SIFE
SOCIETÀ ITALIANA
FISSAZIONE ESTERNA

CONGRESSO NAZIONALE SOCIETÀ ITALIANA FISSAZIONE ESTERNA

Fissazione esterna nel trattamento delle emergenze e traumi militari, tecniche di ricostruzione degli arti e trattamento degli esiti postraumatici

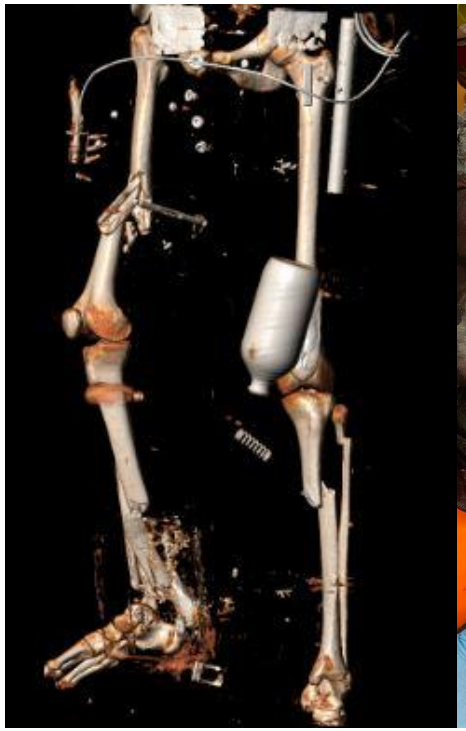
ROMA

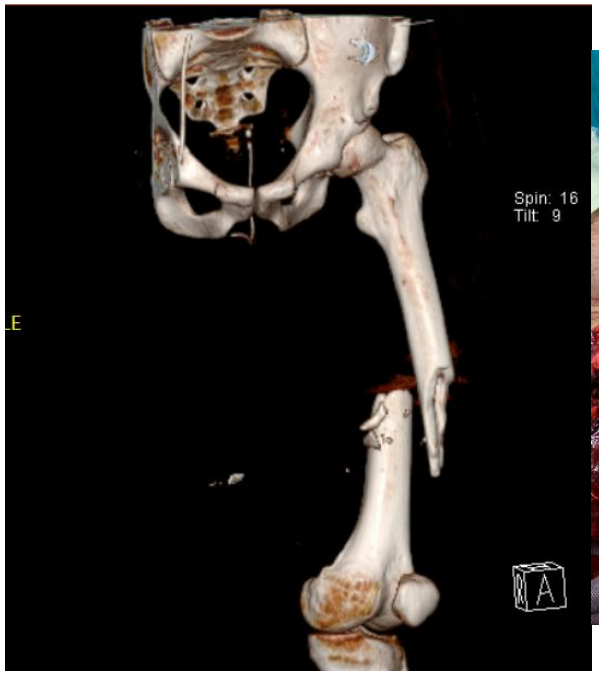
2025

16-17 MAGGIO 2025

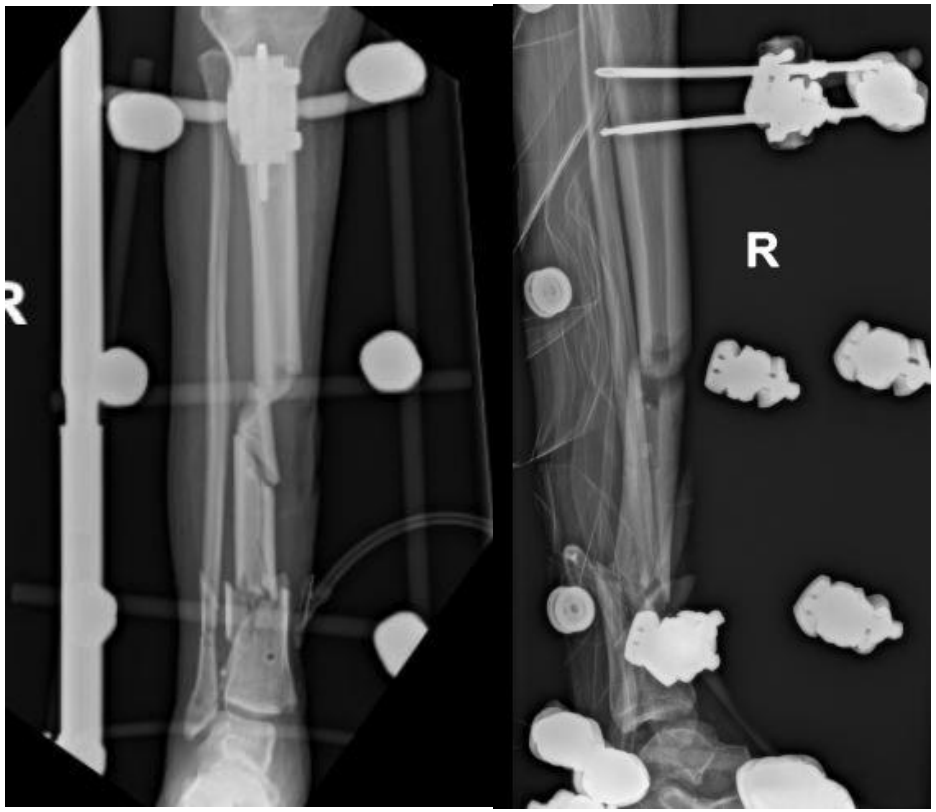
Difetti ossei ed infezioni nei traumi severi

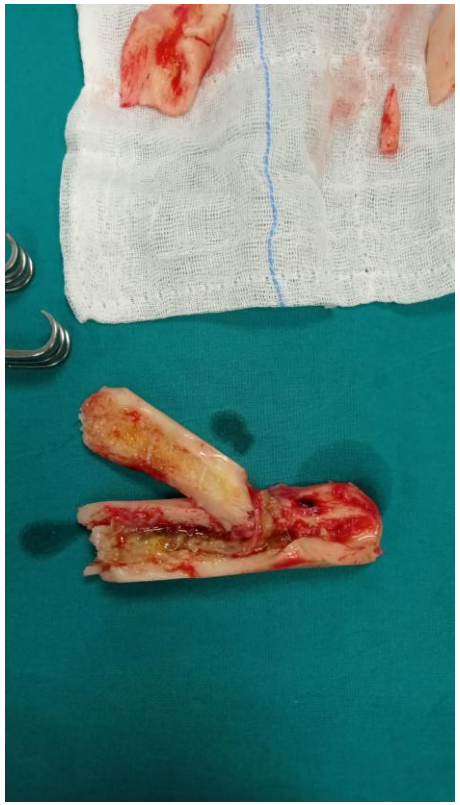
Primari





Secondari





Classificazione

ORIGINAL ARTICLE

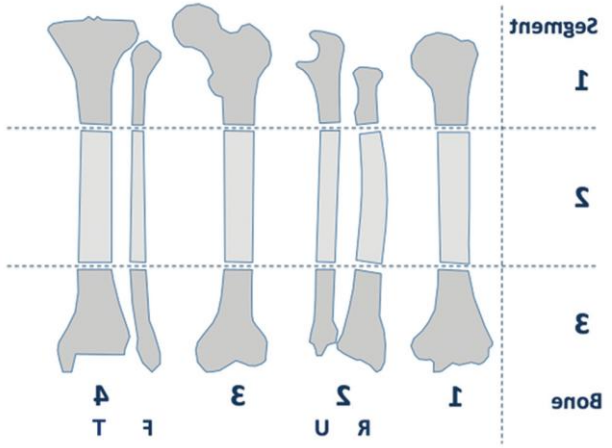
Universal Long Bone Defect Classification

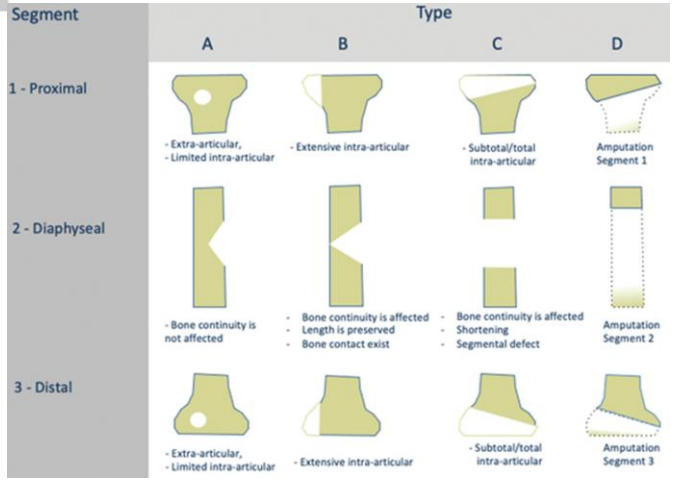
Solomin, L.[1]; Komarov, Artem[2]; Semenistyy, Anton[3]; Sheridan, Gerard A.[4,]; Rozbruch, S. Robert[4]

Author Information

Journal of Limb Lengthening & Reconstruction 8(1):p 54-62, Jan–Jun 2022. | **DOI:** 10.4103/jllr.jllr_3_22

Location			Morphology		
Bone	Segment		Type	Group	Subgroup
1	1	—	A	1	.1
2(R,U)	2		B	2	.2
3	3		C	3	.3
4(F,T)			(D)		

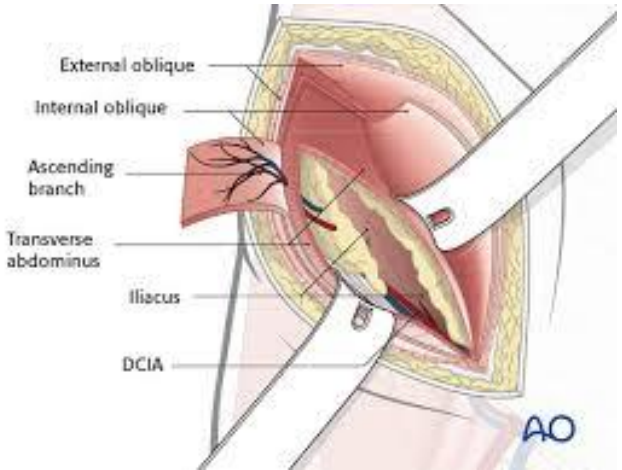


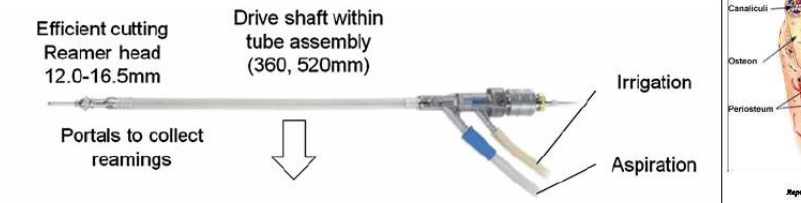


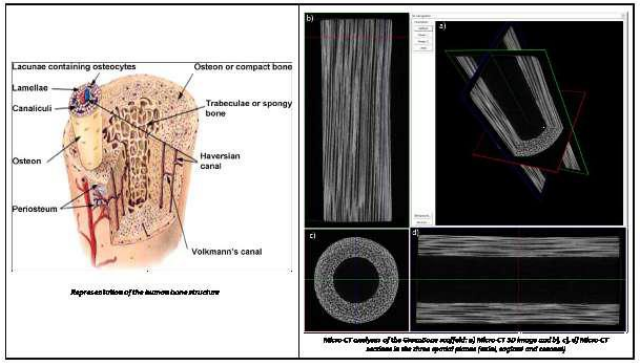
- Parziali
- Minimi
- Critici : Lunghezza maggiore 2 cm o maggiore del 50% della circonferenza

