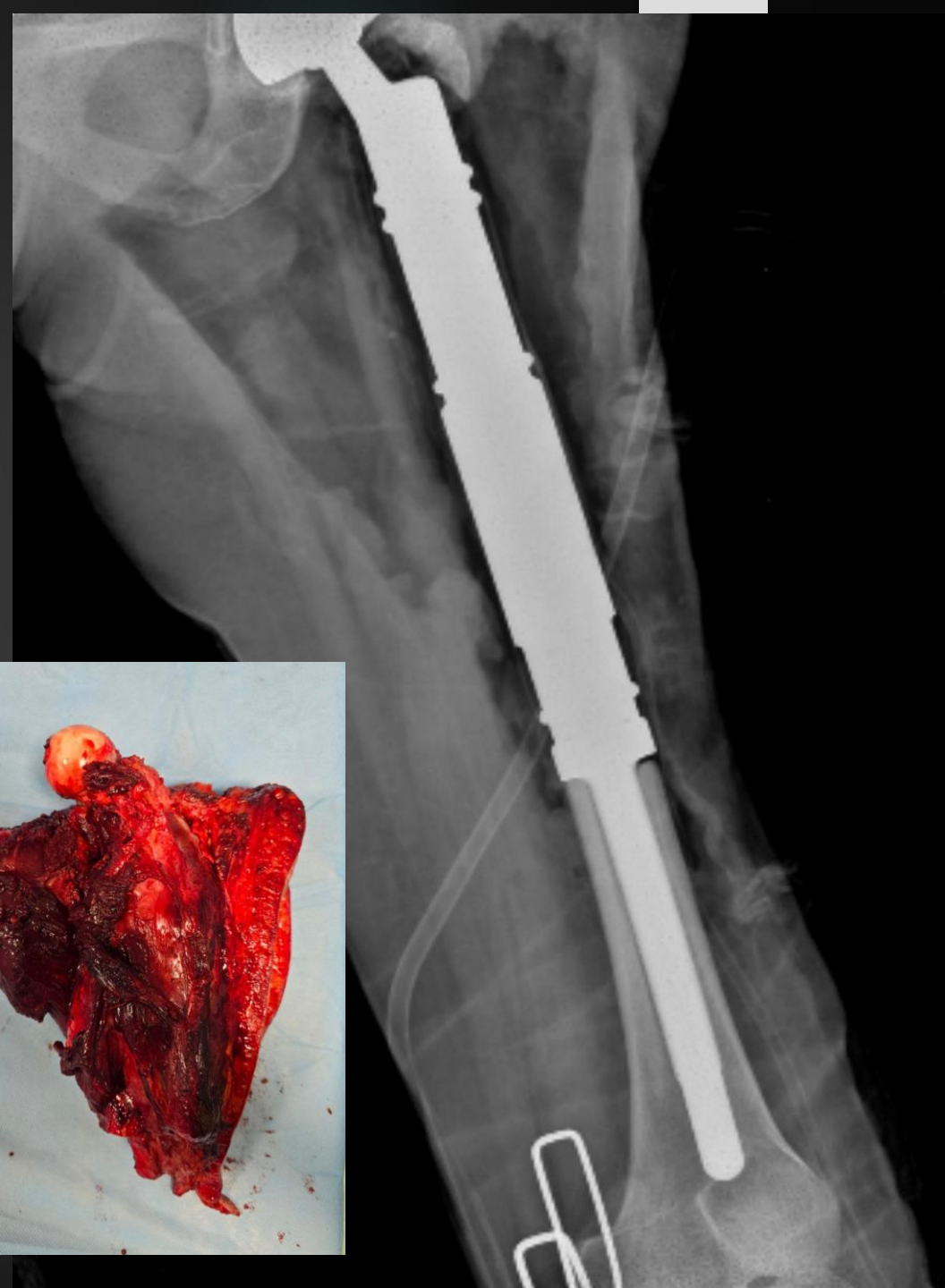














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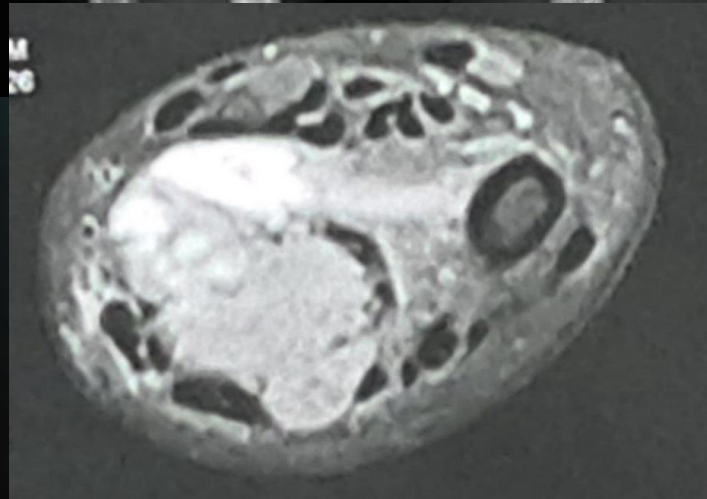
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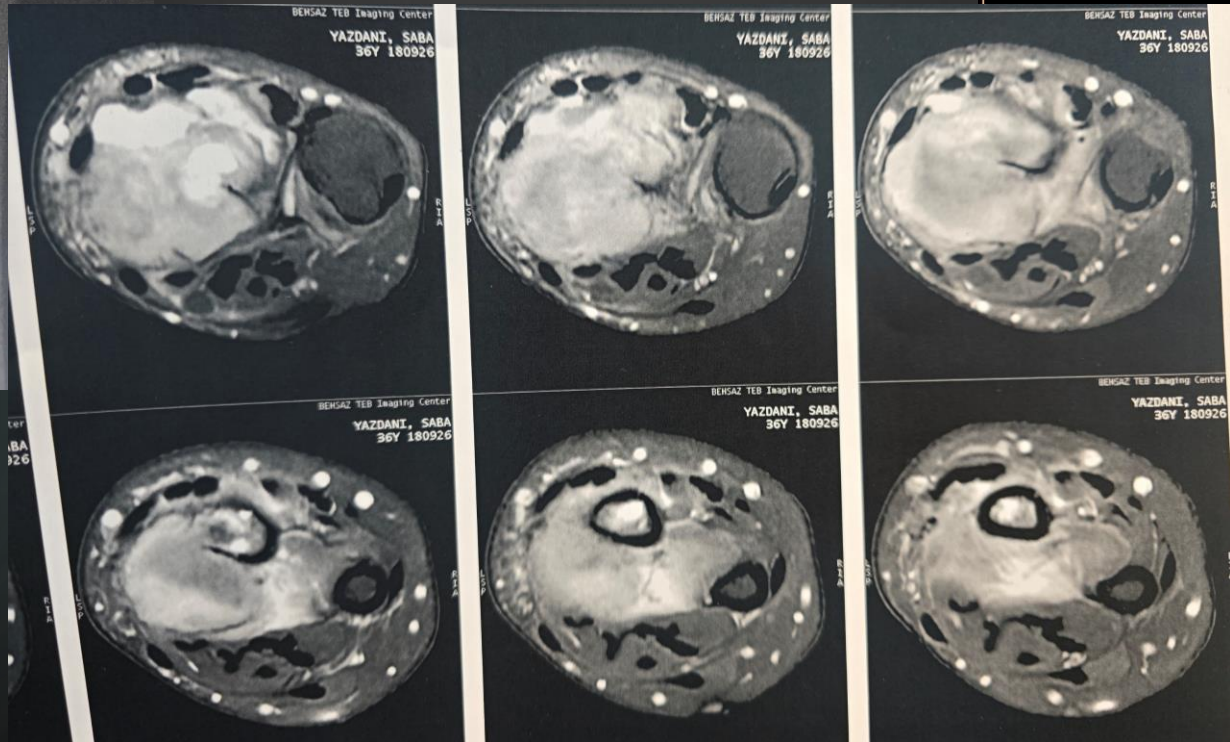
