

13.30
16.00

SIMPOSIO 2: LE REVISIONI CONSERVATIVE: LA DIAGNOSI PRECOCE E LE OPZIONI CHIRURGICHE. QUANDO È POSSIBILE E COME

In collaborazione con SIRM (Società Italiana di Radiologia Medica)
Moderatori: **Antonio Capone** (Cagliari), **Pietro Cavaliere** (Messina)

13.30

Il follow up periodico dei pazienti: sintomatici e asintomatici
Fabio D'Angelo (Varese)

L'importanza dell'imaging e della collaborazione con il Radiologo:
vediamo quello che cerchiamo e cerchiamo quello che conosciamo

13.37

- la TC
Mauro Battista Gallazzi (Milano)

13.52

- la RM
Alberto Aliprandi (Monza)

14.07

Osteolisi sintomatica e asintomatica
Giovanni Zatti (Monza)

Adverse reaction to implant material

14.17

- fallimento meccanico (MAAC)
Giampaolo Rinaldi - (Milano)

14.27

- accoppiamento (MoM, MoP, Ce-Ce)
Francesco Traina (Bologna)

14.37

DAIR: indicazioni, tecnica e risultati
Pier Francesco Indelli (Palo Alto - USA)

14.47

Instabilità protesica
Giuseppe Solarino (Bari)

14.57

Impingement ileo PSOAS
Giovanni Francesco Grano (Bassano del Grappa)

15.07

Le lesioni della cuffia abduktoria
Manuel Ribas (Barcelona - E)

Il follow up periodico dei pazienti: sintomatici e asintomatici

Prof. Fabio D'Angelo
*Direttore U.O.C. Ortopedia e Traumatologia
Università dell'Insubria – Varese*

Dott.ssa Letizia Libassi





Il fallimento è **evidente** ma spesso **asintomatico**

VANTAGGI del FOLLOW-UP:

identificazione precoce di problemi nel paziente asintomatico



Pianificazione della revisione



- Riduzione di fratture periprotetiche e altre complicanze
- Riduzione dei costi
- Minor complessità dell'intervento
- Miglior outcome chirurgico

Protocol for follow up of hip arthroplasty in the long term:
effect on revision (WHISTLER study)

Lindsay K. Smith¹ | Erik Lenguerrand² | Ashley Blom² | Jane Powell¹ | Shea Palmer¹
Musculoskeletal Care. 2017;15:373-378.

COSA INCIDE SULL'INTERVALLO DI FOLLOW-UP?

- Tempo trascorso dall'impianto



- Obiettività

- Clinica



- Strumentale



Non necessariamente
correlati!

COSA INCIDE SULL'INTERVALLO DI FOLLOW-UP?

- Tempo trascorso dall'impianto



- Obiettività

- Clinica



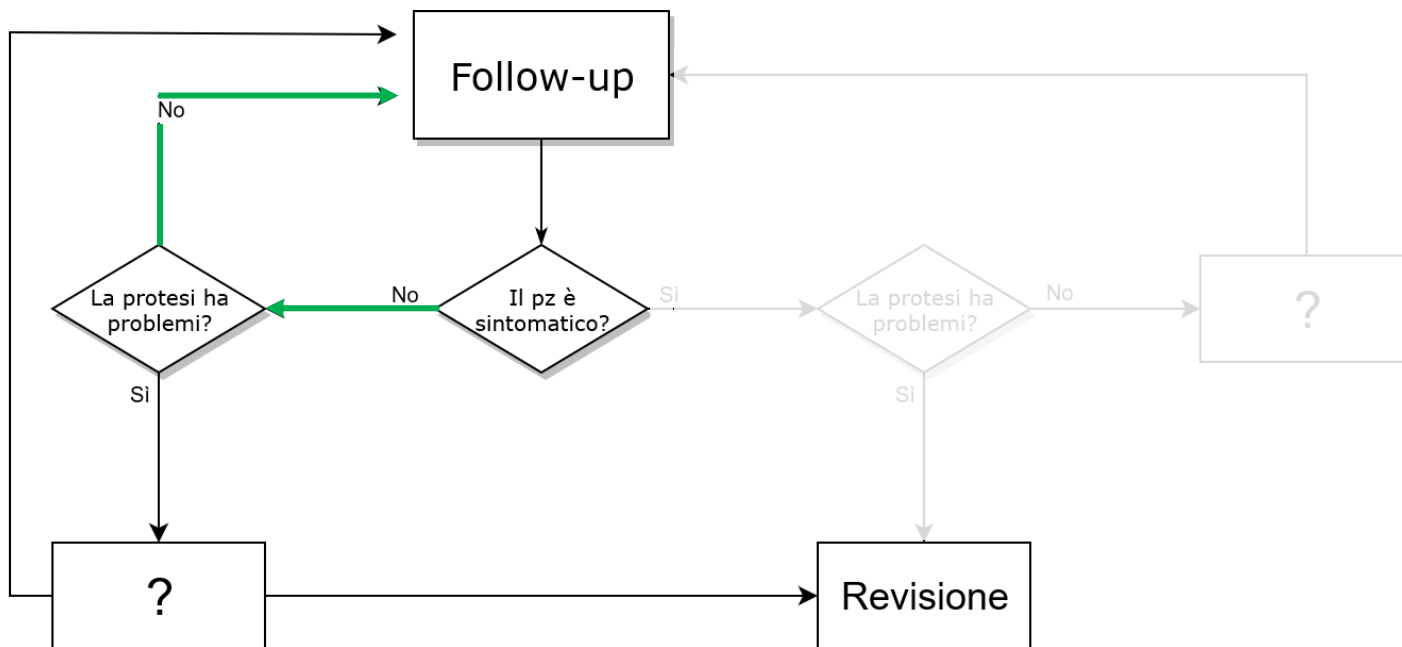
- Strumentale



Non necessariamente
correlati!



PAZIENTE ASINTOMATICO





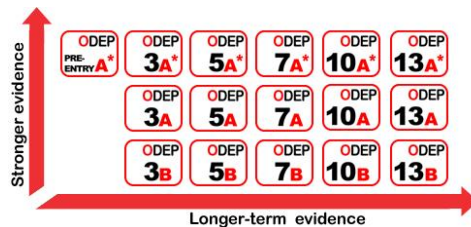
FOLLOW-UP: OGNI QUANTO?

Regno Unito

- Impianto 10A secondo l'ODEP



- a 1 anno
- a 7 anni
- ogni 3 anni dopo il 7° anno



- Impianto non 10A secondo l'ODEP



- annualmente per i primi 5 anni
- ogni 2 anni tra i 5 e i 10
- ogni 3-5 anni dopo il 10° anno



FOLLOW-UP: OGNI QUANTO?

