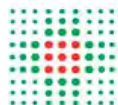


The background image is a photograph of a grand, historic library. It features high ceilings with intricate frescoes and sculptures. The walls are lined with tall, dark wood bookshelves filled with books. In the foreground, there is a wooden reading desk with a large, open book resting on it. A large, ornate globe sits on a stand to the right of the desk. The room is lit by several lamps, creating a warm and scholarly atmosphere.

Concentrato e gel piastrinico: Indicazioni in ortopedia

D. Dallari
Chirurgia Ortopedica conservativa e Tecniche Innovative
Istituto Ortopedico Rizzoli
Bologna



**SERVIZIO SANITARIO REGIONALE
EMILIA-ROMAGNA**
Istituti Ortopedici Rizzoli di Bologna
Istituto di ricovero e cura a carattere scientifico

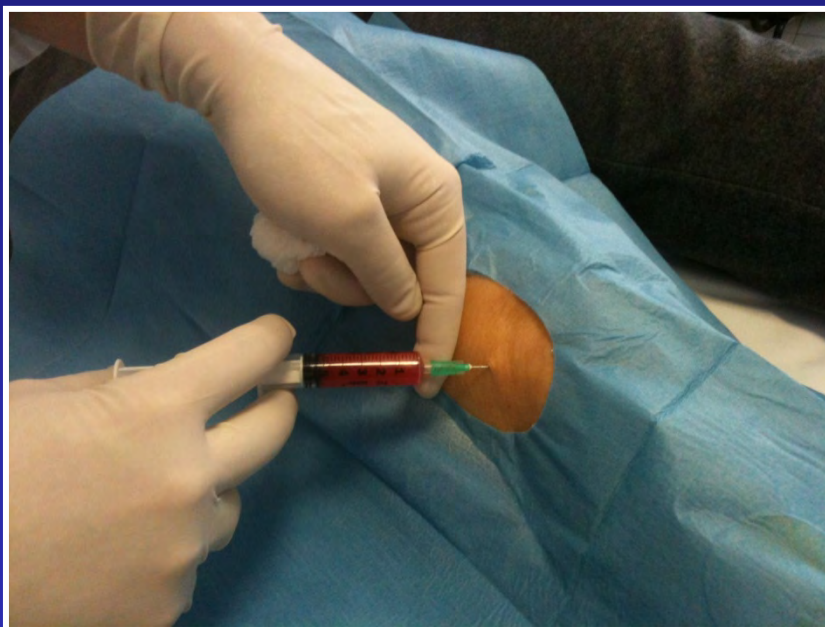
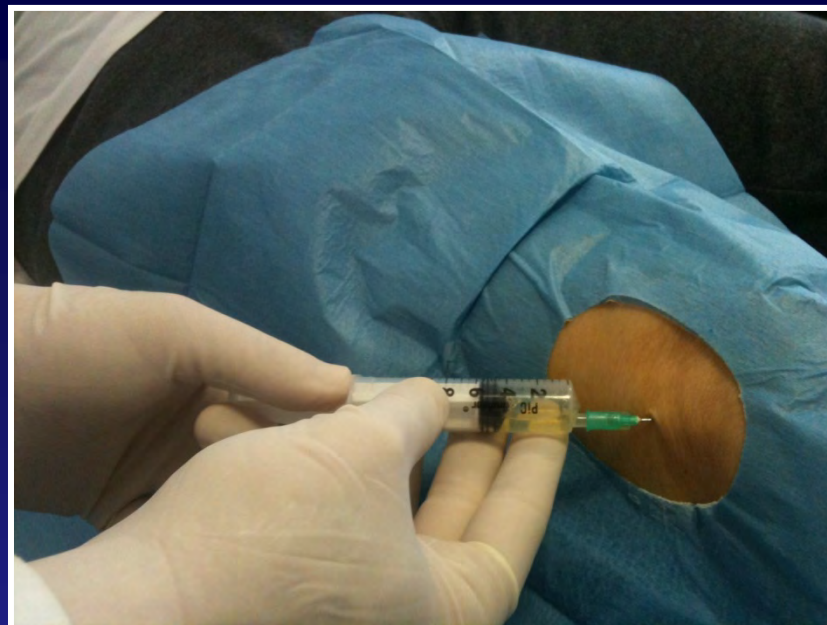


Applicazioni Cliniche

- Infiltrazioni intra-articolari per il trattamento delle condropatie e delle artrosi di II grado (anca, ginocchio e caviglia)
- Trattamento delle pseudoartrosi e ritardi di consolidazione, sia in modalità “open” sia come infiltrazione ecoguidata
- Lesioni Osteocondrali
- Osteonecrosi
- Tendinopatie, acute e croniche
- Lesioni tendinee

TERAPIA INFILTRATIVA INTRA-ARTICOLARE GINOCCHIO

- Dal 2009 trattiamo i pazienti afferenti al protocollo infiltrativo mediante 5 infiltrazioni, le prime 3 a distanza settimanale, le ultime 2 a distanza mensile
- Attualmente trattati oltre 200 pazienti
- Valutazione clinica: Womac score, Vas score, Knee Society score prima del trattamento e dopo, a distanza di 2, 6 e 12 mesi dall'ultima infiltrazione
- Miglioramento clinico soggettivo in oltre l' 85% dei pazienti e obiettivo superiore al 78%



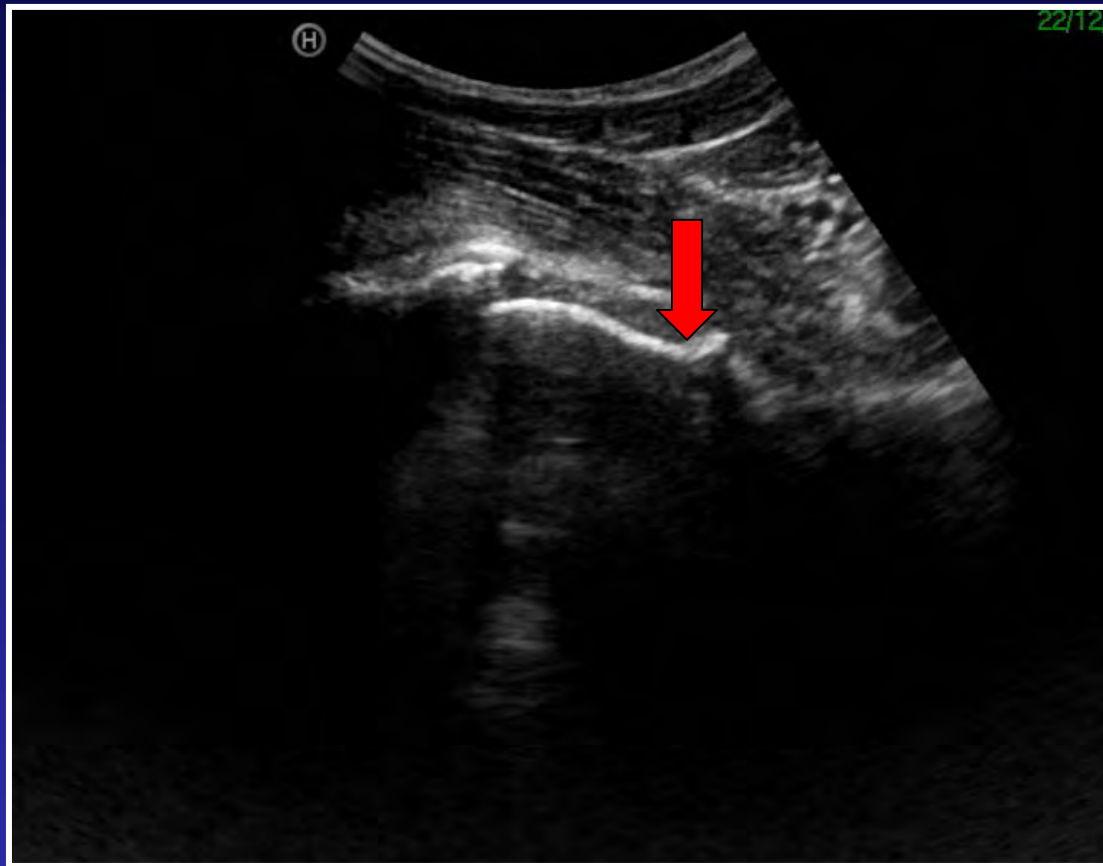
Prelievo del gel piastrinico
dalla sacca dell'aliquota
scongelata, esecuzione
dell'artrocentesi e
infiltrazione

TERAPIA INFILTRATIVA INTRA-ARTICOLARE

ANCA

- Dal 2010 trattiamo i pazienti afferenti a tale protocollo mediante 3 infiltrazioni a distanza settimanale eseguite sotto controllo ecografico;
- Attualmente trattati oltre 100 pazienti
- Valutazione clinica: Womac score, Vas Score ed Harris Hip Score prima del trattamento e dopo il trattamento, a 2, 6 e 12 mesi dall'ultima infiltrazione
- Miglioramento clinico soggettivo in oltre l' 88% dei pazienti e obiettivo superiore al 86%

Infiltrazione ecoguidata all'anca



TRATTAMENTO DELLE TENDINOPATIE

Gli studi in vitro hanno dimostrato che il PRP può aumentare la proliferazione delle cellule umane stromali e mesenchimali.

Lucarelli E, Beccheroni A, Donati D, et al. Platelet-derived growth factors enhance proliferation of human stromal stem cells. Biomaterials 2003;24(18):3095–100.

il PRP inibisce la proliferazione macrofagica e la produzione dell' IL-1 entro le 72 ore dall'infiltrazione. Questa differente azione sulle cellule ha un importante ruolo nel meccanismo di guarigione di tendini e muscoli.

Kawamura S, Ying L, Kim HJ, et al. Macrophages accumulate in the early phase of tendon-bone healing. J Orthop Res 2005;23(6):1425–32

Atleti con lesione del tendine di Achille guarissero in meno tempo una volta sottoposti a tenoraffia se anche sottoposti a trattamento con gel piastrinico.

Anitua E, Sanchez M, Nurden AT, et al. Reciprocal actions of platelet-secreted TGF-beta1 on the production of VEGF and HGF by human tendon cells. Plast Reconstr Surg 2007;119:950–9



Trattamento infiltrativo per
tendinosi cronica del gomito.



Trattamento infiltrativo per
tendinopatia cronica del
tendine di Achille.

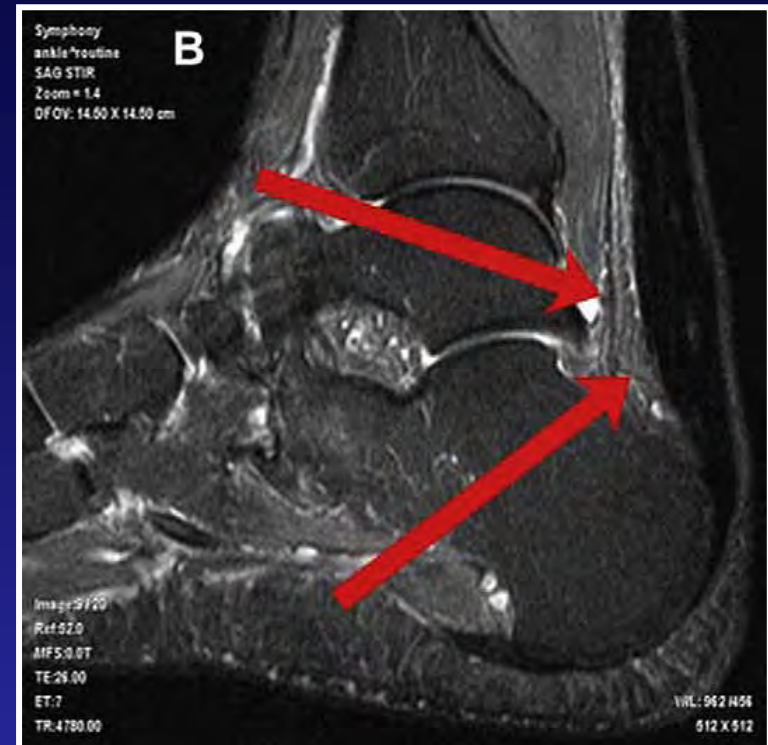
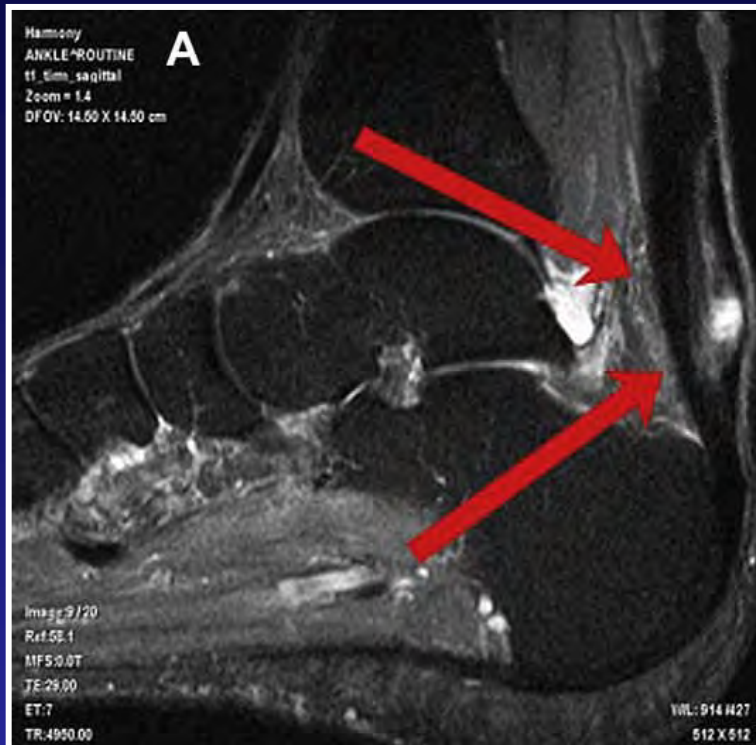


Immagine RM del tendine di Achille prima e dopo il trattamento con PRP:

Nella prima immagine si apprezza una lesione parziale del tendine, nella seconda, a 4 mesi dal trattamento, si apprezza la guarigione pressochè completa.

Opening of
Rizzoli Orthopedic Institute
28th June 1896

APPLICAZIONI CLINICHE



Platelet gel

Peripheral blood



Growth factors

*PDGF, TGF- β , PDEGF,
PDAF, IGF-1*

*Osteo/chondrogenetic and Angiogenetic
properties*

<i>GF</i>	<i>SOURCE CELL</i>	<i>TARGET</i>	<i>ACTION</i>
PDGF	Platelets, macrophages, monocytes, endothelial cell	Fibroblasts, macrophages, smooth muscle, glial cell	Chemotaxis/mitogenesis in fibroblast/glial/smooth muscle cell; chemotaxis macrophages; regulates collagen synthesis
TGF-β	Platelets, macrophages, monocytes, T-lymphocytes, neutrophils	Fibroblasts, marrow stem cells, endothelial cells, epithelial cells, preosteoblasts	Stimulates/inhibits endothelial, fibroblastic, osteoblastic mitogenesis; regulates collagen synthesis and mitogenic effects of other GF; angiogenesis
PDEGF	Platelets, macrophages, monocytes	Fibroblasts, endothelial cells, epithelial cells	Stimulates endothelial chemotaxis, angiogenesis; stimulates mesenchymal mitogenesis
PDAF	Platelets, endothelial cells	Fibroblasts, endothelial cells	Angiogenesis; increases vessel permeability and endothelial cell mitogenesis
IGF-1	Platelets, macrophages, monocytes, osteoblasts	Fibroblasts, osteoblasts, chondrocytes	Stimulates cartilage growth, bone matrix formation and replication of preosteoblasts and osteoblasts; in combination with PDGF enhances wound healing
PF-4	Platelets	Fibroblasts, neutrophils	Chemotaxis for neutrophils and fibroblasts

Autologous stromal cells

Medullary aspirate



Osteoprogenitor cells

+

Growth factors

*"... selection of an appropriate carrier is crucial...
... cancellous bone chips or DBM are
excellent carriers..."*

Gamradt SC, Clin Orthop 2003

Banca dell'Osso



Banca dell'osso

corticale

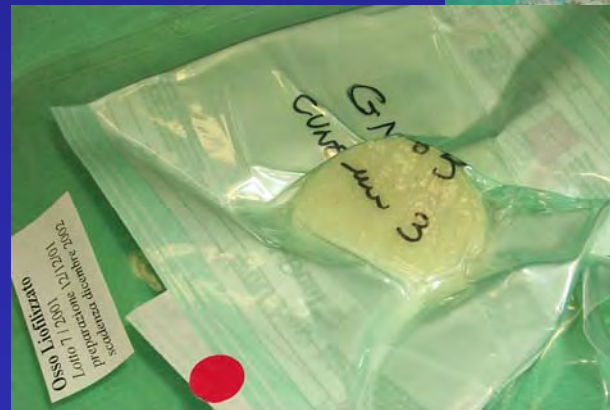
spongioso

osteocondrale

morcellizzato

liofilizzato

DBM



In vivo study on the healing of bone defects treated with bone marrow stromal cells, platelet rich plasma and freeze-dried bone allografts, alone and in combination

*D.Dallari, M.Fini, C.Stagni, P.Torricelli,
N.Nicoli Aldini, G.Giavaresi, E.Cenni,
A.Cenacchi, A.Bassi, R.Giardino,
PM.Fornasari, A.Giunti*

J. Orthop. Res. august 2005

THE JOURNAL OF BONE & JOINT SURGERY

JBJS

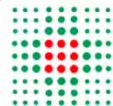
This is an enhanced PDF from The Journal of Bone and Joint Surgery
The PDF of the article you requested follows this cover page.

Enhanced Tibial Osteotomy Healing with Use of Bone Grafts Supplemented with Platelet Gel or Platelet Gel and Bone Marrow Stromal Cells

D. Dallari, L. Savarino, C. Stagni, E. Cenni, A. Cenacchi, P.M. Fornasari, U. Albisinni, E. Rimondi, N. Baldini and
A. Giunti

J Bone Joint Surg Am. 2007;89:2413-2420. doi:10.2106/JBJS.F.01026

OSTEONECROSIS



SERVIZIO SANITARIO REGIONALE
EMILIA - ROMAGNA
Istituto Ortopedico Rizzoli di Bologna
Istituto di Ricovero e Cura a Carattere Scientifico









Harvest

Objectives

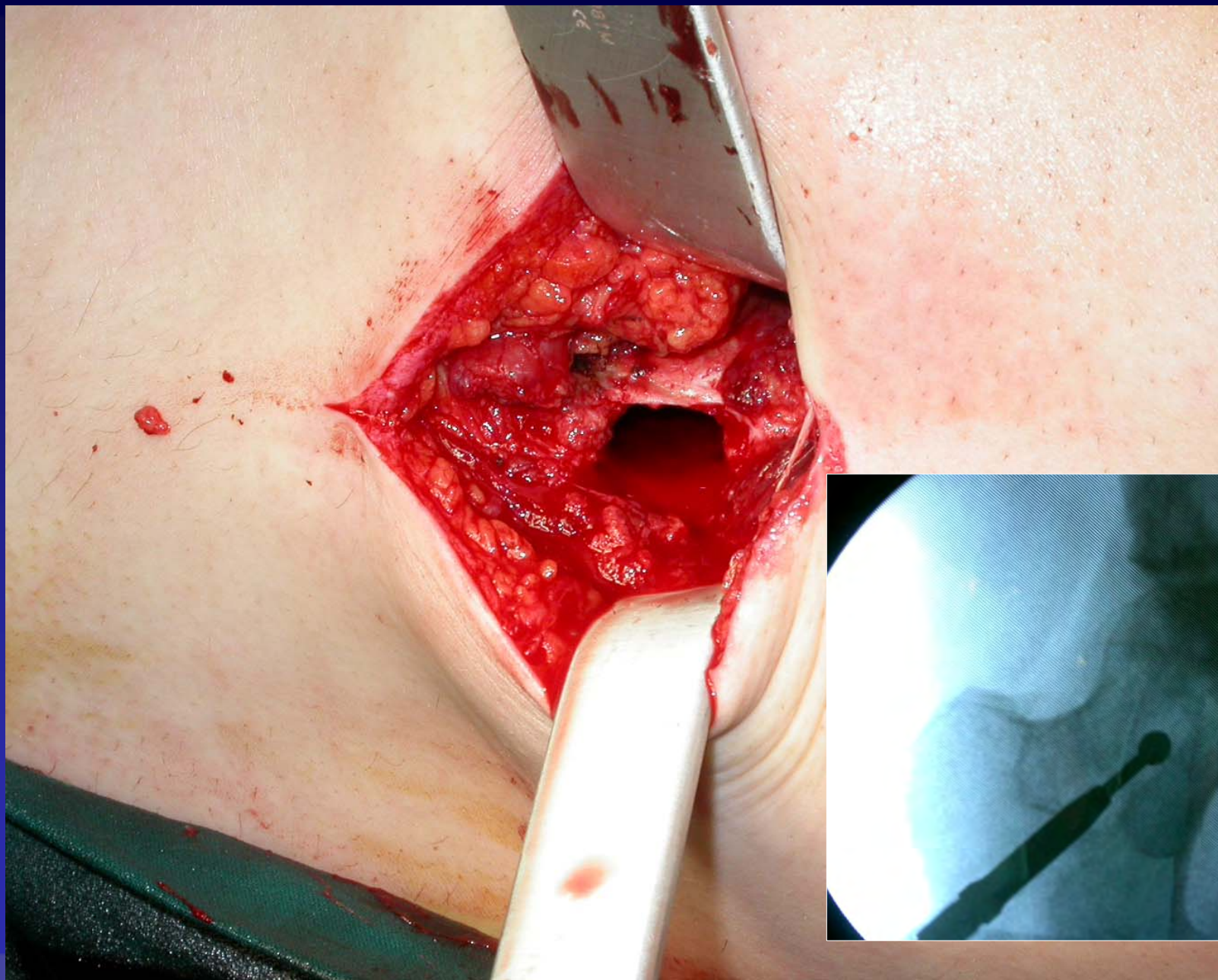
Stimulate revascularization

Stimulate bone regeneration

Avoid bone collapse

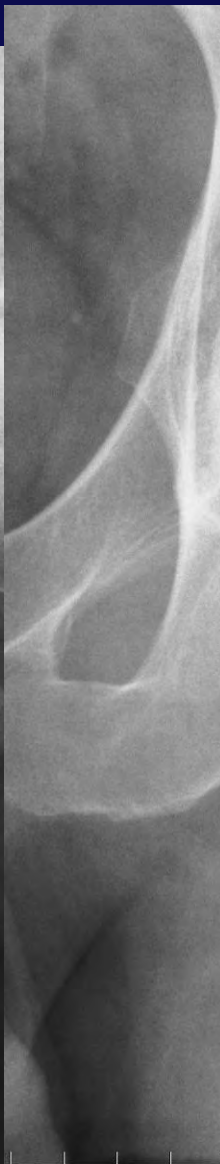
Osteonecrosis

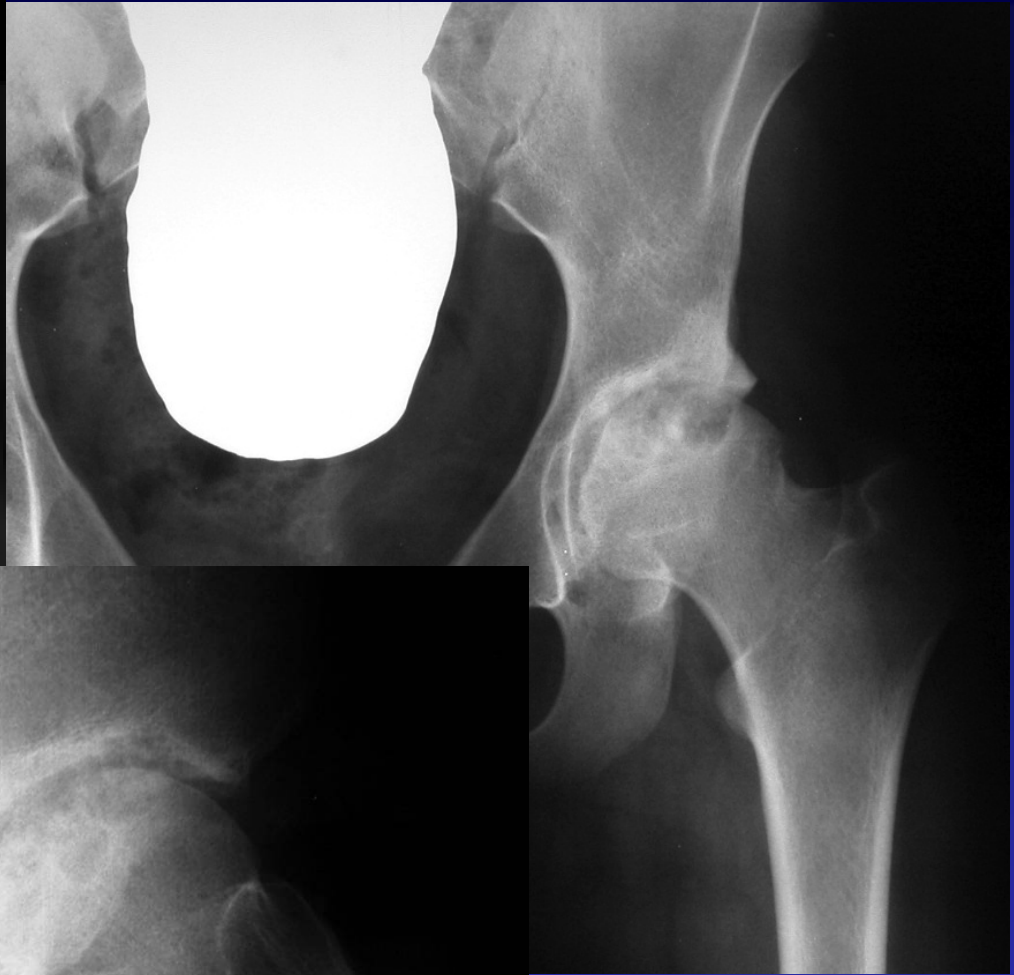
Early Stage



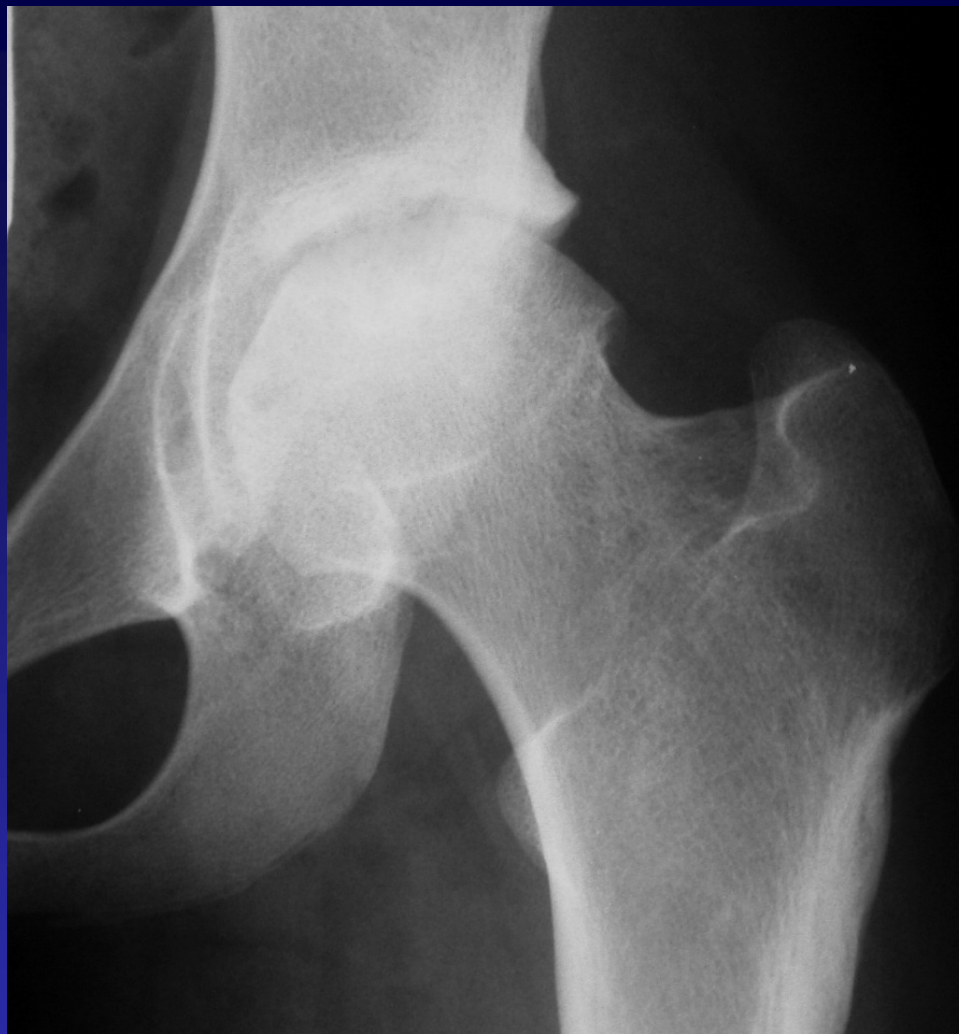


F.U. 1 y

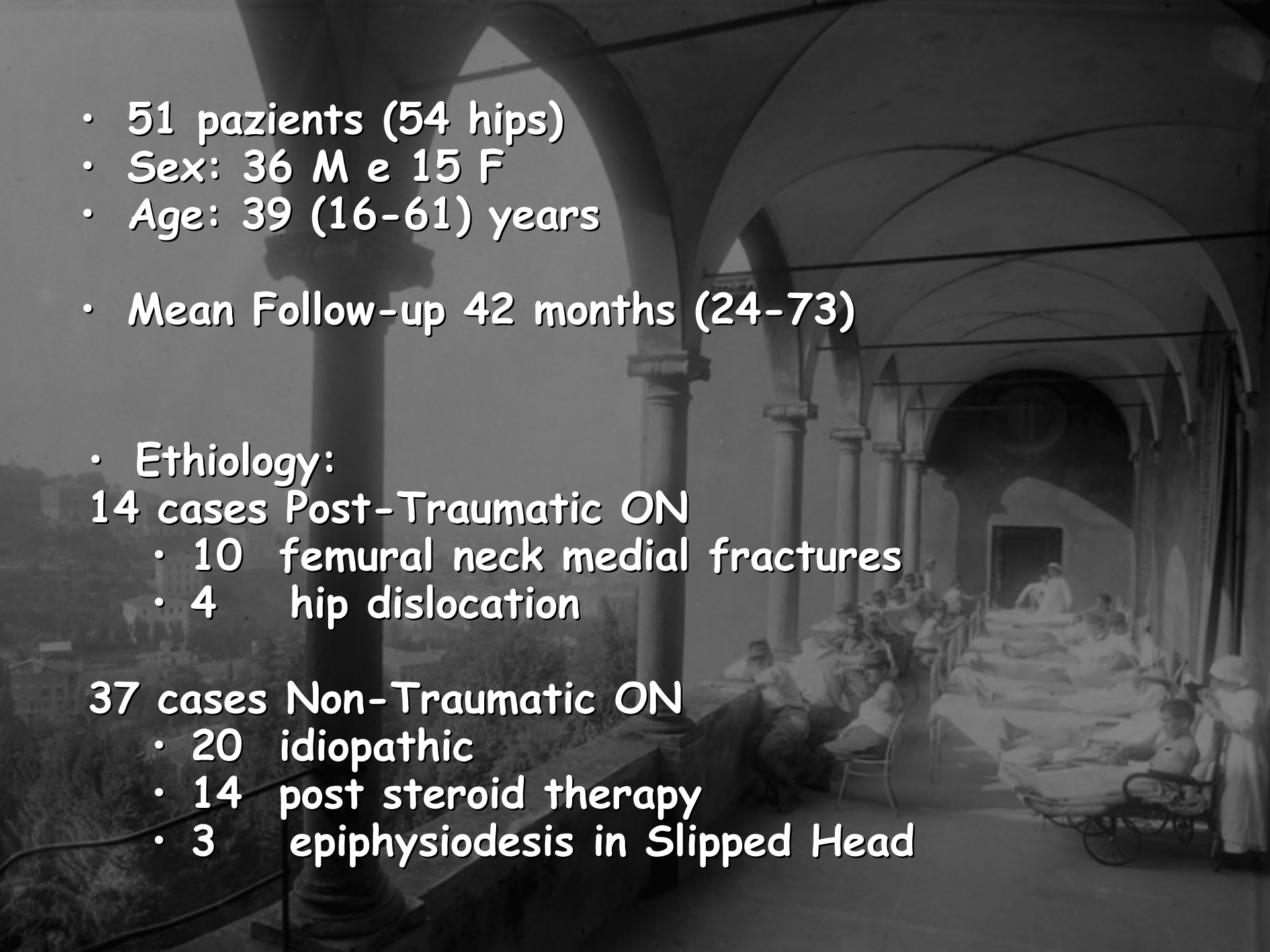




♀ 16 y

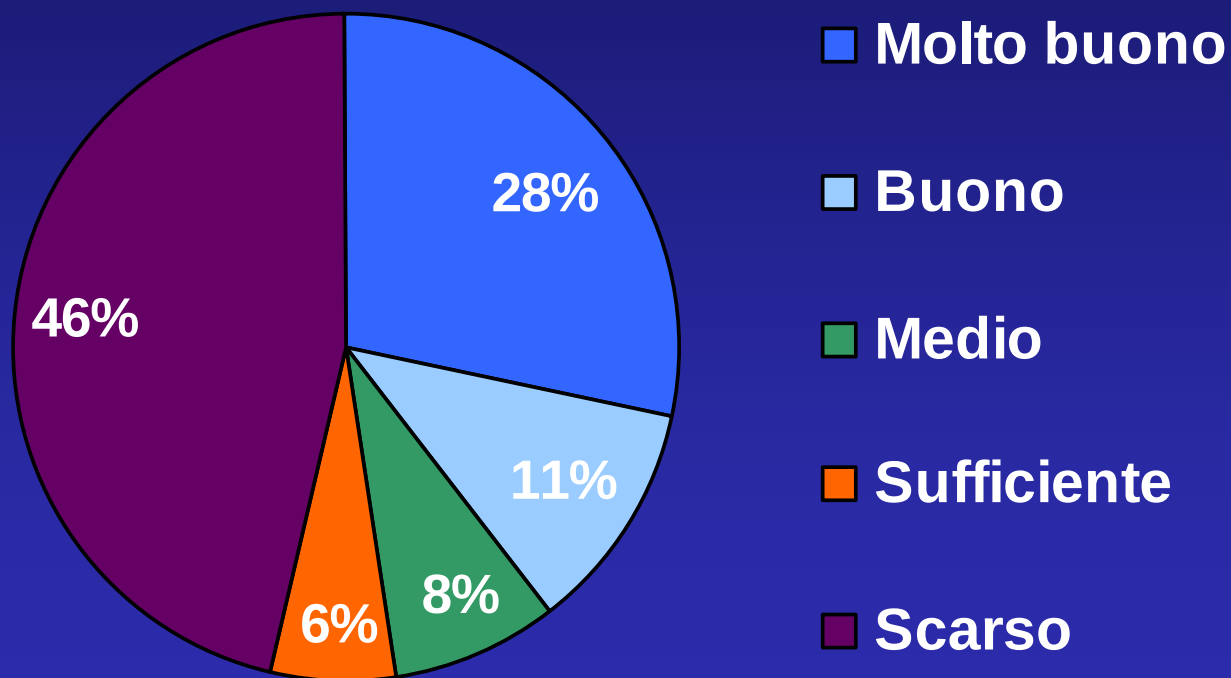


F.U. 36 mesi

- 
- 51 patients (54 hips)
 - Sex: 36 M e 15 F
 - Age: 39 (16-61) years
 - Mean Follow-up 42 months (24-73)
 - Etiology:
 - 14 cases Post-Traumatic ON
 - 10 femoral neck medial fractures
 - 4 hip dislocation
 - 37 cases Non-Traumatic ON
 - 20 idiopathic
 - 14 post steroid therapy
 - 3 epiphysiodesis in Slipped Head