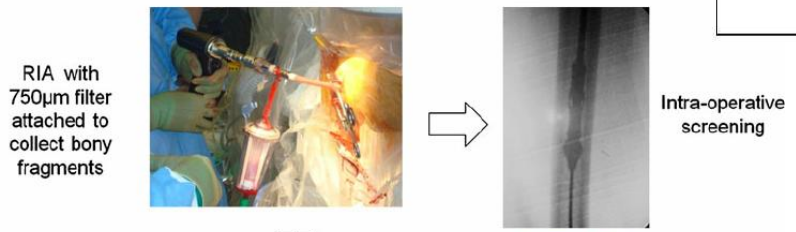
Il riempimento del gap osseo può essere realizzato tramite:

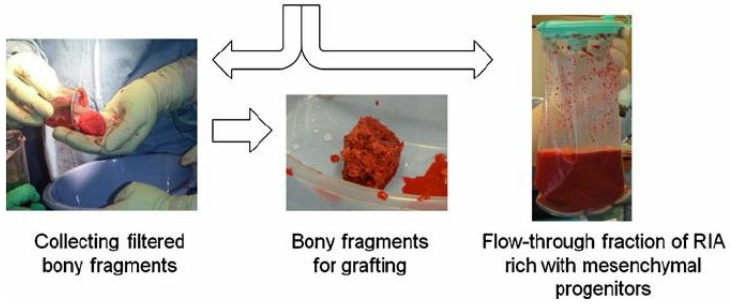
- Innesti ossei autologhi (Prelievo da siti donatori, RIA, innesto di perone vascolarizzato)
- Innesti ossei omologhi
- Innesti ossei eterologhi
- Innesti di materiale sintetico (calcio solfato,
  calcio fosfato



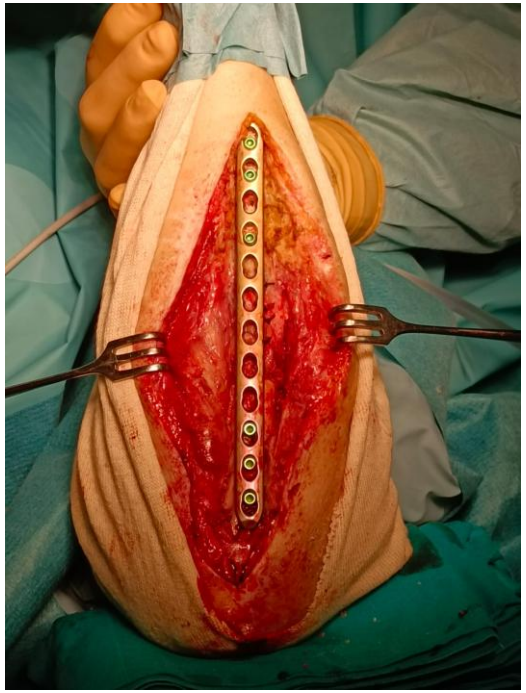








Tecnica di Masquelet



Caso per gentile concessione Dott. Calderazzi

Perone vascolarizzato

IL TRATTAMENTO DELLE PERDITE DI SOSTANZA OSSEA POST-TRAUMATICHE DELL'AVAMBRACCIO MEDIANTE IL PERONE VASCOLARIZZATO

R. ADANI, L. DELCROIX', M. INNOCENTI', I. MARCOCCIO, L. TARALLO, M. CERUSO'
Dipartimento delle Emergenze-Urgenze - Sezione di Ortopedia e Traumatologia,
Università degli Studi di Modena e Reggio Emilia
'Unità di Chirurgia della Mano e Microchirurgia Ricostruttiva, CTO, Firenze

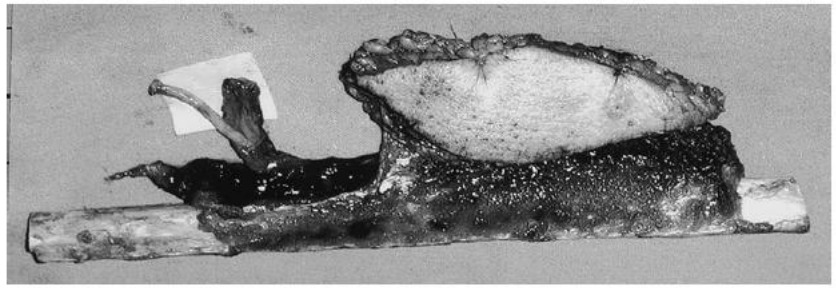
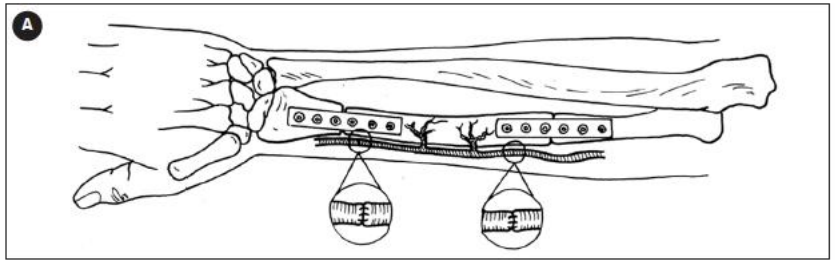
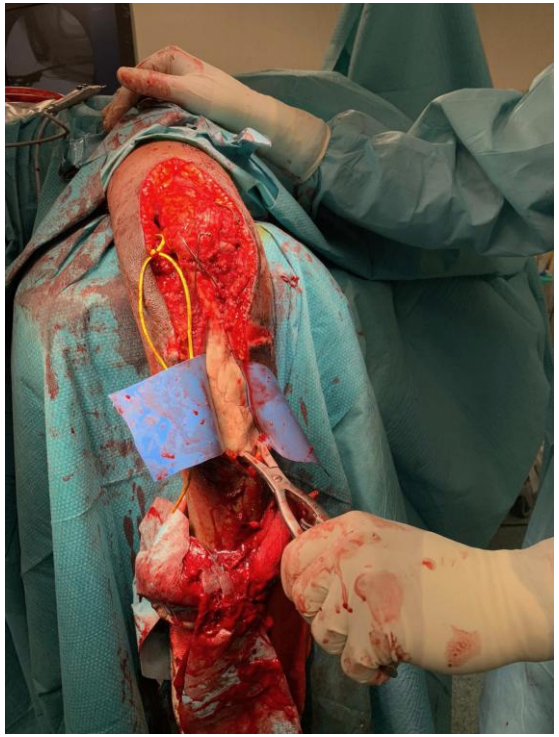


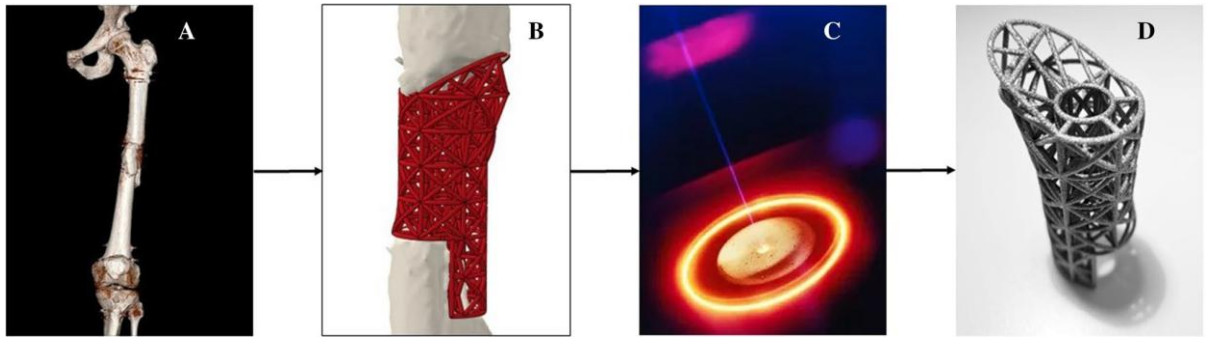
Figura 2. *Prelievo del perone come lembo osteocutaneo.*