Australia

Tutti i pz portatori di
THA



- a 3 mesi
- tra il 1° e il 2° anno
- a 10 anni
- dopo il 10° anno: ogni 2 anni

Nord America

Tutti i pz portatori di
THA



- a 1 anno
 - a 8 anni
- 2 picchi temporali
per la
mobilizzazione
asettica



**Total Hip Arthroplasty Surveillance: When Do
We See Our Patients Postoperatively?**

Jay R. Lieberman, MD,* Robin R. Leger, PhD,* Jeanette C. Tao, MD,†
John C. Clohisy, MD,‡ and R. Michael Meneghini, MD*

The Journal of Arthroplasty Vol. 26 No. 8 2011





FOLLOW-UP: OGNI QUANTO?

Australia

Tutti i pz portatori di
THA



- a 3 mesi
- tra il 1° e il 2° anno
- a 10 anni
- dopo il 10° anno: ogni 2 anni

Nord America

Tutti i pz portatori di
THA



- a 1 anno
- a 8 anni

2 picchi temporali
per la
mobilizzazione
asettica

MA

- Non uniformità nei controlli tra 1° e 10° anno
- Non uniformità nella frequenza del follow-up dopo il 10° anno

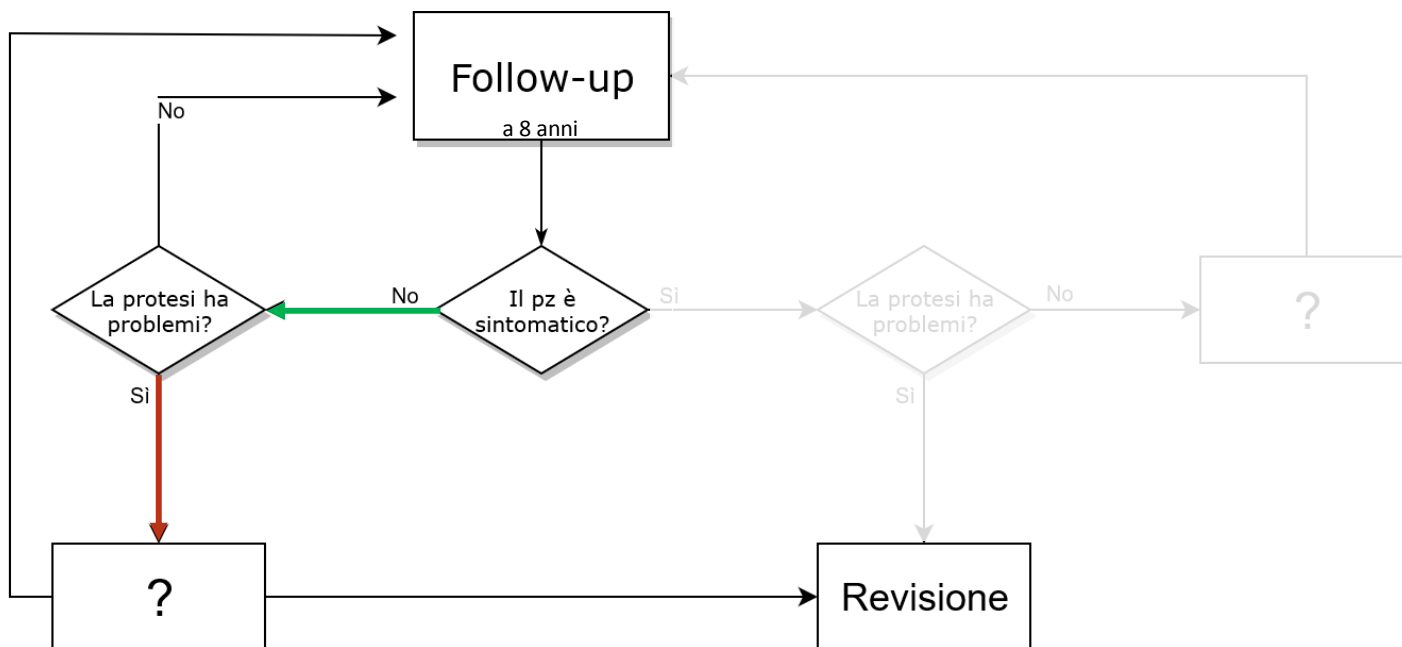
The Journal of Arthroplasty Vol. 26 No. 8 2011

Arthroplasty Surveillance: When Do Patients Postoperatively?

Robin R. Leger, PhD,* Jeanette C. Tao, MD,†
John C. Clohisy, MD,‡ and R. Michael Meneghini, MD*



PAZIENTE ASINTOMATICO





OSTEOLISI LOCALIZZATA

Assenza di markers che identifichino quelle a rapida
progressione

- **FOLLOW-UP** con RX seriate → ogni 6 mesi
- **REVISIONE PRECOCE** se eccessiva o rapida perdita ossea, anche se asintomatica

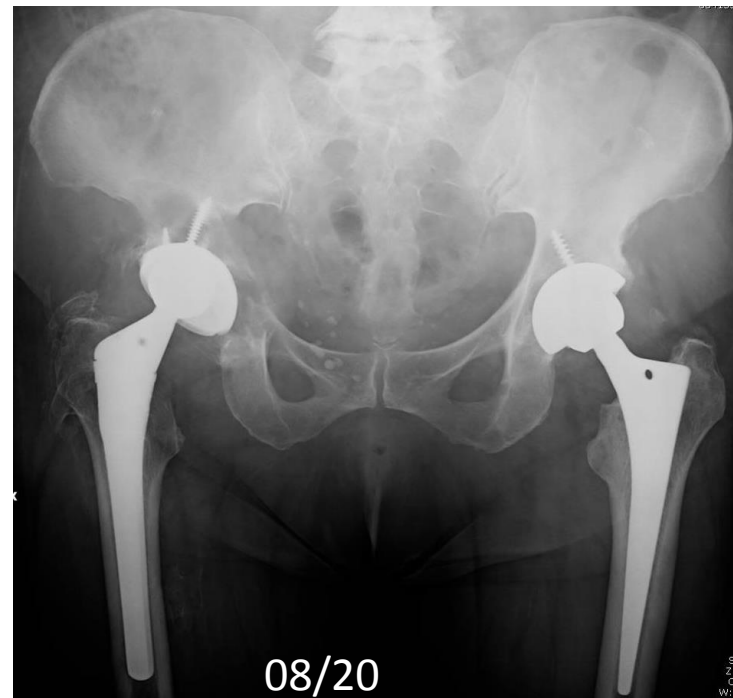


OSTEOLISI LOCALIZZATA

C.L., 72 anni



- IA
- THA destra (1995)
- THA sinistra (2011)





USURA DEL POLIETILENE

FOLLOW-UP:

- 1 anno
- 5 anni
- 10 anni
- Ogni 1-5 anni



a seconda del reperto RX e della
progressione del riassorbimento osseo

ogni 6 mesi



- Proiezione di Judet
- RMN
- TC

**How are wear-related problems
diagnosed and what forms of surveillance
are necessary?**

[Malchau H¹](#), [Potter HG](#): [Implant Wear Symposium 2007 Clinical Work Group](#).