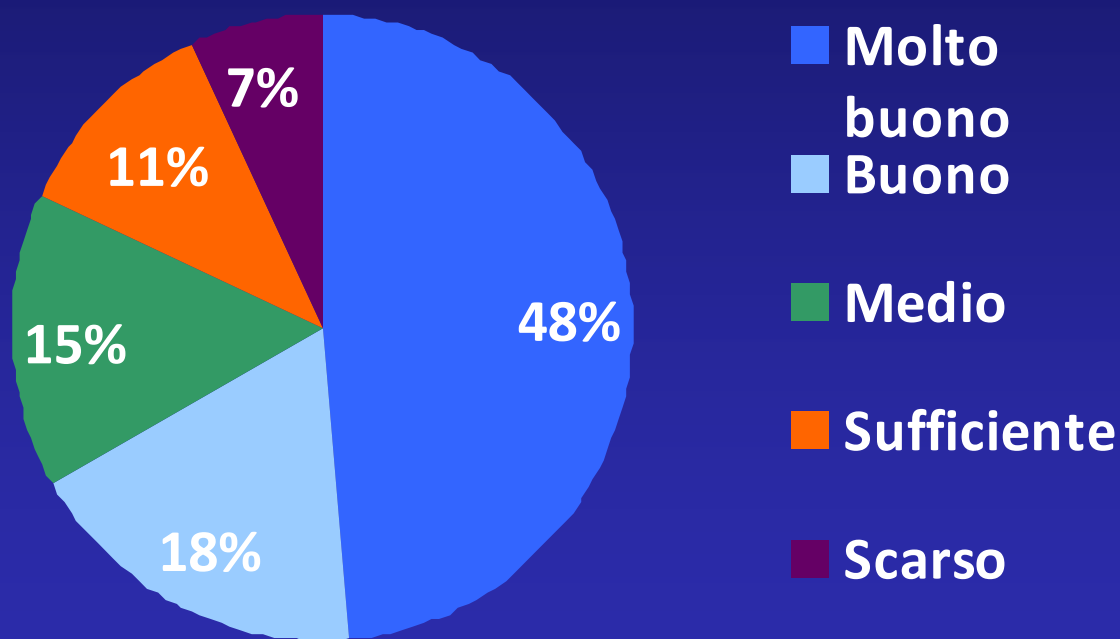
Clinical Results

Total patients



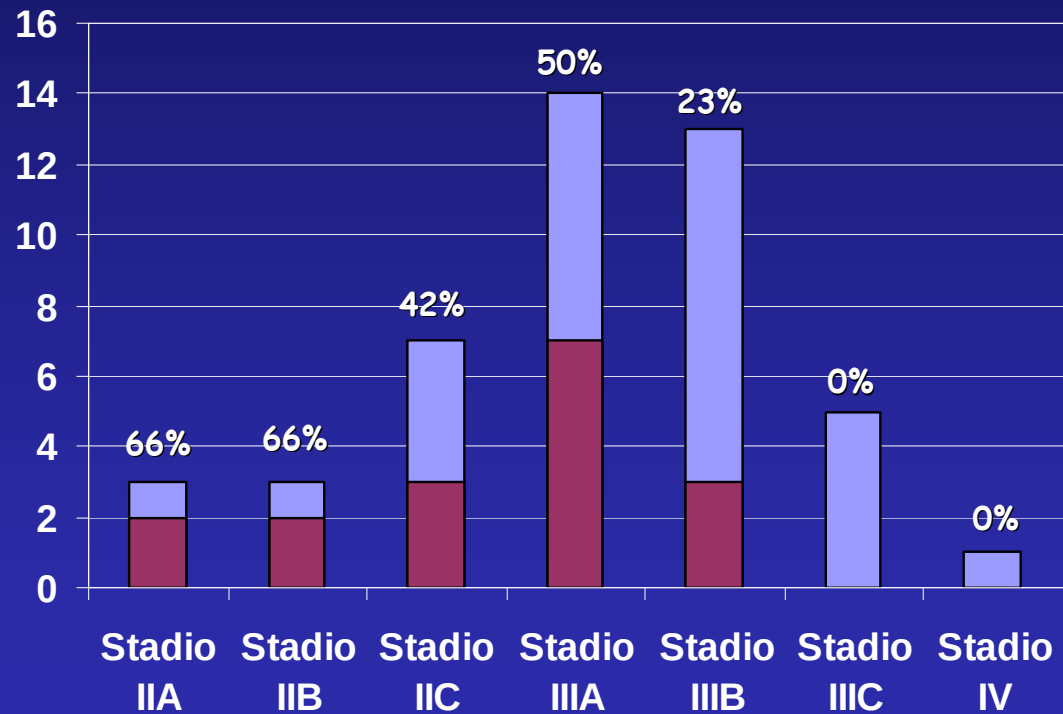
Clinical Results

Not-prosthesis patients



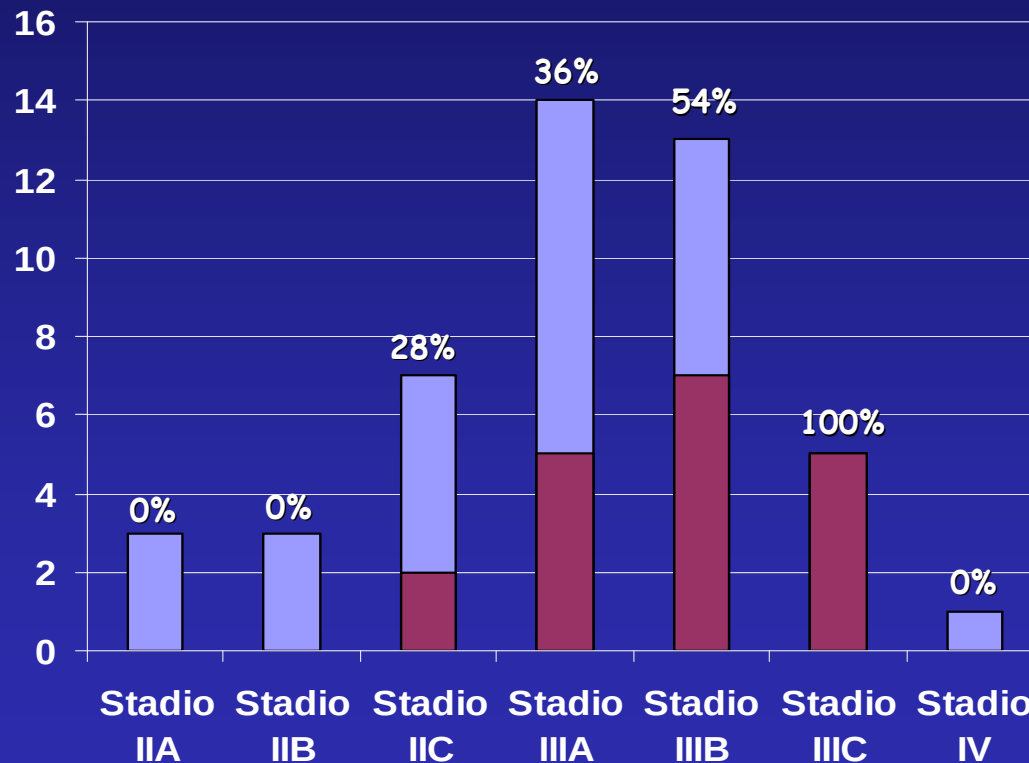
Clinical Results

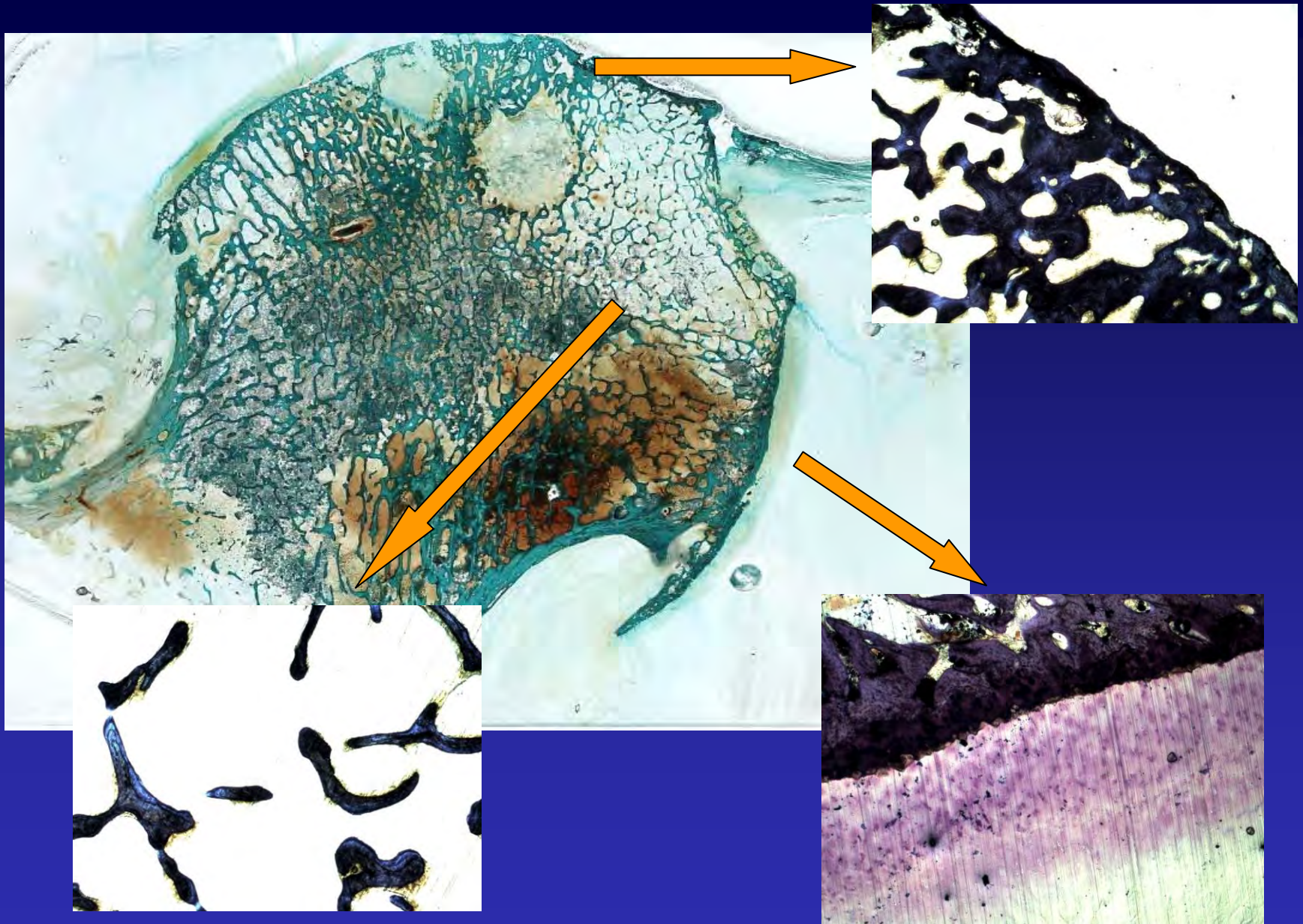
Total Patients



Clinical Results

19 failures (prosthesis)
(mean 26 months)





Osteonecrosis

Advanced Stage

Grade 3b-4 (ARCO)

ARTHROPLASTY



CONSERVATIVE SURGERY

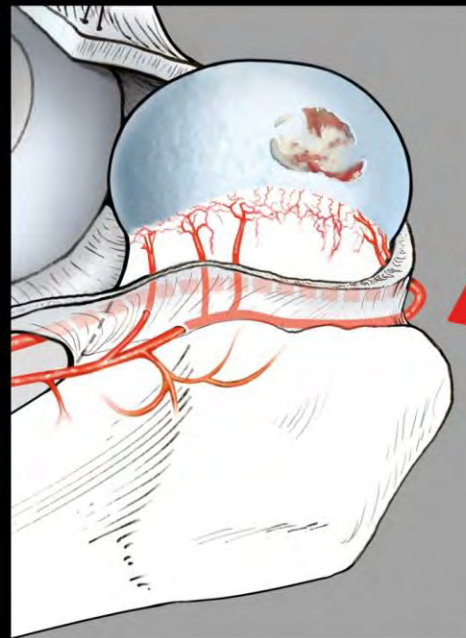
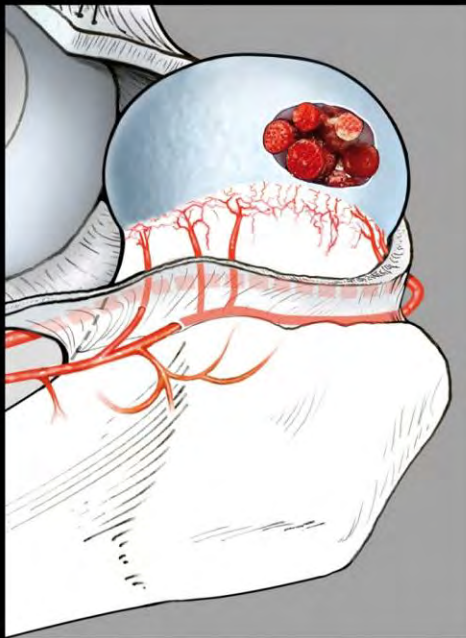
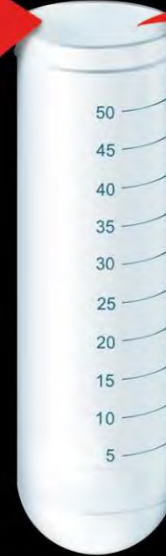
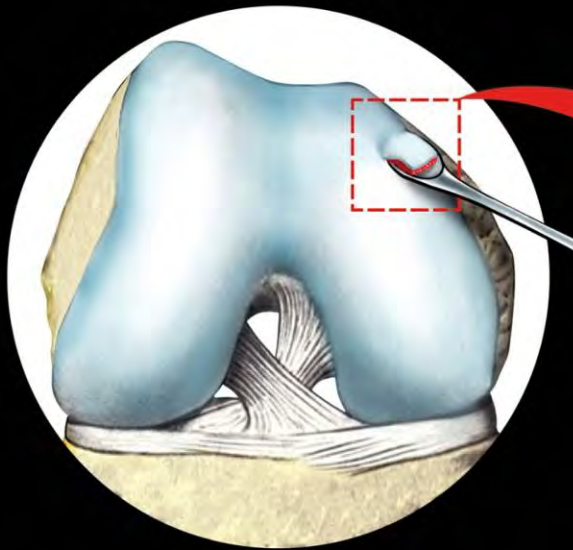


Objectives

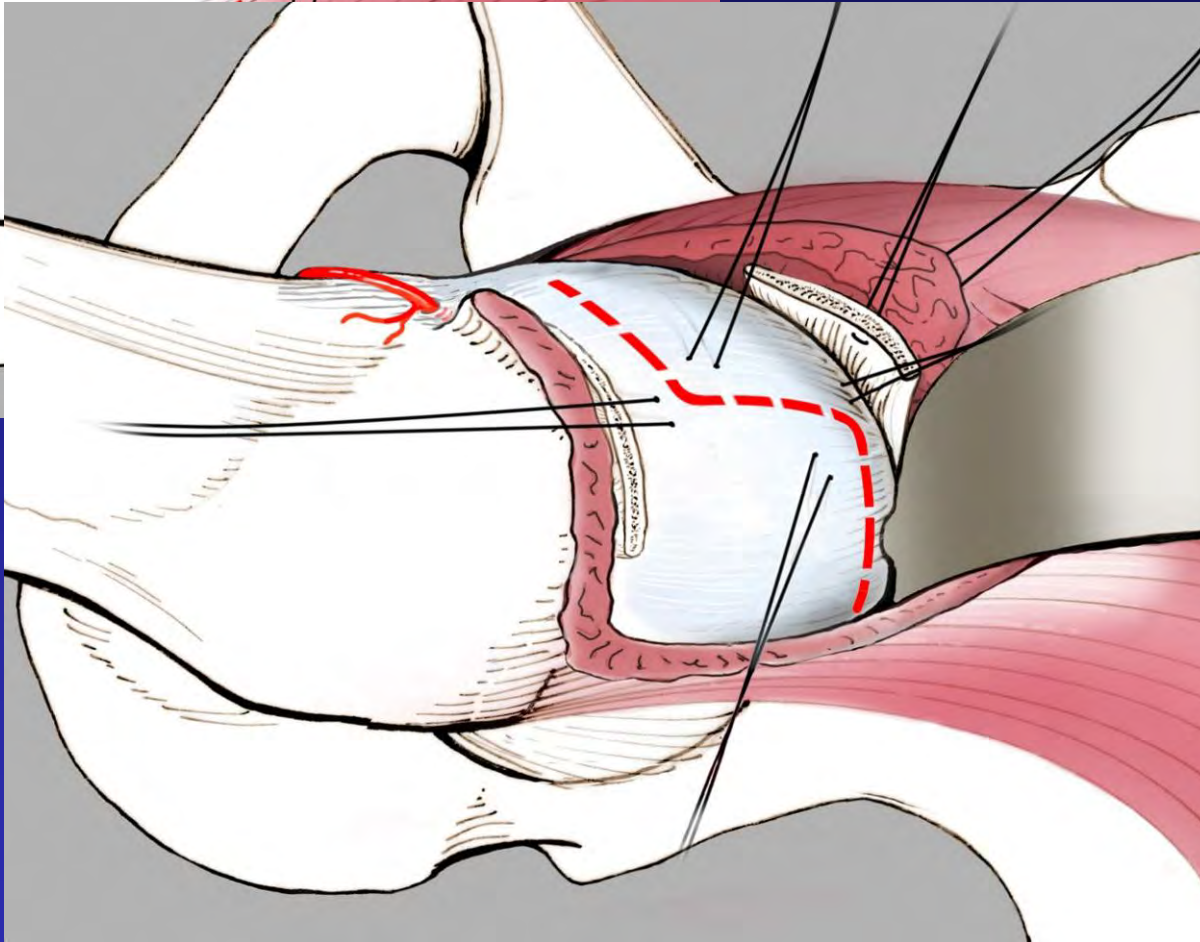
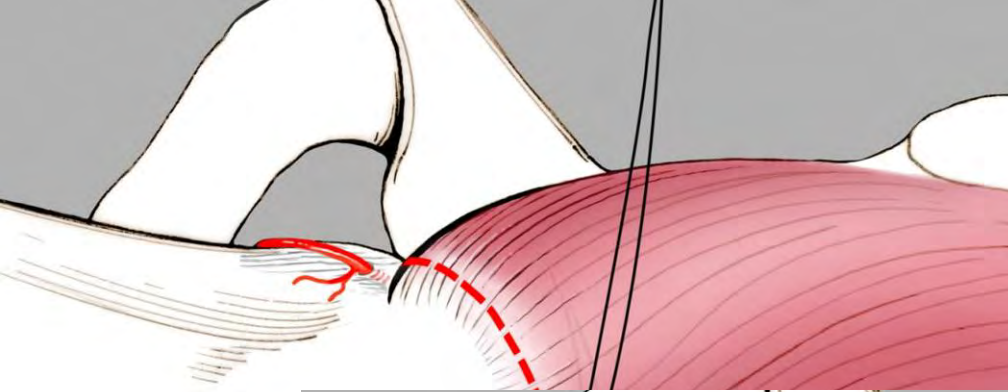
Stimulate revascularization