Caso per gentile concessione Dott. Calderazzi\ Dott. Tos

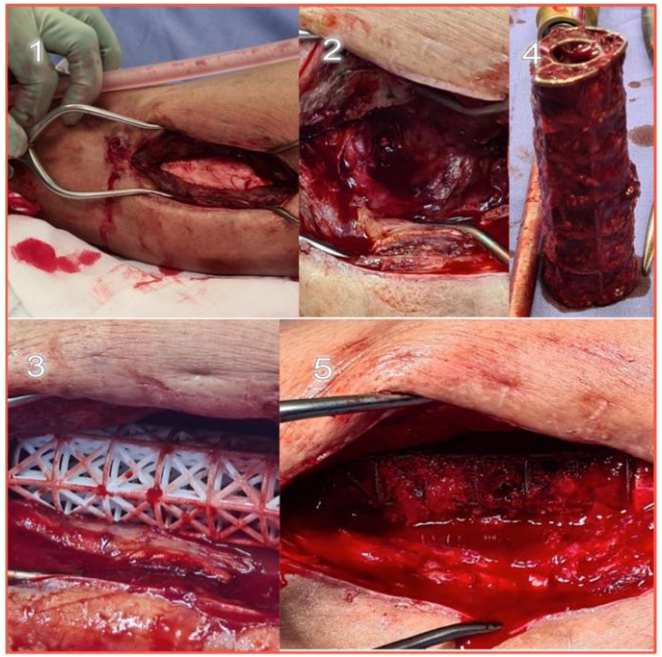
Utilizzo di cage in titanio



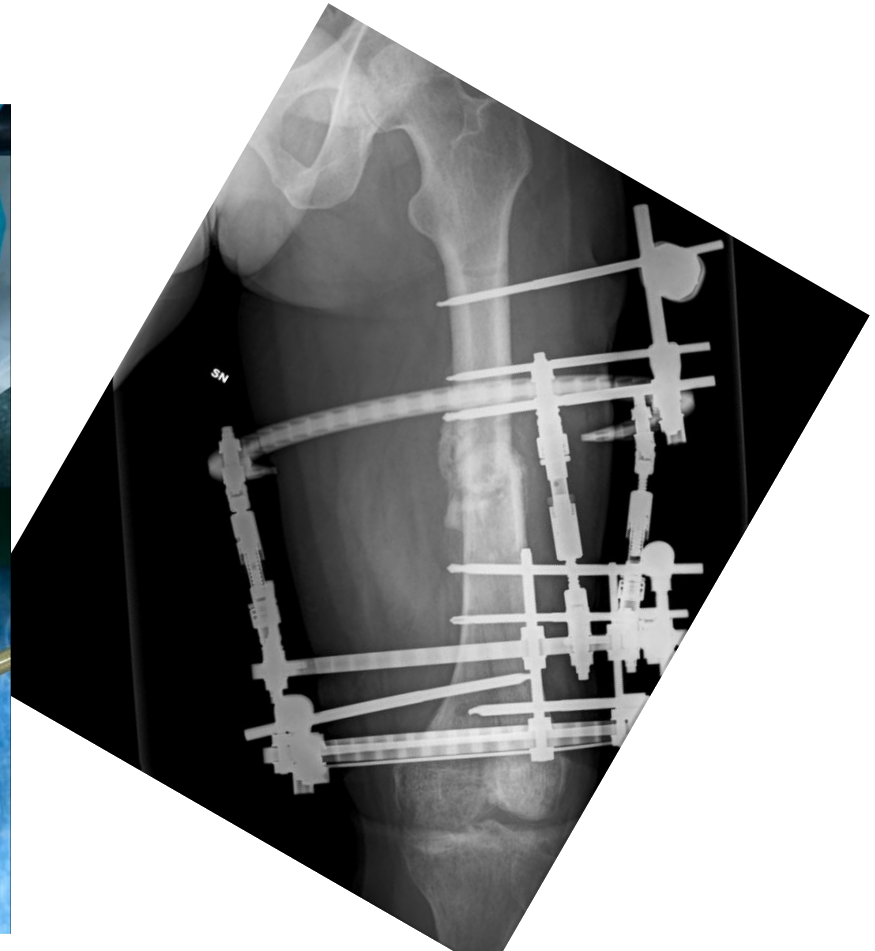
› Eur J Orthop Surg Traumatol. 2023 Apr;33(3):497-505.
doi: 10.1007/s00590-022-03434-5. Epub 2022 Nov 16.

Filling the gap: a series of 3D-printed titanium truss cages for the management of large, lower limb bone defects in a developing country setting

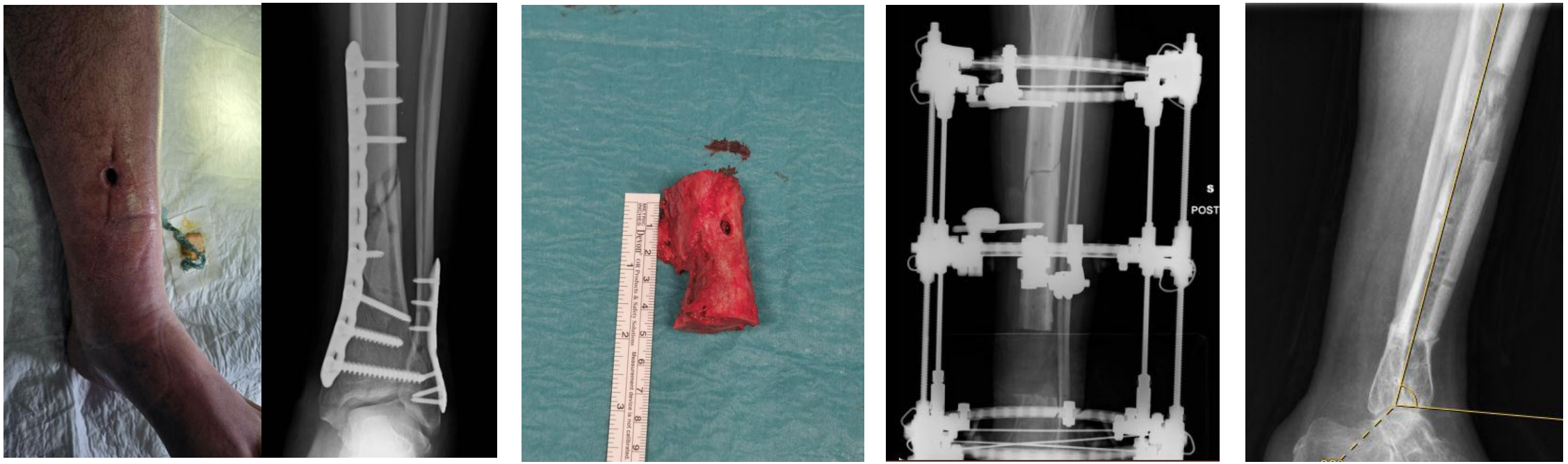
Hammaad Gamieldien [1], Nando Ferreira [2], Franz Friedrich Birkholtz [3 4], Thomas Hilton [5], Neil Campbell [6], Maritz Laubscher [5]



Accorciamento in acuto



Osteogenesi per distrazione



Fracture Related Infection

BJR
INFOGRAPHIC
Fracture-related infection
S. Baertl, W-J. Metsemakers,
Cite this article: *Bone Joint Res* 2021;10(6):351–353.

Background

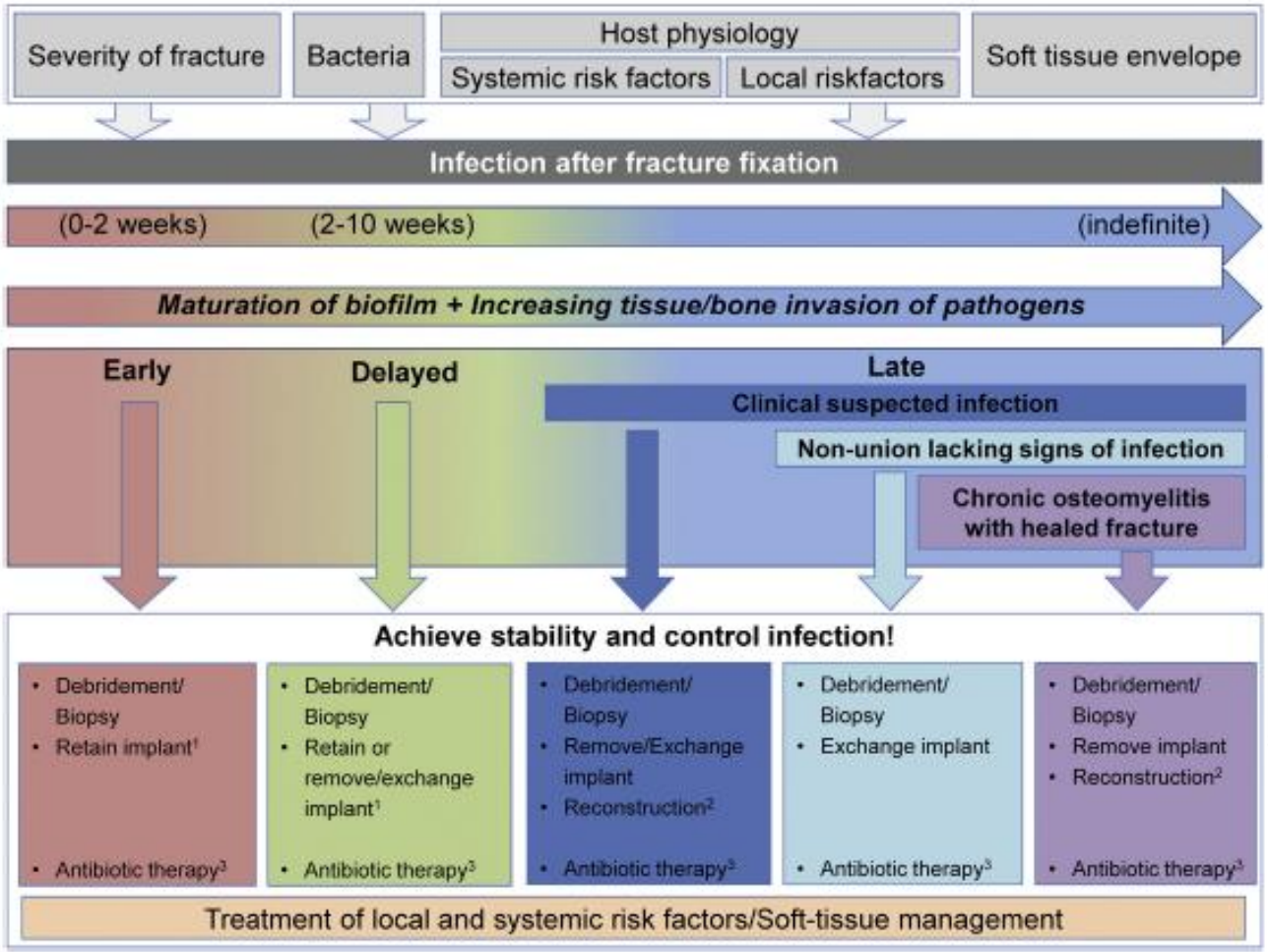
- **Incidence:** Up to 30% of open fractures
  1-2% of closed fractures
- **Recurrence:** 6-9%
- **Amputation rate:** 3-5%
- **Large burden of disease:**
  - Increased non-union rates
  - Up to 6.5 x higher treatment costs
  - Increased length of stay
  - Decreased quality of life

Fracture-related infection: A consensus on definition from an international expert group

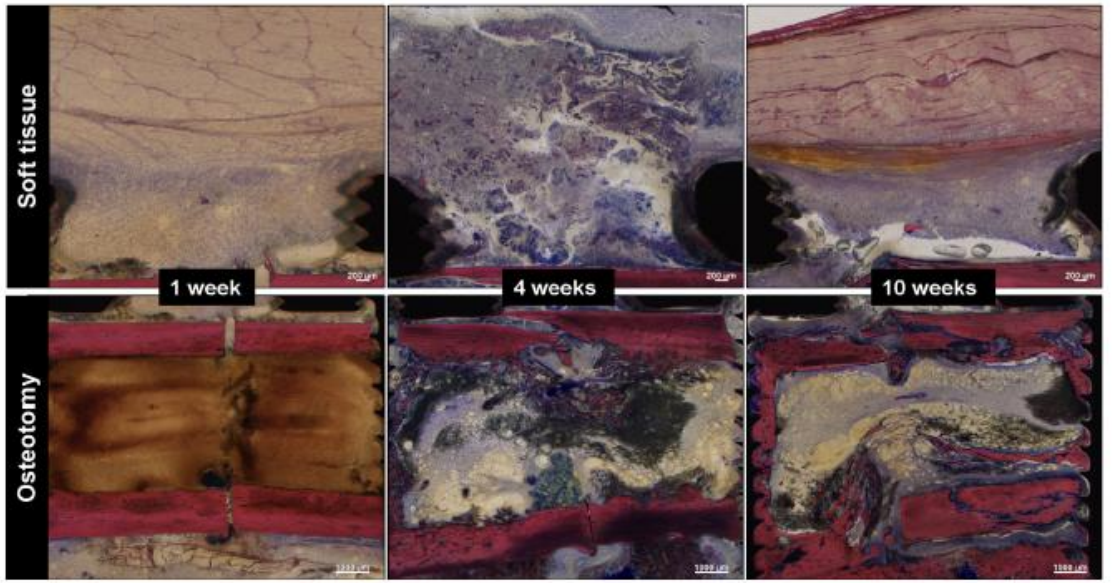
WJ. Metsemakers[a,s,*], M. Morgenstern[b], M.A. McNally[c], T.F. Moriarty[d], I. McFadyen[e],