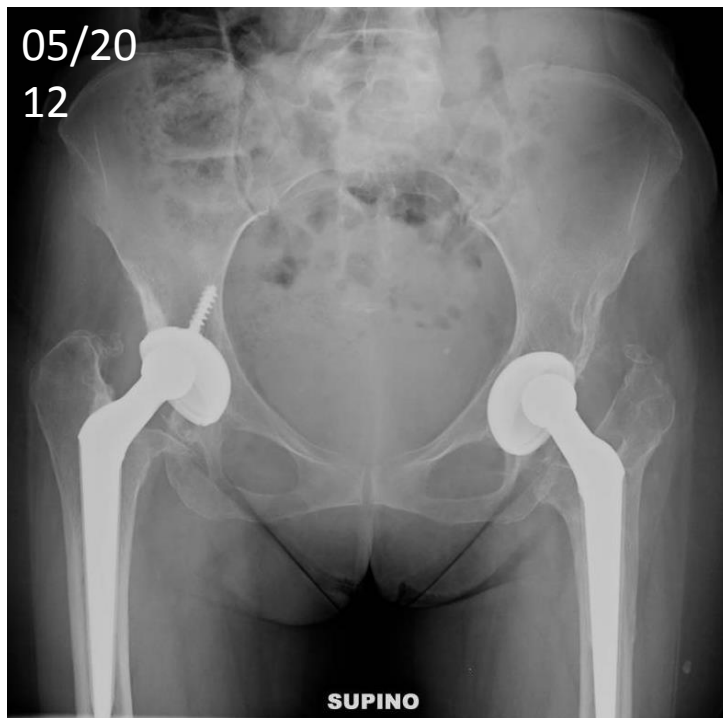


USURA DEL POLIETILENE

R.L., 63 anni



- ALLERGIA A FANS, ASA
- MRGE
- impianto THA destra (2003)
- impianto THA sinistra (2004)





USURA DEL POLIETILENE

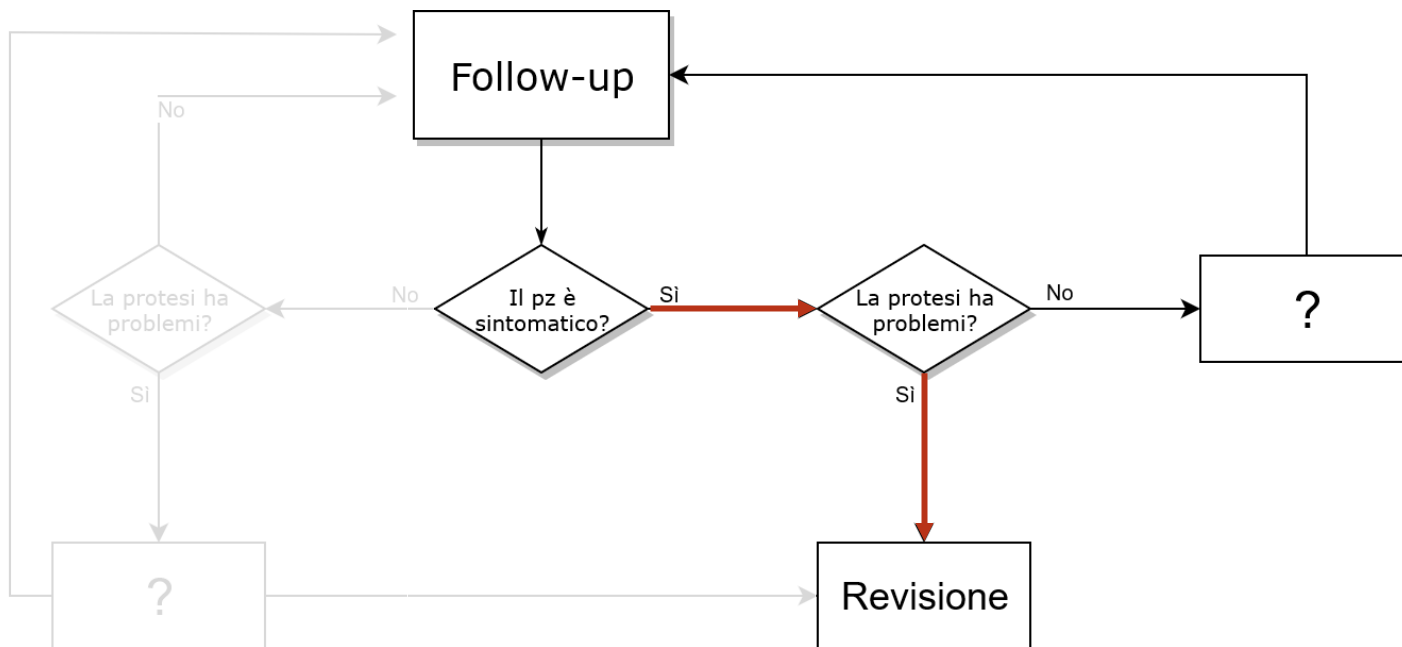
R.L., 63 anni



- ALLERGIA A FANS, ASA
- MRGE
- impianto THA destra (2003)
- impianto THA sinistra (2004)



PAZIENTE SINTOMATICO





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19-20
settembre 2019
BERGAMO

MANCATA INTEGRAZIONE

B.R., 65 anni



- Osteoporosi
- QUART sin (2018)



a 3 anni



DOLORE





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19-20
settembre 2019
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MANCATA INTEGRAZIONE

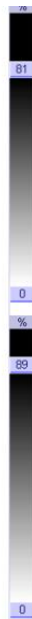
10/2017



Anteriore 1455K Counts
Duration:1189sec



Posteriore 1371K Counts
Duration:1189sec



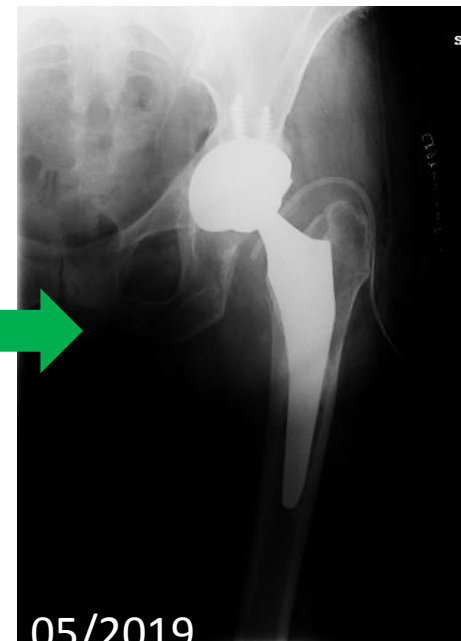
Anteriore 938K Counts Duration:498sec 256x256