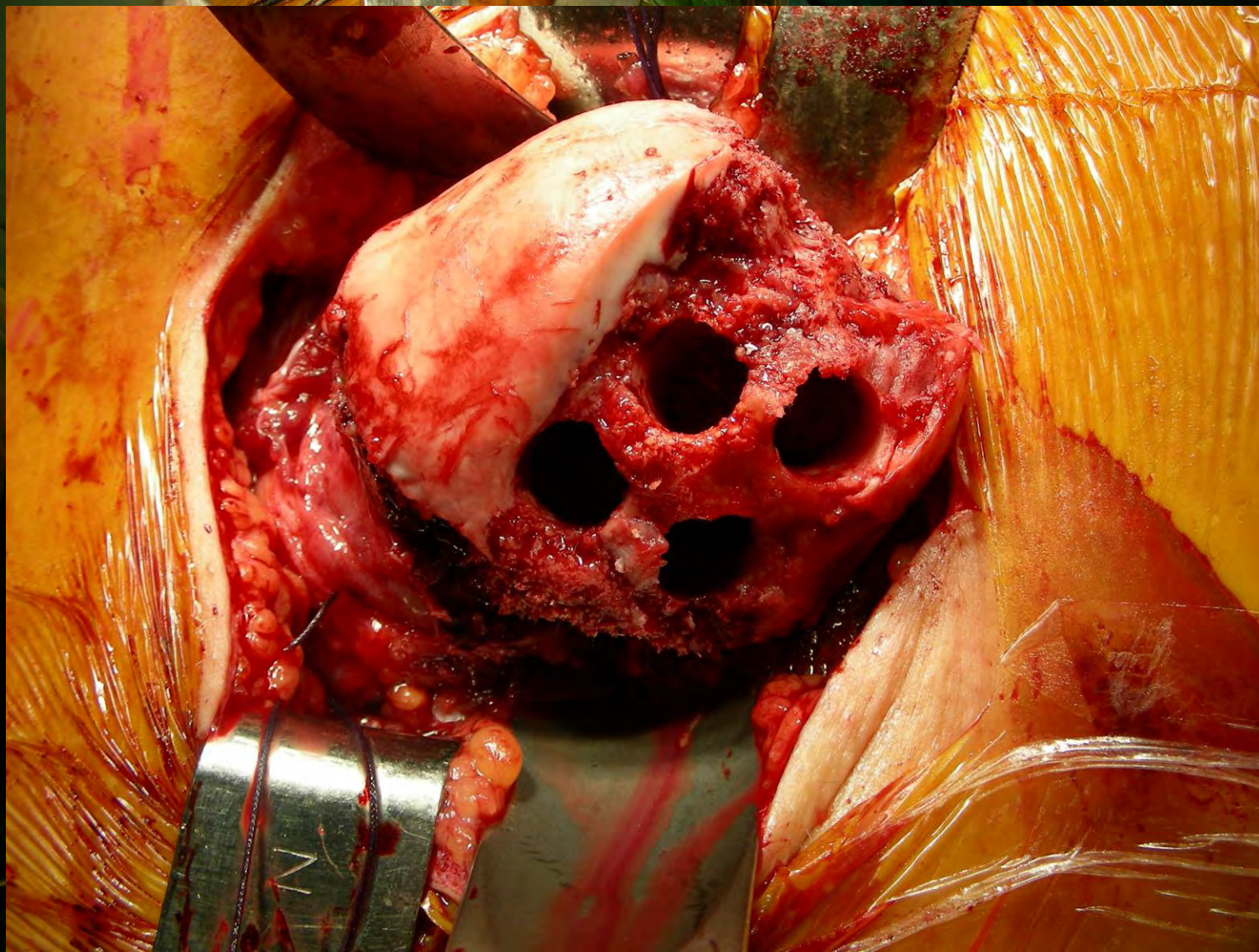
Stimulate bone regeneration

Avoid bone collapse

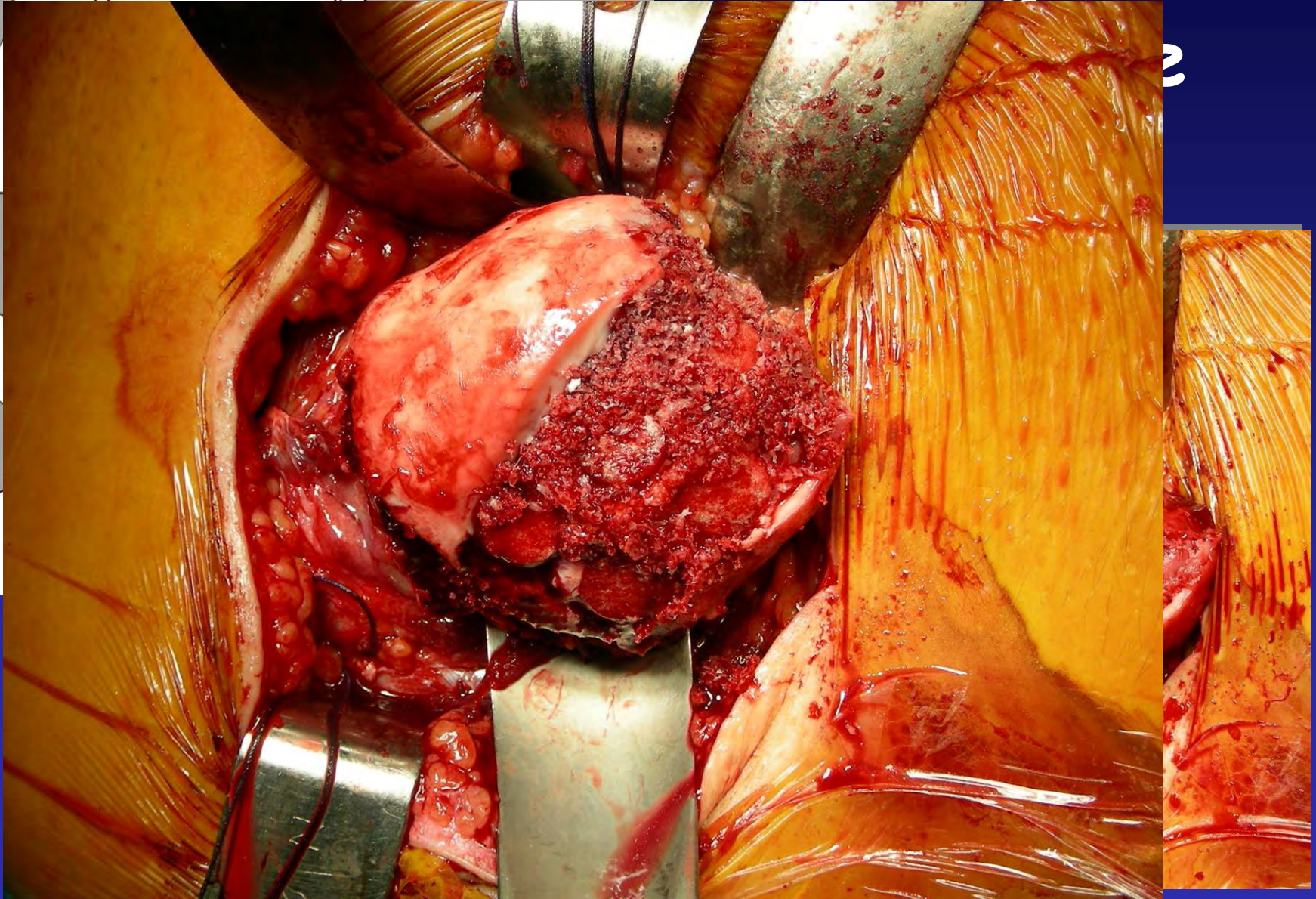


Surgical Technique

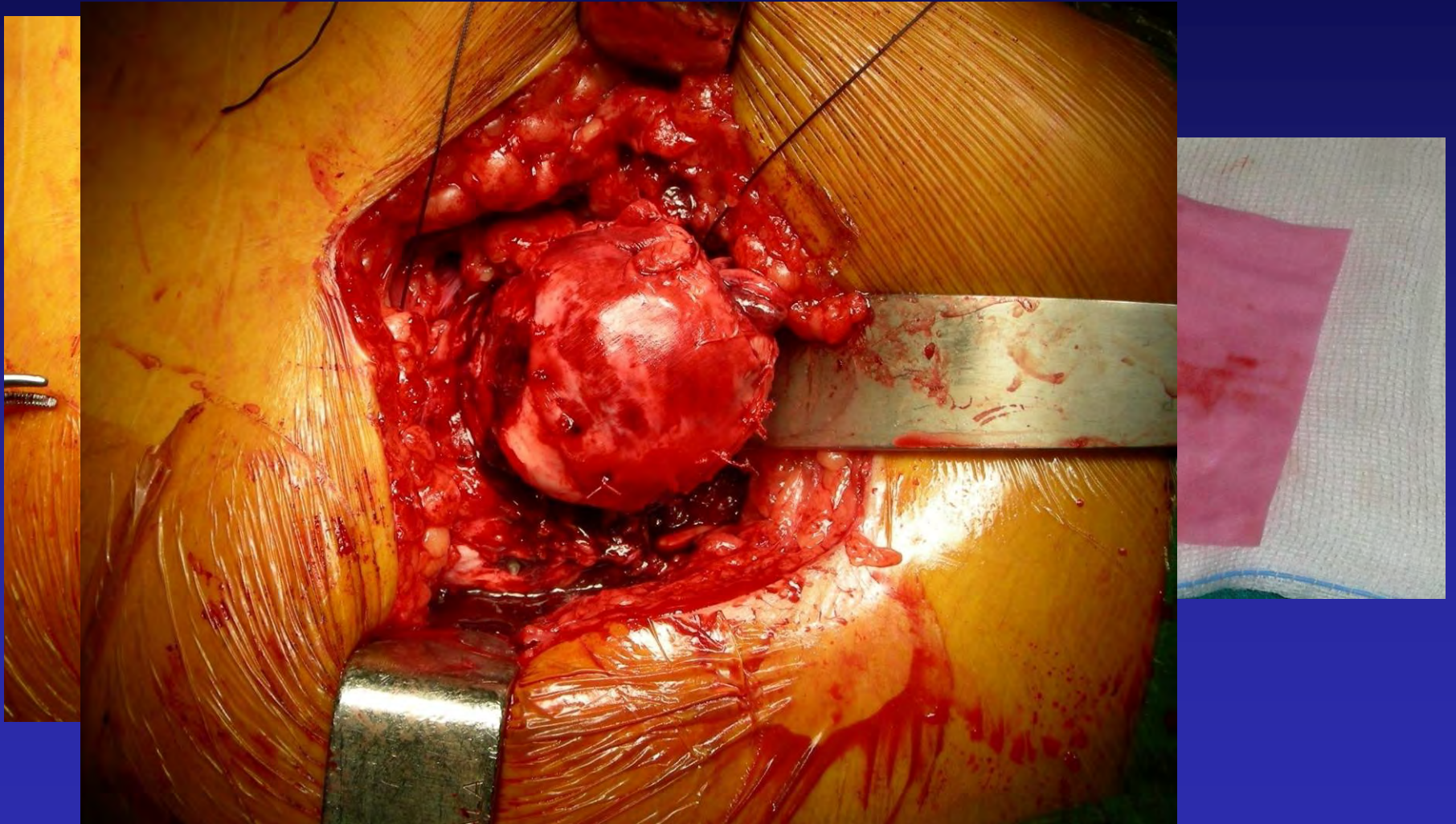




Surgical



Surgical Technique





♀ 29 y



24/4219.1

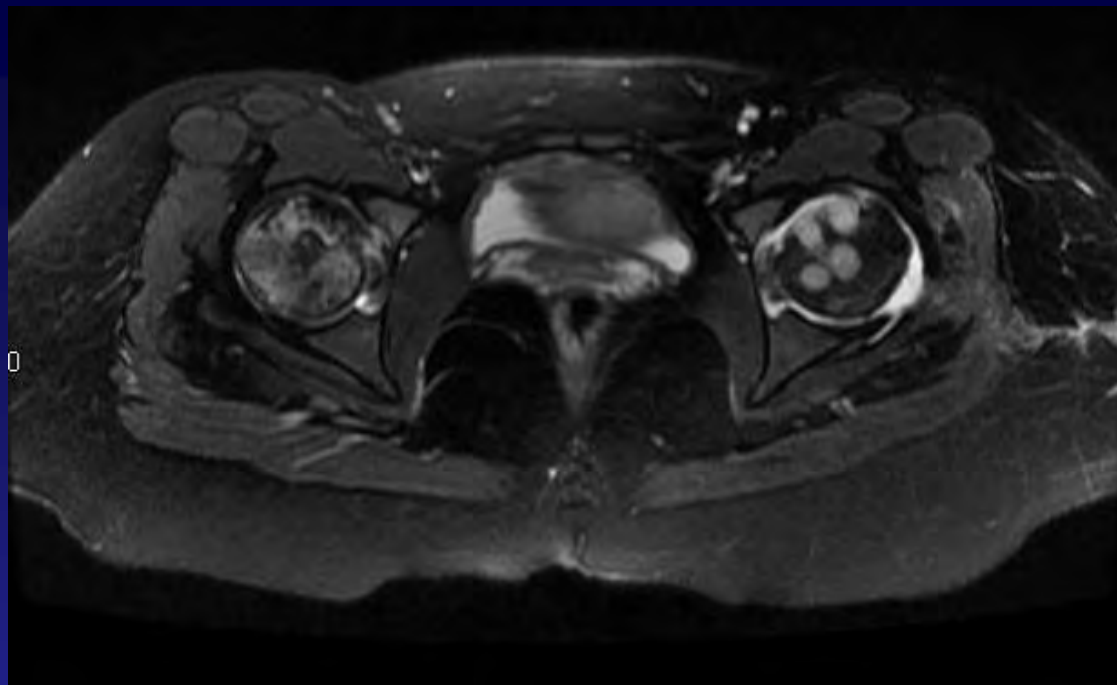
ziente: FFS

3
t:90
2





F.U. 3 mesi

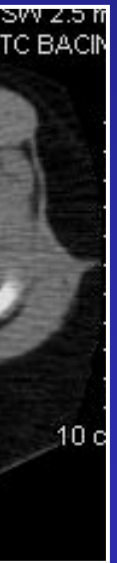
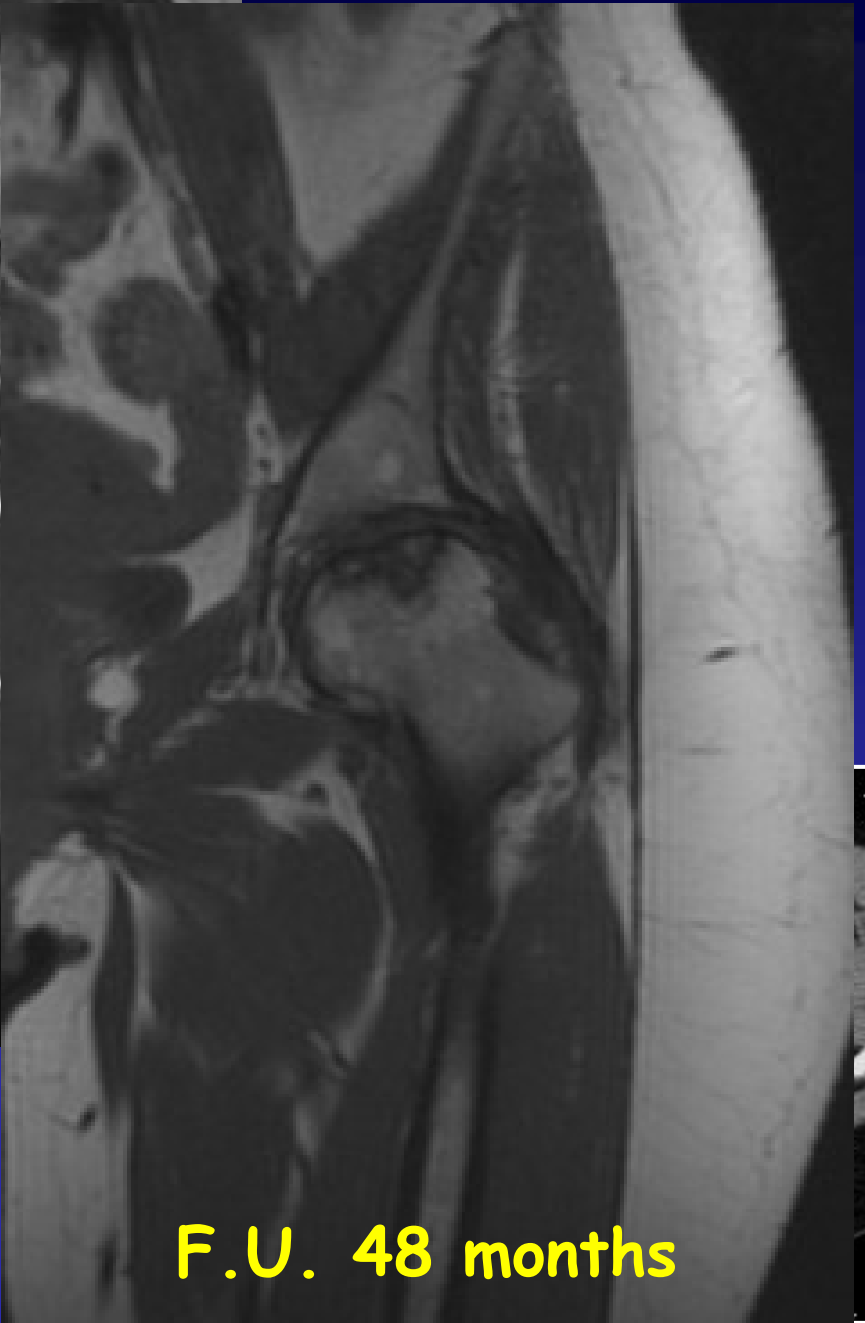
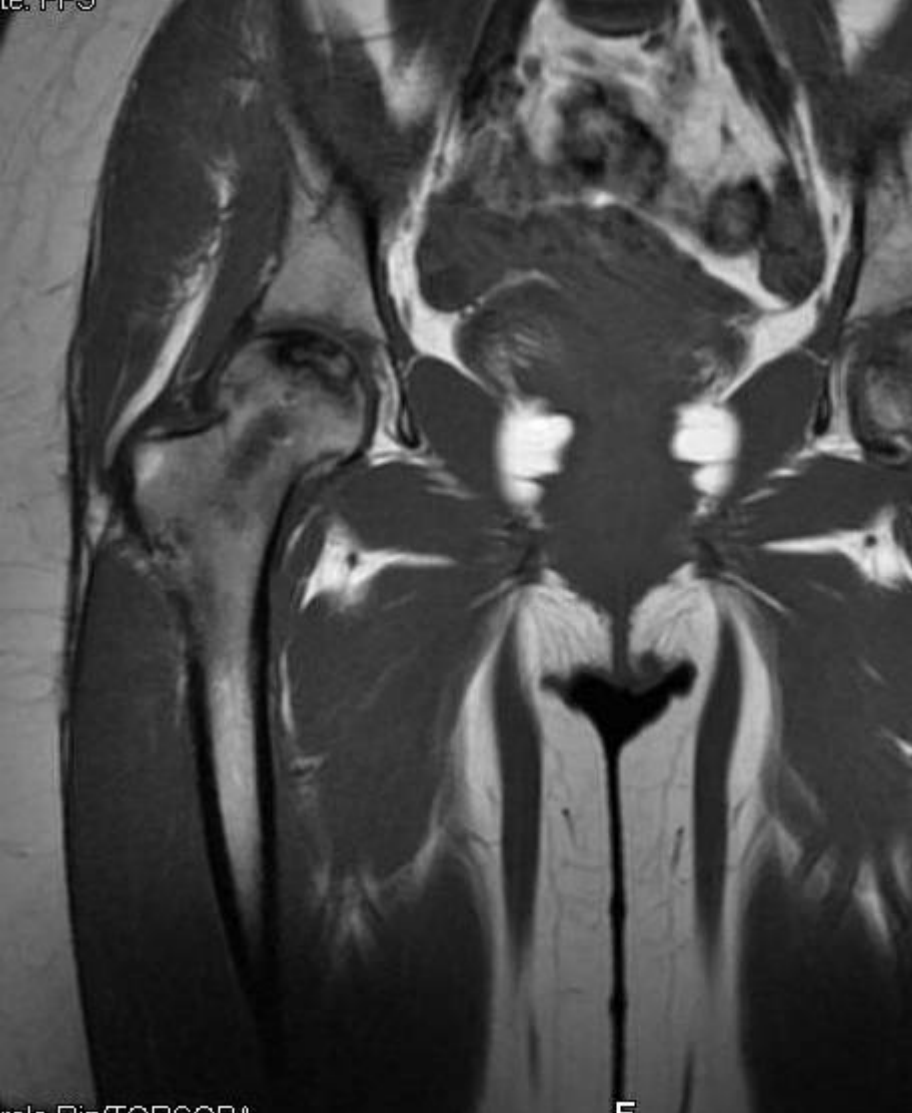


F.U. 3 mesi





F.U. 12 mesi



F.U. 48 months

1550.1
ite: SUPINO
pos.: AP



♂ 19 y

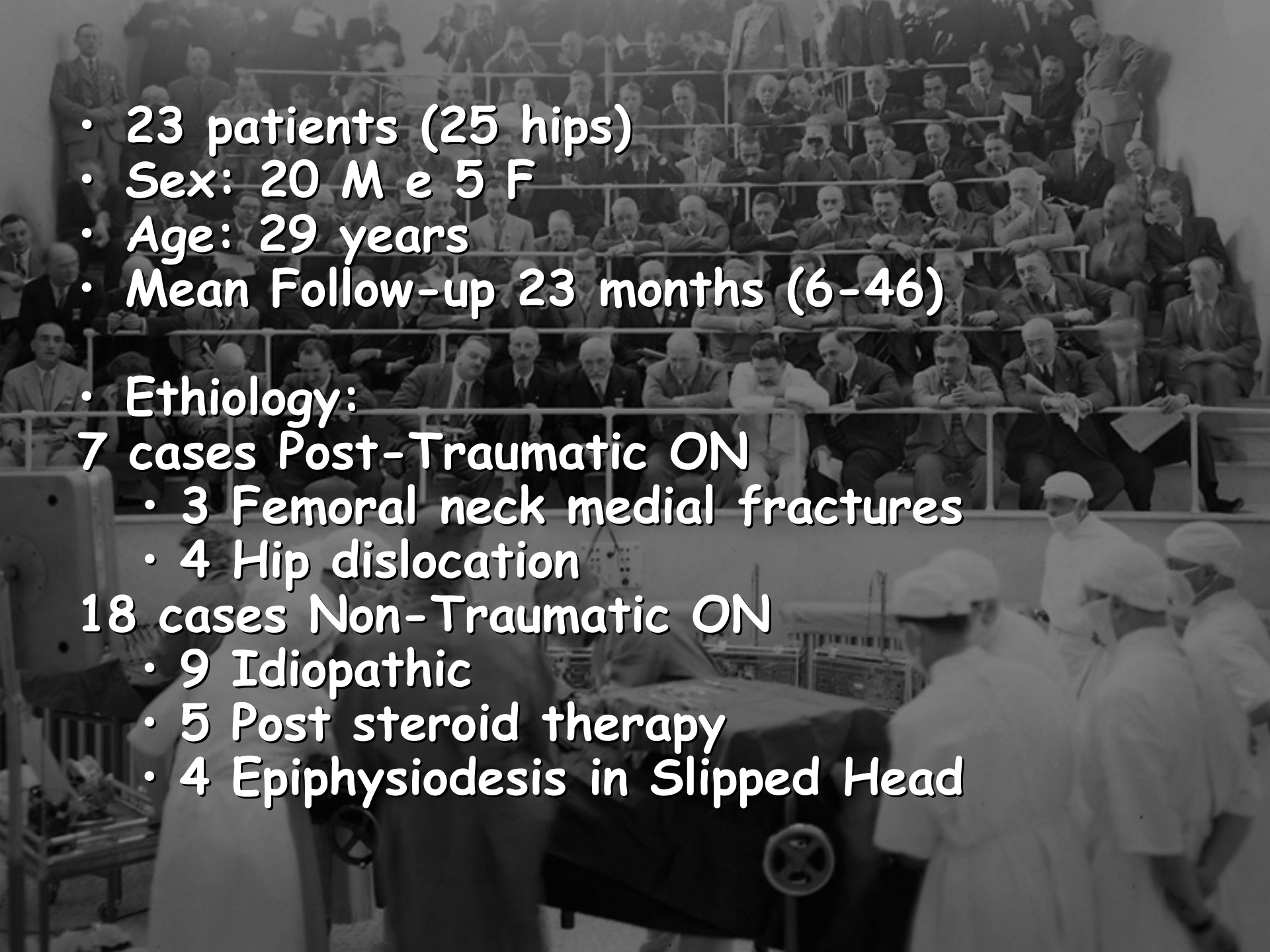
D



D



F.U. 48 months

- 
- 23 patients (25 hips)
 - Sex: 20 M e 5 F
 - Age: 29 years
 - Mean Follow-up 23 months (6-46)
 - Etiology:
 - 7 cases Post-Traumatic ON
 - 3 Femoral neck medial fractures
 - 4 Hip dislocation
 - 18 cases Non-Traumatic ON
 - 9 Idiopathic
 - 5 Post steroid therapy
 - 4 Epiphysiodesis in Slipped Head

Risultati

Follow up 23 months: Harris Hip Score and Womac Score

HHS POST OPERATIVE	WOMAC POST OPERATIVE
51,41	46,57
HHS POST OPERATIVE	WOMAC POST OPERATIVE
79,42 ↑	21,28 ↓

3 failure (prosthesis)

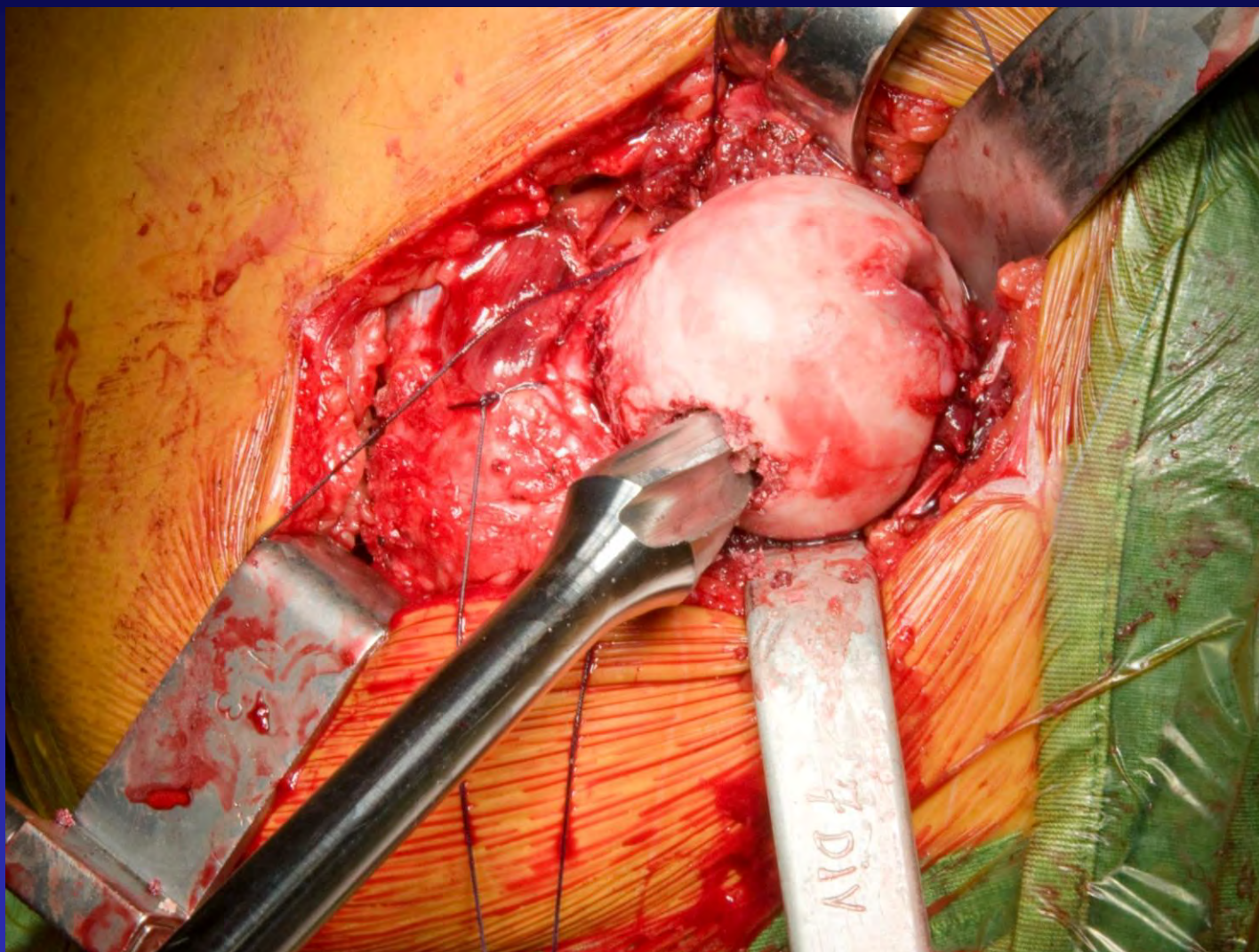
SCAFFOLD

Easy morphological restoration of
the femoral head

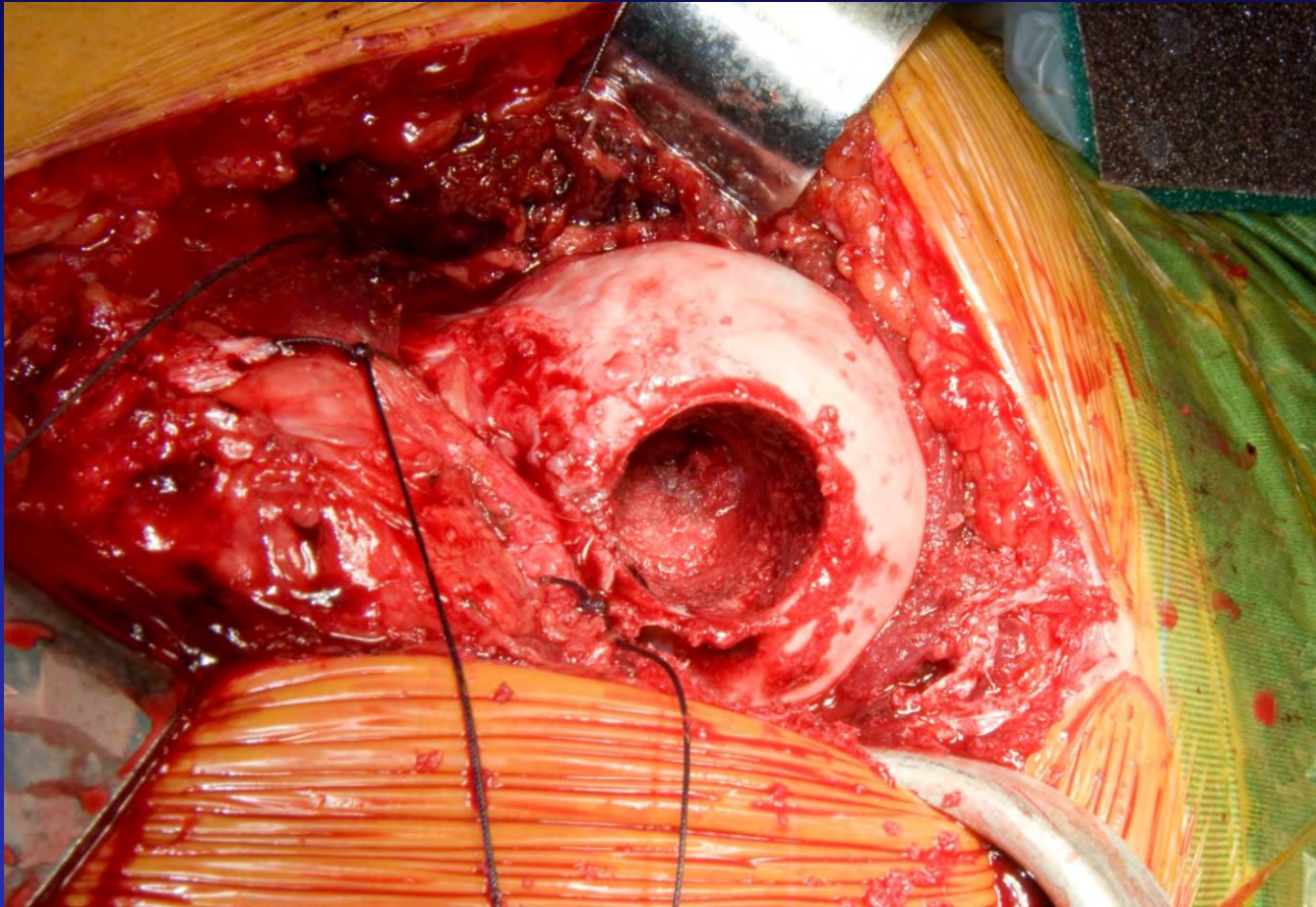
Adequate mechanical strength

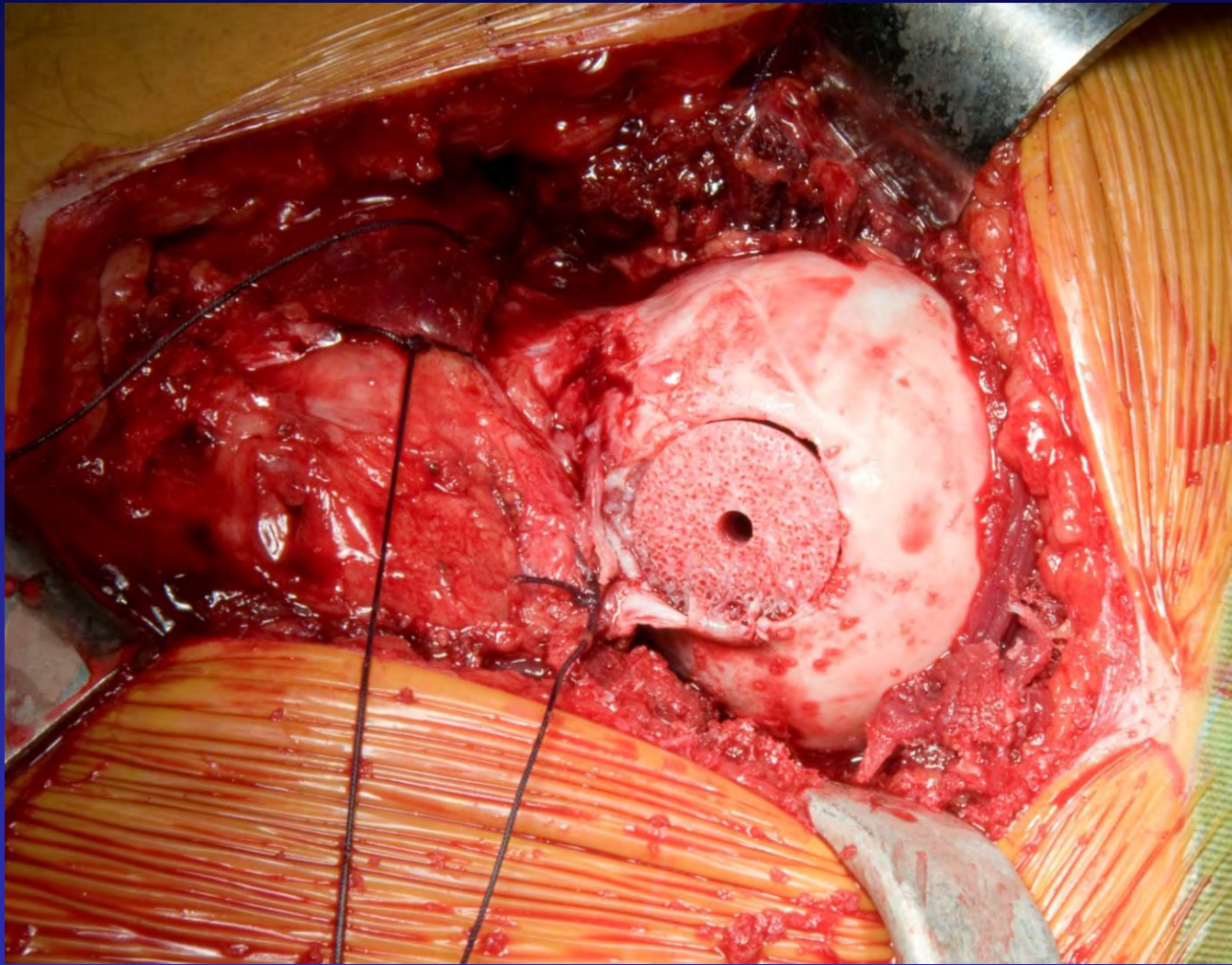
Engineering with hyaline
cartilaginous tissue