Pathology

W.J. Metsemakers et al. / Injury, Int. J. Care Injured 49 (2018) 511–522



W.J. Metsemakers et al. / Injury, Int. J. Care Injured 49 (2018) 511–522



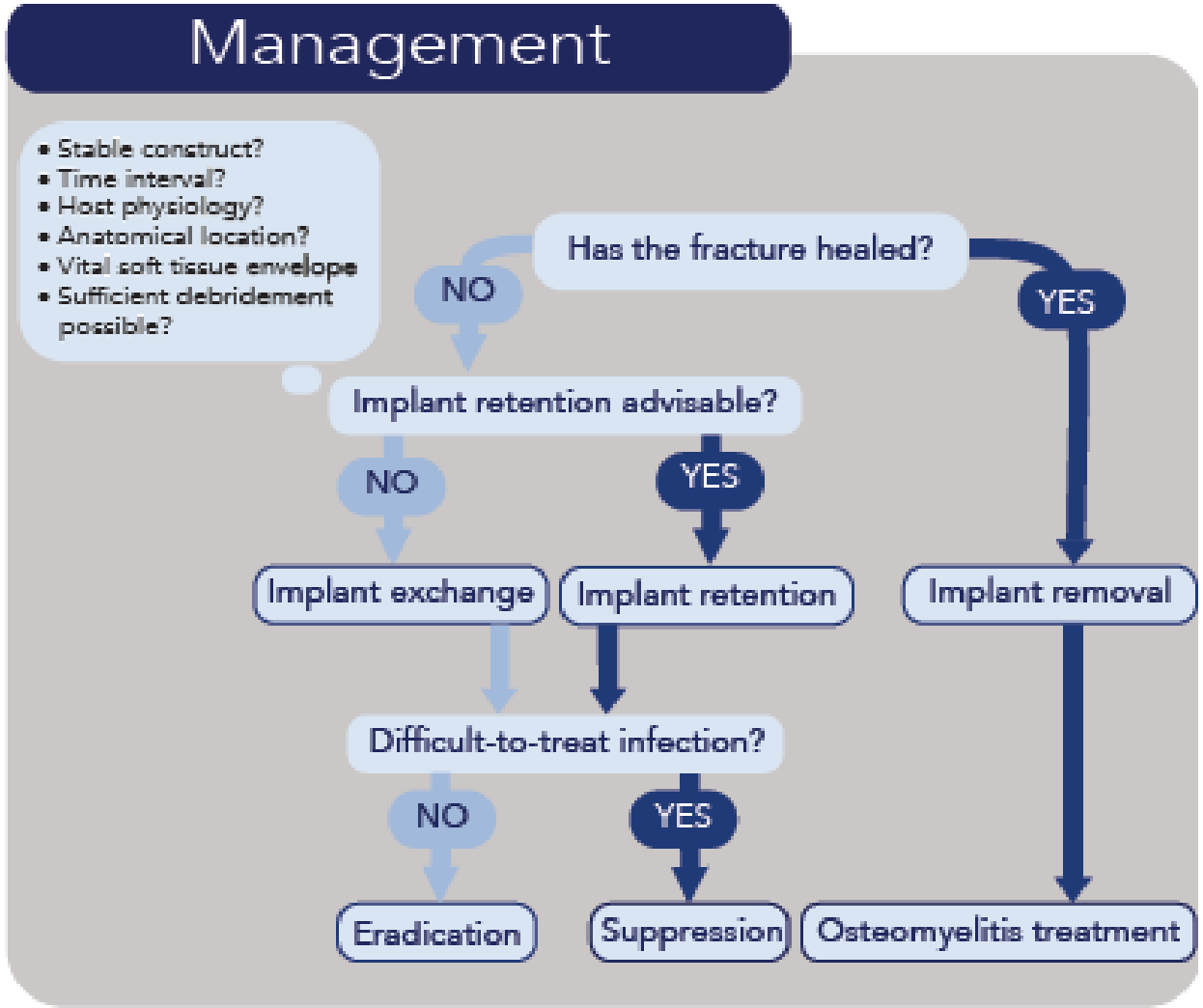
The FRI classification – A new classification of fracture-related infections

Volker Alt [a,1], Martin McNally [b,1,*], Marjan Wouthuyzen-Bakker [c], Willem-Jan Metsemakers [d,e], Leonard Marais [f], Charalampos Zalavras [g,2], Mario Morgenstern [h,2]

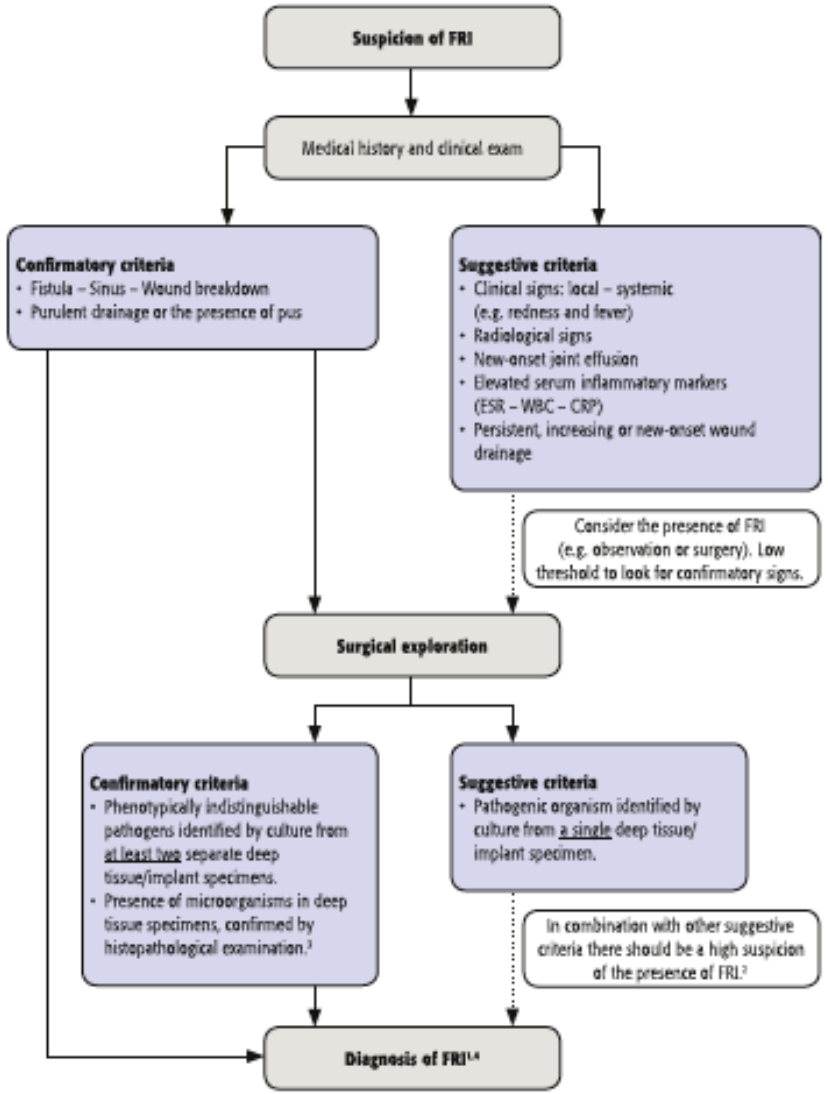
	1	2	3	4	5
Fracture **F**	Fracture healed	Fracture not healed Good bone healing potential	Fracture not healed Poor bone healing potential	Fracture not healed Major bone defect	Fracture not healed Bone reconstruction not possible
Relevant patient factors* **R**	Fit for Surgery	1 or 2 systemic comorbidities, without end-organ damage	3 or more systemic comorbidities without end-organ damage	Systemic comorbidity with end-organ damage	Unfit for surgery or Declines treatment
Impairment of soft tissues **I**	Robust direct wound closure possible	Direct wound closure possible but cover of bone and/or implant is fragile	Soft tissue reconstruction is required with local tissue transfer	Soft tissue reconstruction is required with free tissue transfer	Soft Tissue reconstruction not possible

- Diagnosi
- Debridement
- Stabilità ossea
- Terapia antibiotica
- Ricostruzione ossea e dei tessuti molli

BJR
INFOGRAPHIC
Fracture-related infection
S. Baertl, W-J. Metsemakers,
Cite this article: *Bone Joint Res* 2021;10(6):351–353.