Posteriore 879K Counts Duration:498sec 256x256



05/2019



05/2019



MOBILIZZAZIONE OCCULTA DELL'ANCA

A.A., 40 anni

BMI = 33 (obesità di
medio grado)

Lavoratore pesante
(carpentiere)

In anamnesi:

- EDD L4-L5
- Gastrite



Giugno 2011

***Impianto di artroprotesi non
cementata***

ET 14, Tritanium 62+, testina 32/+3.5





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MOBILIZZAZIONE OCCULTA DELL'ANCA

Settembre 2011: trauma "distrattivo" anca sinistra

Dolenza alla flessione attiva della coscia



- *FKT di potenziamento muscolare*
- *Stretching degli ischiocrurali e del quadricipite femorale*
- *FANS per os*





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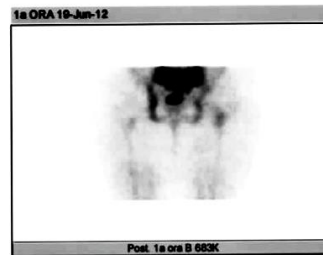
MOBILIZZAZIONE OCCULTA DELL'ANCA

Controllo clinico (giugno 2012)

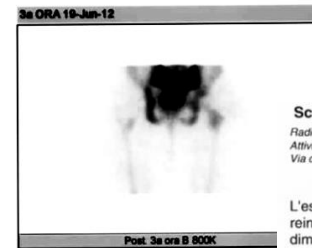
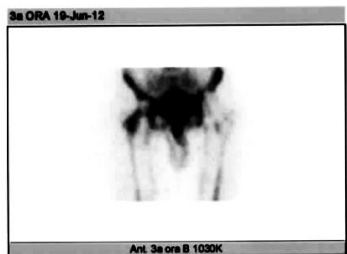
Persistenza sintomatologia algica all'anca



1a ORA



3a ORA



Scintigrafia con leucociti marcati

Radiofarmaco: ^{99m}Tc leucociti autologhi - HM-PAO
Attività somministrata: 377 MBq
Via di somministrazione: Via endovenosa

L'esame, eseguito mediante scansioni planari mirate a livello del bacino 1 e 3 ore dopo la reiniezione dei globuli bianchi autologhi marcati non dimostra aree di accumulo di essi dimostrative della presenza di un focolaio settico.



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MOBILIZZAZIONE OCCULTA DELL'ANCA

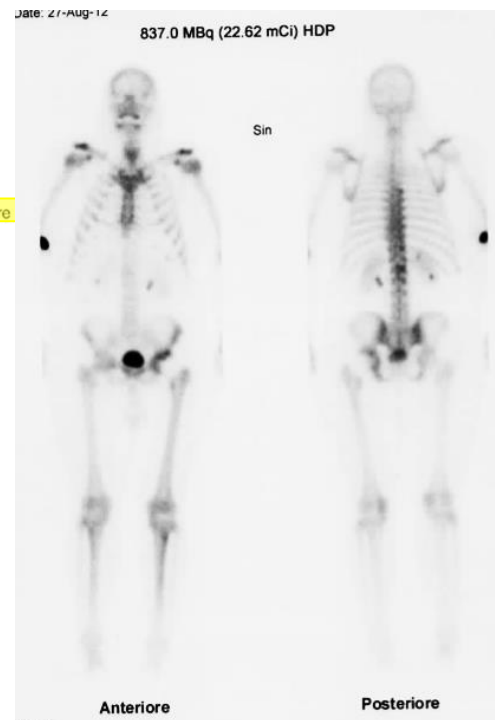
Controllo clinico (settembre 2012)



Scintigrafia ossea total body

Radiofarmaco: ^{99m}Tc etilen-difosfonato
Attività somministrata: 837 MBq
Via di somministrazione: Via endovenosa

L'esame dimostra unicamente un **peraccumulo dell'indicatore dell'acetabolo di sinistra**, in presenza di artroprotesi d'anca.





MoM

FOLLOW-UP:

Pazienti a basso rischio

- Uomini con testina <36mm



Ogni 1-3
anni

EE (concentrazione ematica ioni
metallici)

Pazienti ad alto rischio

- Donne
- Uomini con testina >36mm



annuale

EE (concentrazione ematica ioni
metallici)

ECO / RMN

se aumentata concentrazione ematica
ioni metallici

MA

alti livelli sistemici di ioni metallici **non** sono un
fattore significativo per la revisione

Clinical manifestations in ten patients with asymptomatic
metal-on-metal hip arthroplasty with very high cobalt



Scientific Committee on Emerging and Newly Identified Health Risks

SCENIHR

Opinion on

The safety of Metal-on-Metal joint replacements
with a particular focus on hip implants



MoM

FOLLOW-UP:

Pazienti a basso rischio

- Uomini con testina <36mm

Pazienti ad alto rischio

- Donne
- Uomini con testina >36mm

annuale

EE (concentrazione ematica ioni metallici)



ECO / RMN

I **sintomi** potenzialmente significano
distruzione dei tessuti molli e dell'osso



Scientific Committee on Emerging and Newly Identified Health Risks

SCENIHR

Opinion on

The safety of Metal-on-Metal joint replacements
with a particular focus on hip implants



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settembre 2019
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TAKE HOME MESSAGE

Non è necessario un follow-up annuale

MA

In presenza di segni radiologici è utile intervenire tempestivamente



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19-20
settembre 2019

BERGAMO



GRAZIE

CONGRESSO NAZIONALE DELLA
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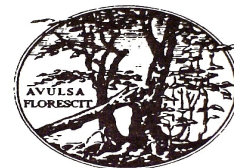