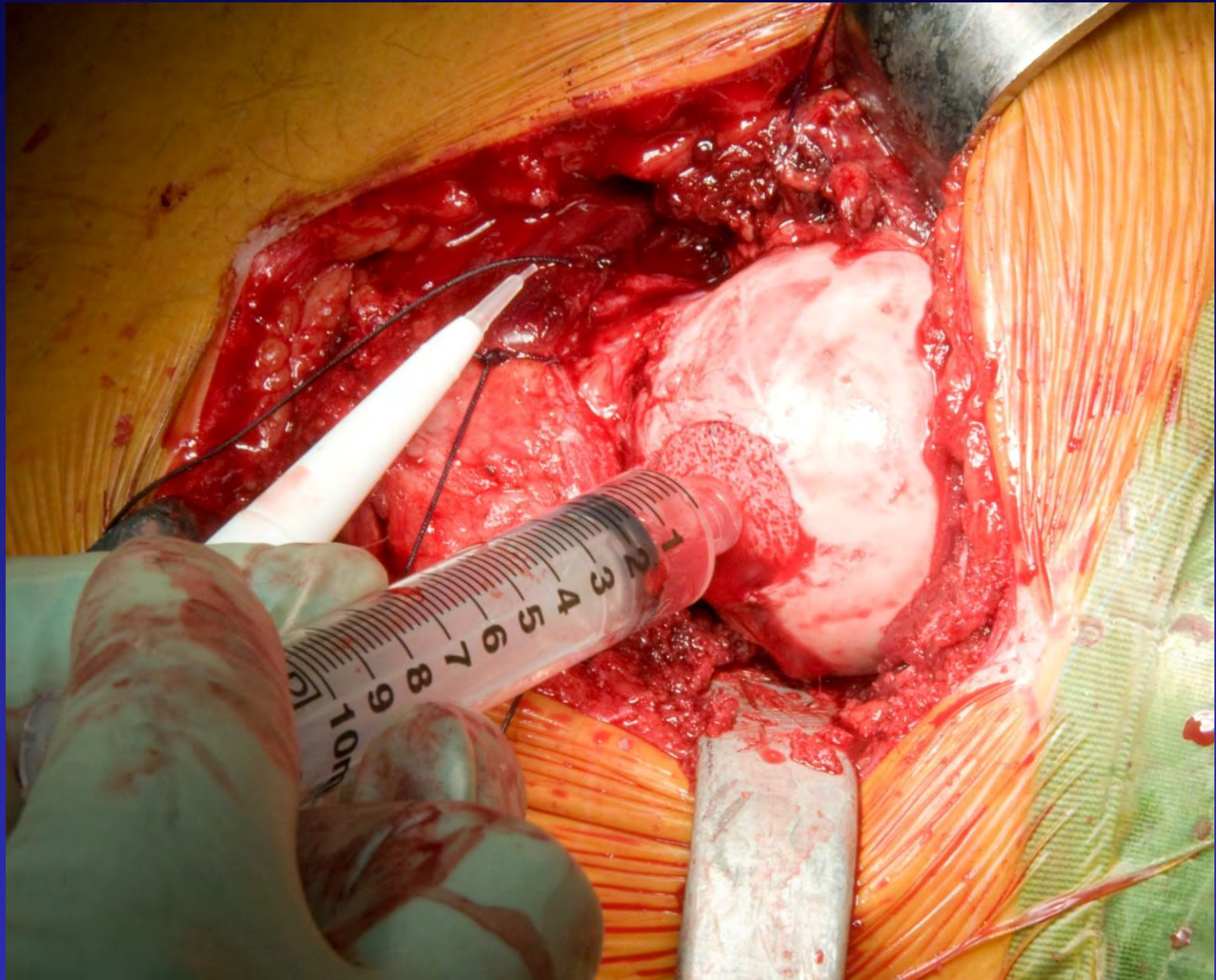


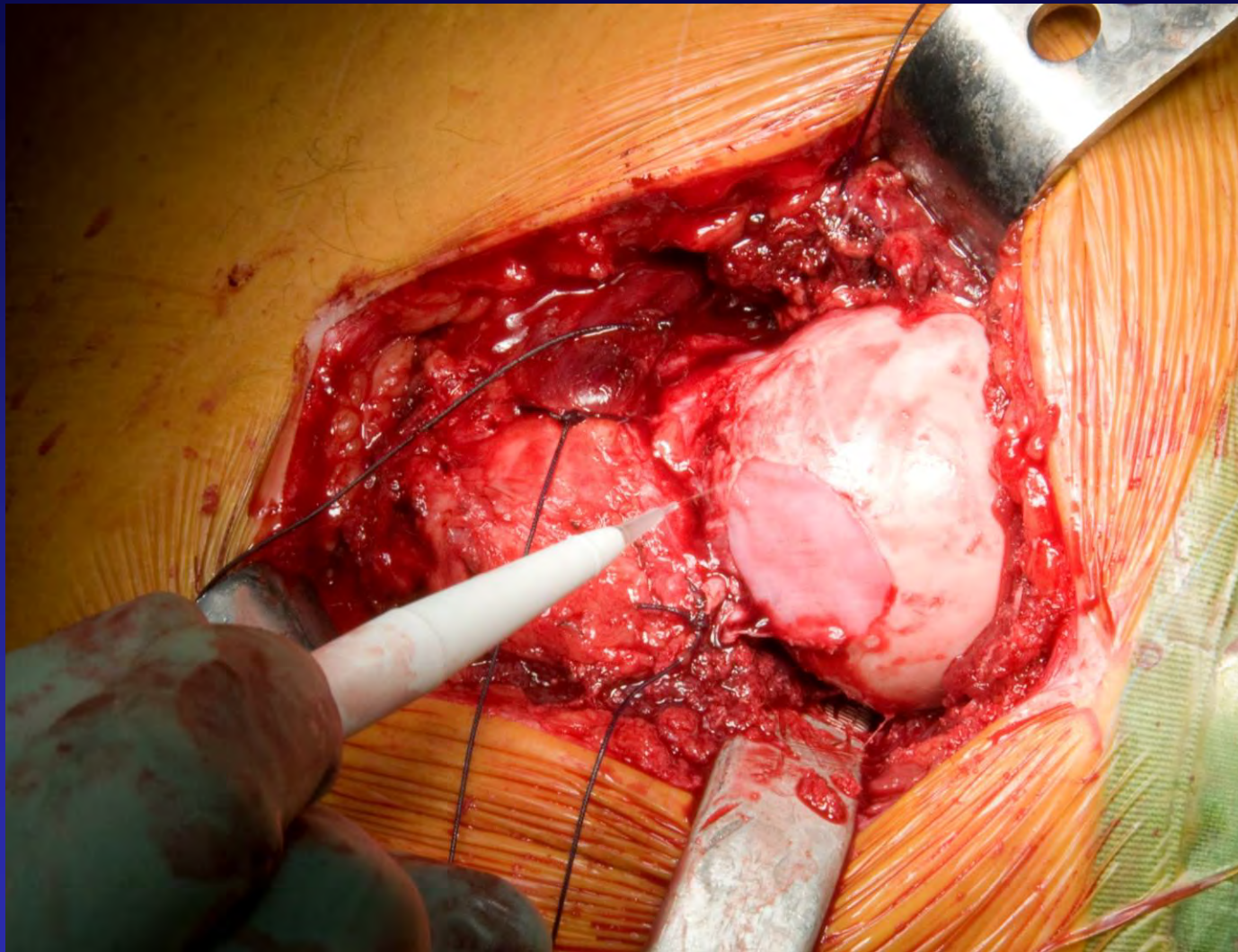


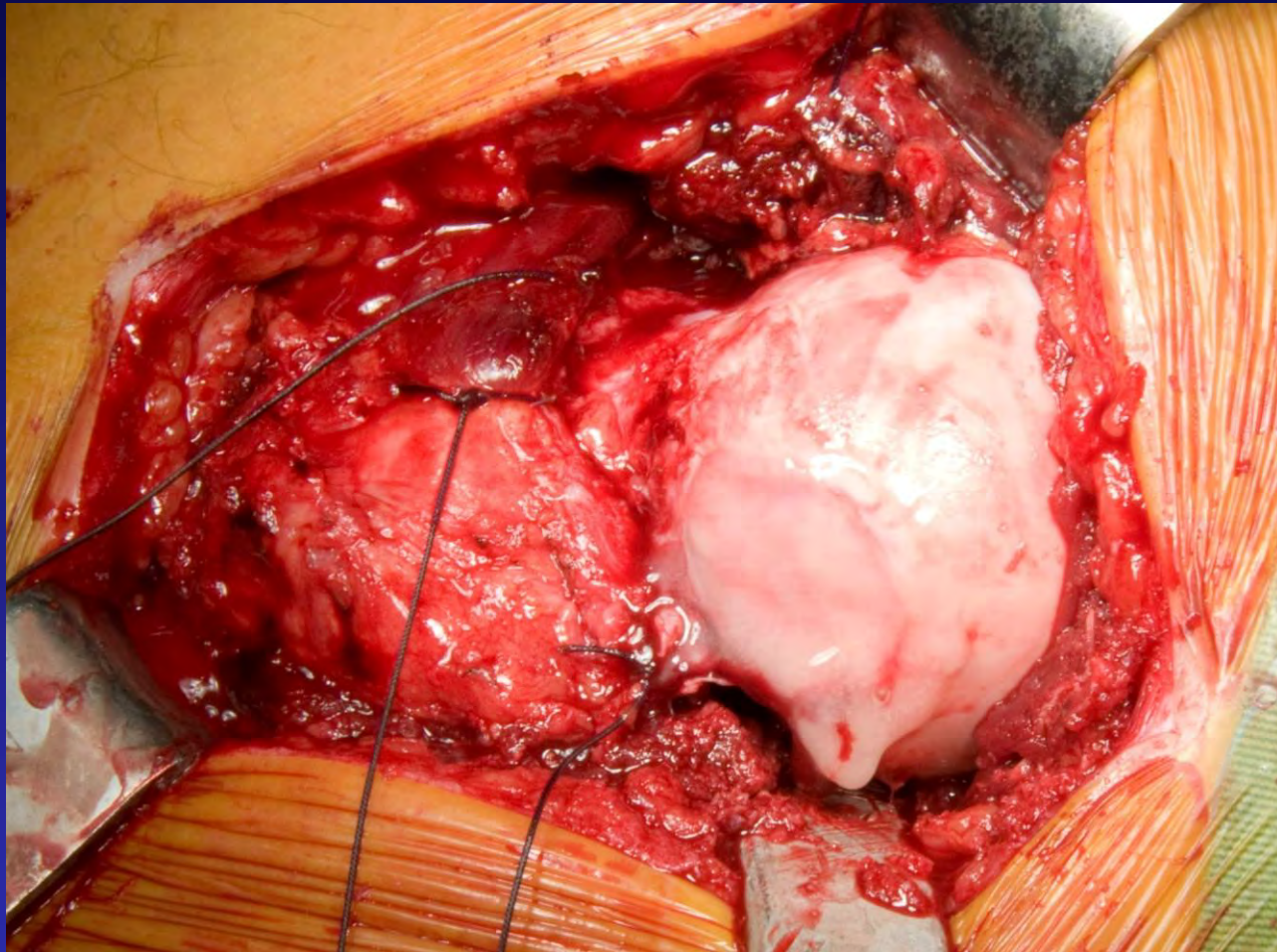




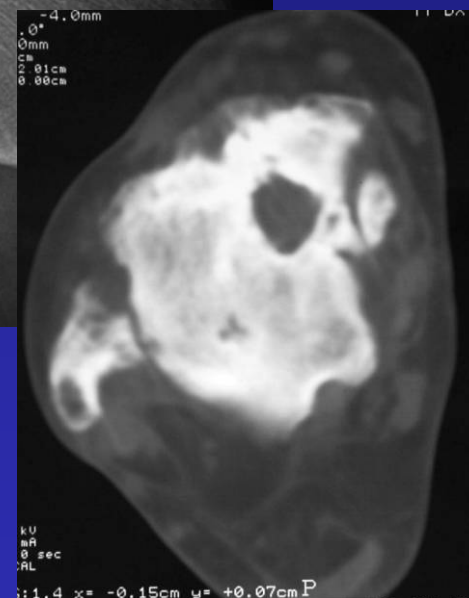




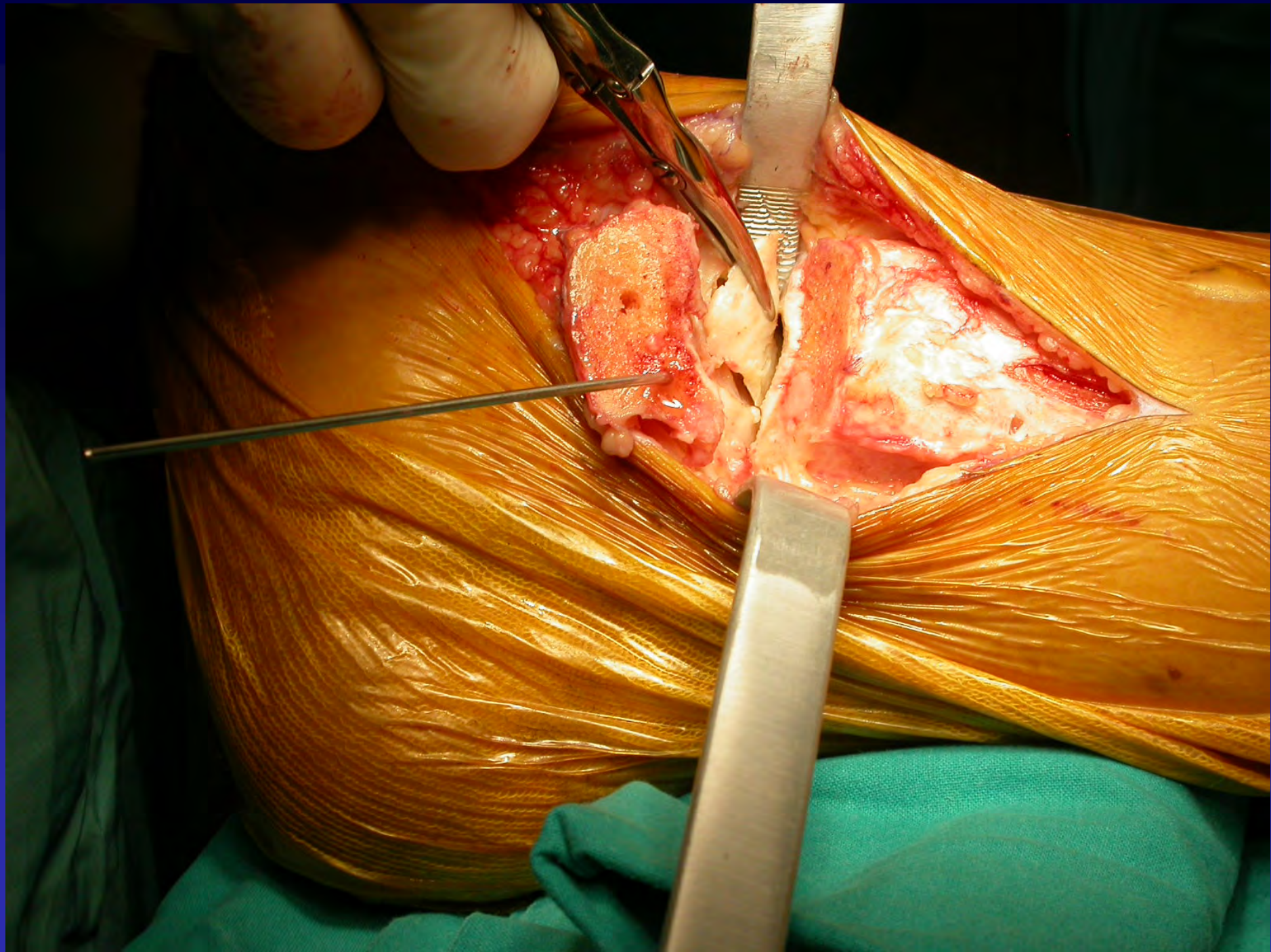


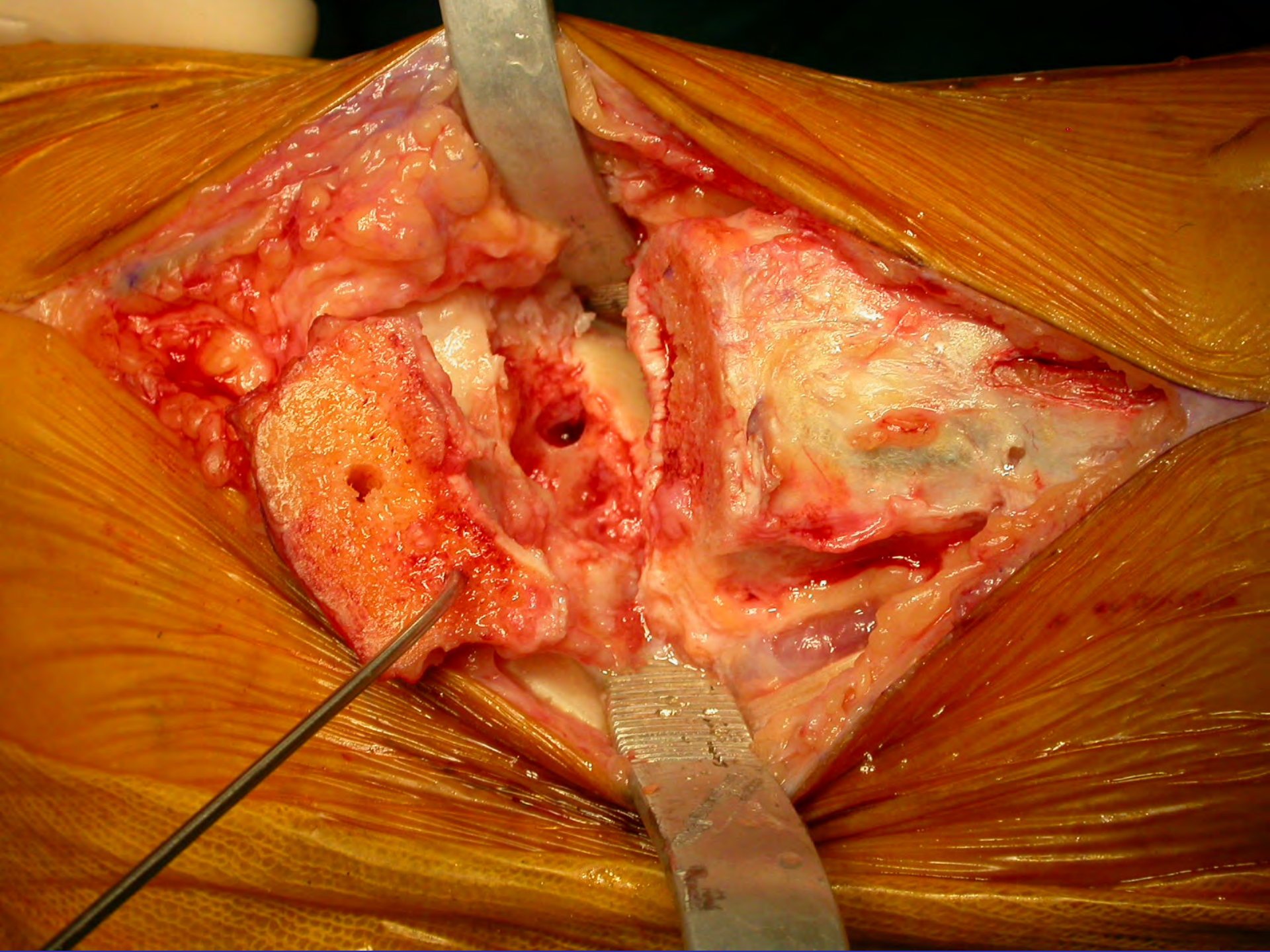


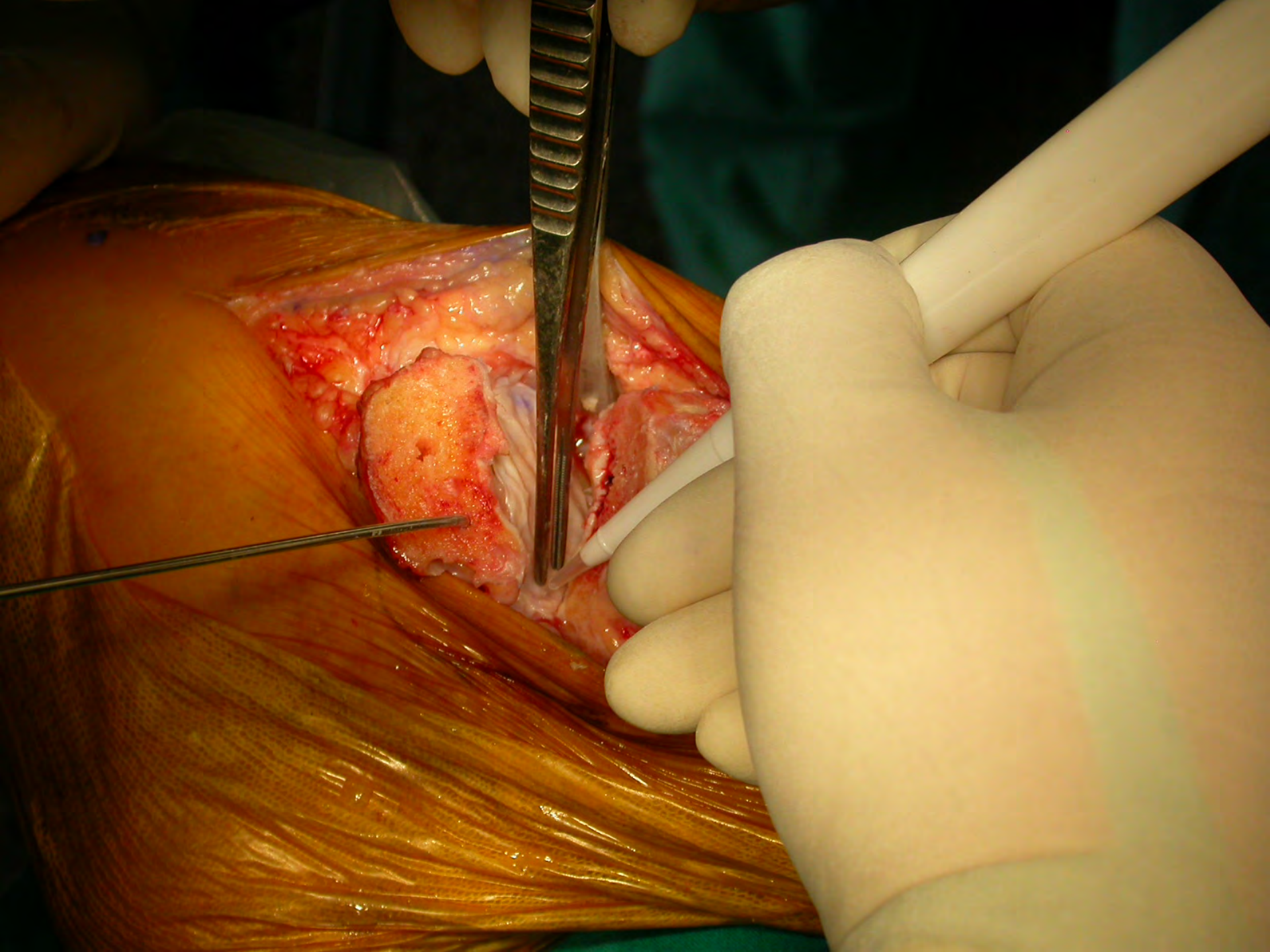
Osteo-Chondral Lesions

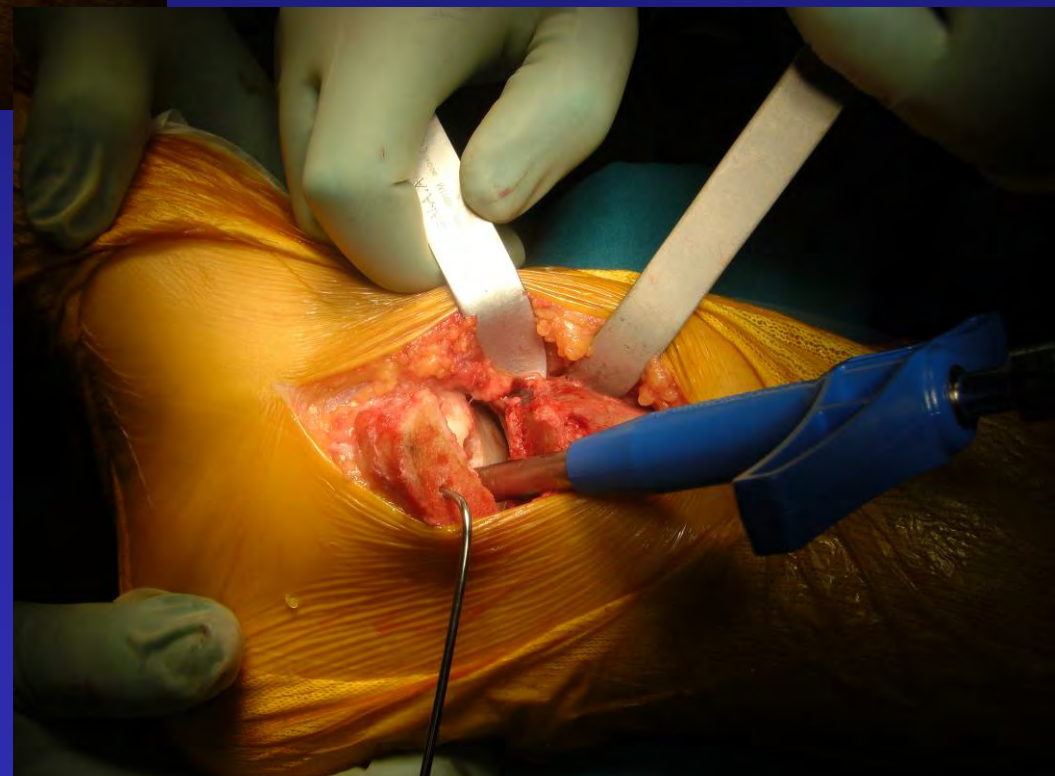
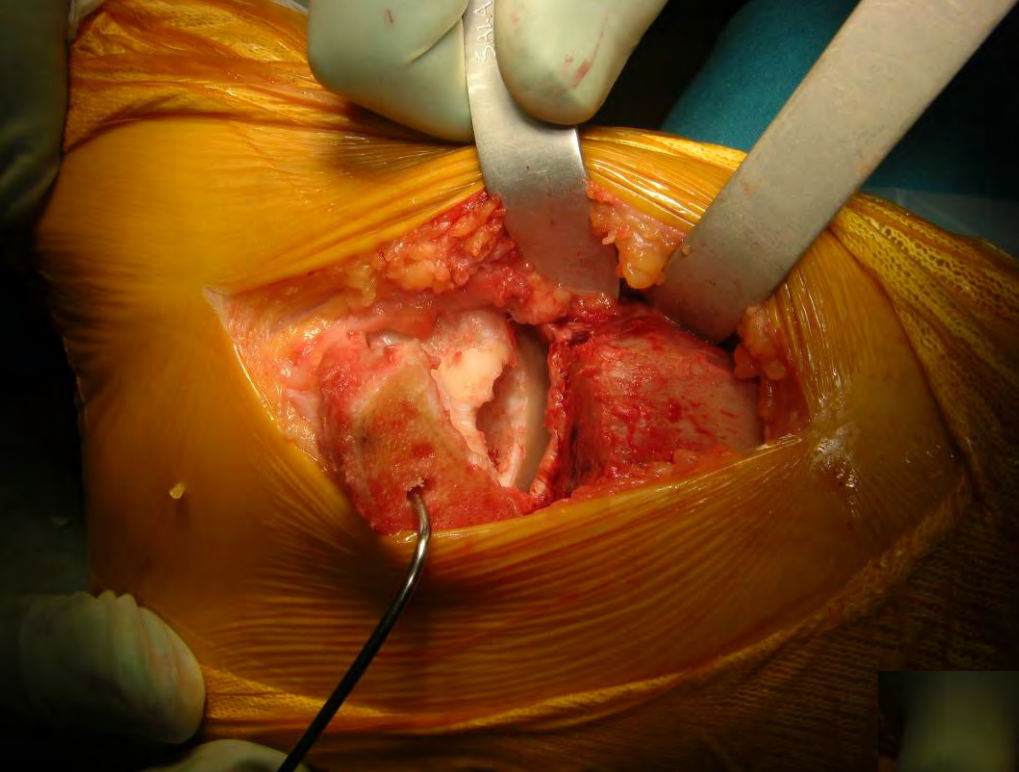