- Diagnosi
- Debridement
- Stabilità ossea
- Terapia antibiotica
- Ricostruzione ossea e dei tessuti molli



- Diagnosi
- Debridement
- Stabilità ossea
- Terapia antibiotica
- Ricostruzione ossea e dei tessuti molli

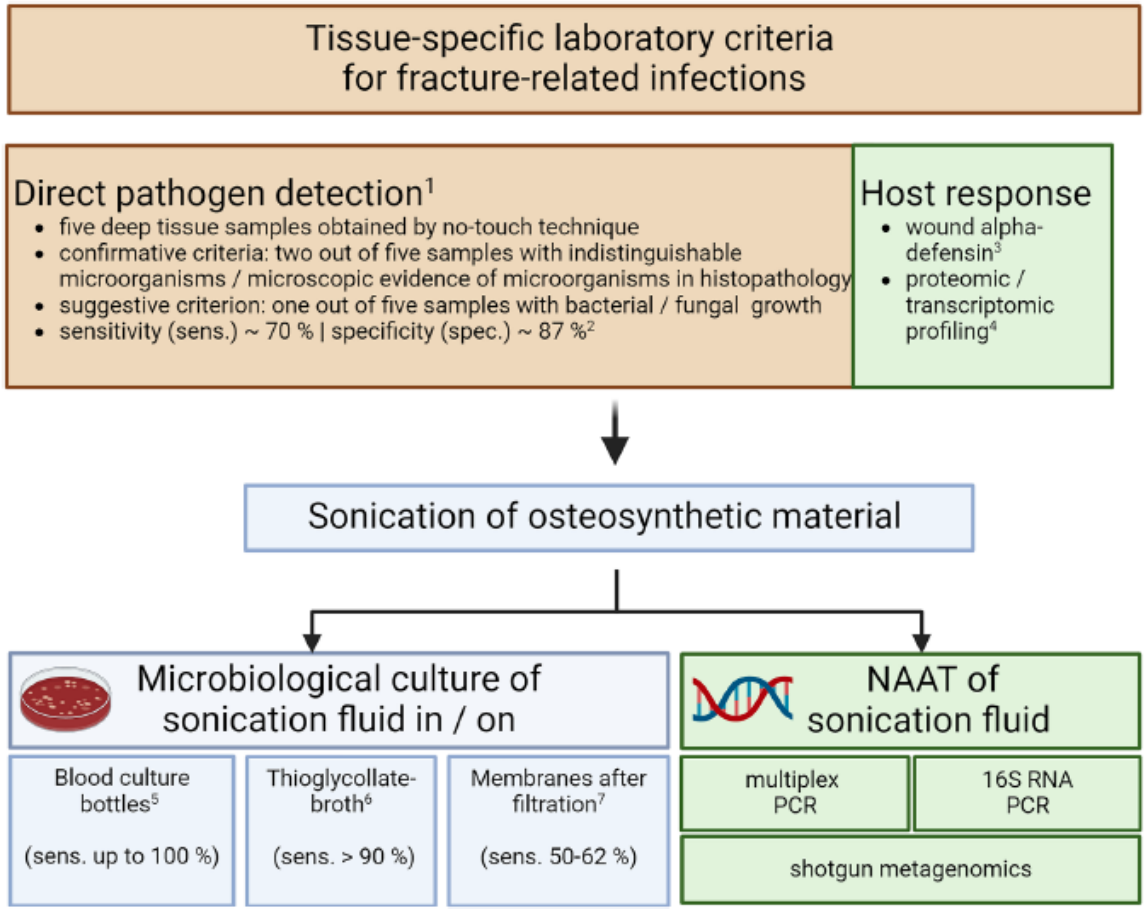
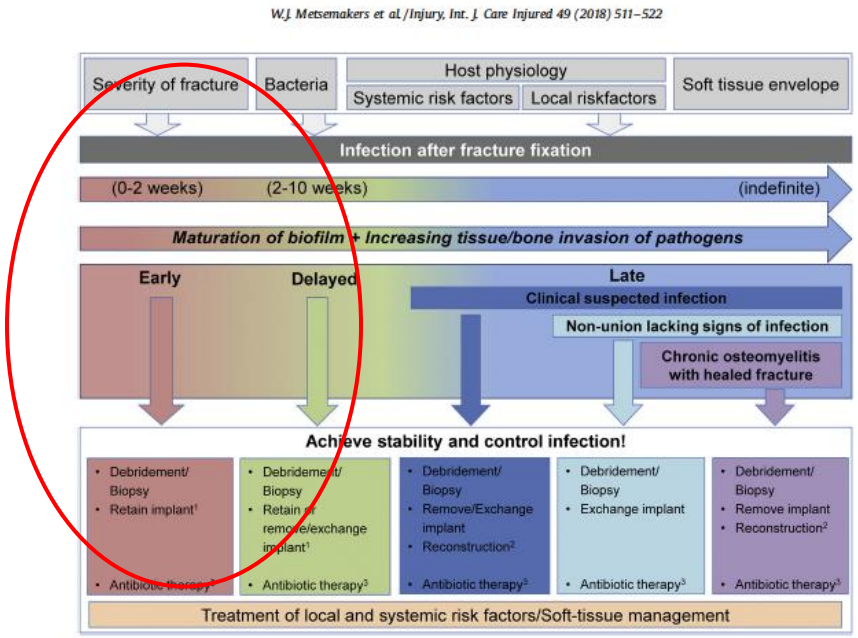


Fig. 1. Diagnostic work-flow for fracture-related infections (FRI). The diagnostic work-up should include the points highlighted in red-brown color. The processes colored in blue have already been tested and promise improvements over the current gold standard. Processes marked in green are experimental in nature and promise significant progress in the future. [1] Metsemakers et al. [17]; [2] Dudareva et al. [21]; [3] Kumar et al. [55]; [4] Fisher et al. [32]; [5] Portillo et al. [33]; [6] Yano et al. [23]; [7] Trenkwalder et al. [39]. NAAT: Nucleic acid amplification test. Figure was created with Biorender.

Infezioni acute

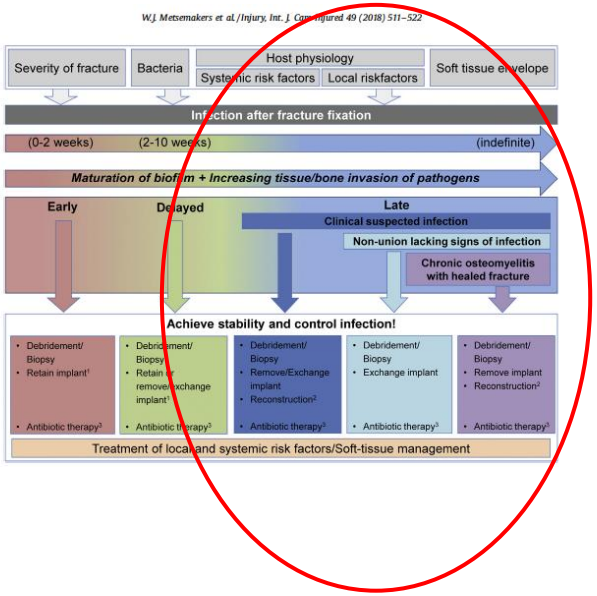


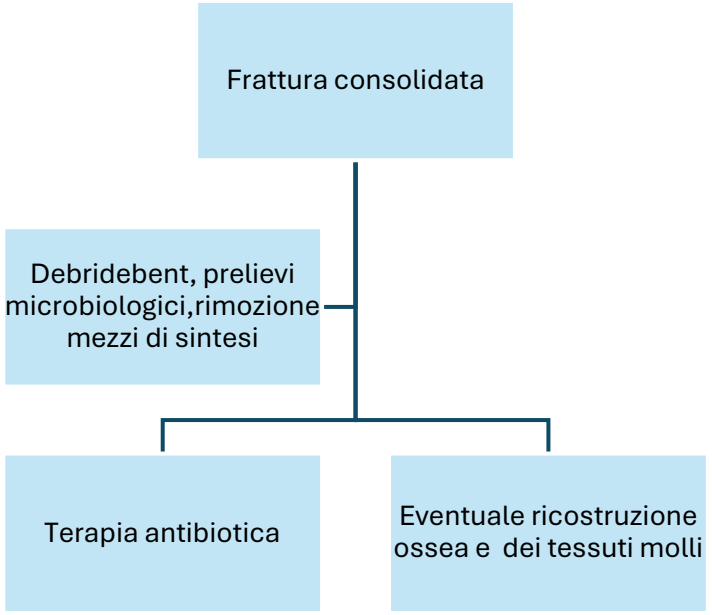
Maintenance of Hardware After Early Postoperative Infection Following Fracture Internal Fixation

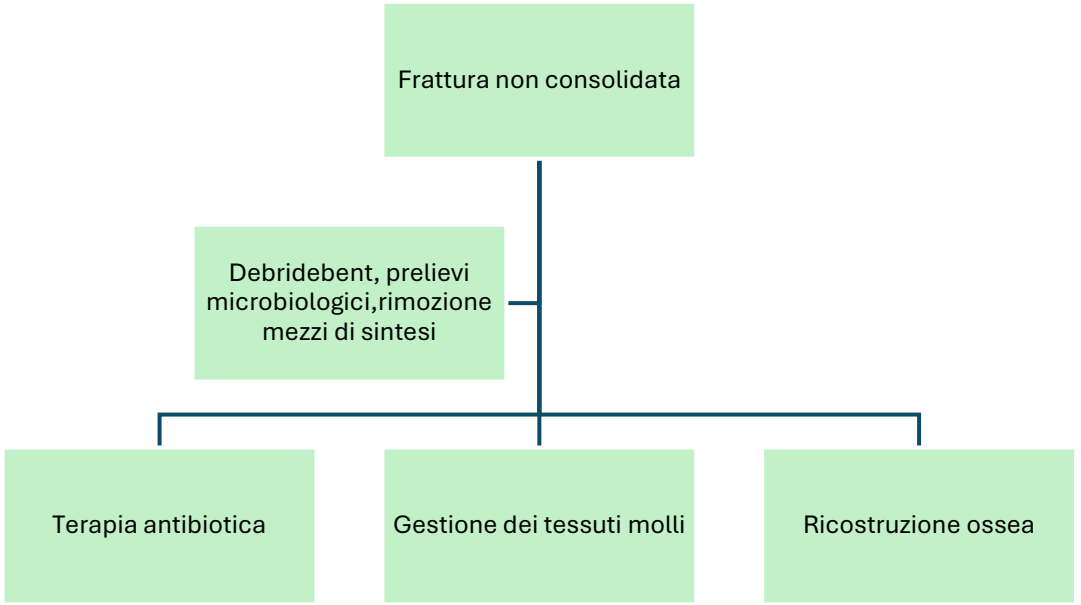
By Marschall Berkes, MD, William T. Obremskey, MD, MPH, Brian Scannell, MD, J. Kent Ellington, MD, Robert A. Hymes, MD, and Michael Bosse, MD, and the Southeast Fracture Consortium

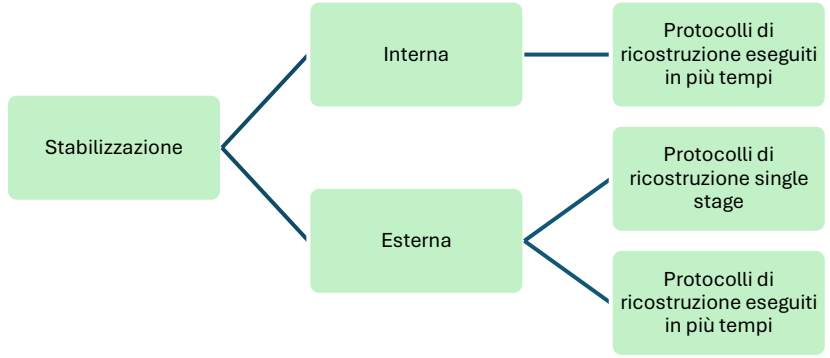
- Protocollo DAIR : 21.4%
- Sostituzione mezzi di sintesi: 12,5%
- Conversione in fissazione esterna: 10,1%

Indicazione alla rimozione dei mezzi di sintesi
Fissazione instabile
Fratture esposte
Tessuti molli compromessi
Chiodi endomidollari
Condizioni cliniche del paziente scadenti
Patogeni difficili da trattare