19-20
settembre 2019

BERGAMO

L'importanza dell'imaging nelle protesi d'anca: la TC

M. Gallazzi
UOC di Radiodiagnostica Pini-CTO
Asst Pini/CTO - Milano



MODALITA' DIAGNOSTICHE RADIOLOGICHE

RADIOLOGIA TRADIZIONALE  ***SPECIFICA MA POCO
SENSIBILE***

TC



***SPECIFICHE E SENSIBILI MA
CONDIZIONATE DAGLI ARTEFATTI
METALLICI***

RM

SCINTIGRAFIA OSSEA



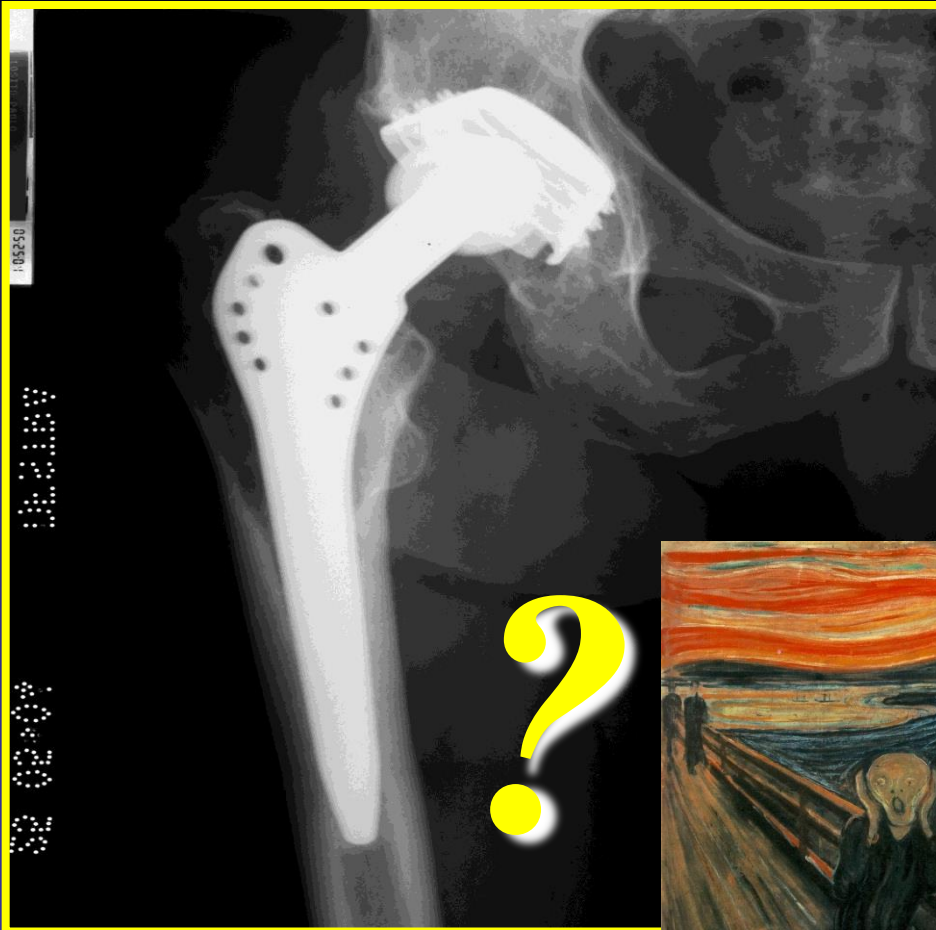
***SENSIBILE MA POCO
SPECIFICA ED
INOLTRE
CONDIZIONATA
DALL'INTERVENTO E***

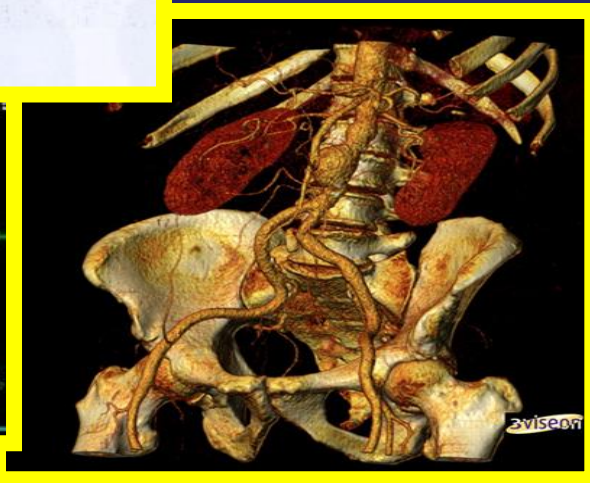
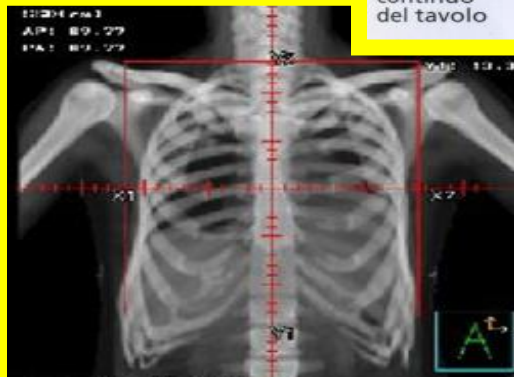
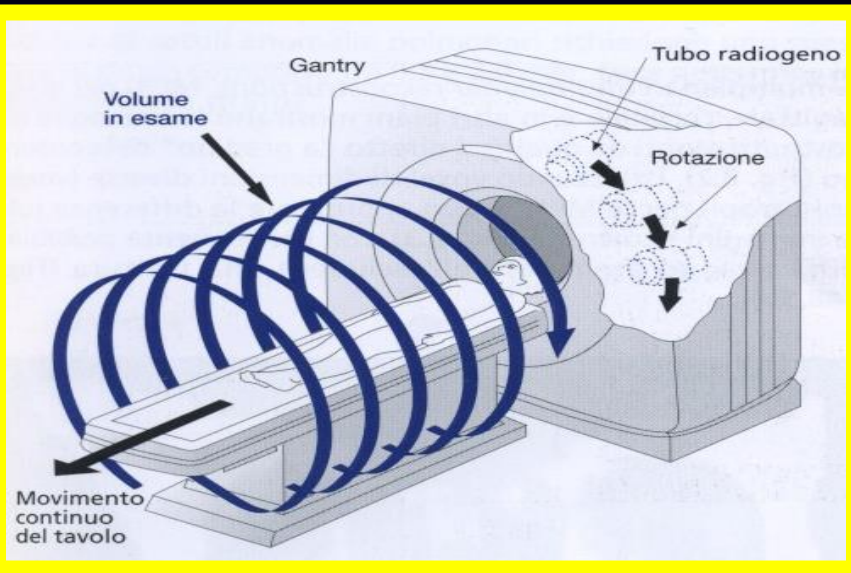
PROTESI SINTOMATICA

PROTESI ASINTOMATICA



***STESSA
PRESENTAZIONE
RADIOLOGICA***





*Why the use of similar
Technologies is not same on
clinical «scenario» ?*

MRI



CT



Imaging method

CT-scan vs MRI-scan



CT-scan

- *cheaper*
- *clear definition of bony borders and landmarks*
- *no contraindication*
- *shorter examination time*