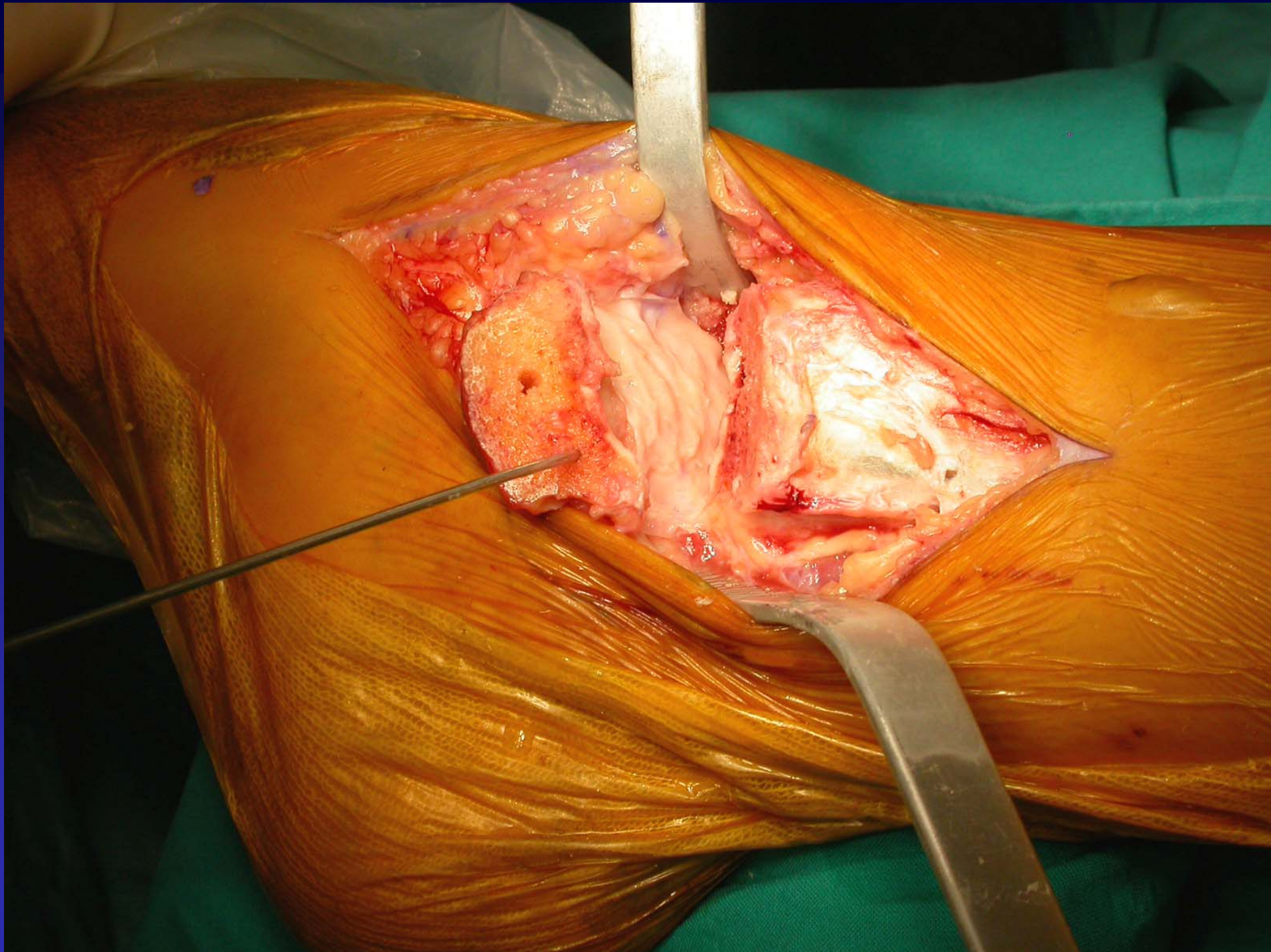
Male, 48 yy













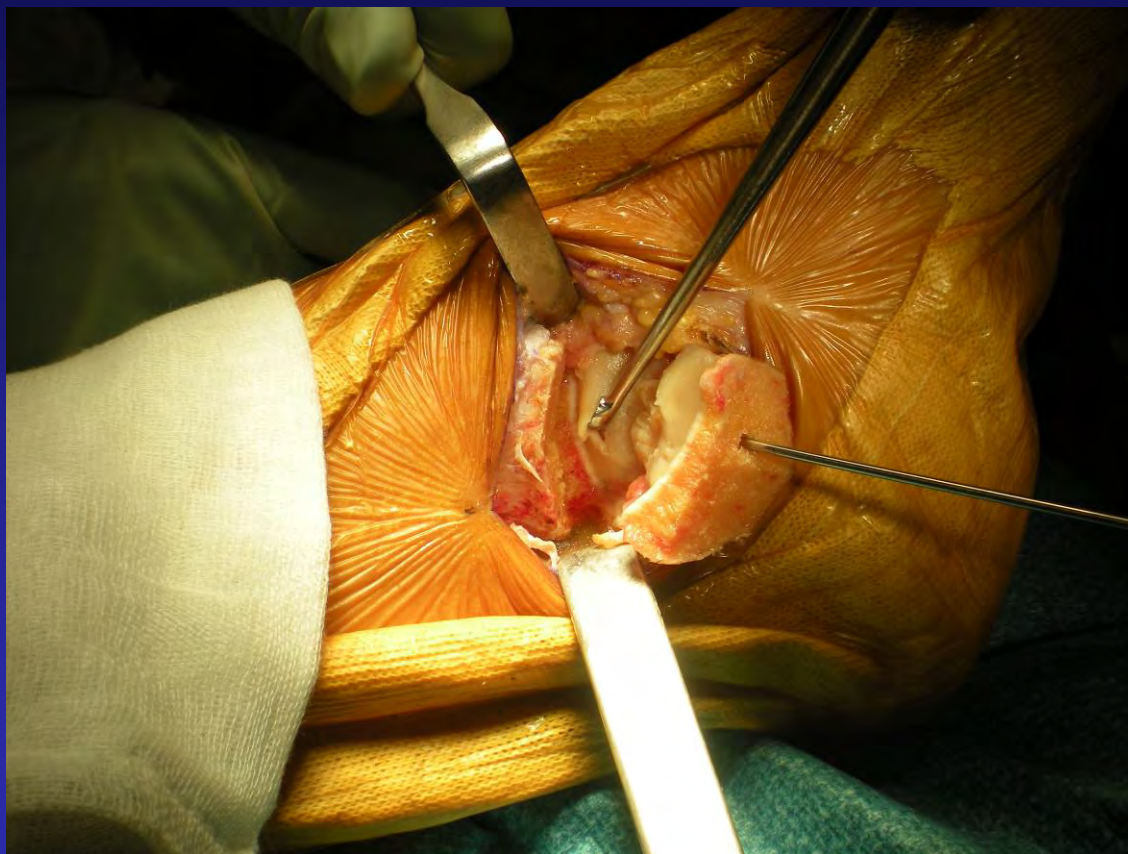
1 anno

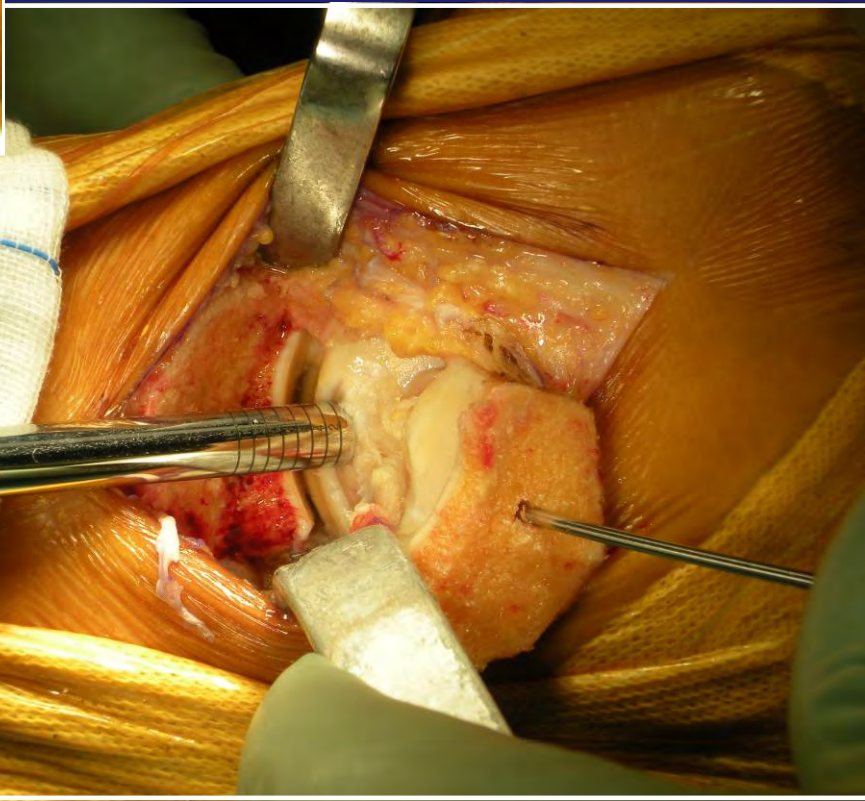


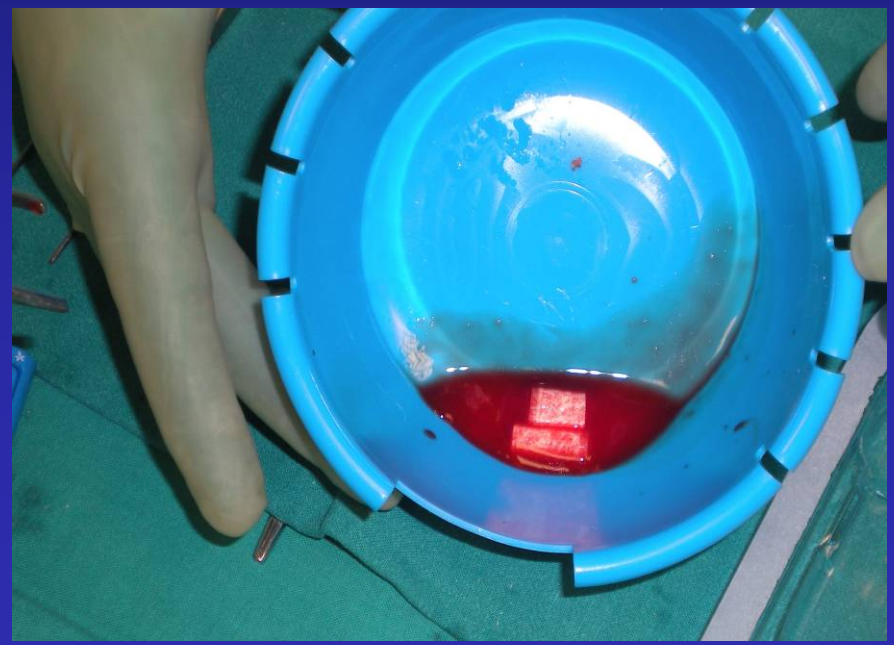
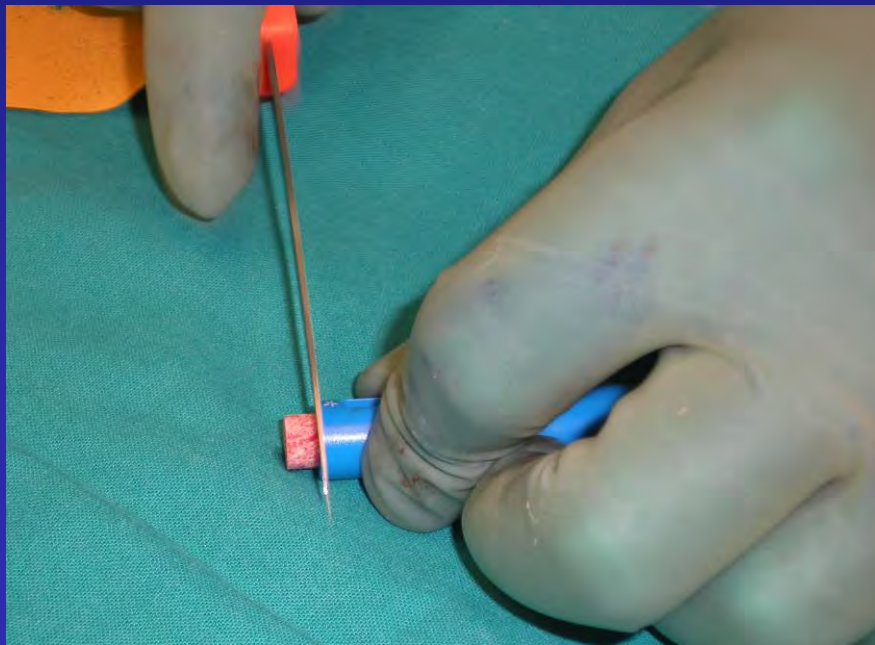
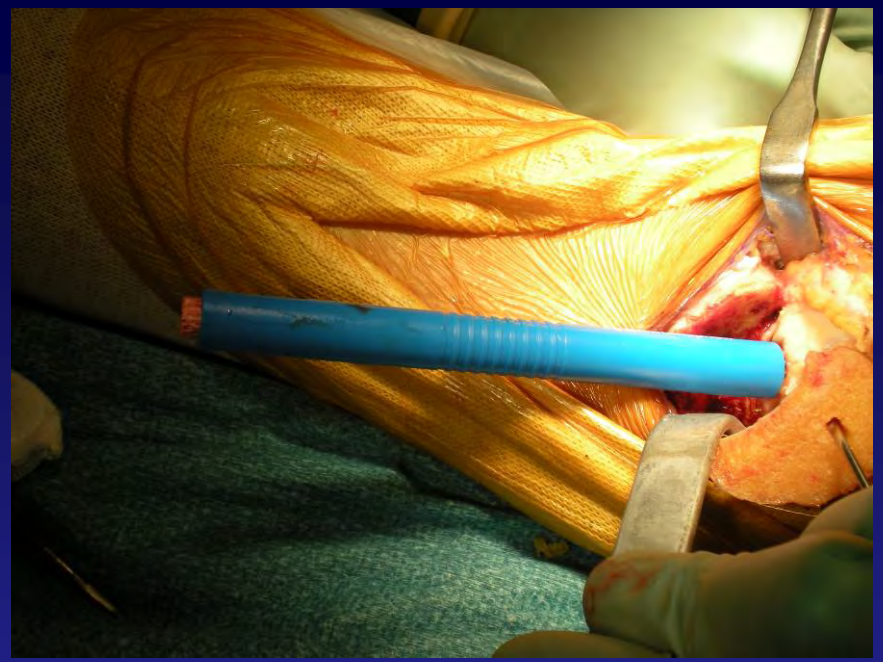
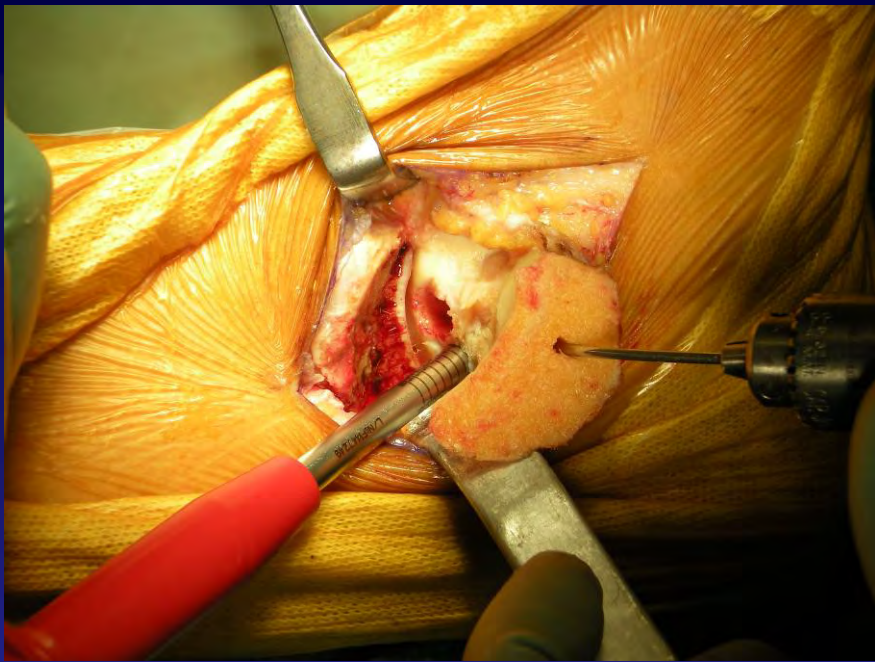
SCAFFOLD + BONE MARROW STROMAL CELLS

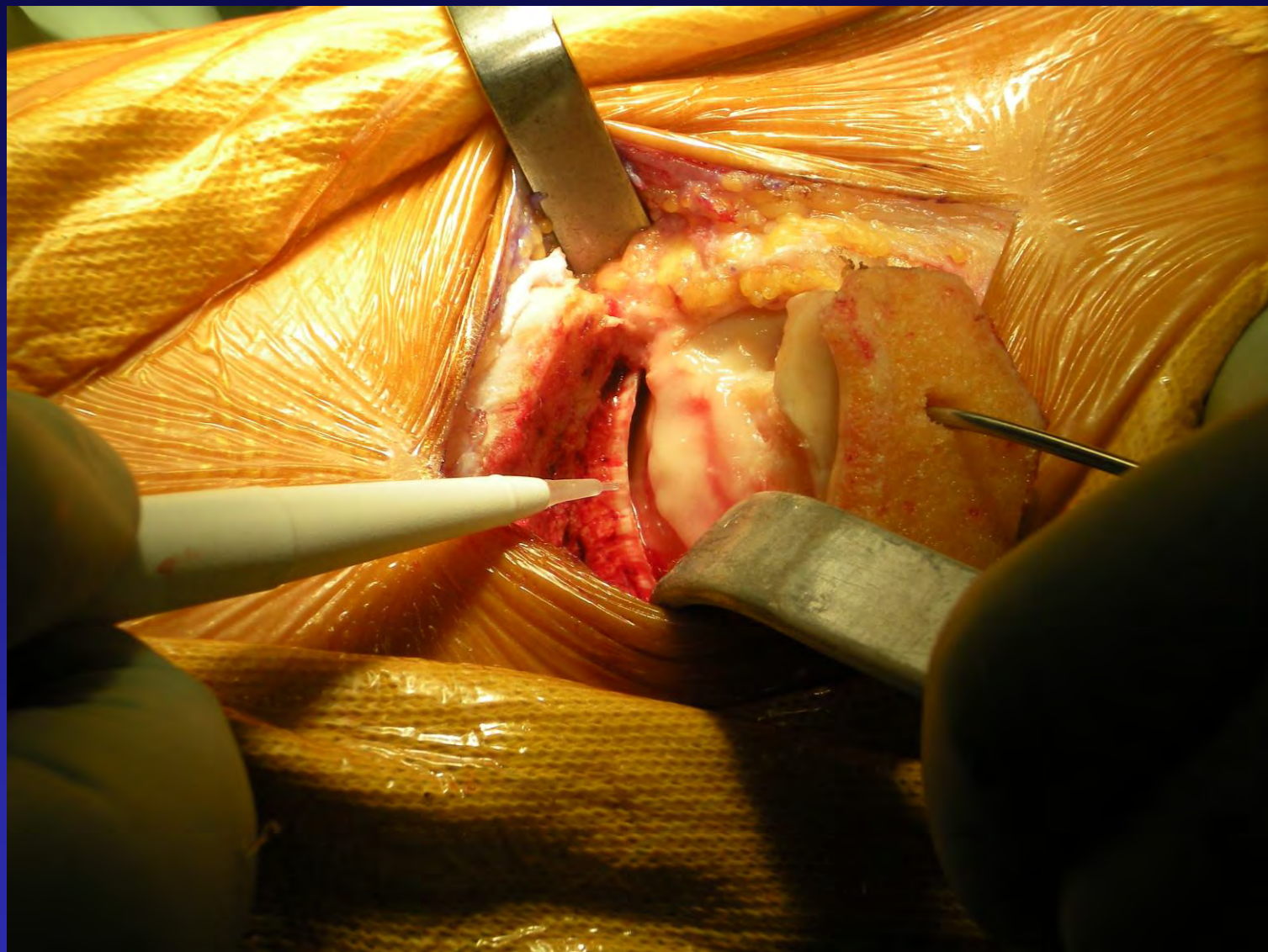


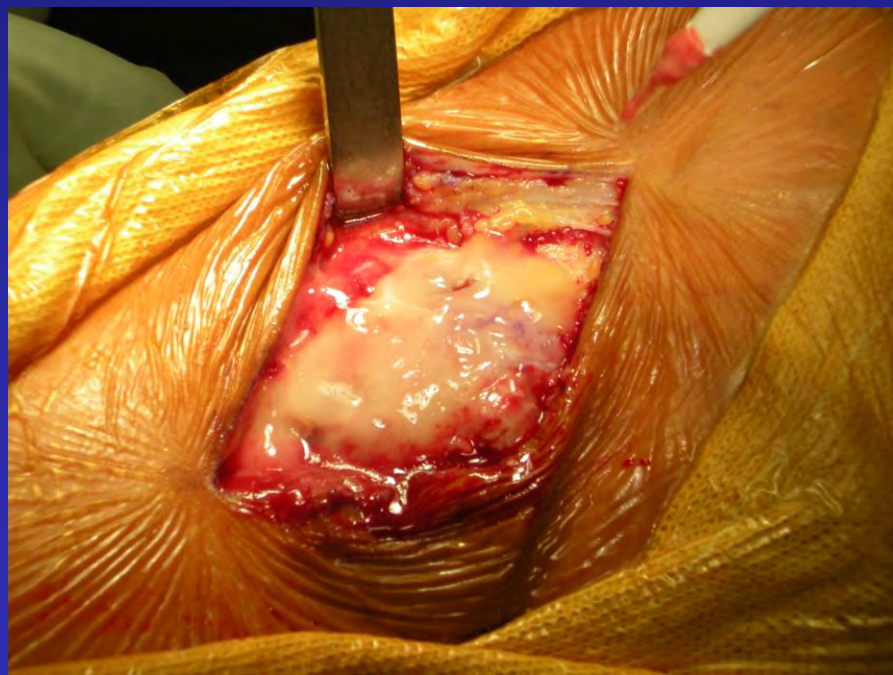
Maschio 42 aa

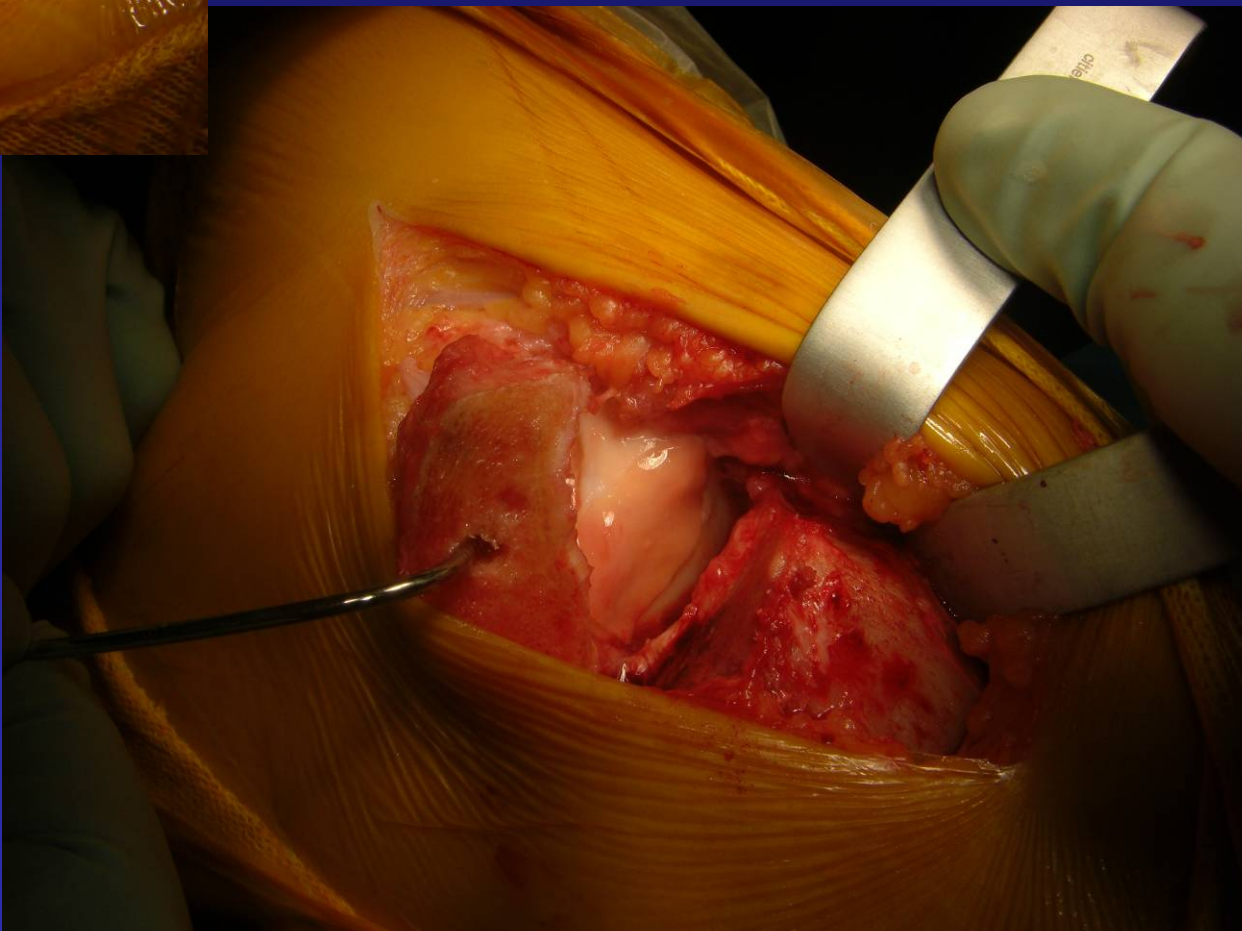
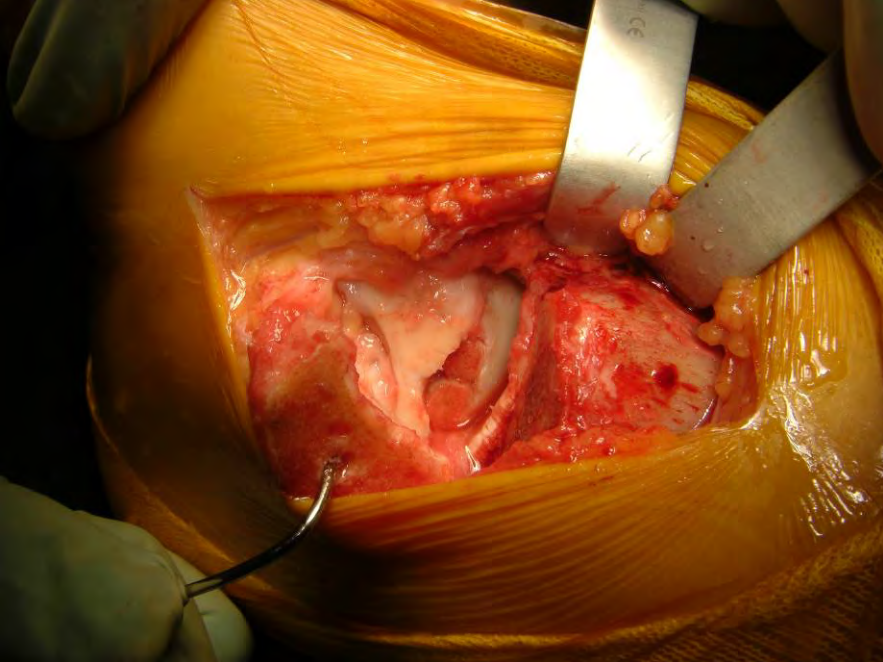




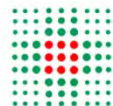








NON-UNION



SERVIZIO SANITARIO REGIONALE
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Istituto Ortopedico Rizzoli di Bologna
Istituto di Ricovero e Cura a Carattere Scientifico



Non-union

**decortication
stabilization
grafts, stromal cells
and growth factors**

Tibia	25 casi
Femur	21 casi
Humerus	13 casi
Radio	11 casi
Ulna	7 casi



According to AO class.

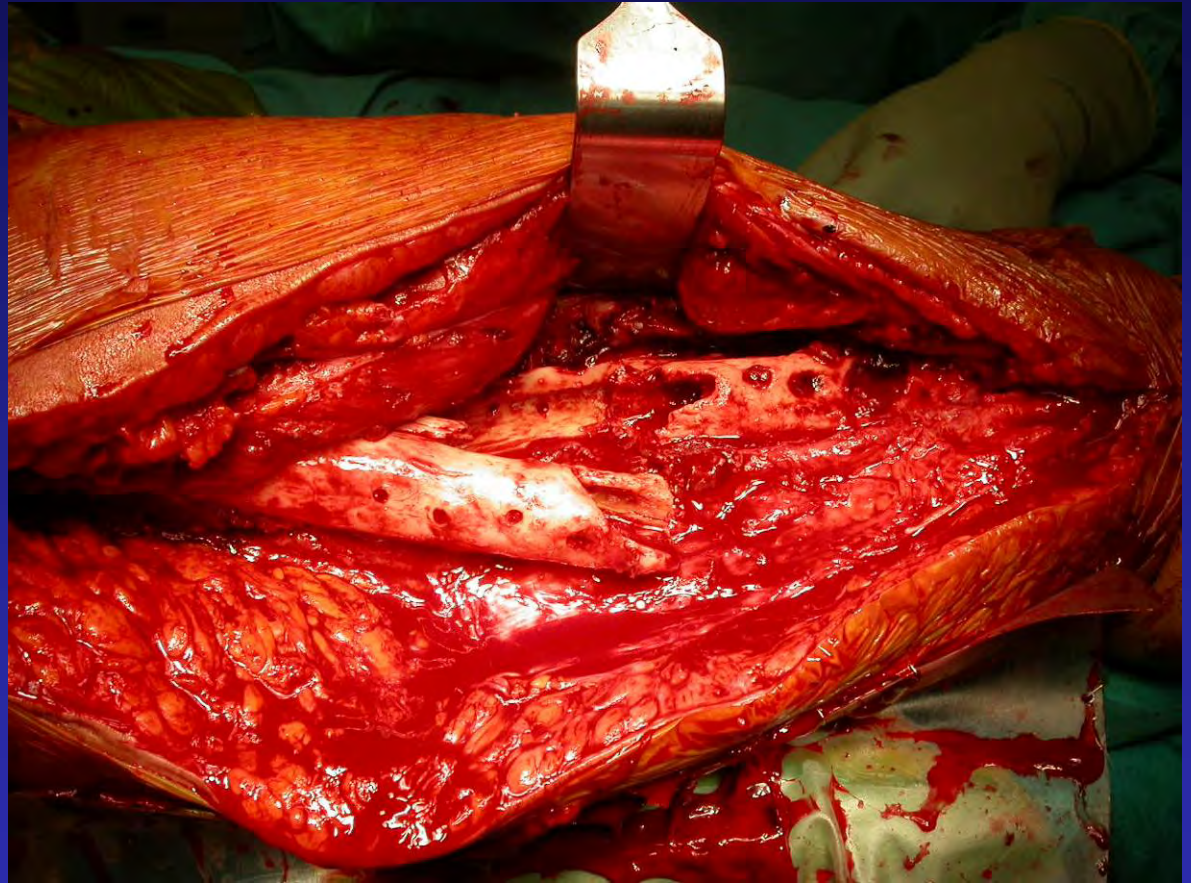
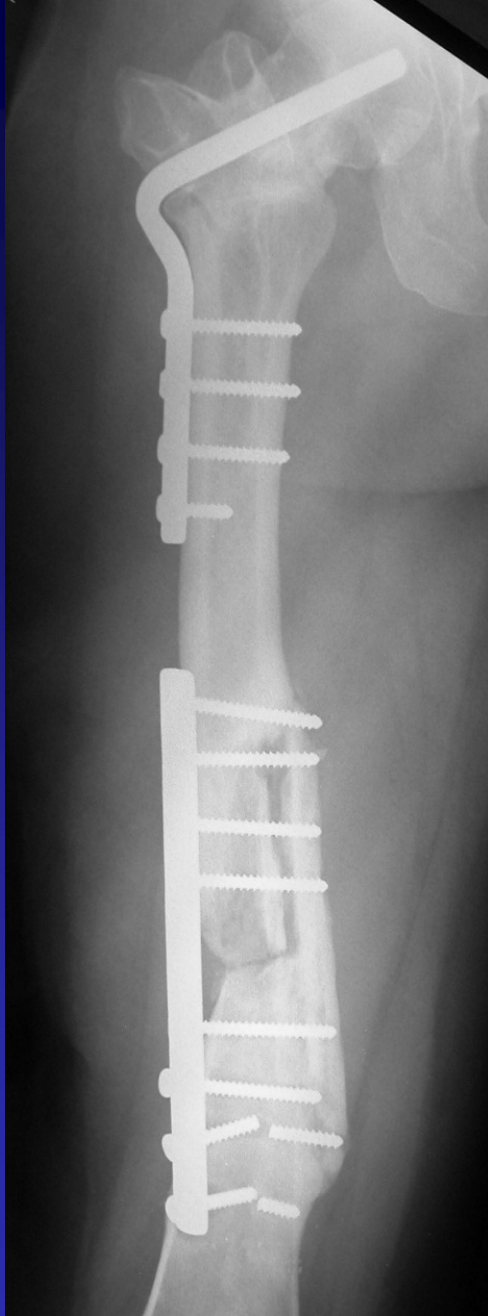
- hypertrophic 16%
- atrotrophic 28%
- Avascular 56%