W.J. Metsemakers et al. / Injury, Int. J. Care Injured 49 (2018) 511–522
Severity of fracture
Bacteria
Host physiology
Systemic risk factors
Local riskfactors
Soft tissue envelope
Infection after fracture fixation
(0-2 weeks)
(2-10 weeks)
(indefinite)
Maturation of biofilm + Increasing tissue/bone invasion of pathogens
Early
Delayed
Late
Clinical suspected infection
Non-union lacking signs of infection
Chronic osteomyelitis with healed fracture
Achieve stability and control infection!
Debridement/ Biopsy
Retain implant
Antibiotic therapy
Debridement/ Biopsy
Retain or remove/exchange implant
Antibiotic therapy
Debridement/ Biopsy
Remove/Exchange implant
Reconstruction
Antibiotic therapy
Debridement/ Biopsy
Exchange implant
Antibiotic therapy
Debridement/ Biopsy
Remove implant
Reconstruction
Antibiotic therapy
Treatment of local and systemic risk factors/Soft-tissue management


Frattura consolidata
Debridebent, prelievi microbiologici,rimozione mezzi di sintesi
Terapia antibiotica
Eventuale ricostruzione ossea e dei tessuti molli


Frattura non consolidata
Debridebent, prelievi microbiologici,rimozione mezzi di sintesi
Terapia antibiotica
Gestione dei tessuti molli
Ricostruzione ossea


Stabilizzazione
Interna
Esterna
Protocolli di ricostruzione eseguiti in più tempi
Protocolli di ricostruzione single stage
Protocolli di ricostruzione eseguiti in più tempi

- Diagnosi
- Debridement
- Stabilità ossea
- Terapia antibiotica
- Ricostruzione ossea e dei tessuti molli

Comparative Study > J Bone Joint Surg Br. 2001 Apr;83(3):403-7.
doi: 10.1302/0301-620x.83b3.10727.

Chronic osteomyelitis. The effect of the extent of surgical resection on infection-free survival

A H Simpson [1], M Deakin, J M Latham

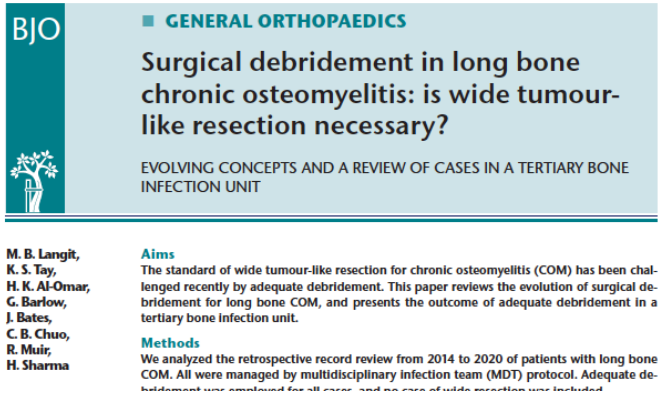
Storicamente si è sempre considerata necessaria una resezione ossea «oncologica» \ radicale

Necessità di ricostruzione ossea – lunghi tempi di guarigione

Recidive

. 5mm	100% successo
. < 5 mm:	28%. recidive
. Sbrigliamento senza resezione.	100% recidive

- Diagnosi
- Debridement
- Stabilità ossea
- Terapia antibiotica
- Ricostruzione ossea e dei tessuti molli



BJO

GENERAL ORTHOPAEDICS

Surgical debridement in long bone chronic osteomyelitis: is wide tumour-like resection necessary?

EVOLVING CONCEPTS AND A REVIEW OF CASES IN A TERTIARY BONE INFECTION UNIT

M. B. Langit,
K. S. Tay,
H. K. Al-Omar,
G. Barlow,
J. Bates,
C. B. Chuo,
R. Muir,
H. Sharma

Aims
The standard of wide tumour-like resection for chronic osteomyelitis (COM) has been challenged recently by adequate debridement. This paper reviews the evolution of surgical debridement for long bone COM, and presents the outcome of adequate debridement in a tertiary bone infection unit.

Methods
We analyzed the retrospective record review from 2014 to 2020 of patients with long bone COM. All were managed by multidisciplinary infection team (MDT) protocol. Adequate de-

I nostri «Nemici»:
- Biofilm
- Tessuti molli mortificati
- condizioni cliniche generali / habitus del paziente

. Adeguato Debridment
. Gestione dei tessuti molli
. Antibiotici locali
. Preparazione del Paziente

→

Ridotta tossicità sistemica
- Minimum Biofilm Eradication Concentration (MBEC)

- Diagnosi
- Debridement
- Stabilità ossea
- Terapia antibiotica
- Ricostruzione ossea e dei tessuti molli

- Fondamentele approccio multidisciplinare

- Infettivologo
- Ortopedico
- Chirurgo plastico

Prevenzione

A Prospective Randomized Trial to Assess Fixation Strategies for Severe Open Tibia Fractures: Modern Ring External Fixators Versus Internal Fixation (FIXIT Study)

Robert V. O'Toole, MD, Joshua L. Gary, MD,† Lisa Reider, PhD,‡ Michael J. Bosse, MD,§ Wade T. Gordon, MD,‖ James Hutson, MD,¶ Stephen M. Quinnan, MD,¶ Renan C. Castillo, PhD,‡ Daniel O. Scharfstein, ScD,** Ellen J. MacKenzie, PhD,‡ and METRC*

THE JOURNAL OF BONE & JOINT SURGERY (BI)

Fix and flap: the radical orthopaedic and plastic treatment of severe open fractures of the tibia

S. Gopal, S. Majumder, A. G. B. Batchelor, S. L. Knight, P. De Boer, R. M. Smith

From St James's University Hospital, Leeds and York District Hospital, York, England

An overview of open fracture management

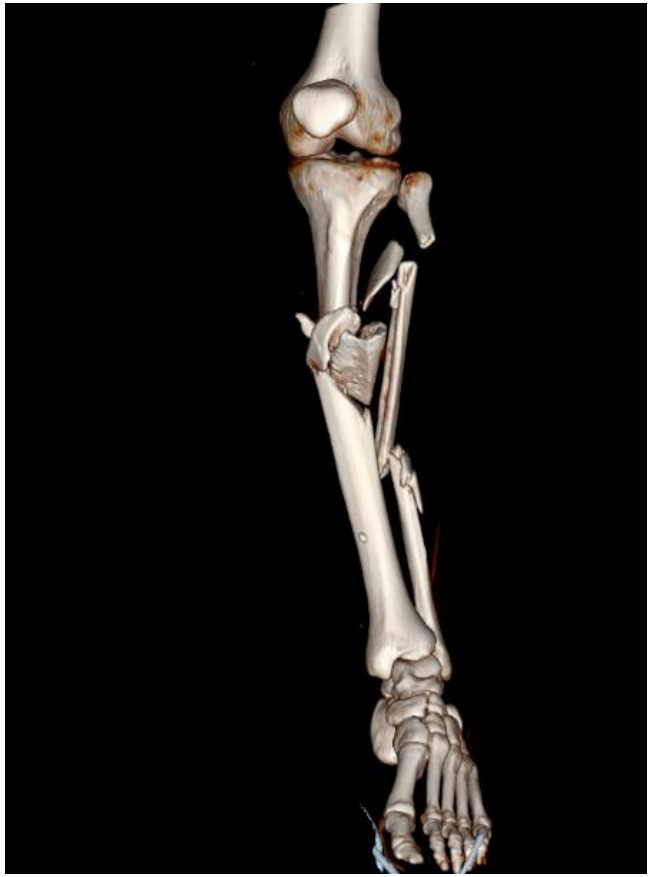
Anthony Rayner

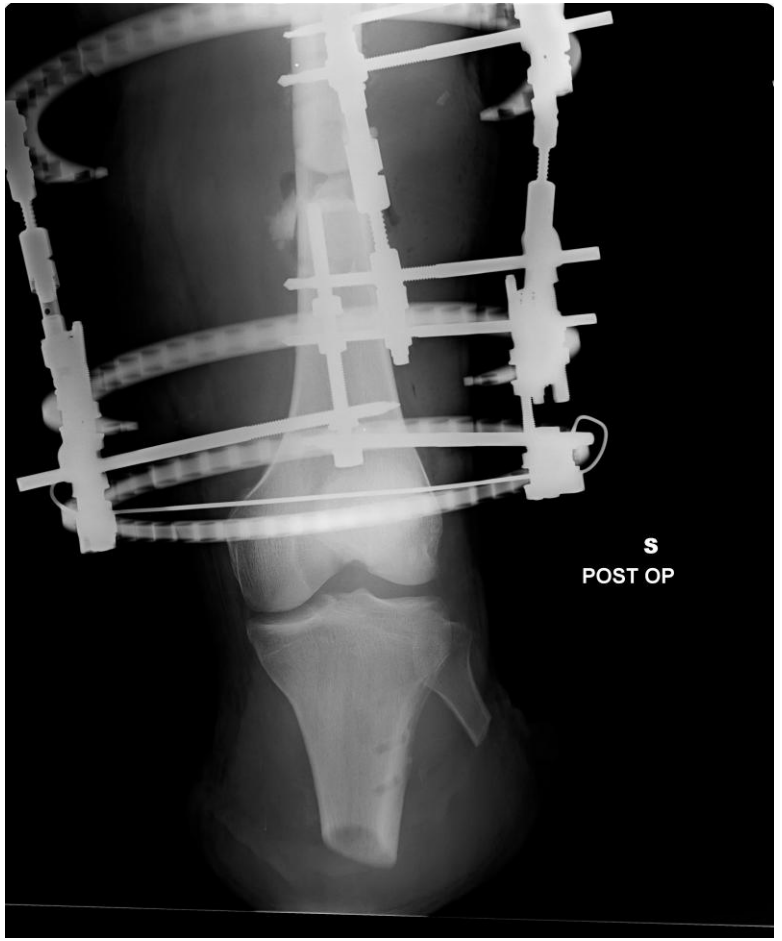
. La principale causa di un infezione è una scorretta gestione dei tessuti molli

. La principale causa del fallimento nel trattamento delle infezioni è un debridement non accurato Associato ad una scorretta gestione dei tessuti molli

- Non esistono differenze, in termini di infezioni, nel trattamento delle fratture con fissazione interna o esterna

Debridement di fondamentale importanza




S
POST OP

Letteratura

Problema → Soluzione

A Prospective Randomized Trial to Assess Fixation Strategies for Severe Open Tibia Fractures: Modern Ring External Fixators Versus Internal Fixation (FIXIT Study)

Robert V. O'Toole, MD,* Joshua L. Gary, MD,† Lisa Reider, PhD,‡ Michael J. Bosse, MD,§ Wade T. Gordon, MD,‖ James Hutson, MD,¶ Stephen M. Quinnan, MD,¶ Renan C. Castillo, PhD,‡ Daniel O. Scharfstein, ScD,** Ellen J. MacKenzie, PhD,‡ and METRC

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BJR INFOGRAPHIC

Fracture-related infection

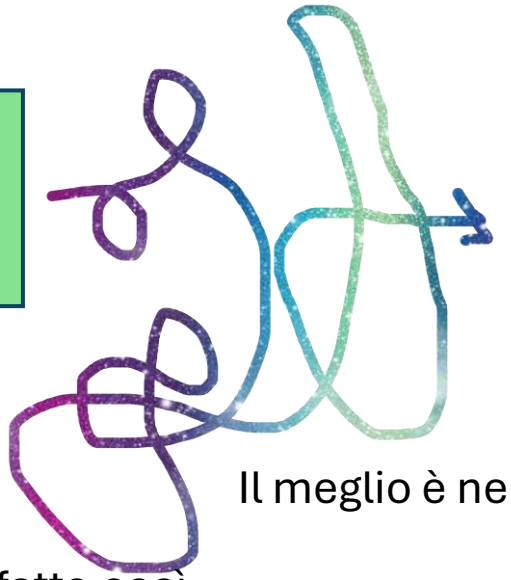
S. Baertl, W-J. Metsemakers,

Cite this article: *Bone Joint Res* 2021;10(6):351–353.