MRI-scan

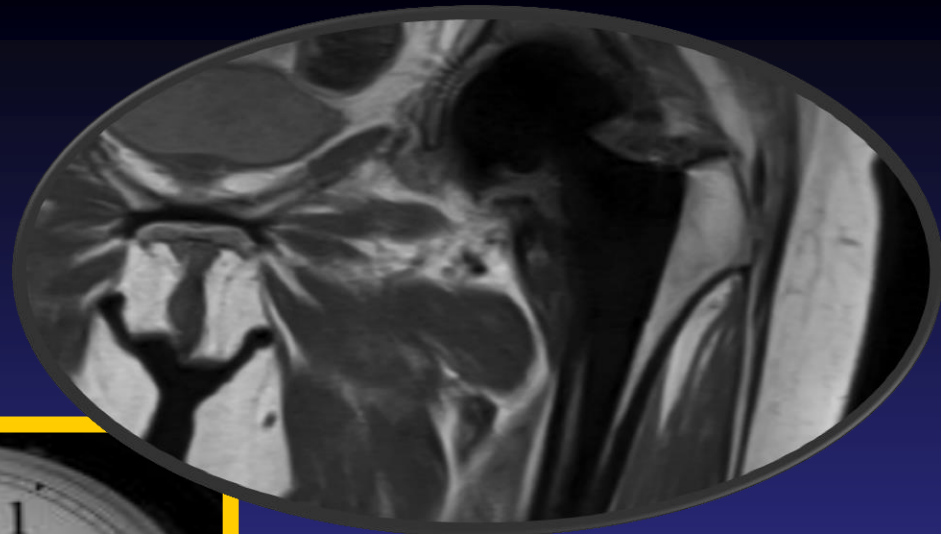
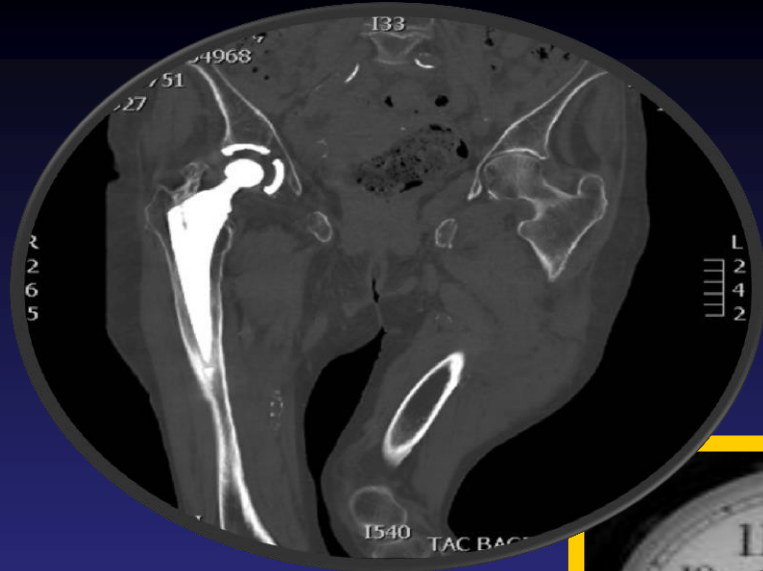


CT-scan

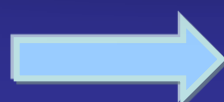
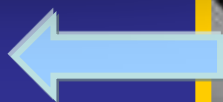


MRI-scan

- *more expensive*
- *longer examination time*
- *contraindications (e.g. pace makers)*
- *less availability*
- *less accuracy*

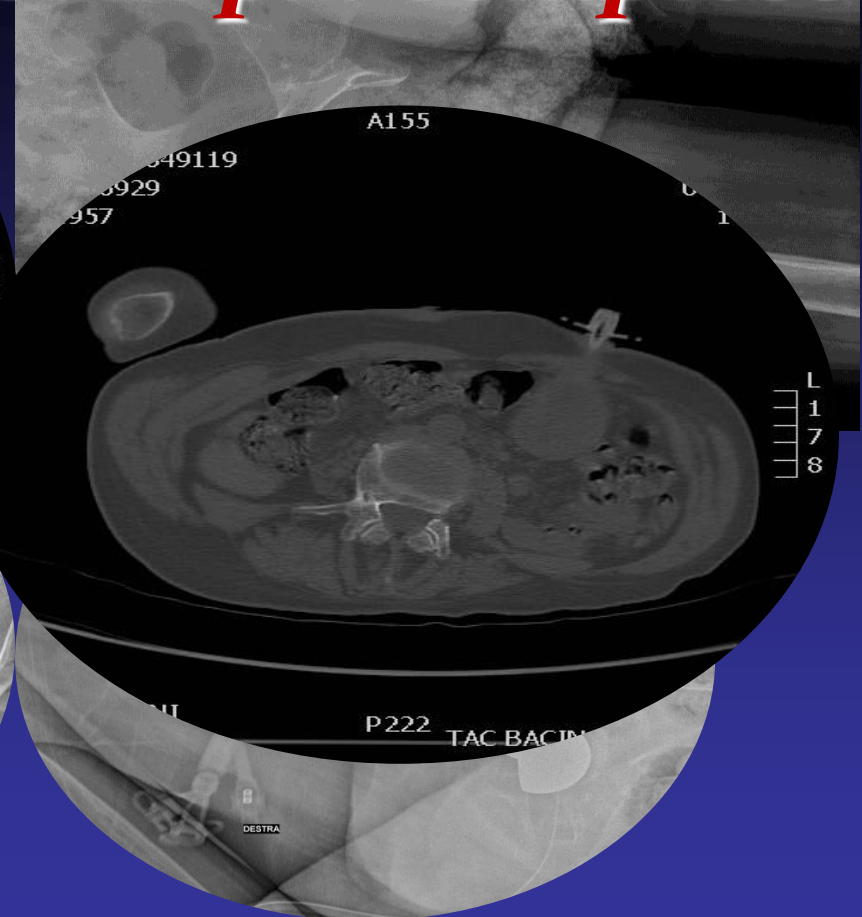
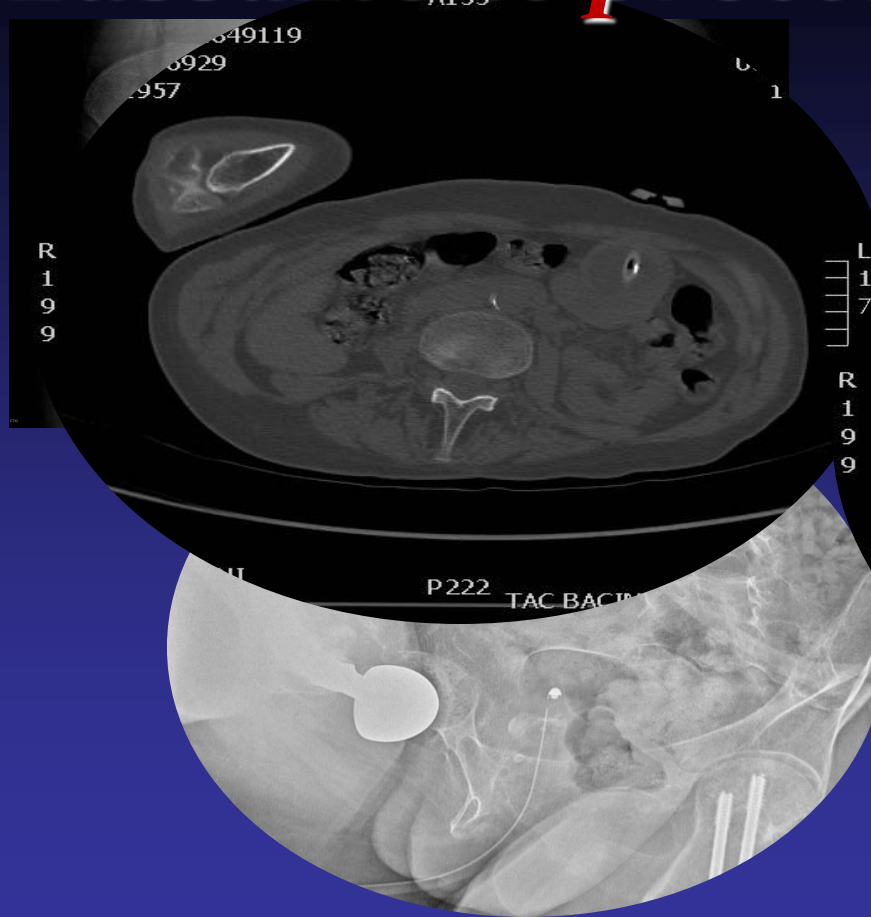