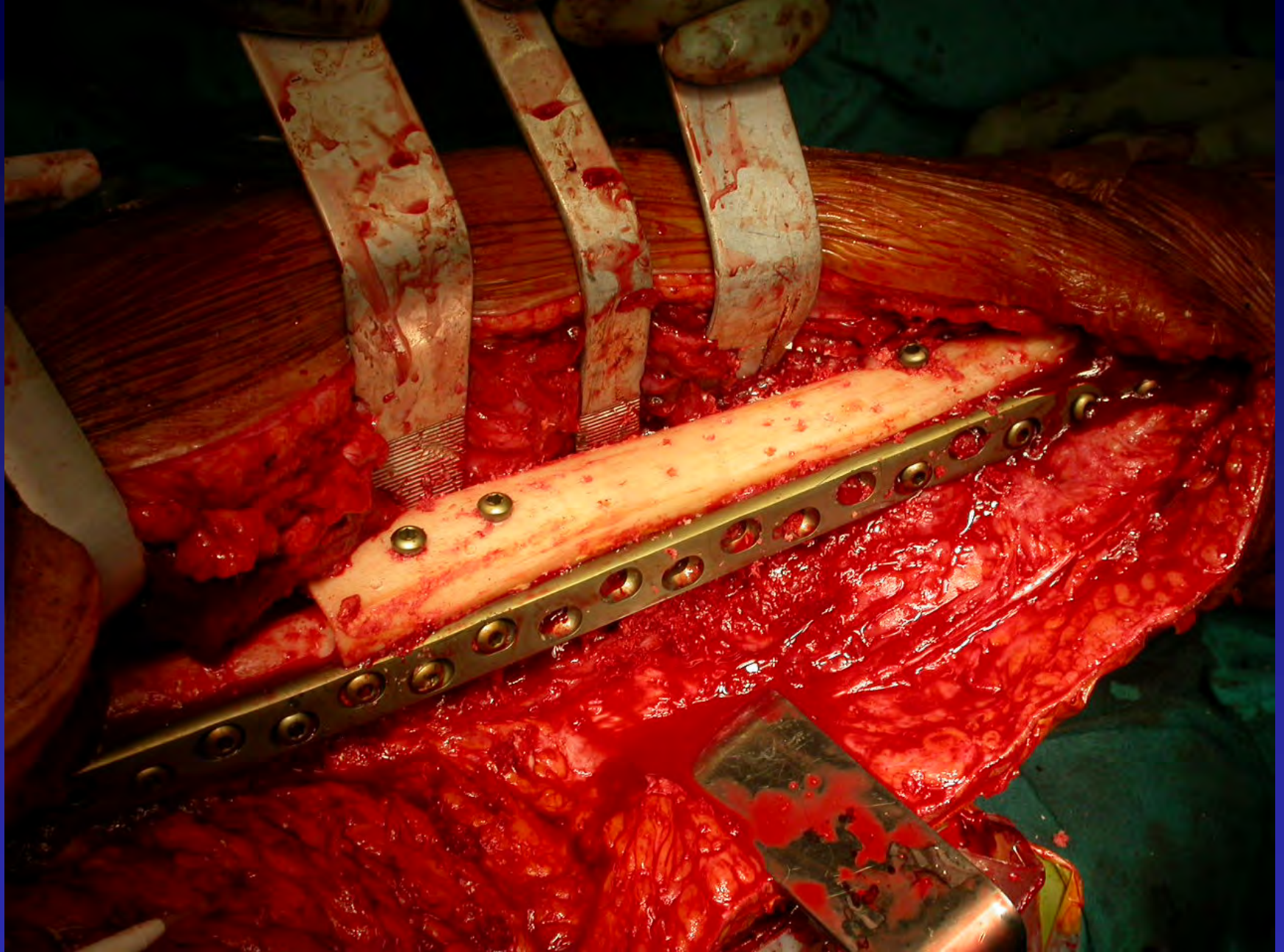
41 patients (64.5%) with defect

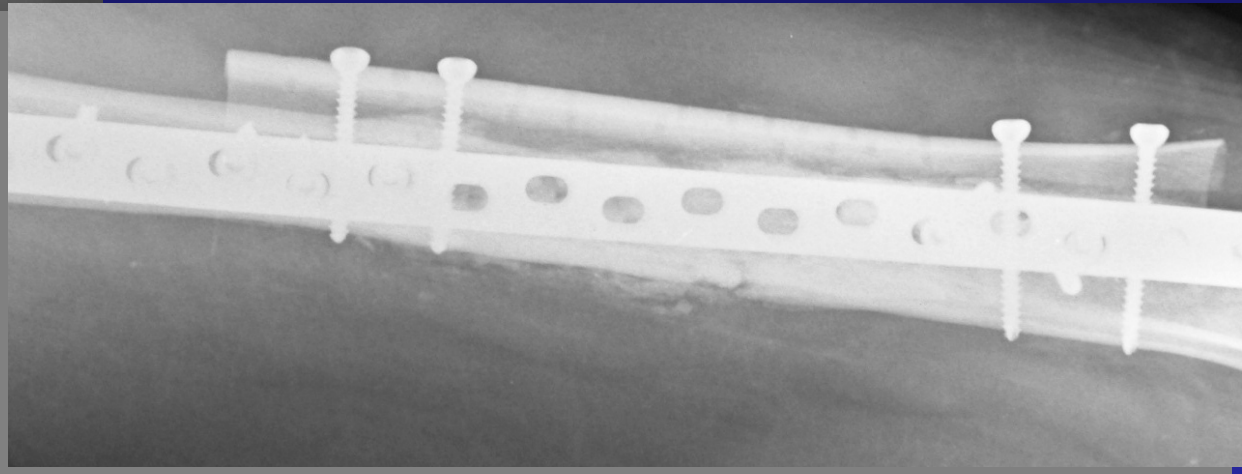
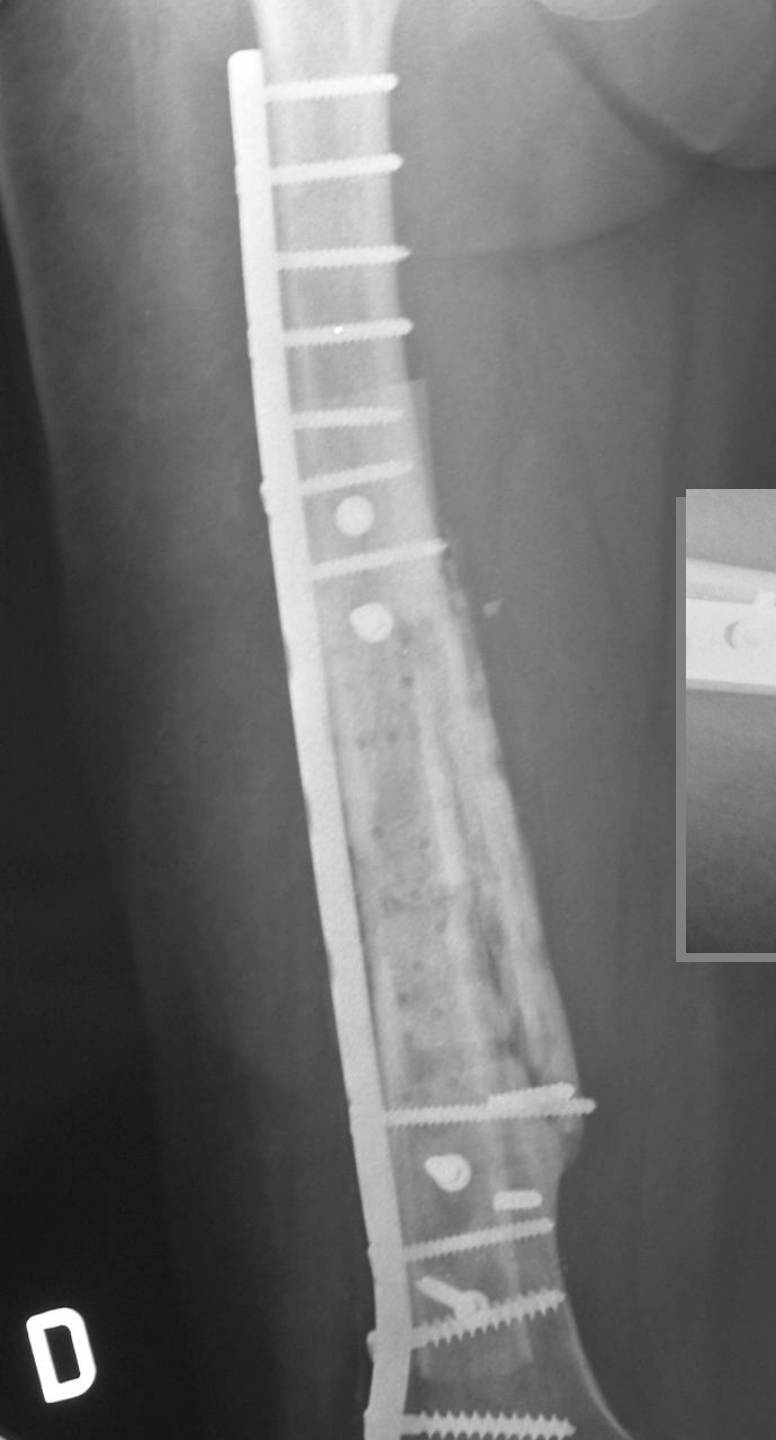


Mean defect: 32 mm (range 10 - 70mm)

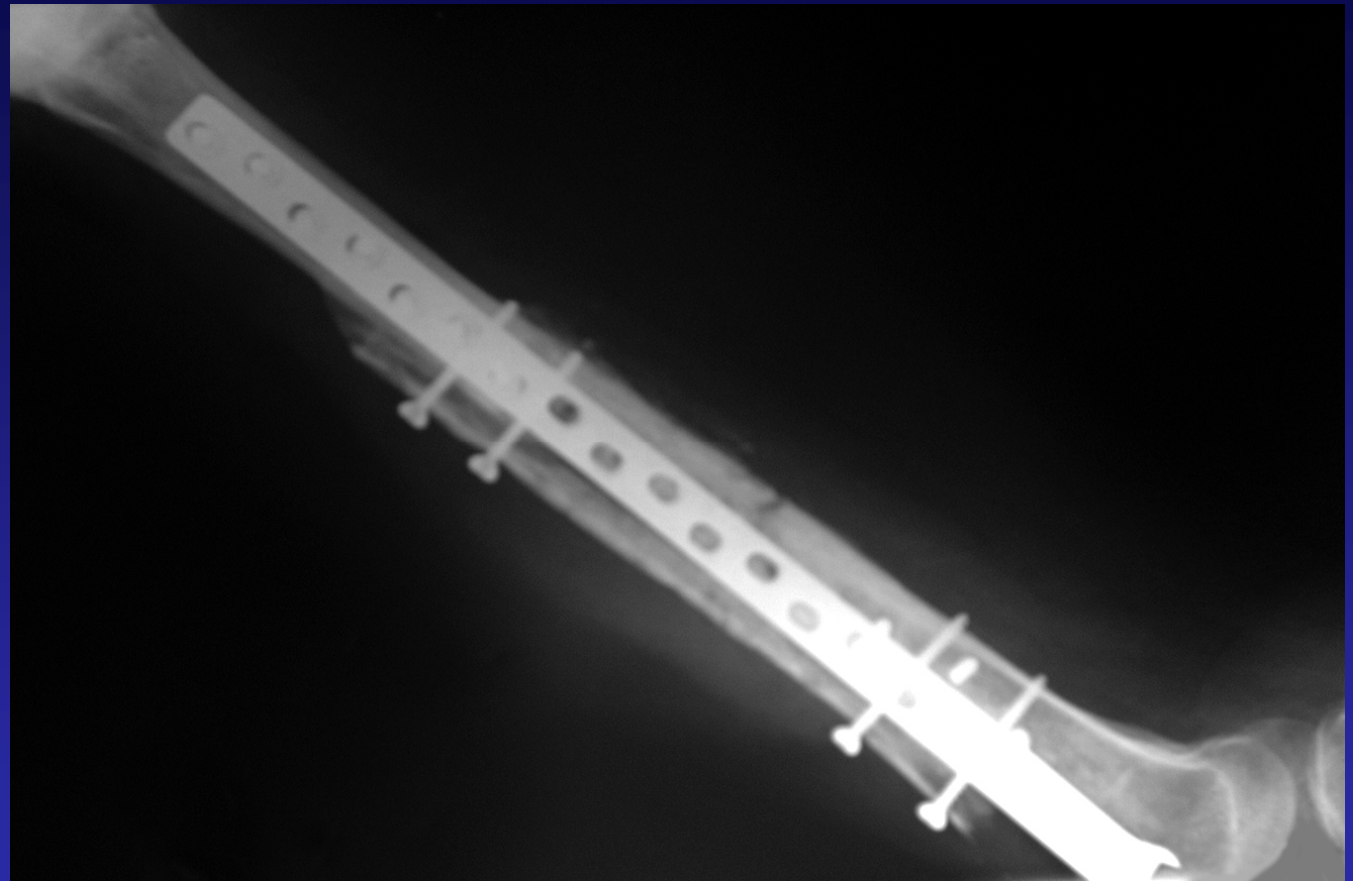
♀ 41 y



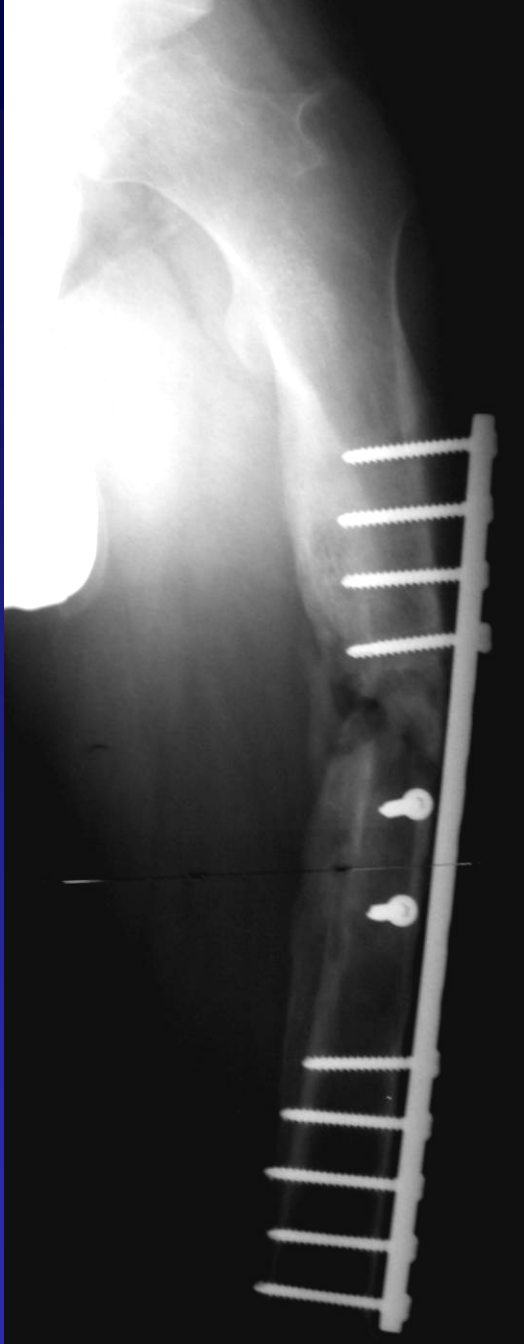




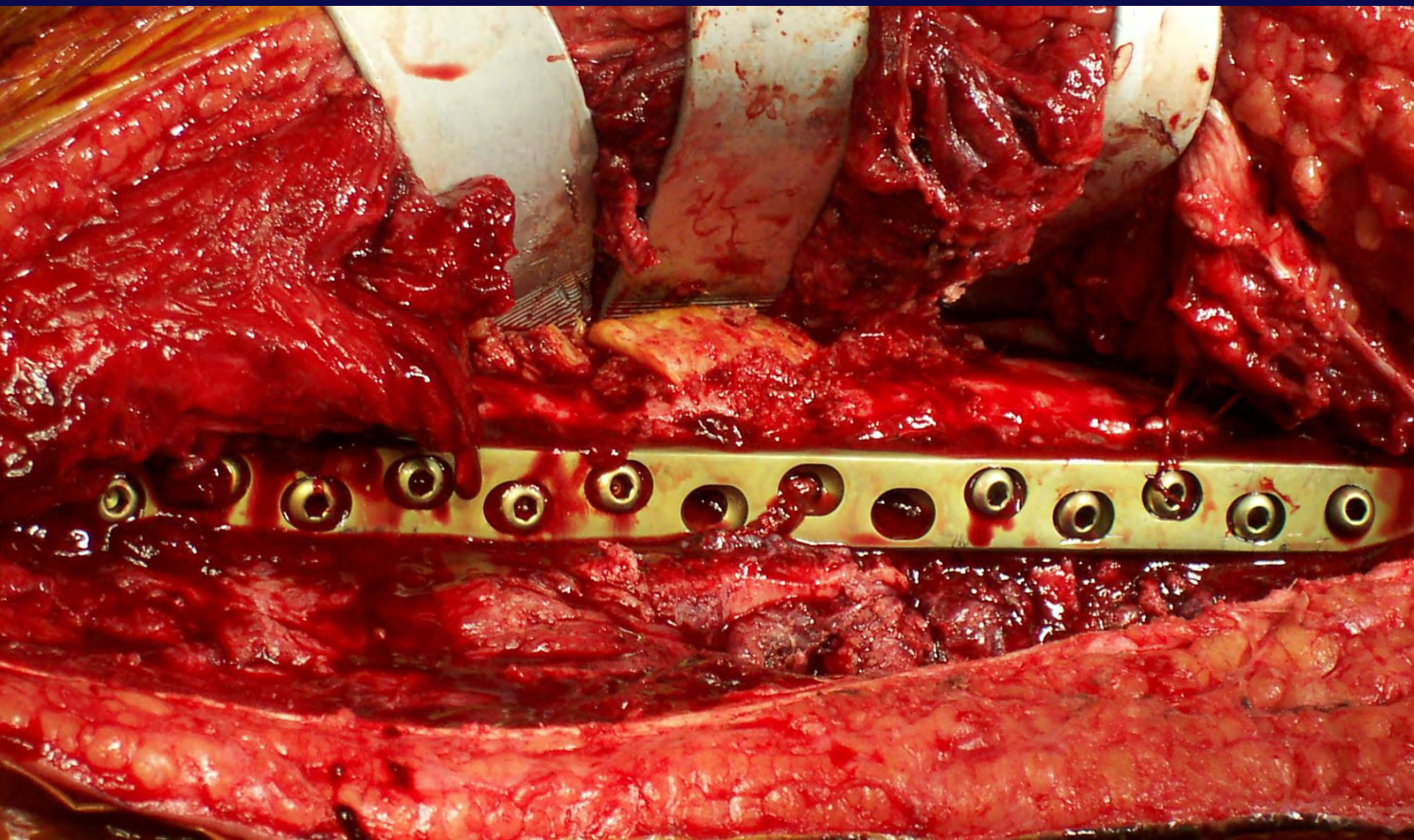
F. U. 45 days

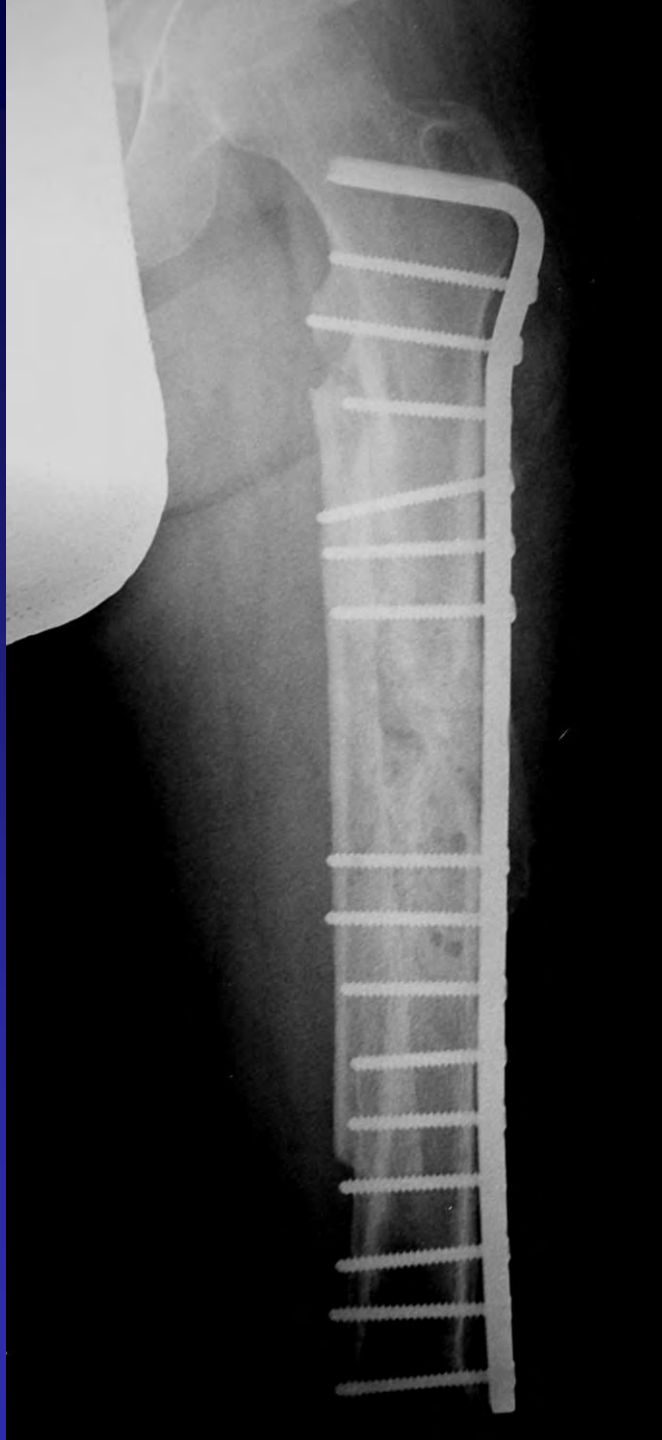


F.U. 6 months

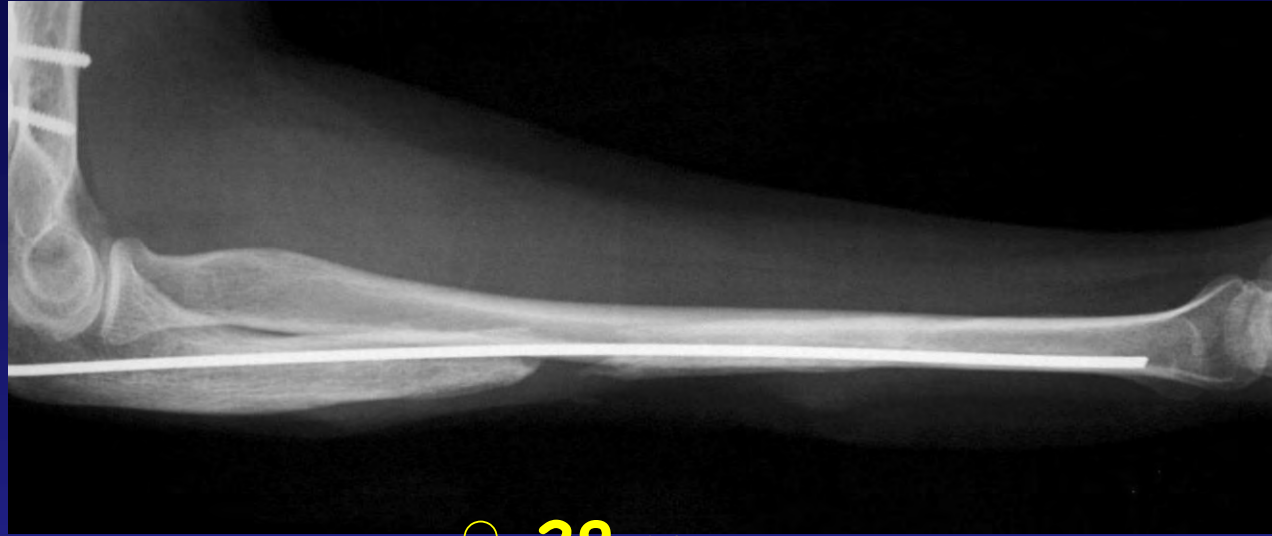


♂ 18 y





F. U. 3 months

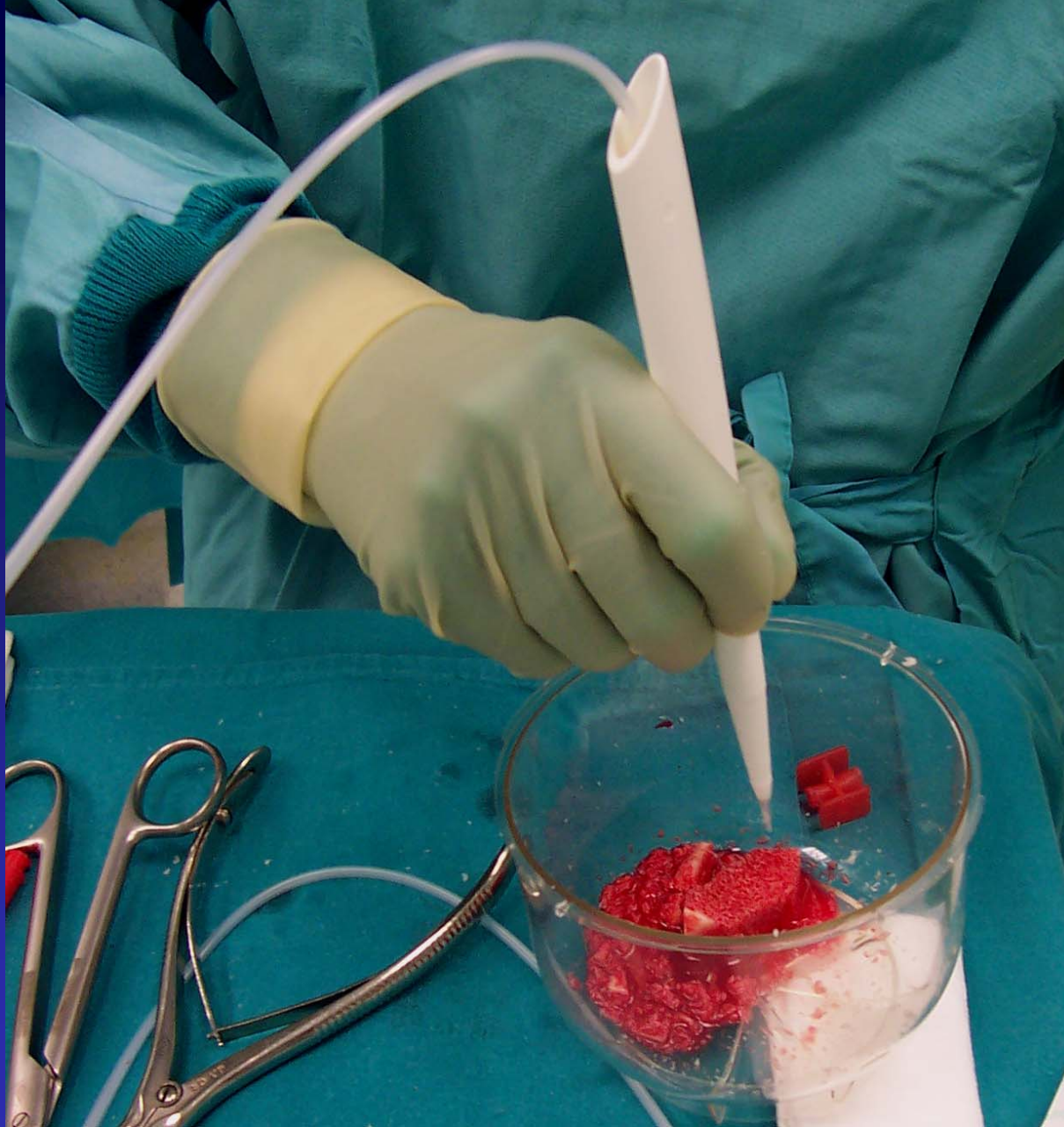


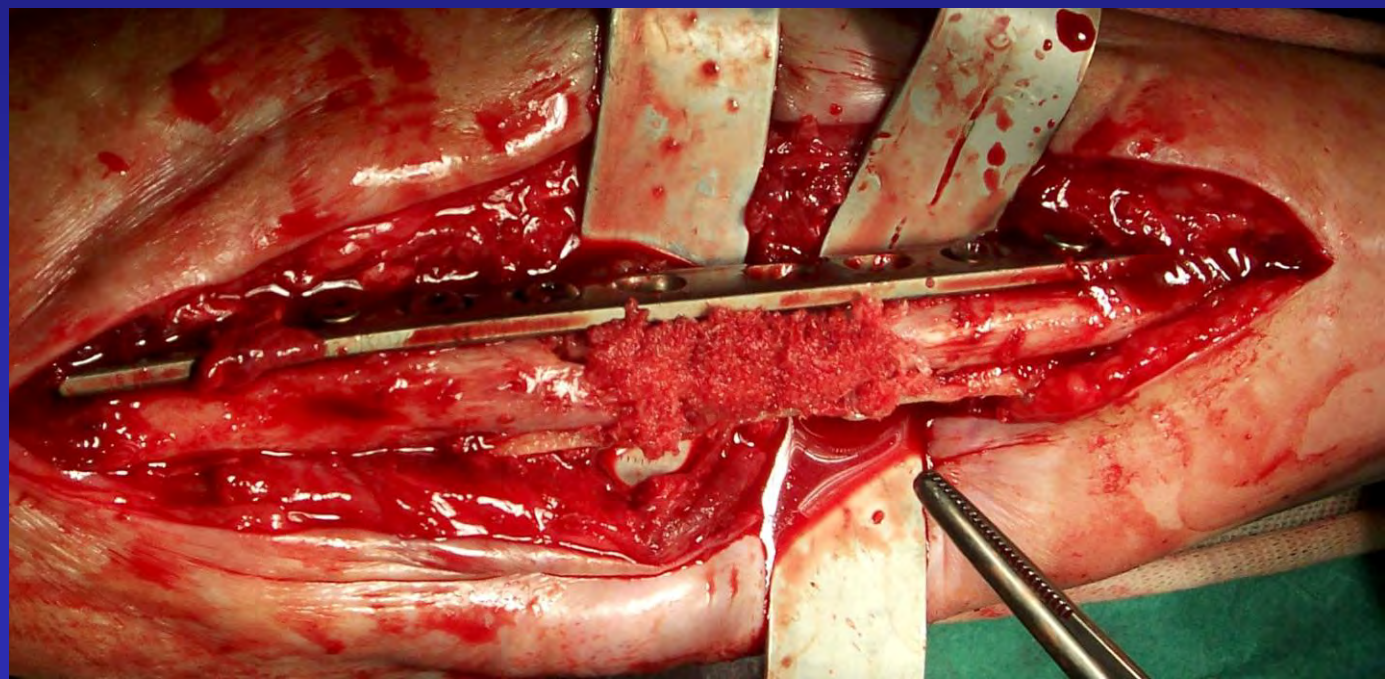
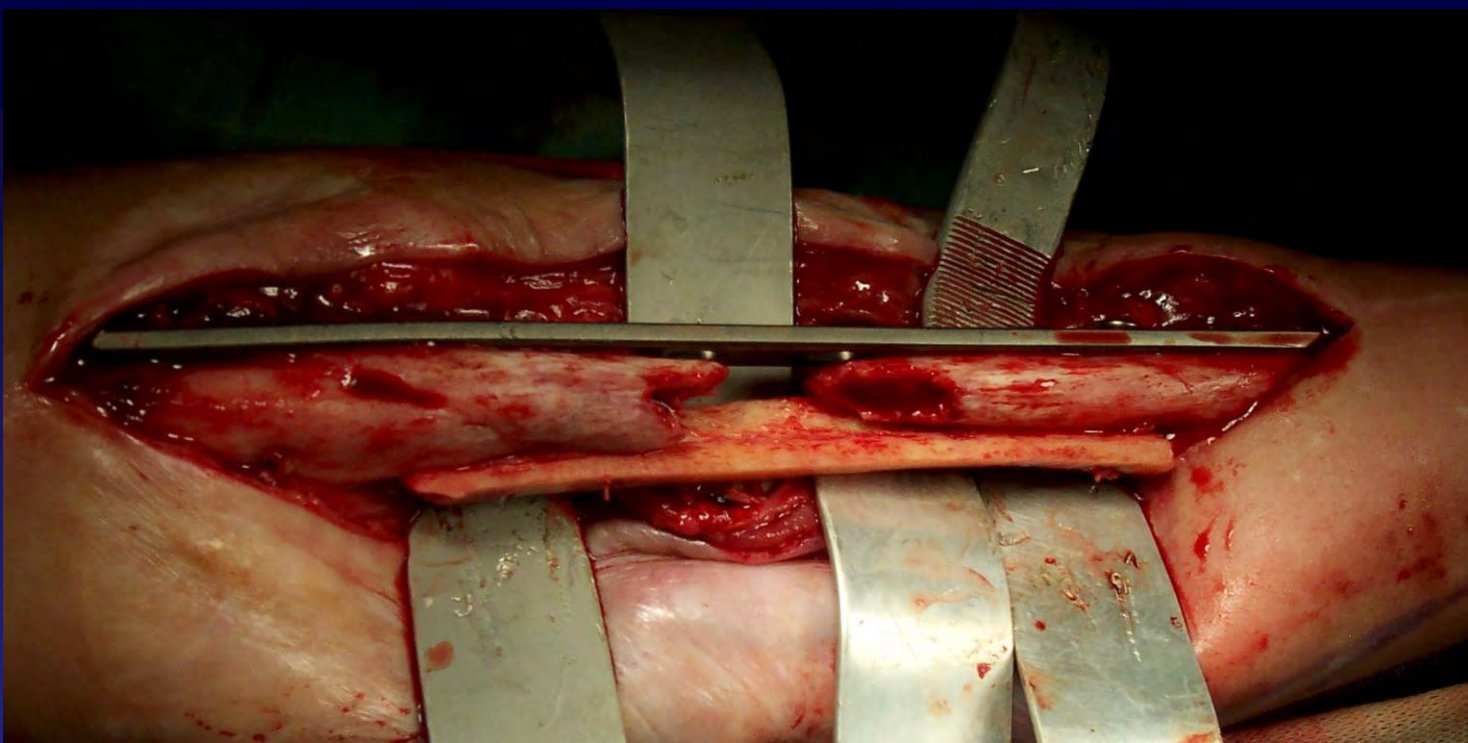
♀ 28 y