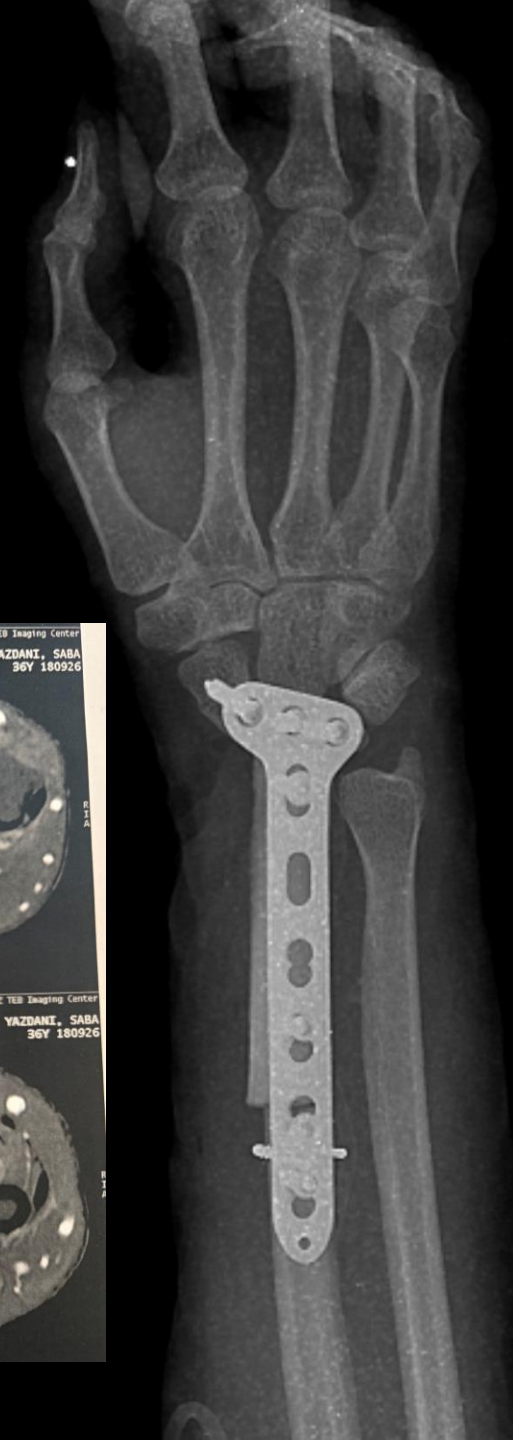
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Z: 0.39



















به فلک برا چو عیسی، ارنی بگو چو موسی  
که خدا تو را نگوید، که خموش لن ترانی  
ارنی کسی بگوید، که تو را ندیده باشد  
تو که با منی همیشه، چه تری چه لن ترانی