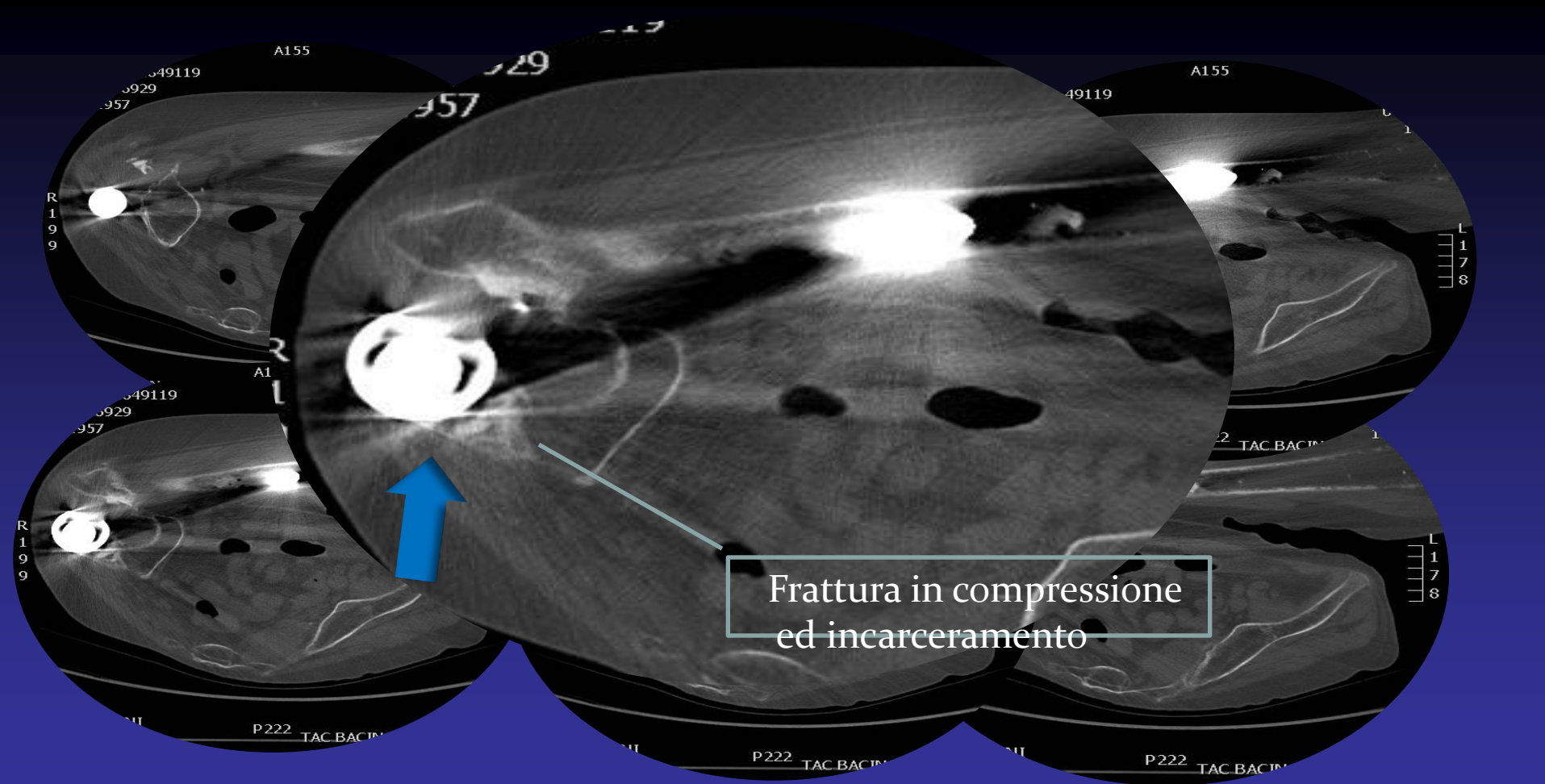
1'



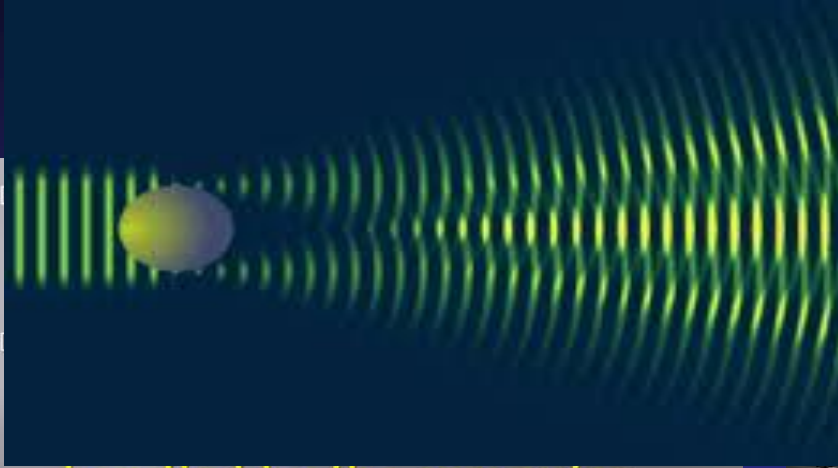
30-40'

Lussazione protesi in pz. complesso





ARTIFACTS :