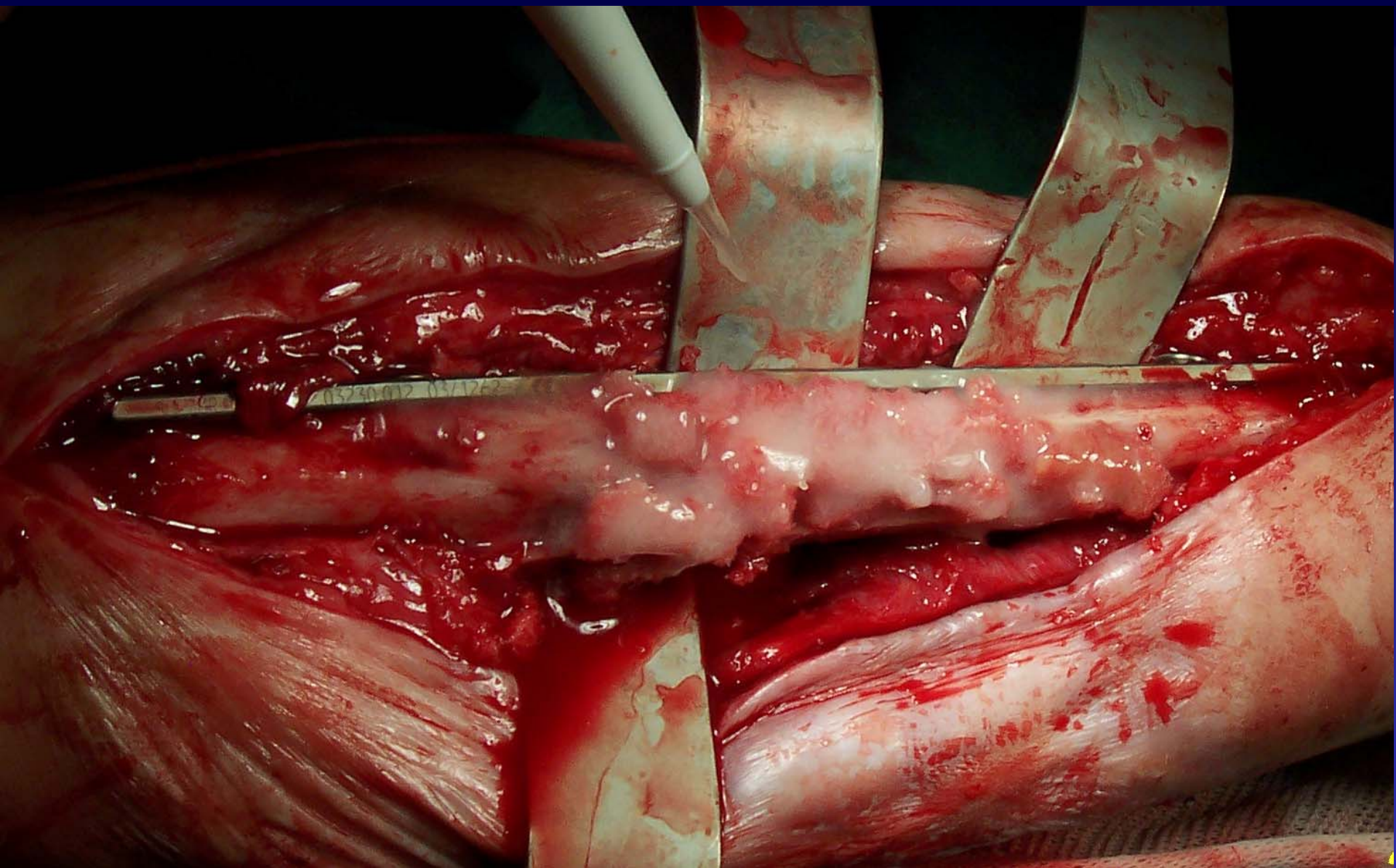


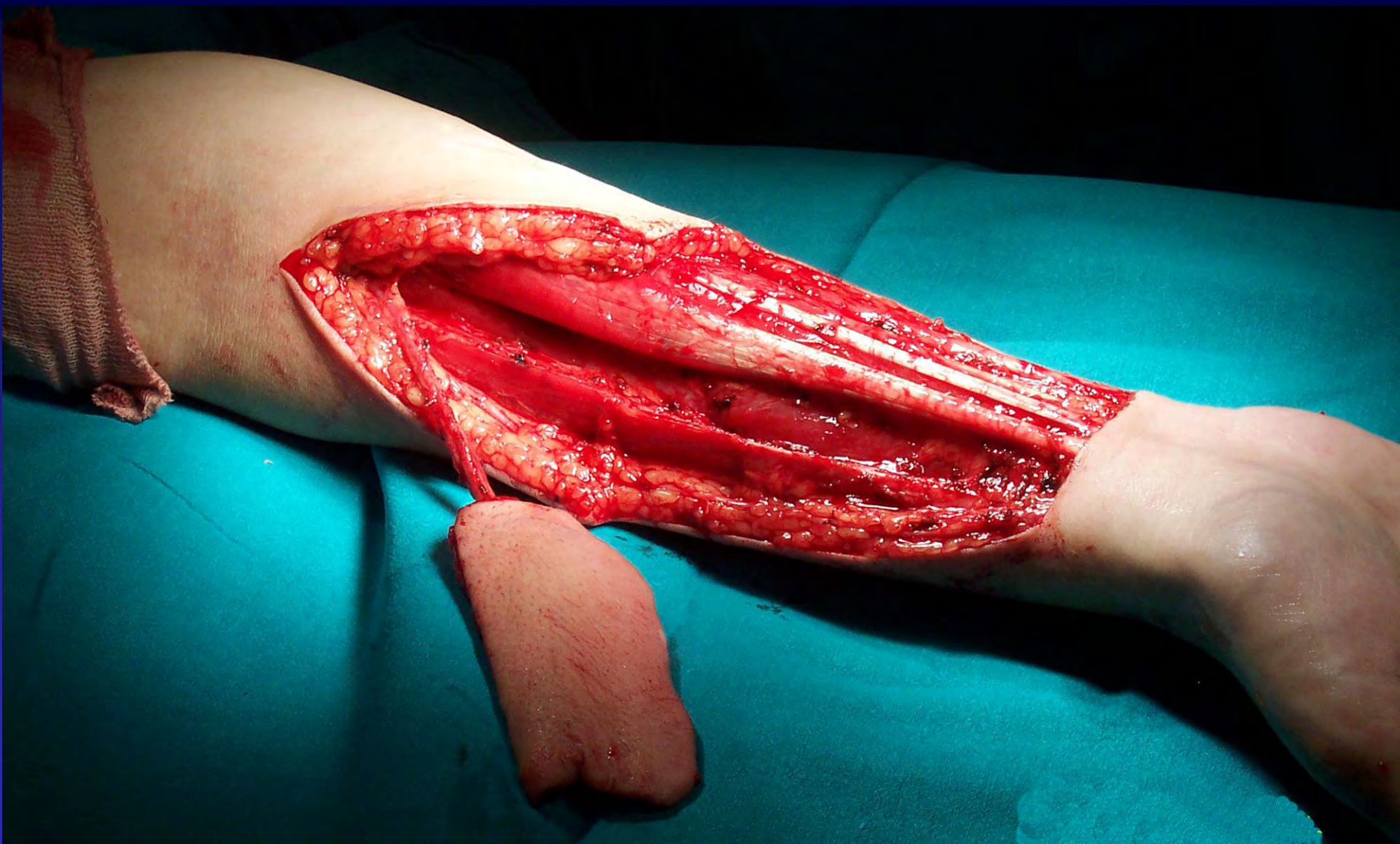


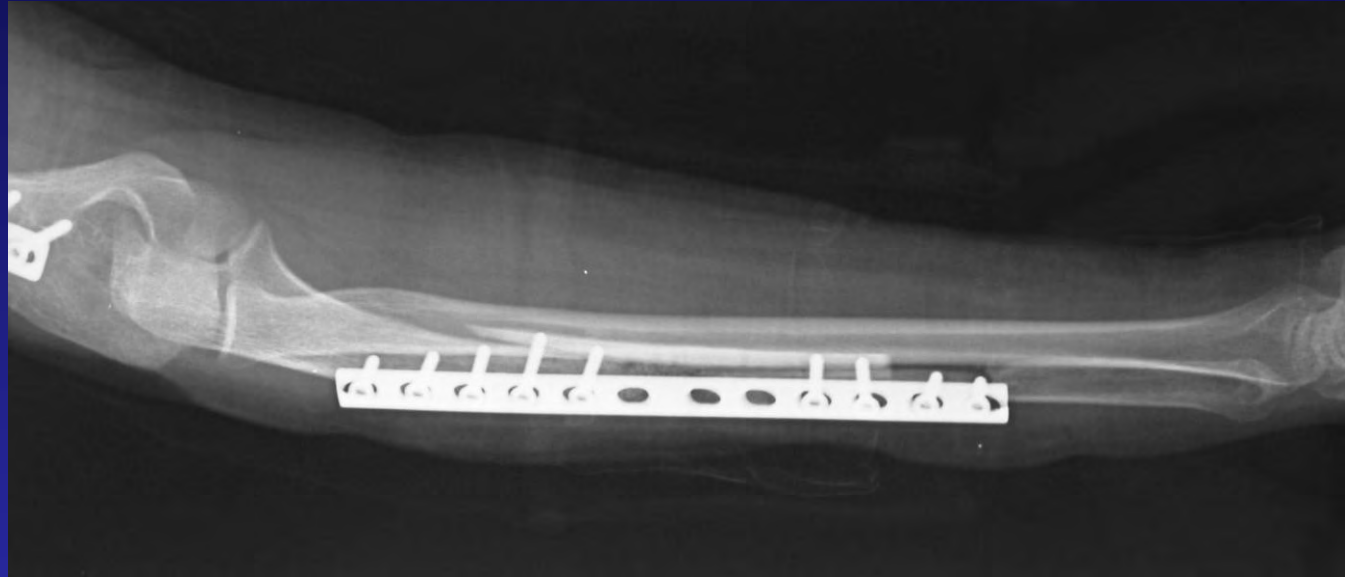




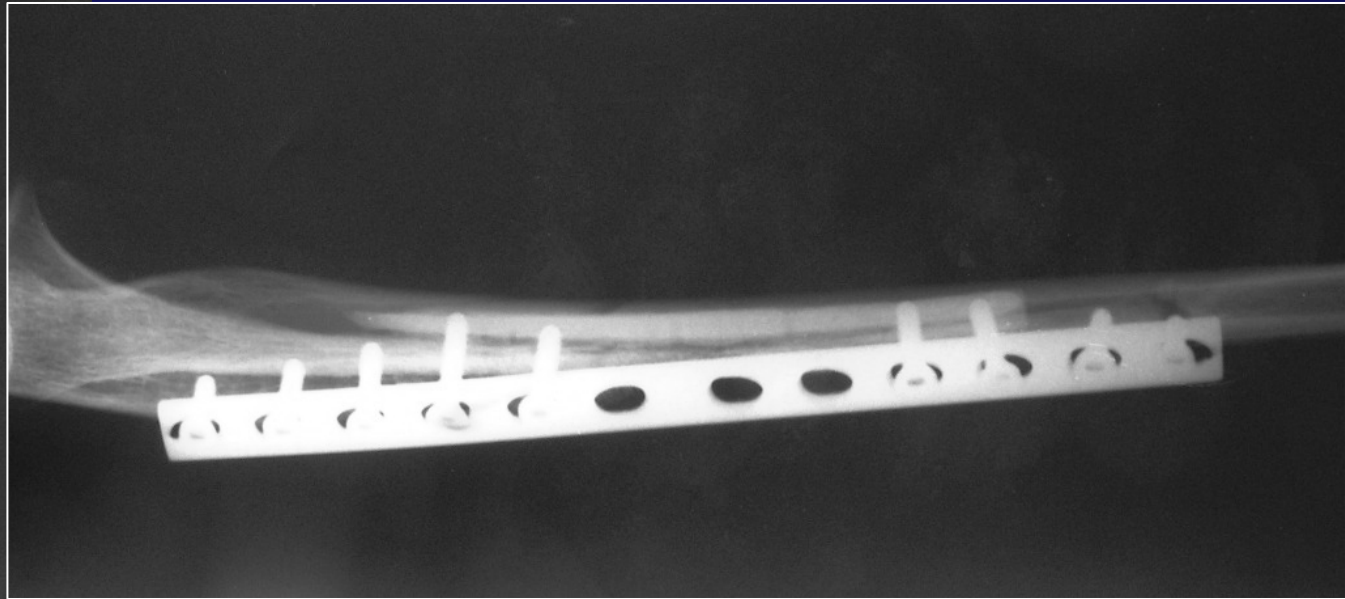
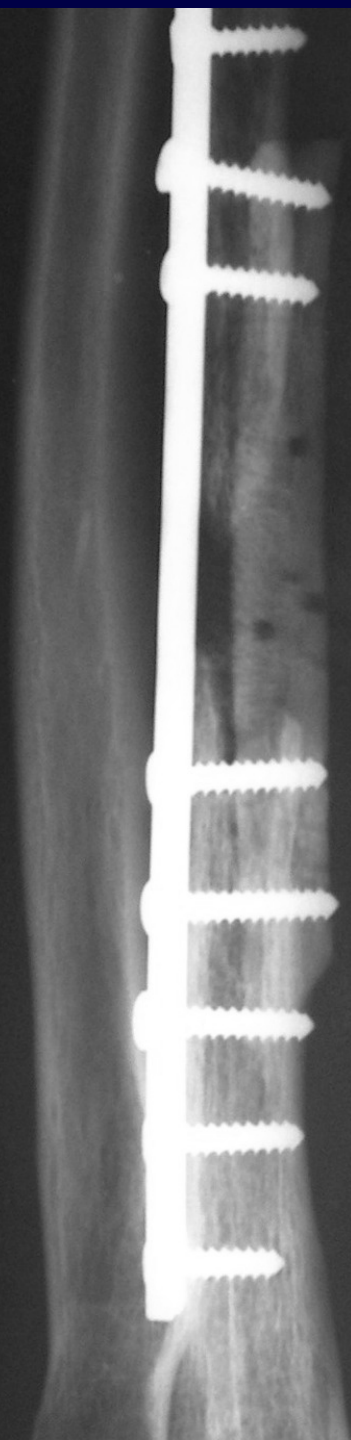








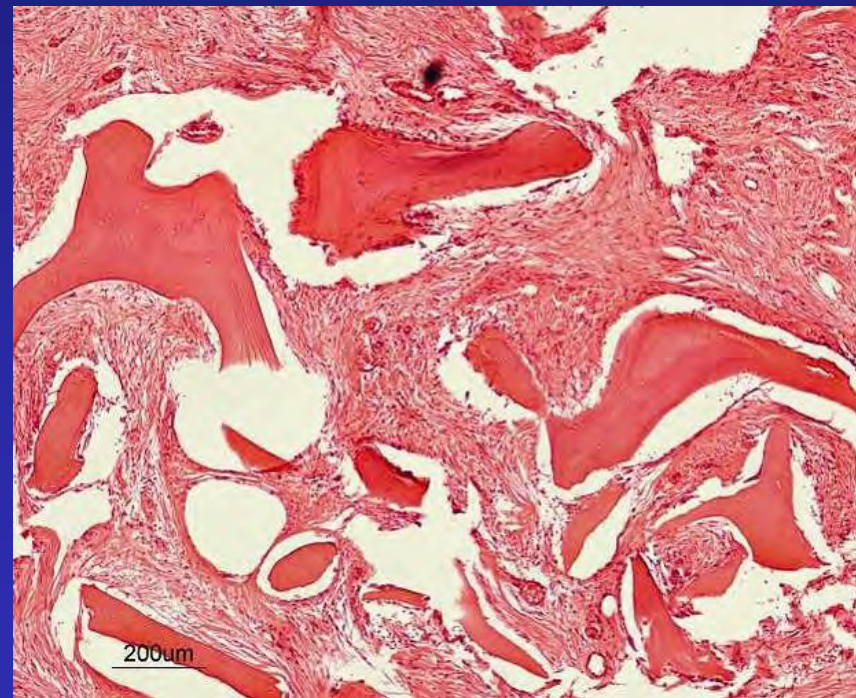
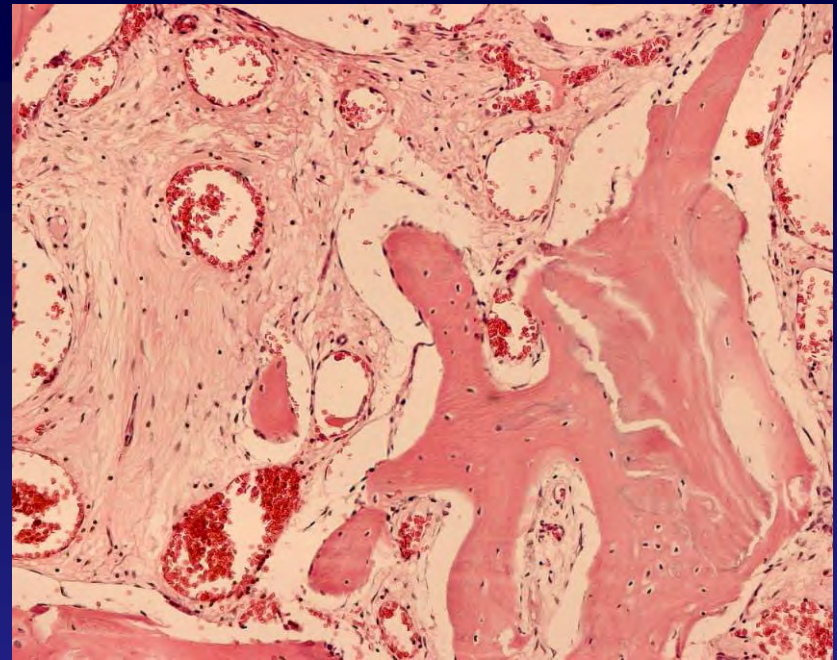
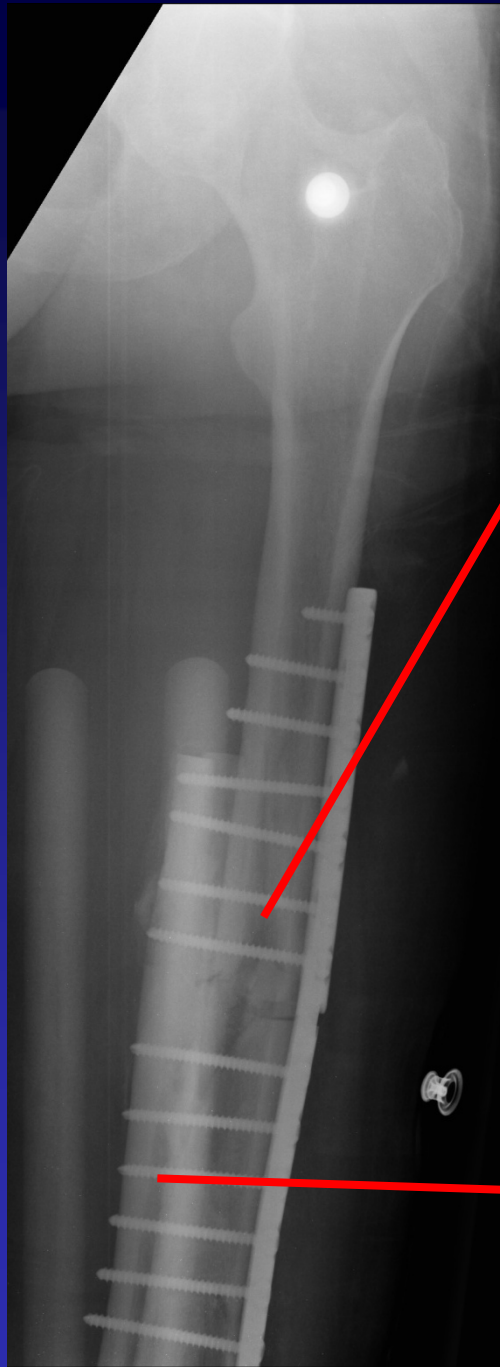
F. U. 2 months

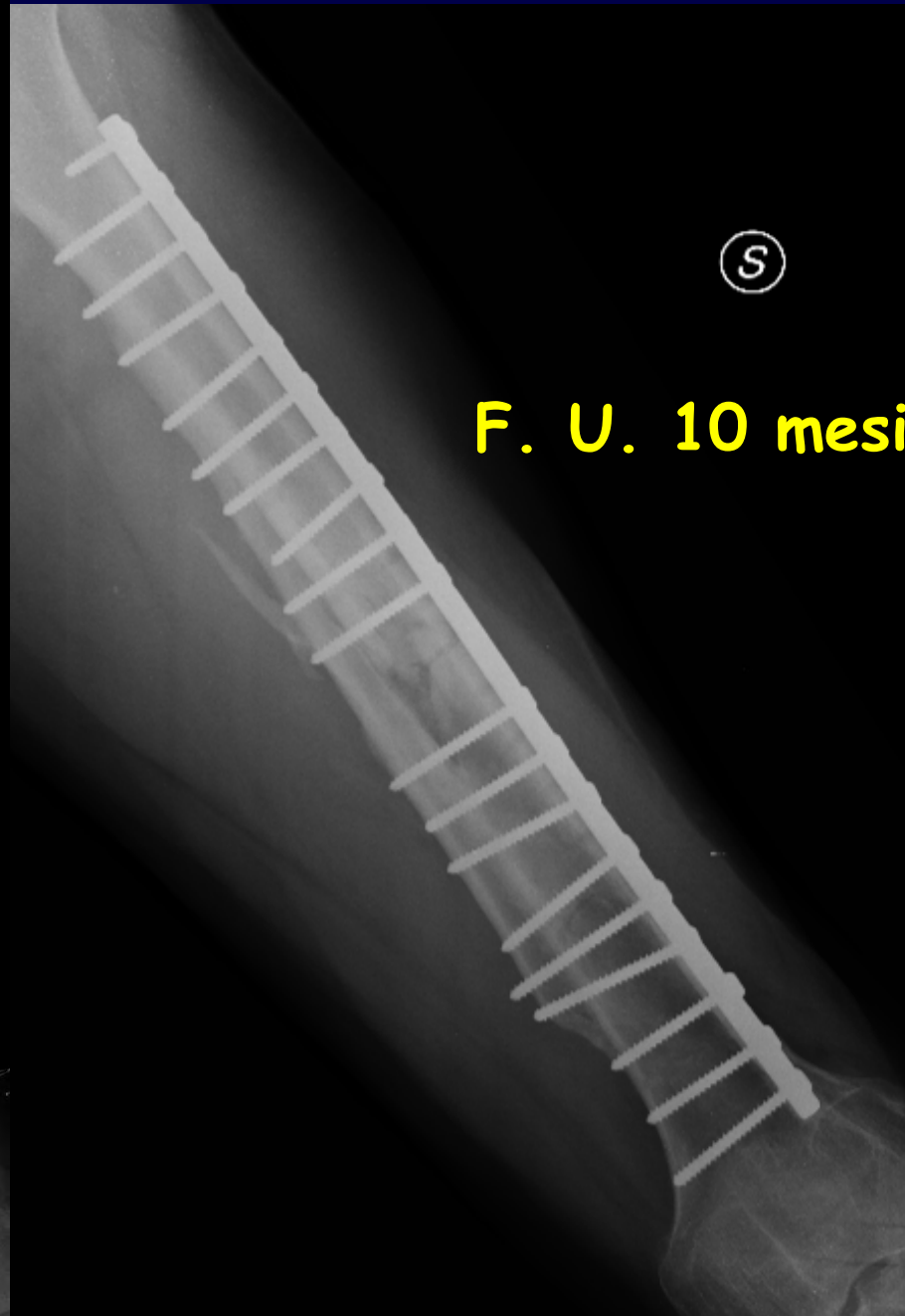
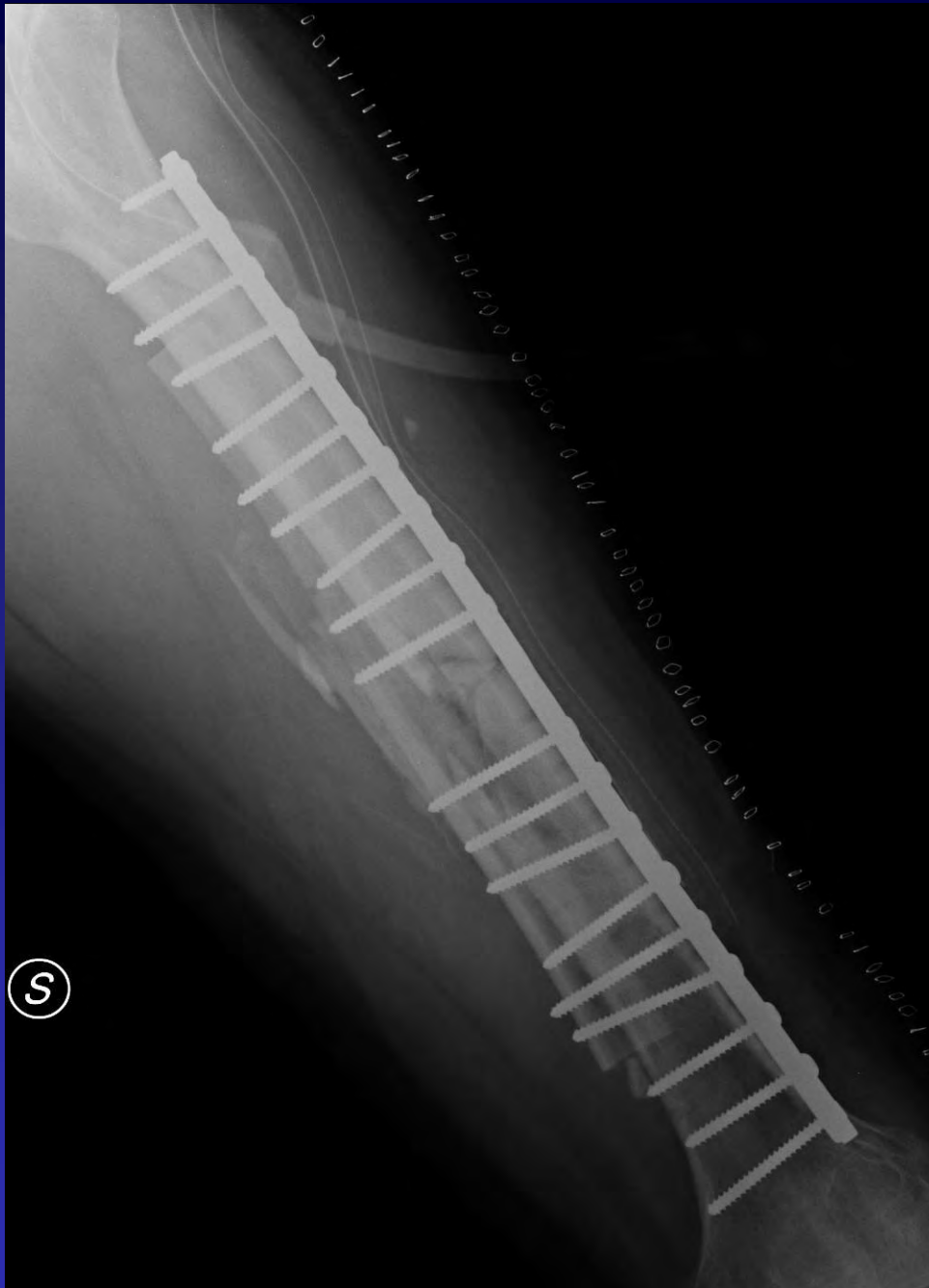