In un qualunque ospedale

Secondo Me

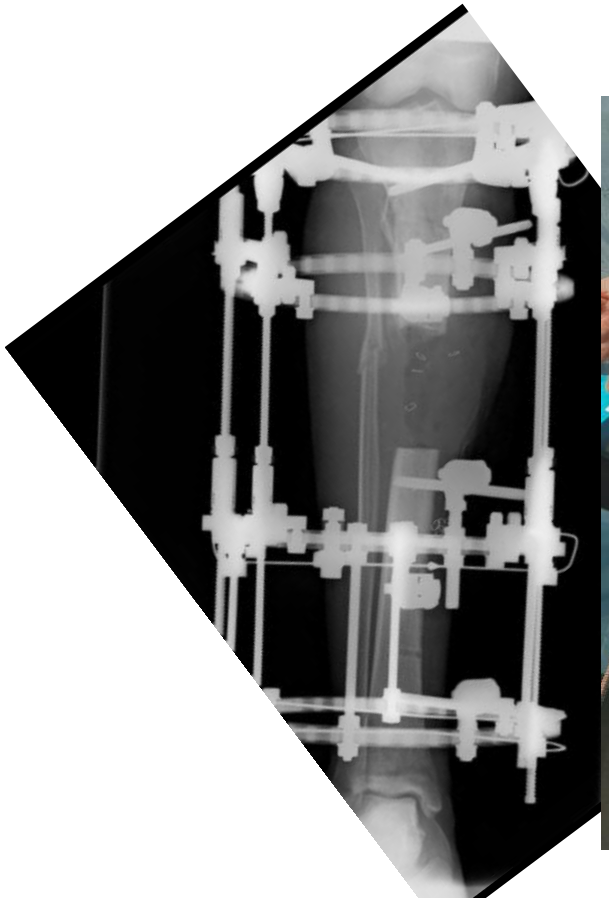
Problema → Soluzione



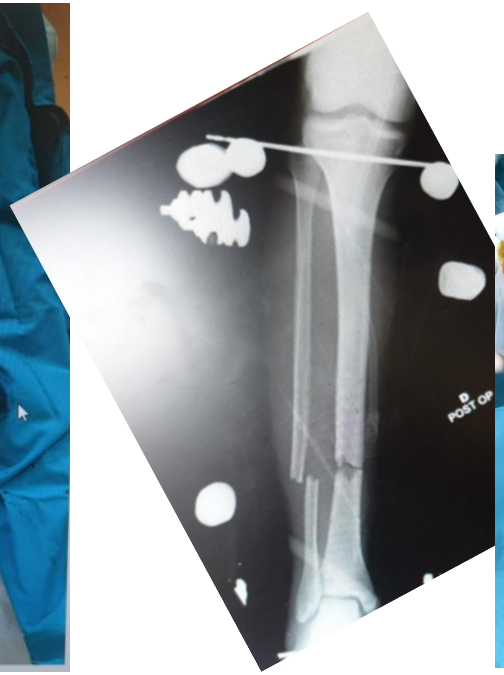
Il meglio è nemico del bene

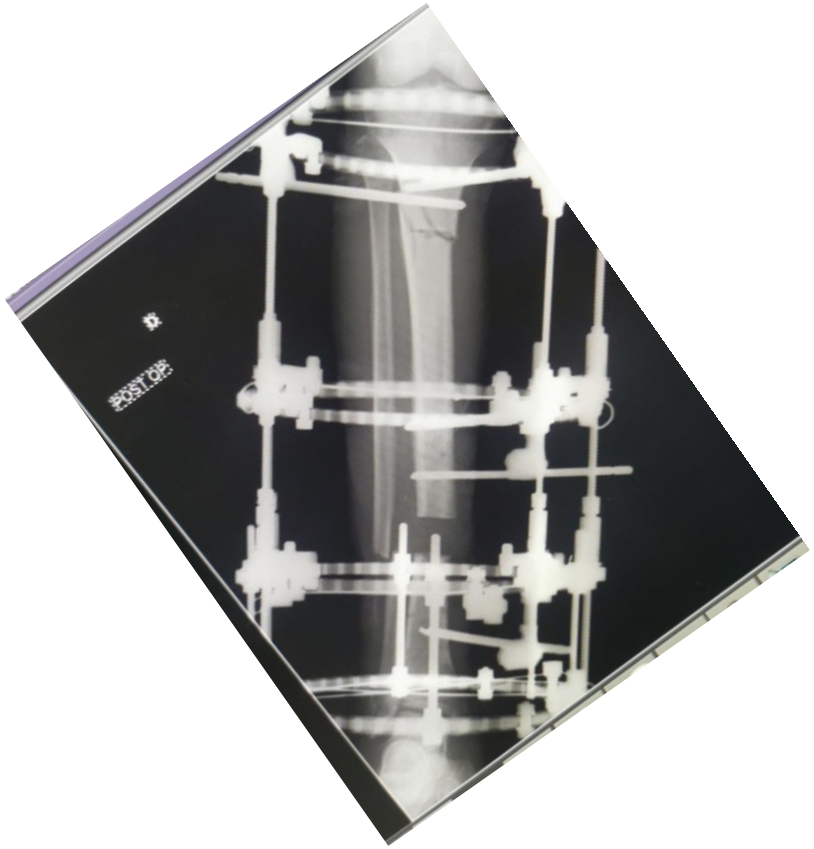
Si è sempre fatto così

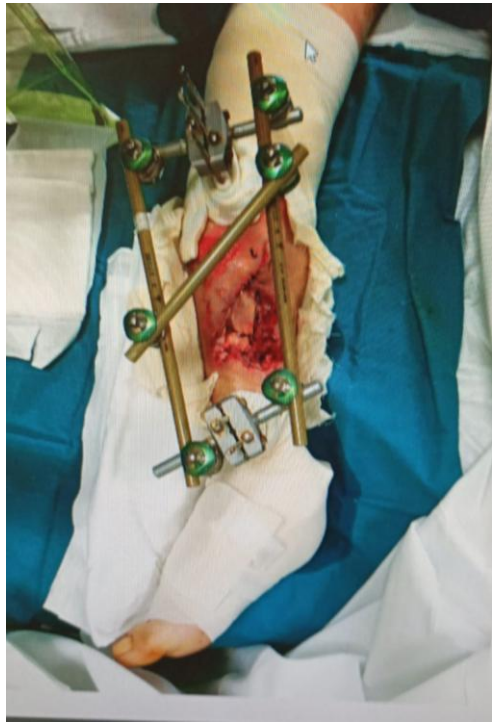
Frame & flap

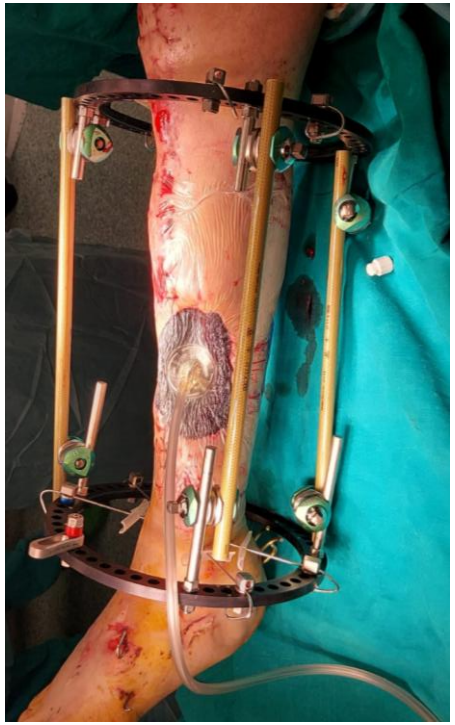


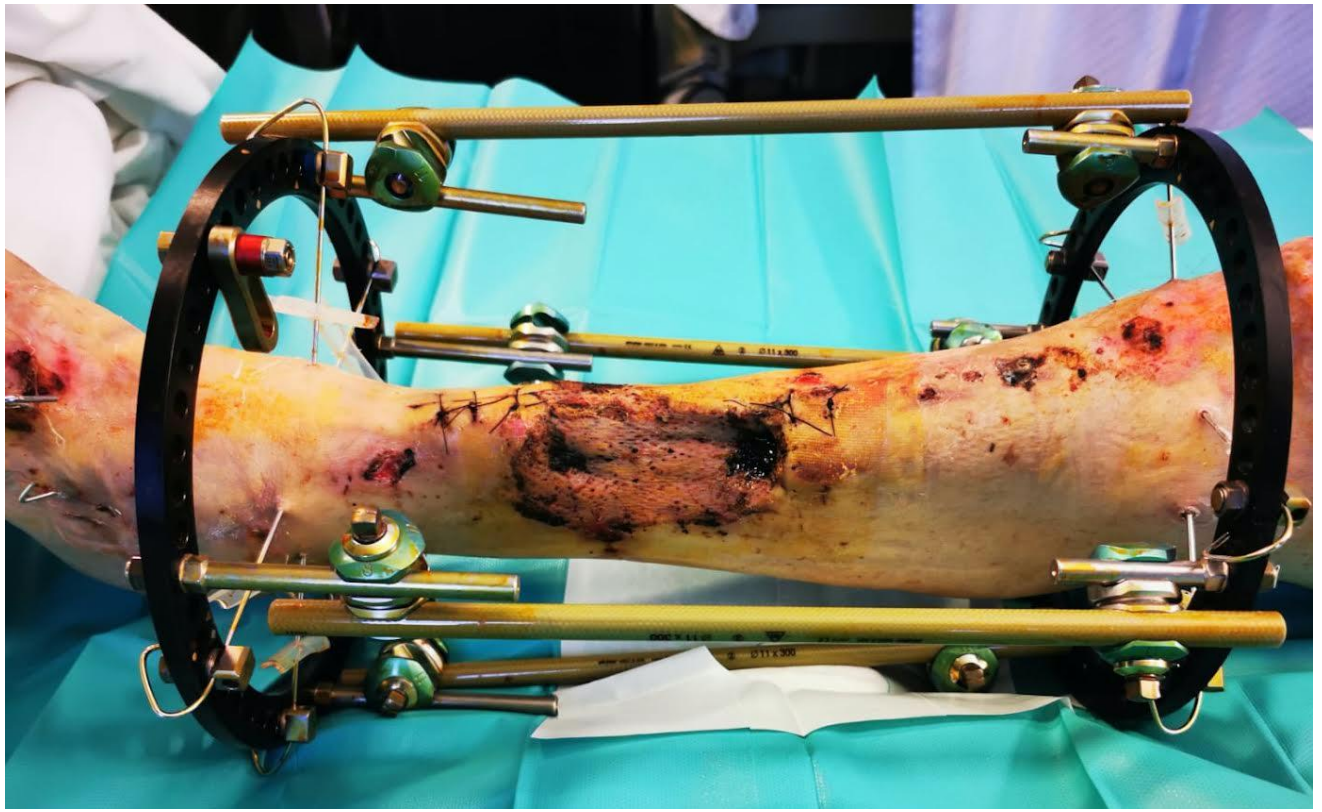
Frame & flap



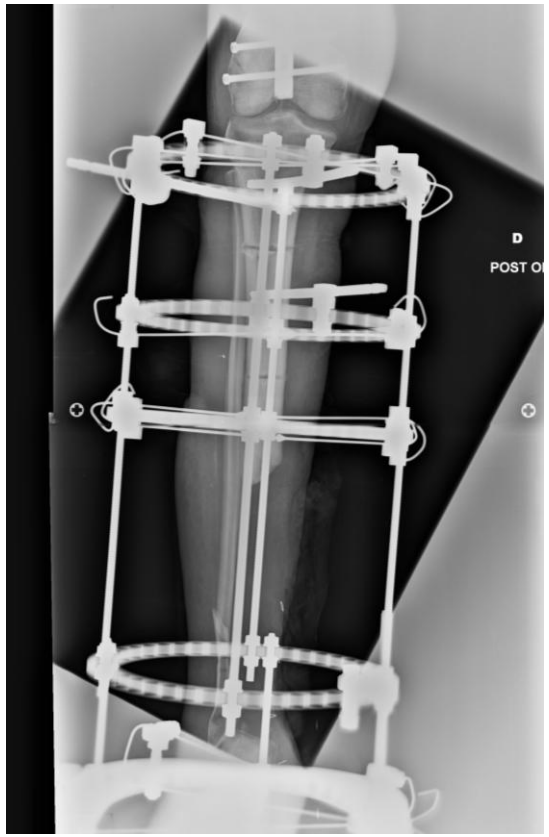