F. U. 4 months

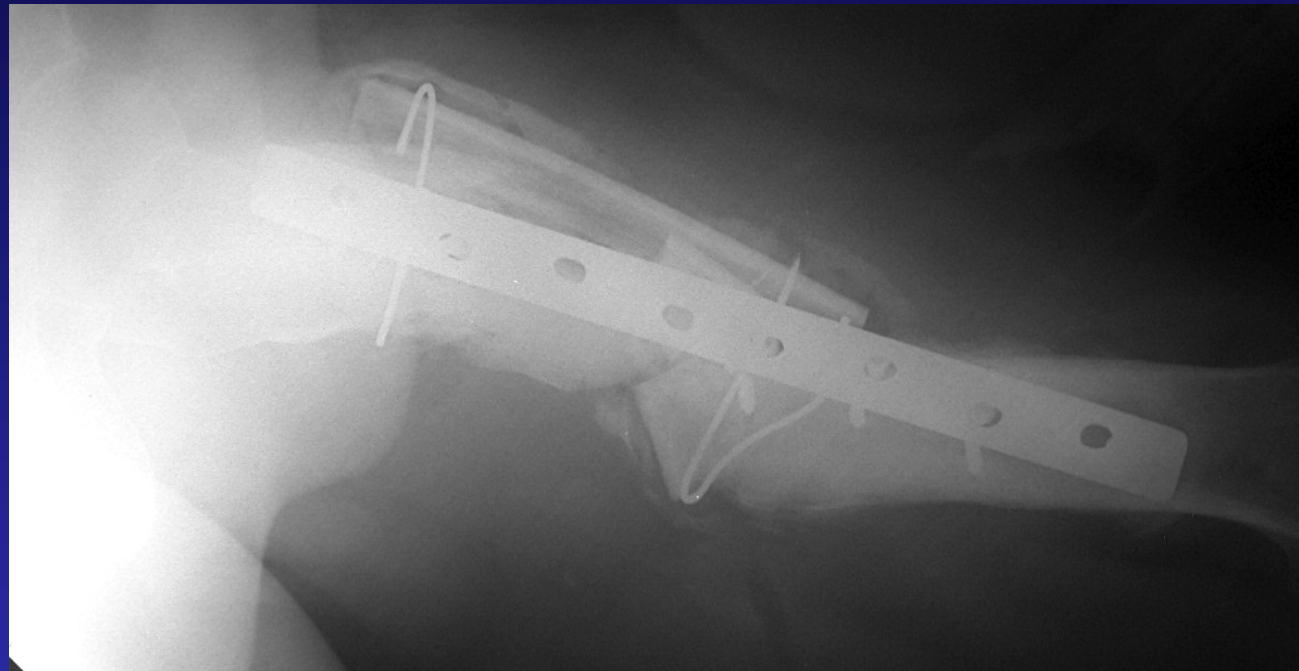


♂ 30 y

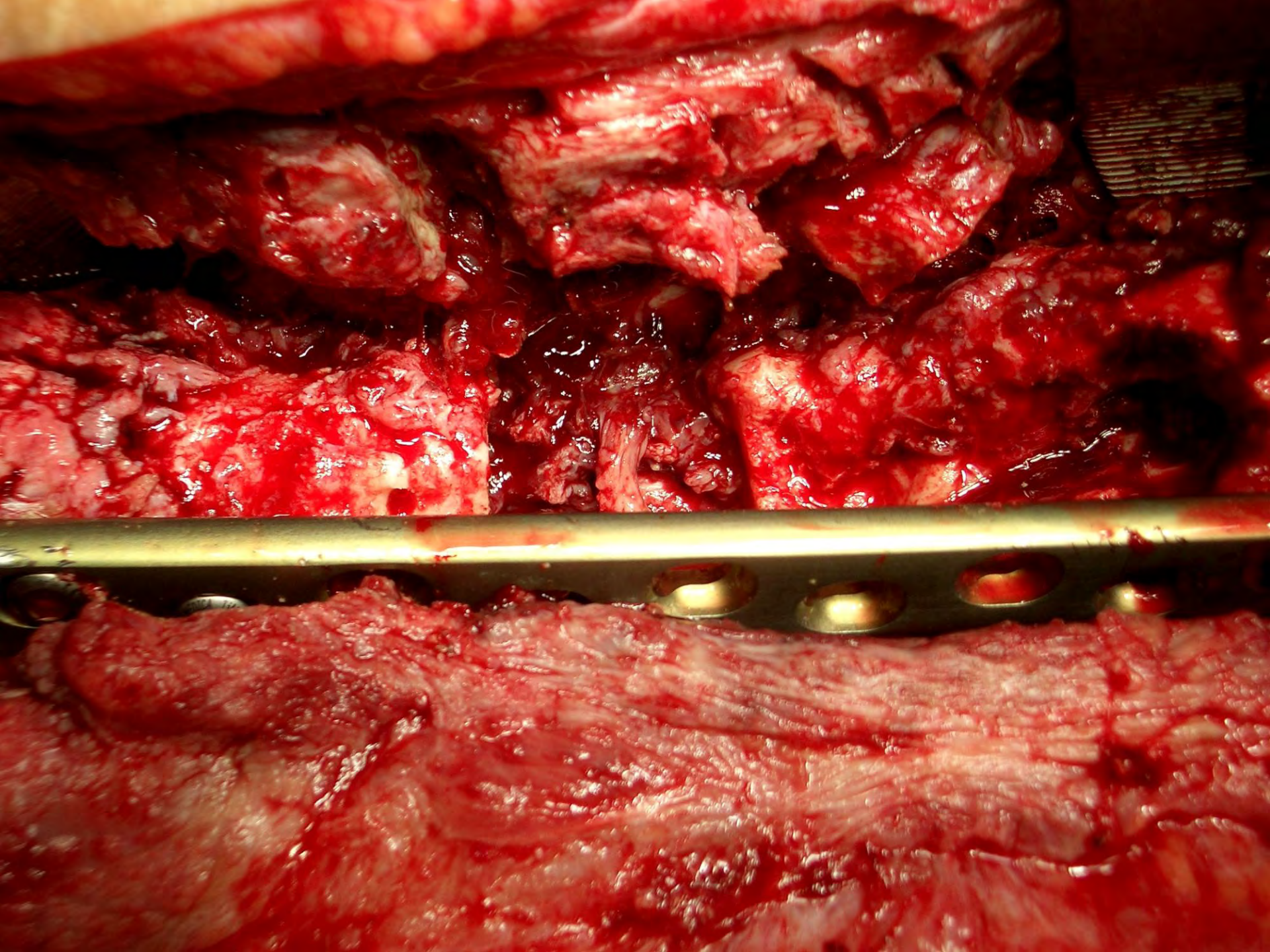




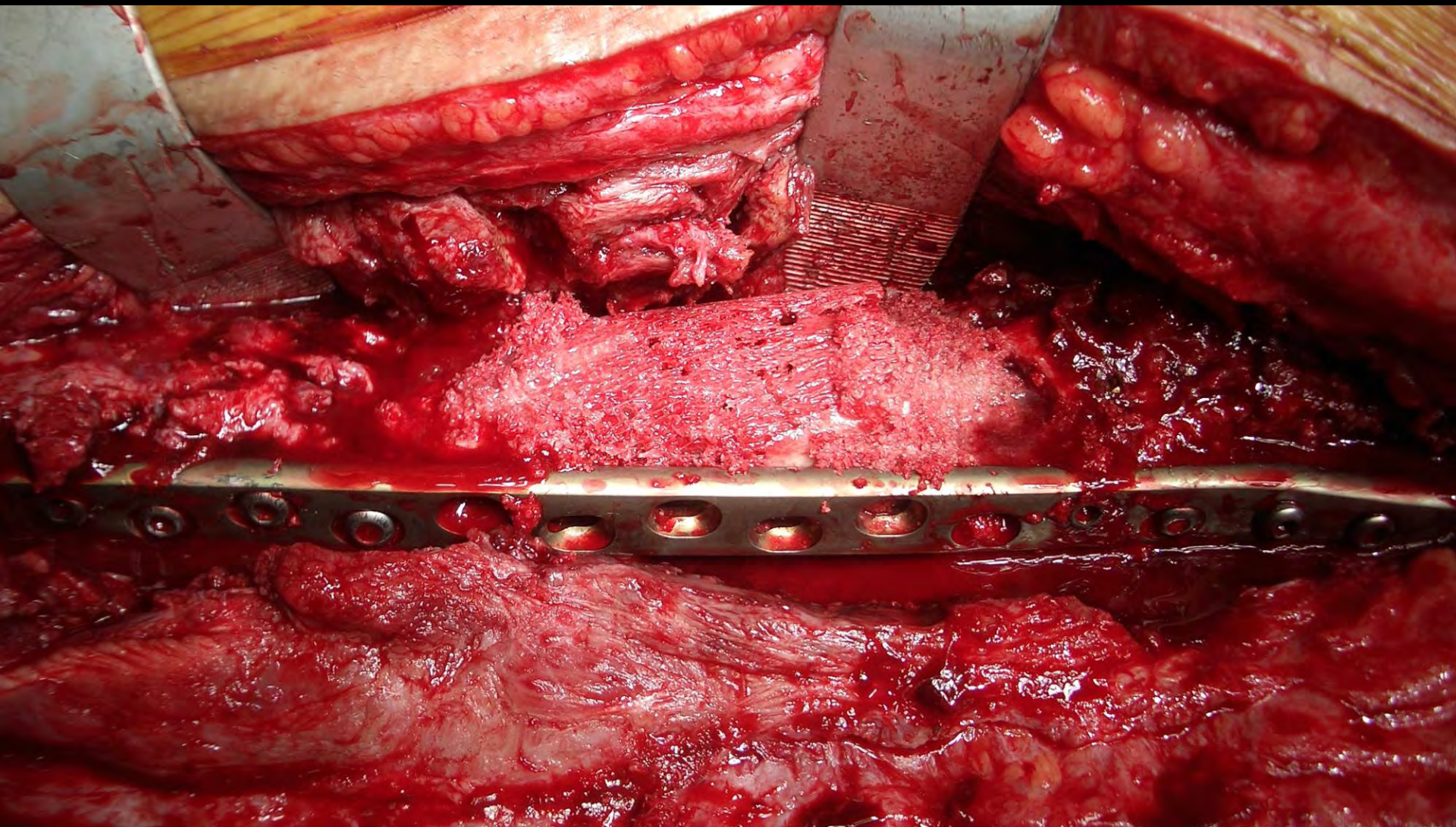
F. U. 10 mesi

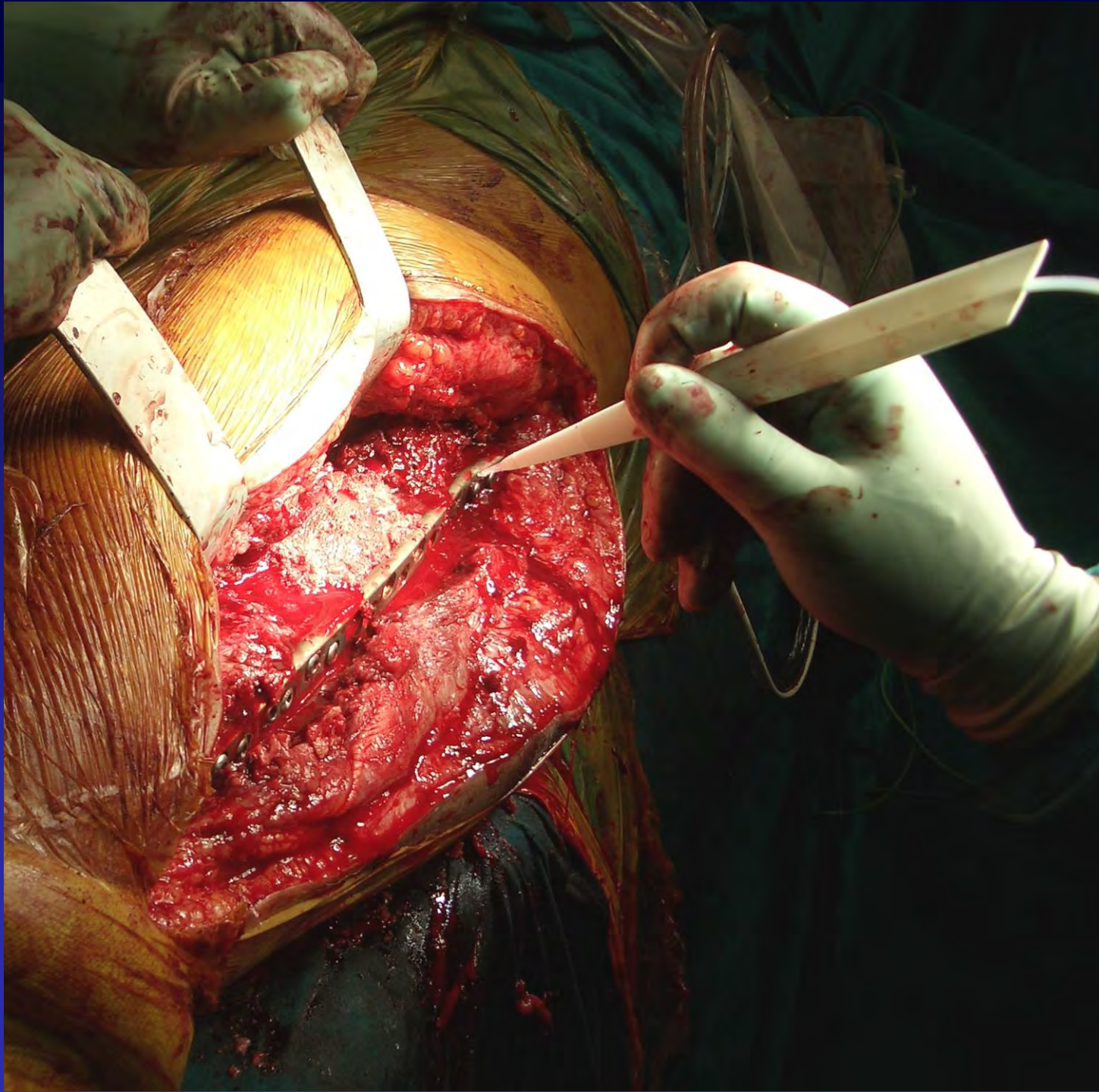


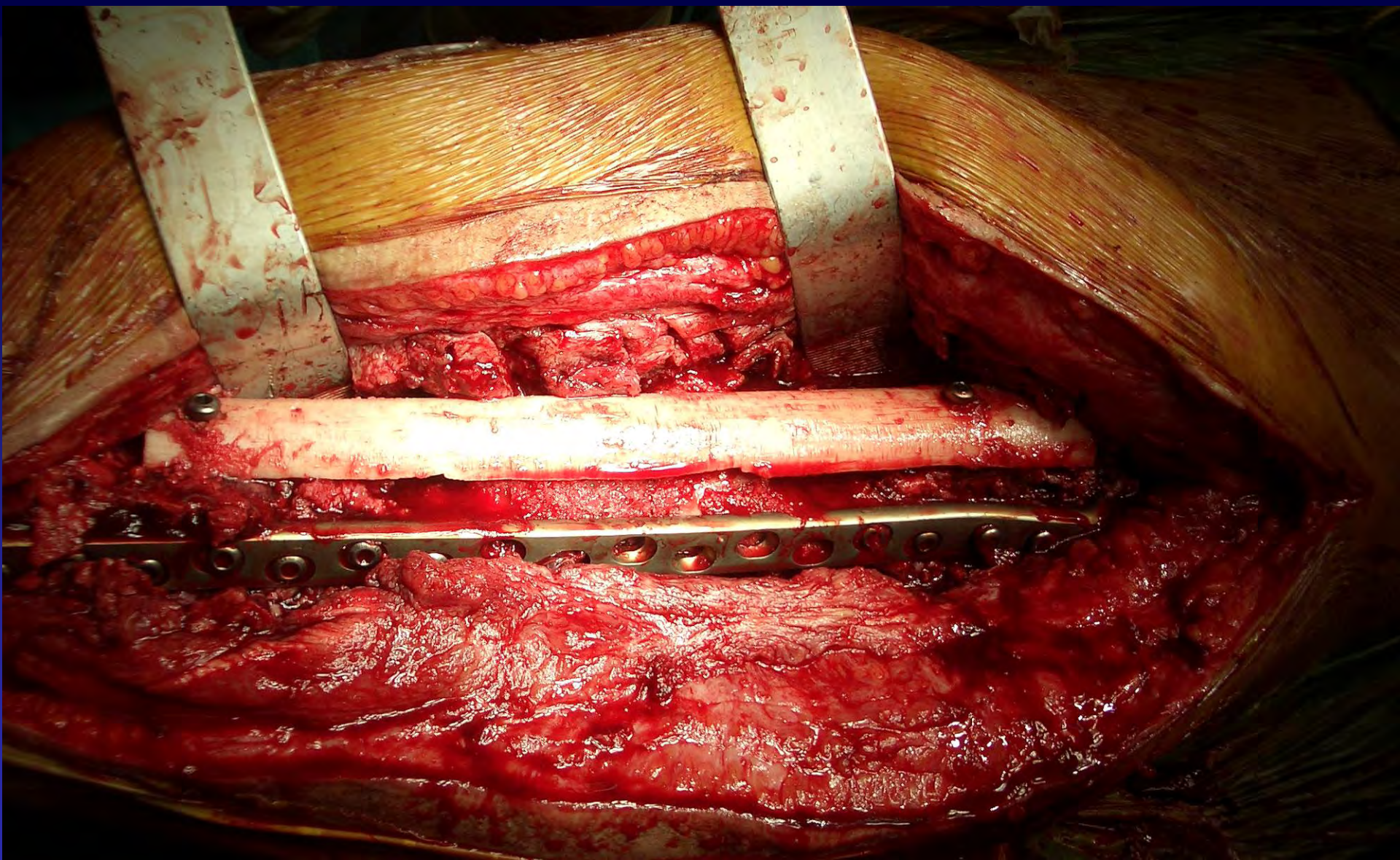
♂ 42 y

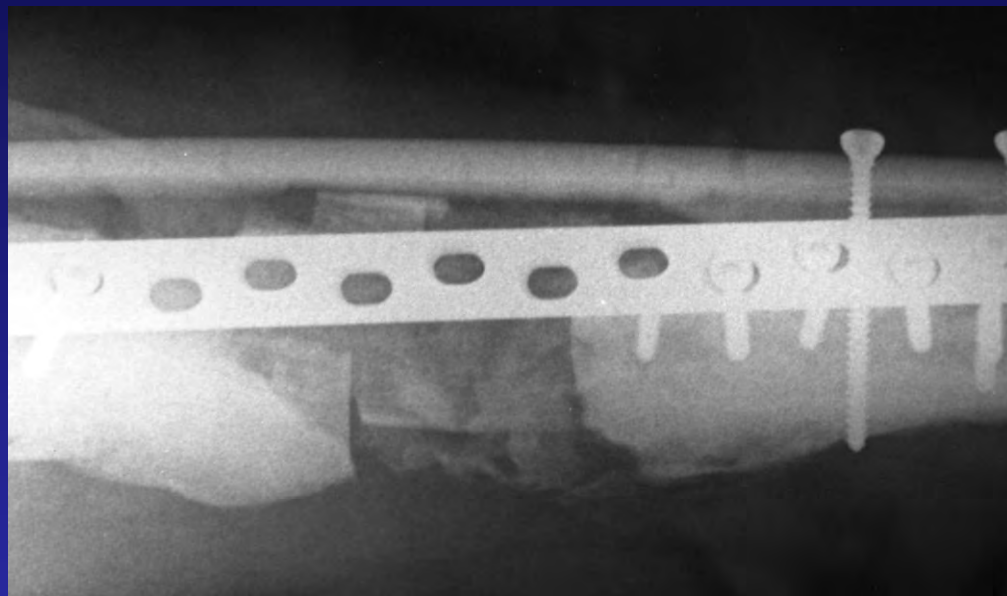
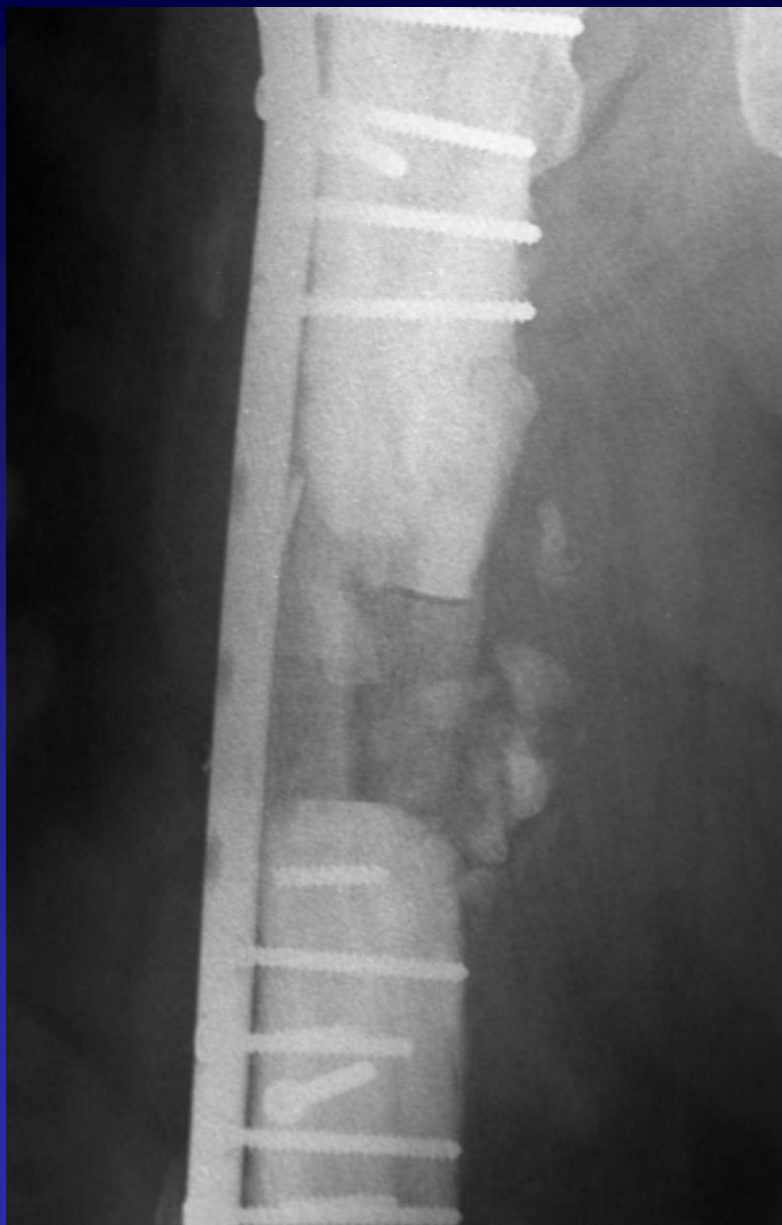




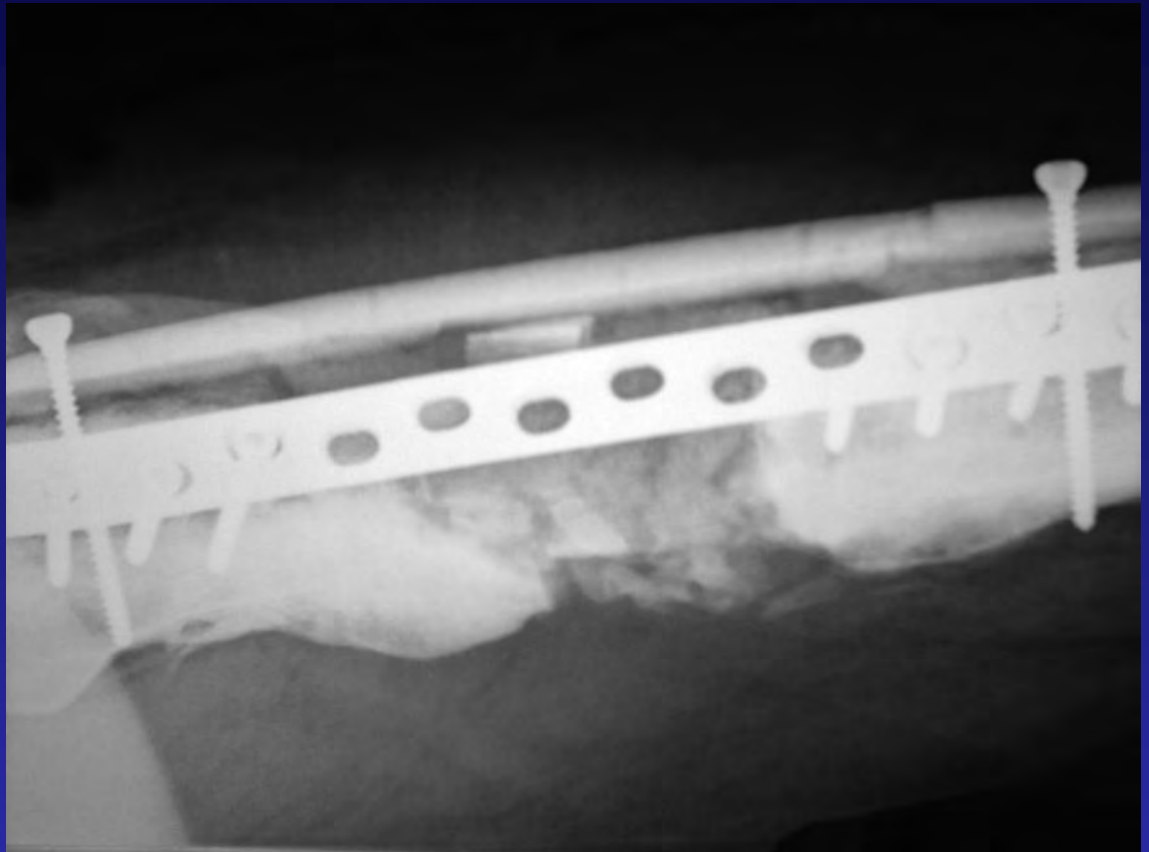
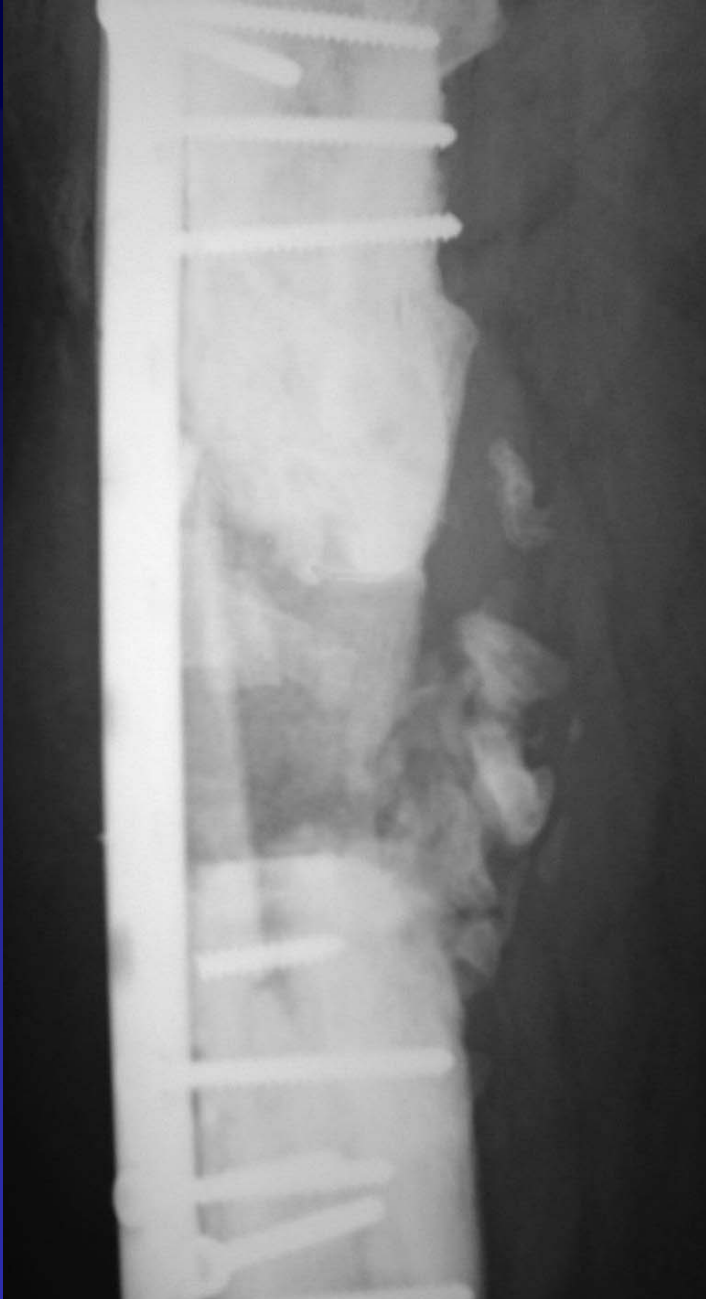








F. U. 40 days

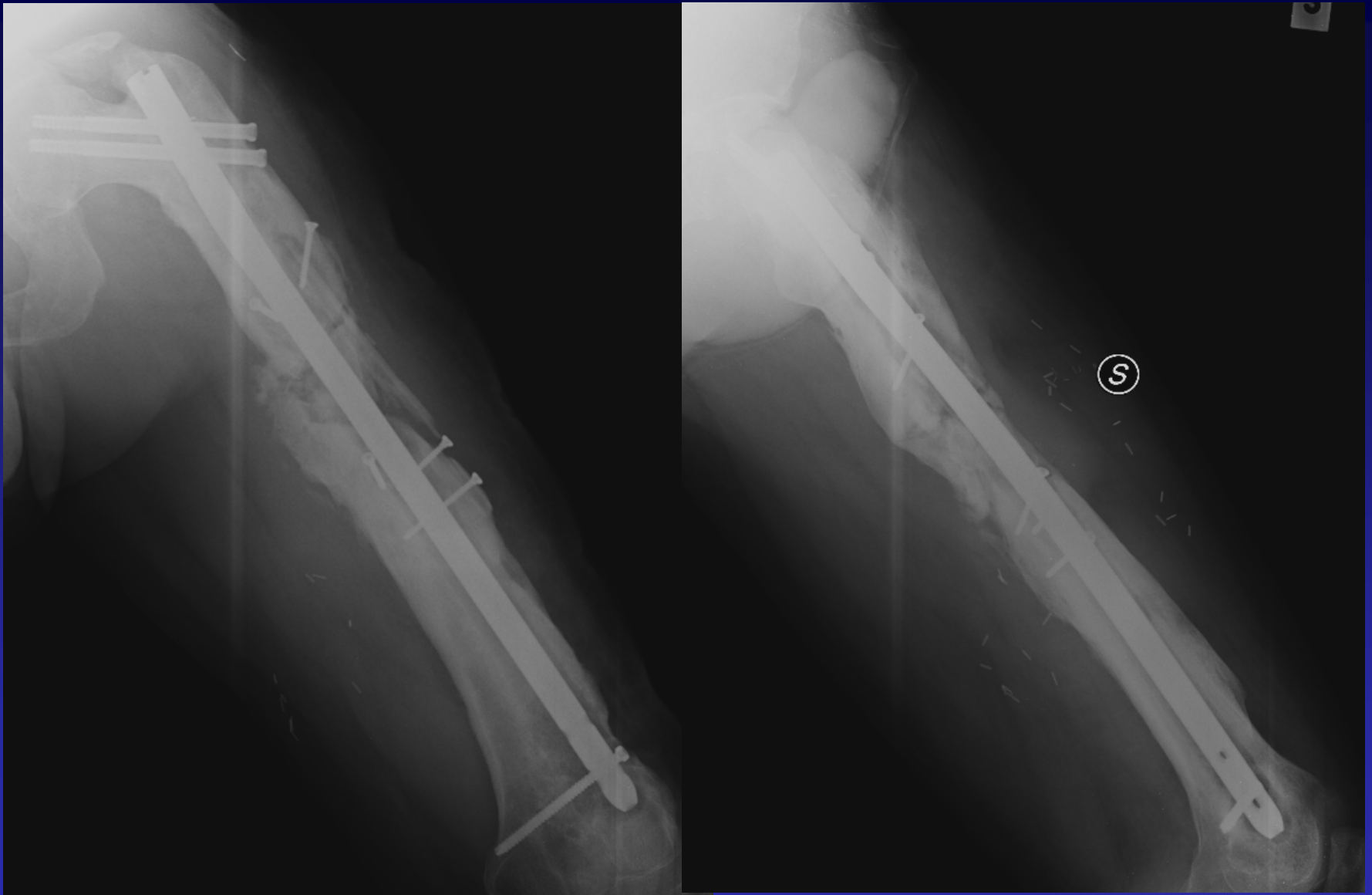


F. U. 4 months



Con perdita



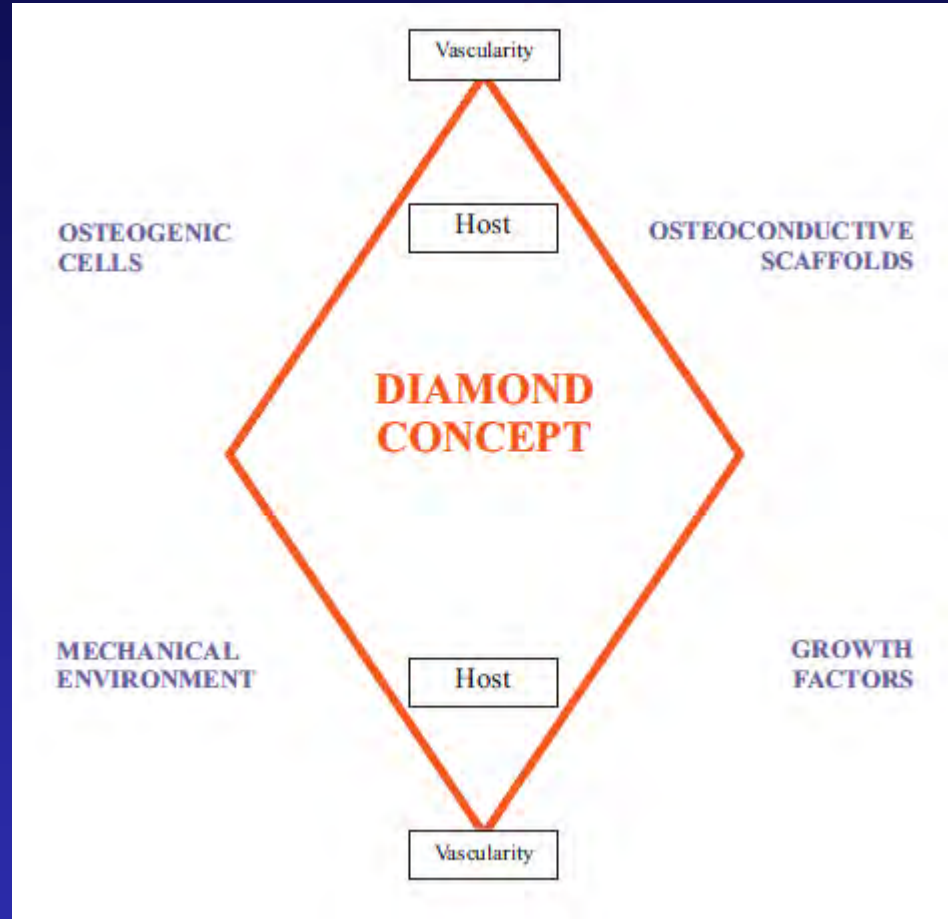


Dopo un anno di terapia
con Teriparatide



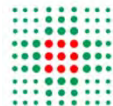
**Rimozione dei mds per
infezione cronica**

Regenerative Medicine





... thanks



SERVIZIO SANITARIO REGIONALE
EMILIA - ROMAGNA
Istituto Ortopedico Rizzoli di Bologna
Istituto di Ricovero e Cura a Carattere Scientifico