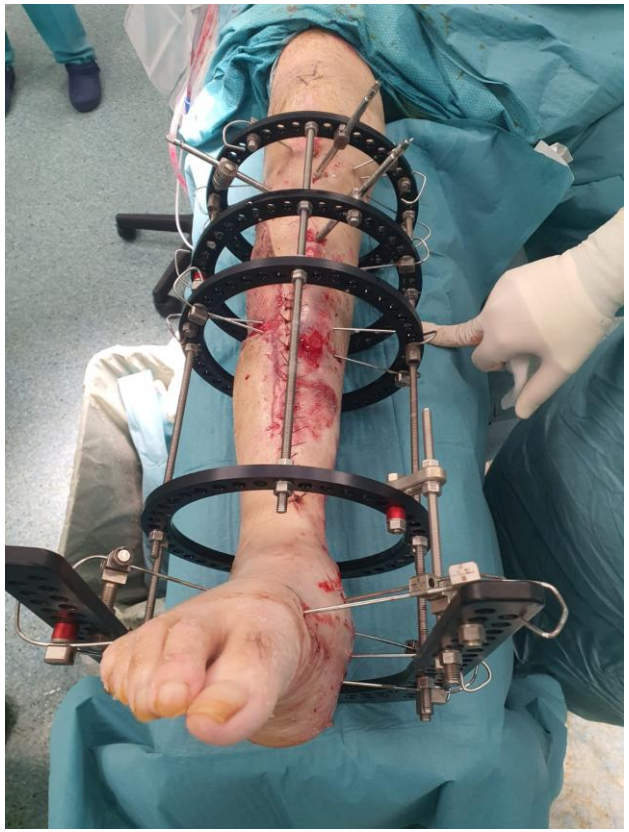


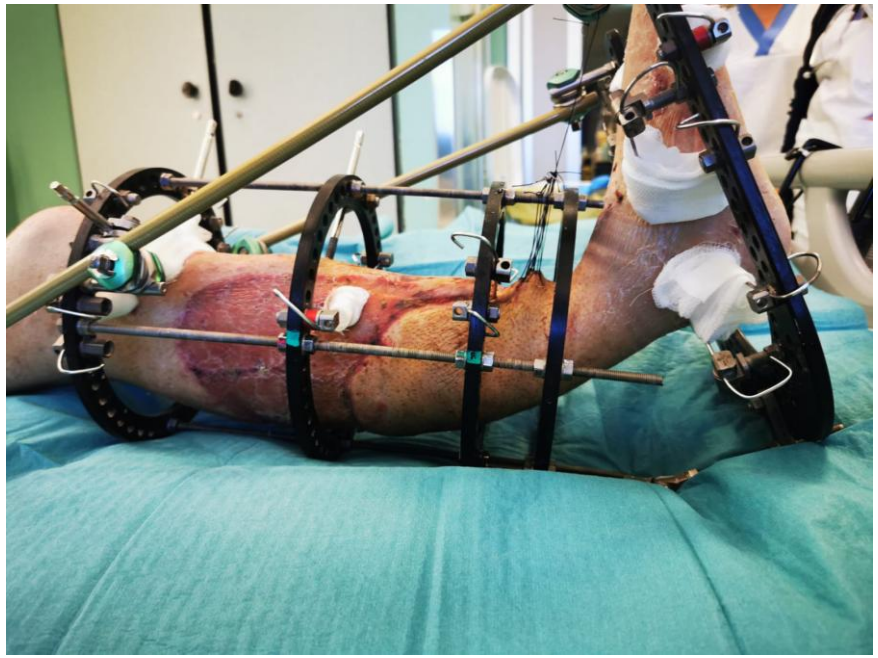




. secondari








D
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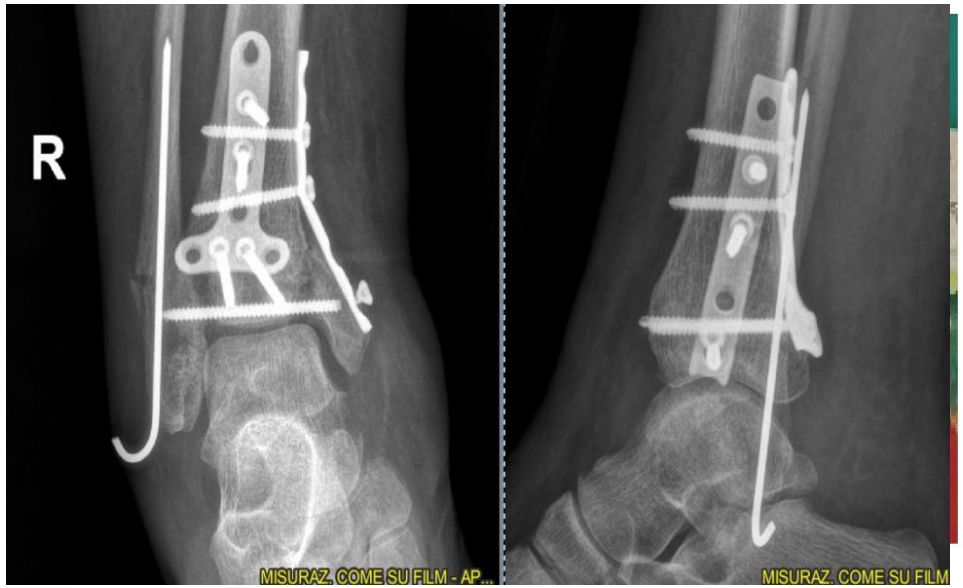
trattamento

Accorciamento in acuto



ROMA

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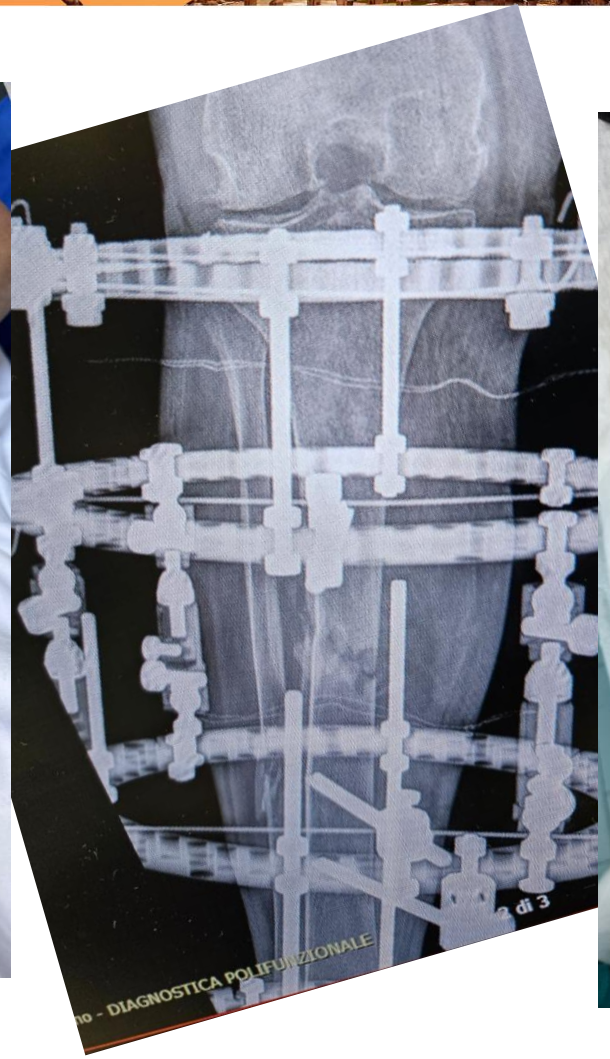
FISSAZIONE ESTERNA

CONGRESSO NAZIONALE SOCIETÀ ITALIANA FISSAZIONE ESTERNA



GRAZIE PER L' ATTENZIONE