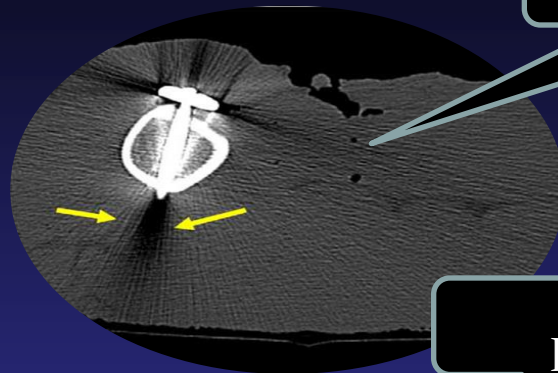
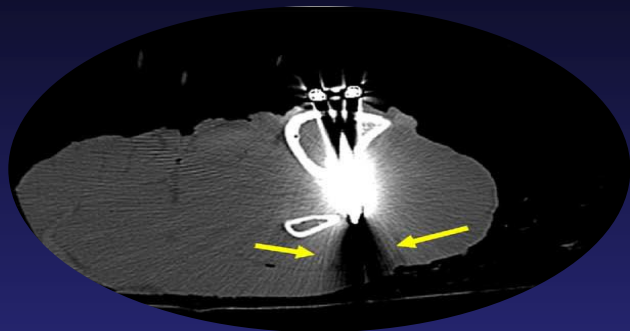
handled by the computer,
resulting in incomplete
attenuation profiles.

- ▣ Additional artefacts due to beam hardening, partial voluming and aliasing compound the problem.

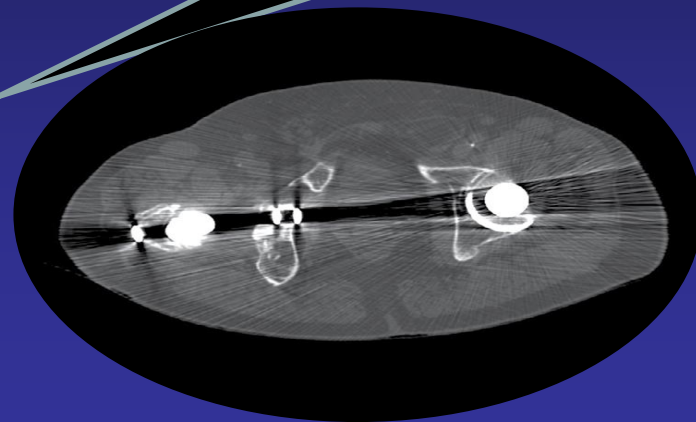
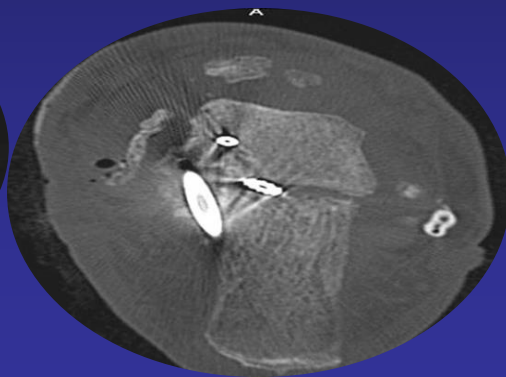
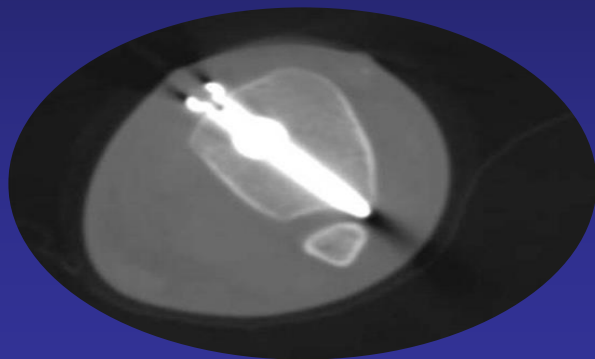


FATTORI CHE INFLUENZANO GLI ARTEFATTI

NUMERO ATOMICO
DEL METALLO



NUMERO DI
INTERFACCIE



METAL ARTIFACTS : AVOIDANCE :



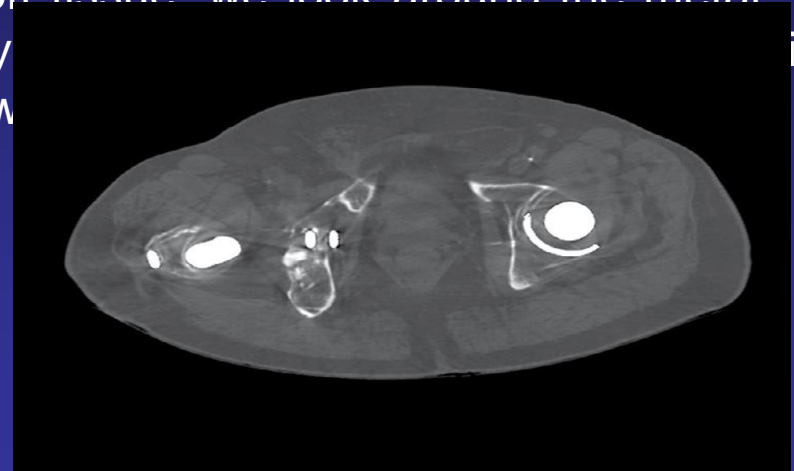
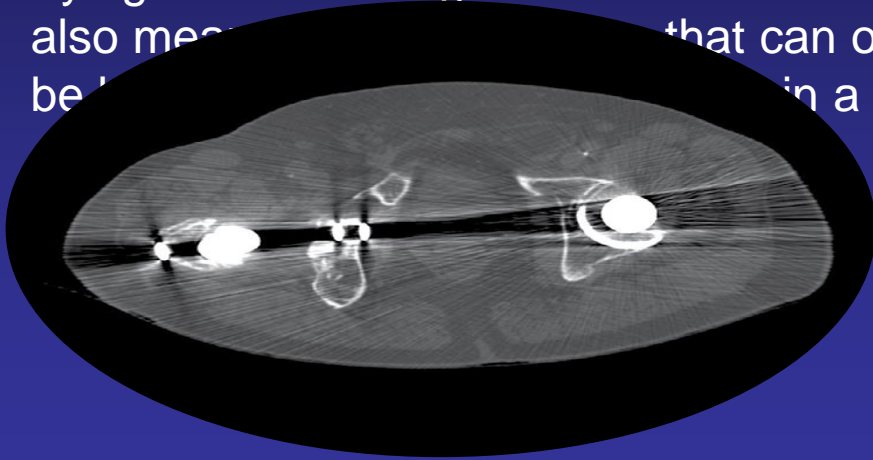
- ▣ Ask patients to **remove all metal objects** and jewellery before scanning.
- ▣ For nonremovable items, it is sometimes **possible using gantry angulation** to exclude the metal inserts from scans of nearby anatomy.
- ▣ When absolutely impossible to eliminate them,
 - ❖ Using **high kVp** may help penetrate some objects.
 - ❖ Using **thin sections** will reduce contribution due to partial volume artifacts.

METAL ARTIFACTS : IN-BUILT MINIMIZING TECHNIQUES :

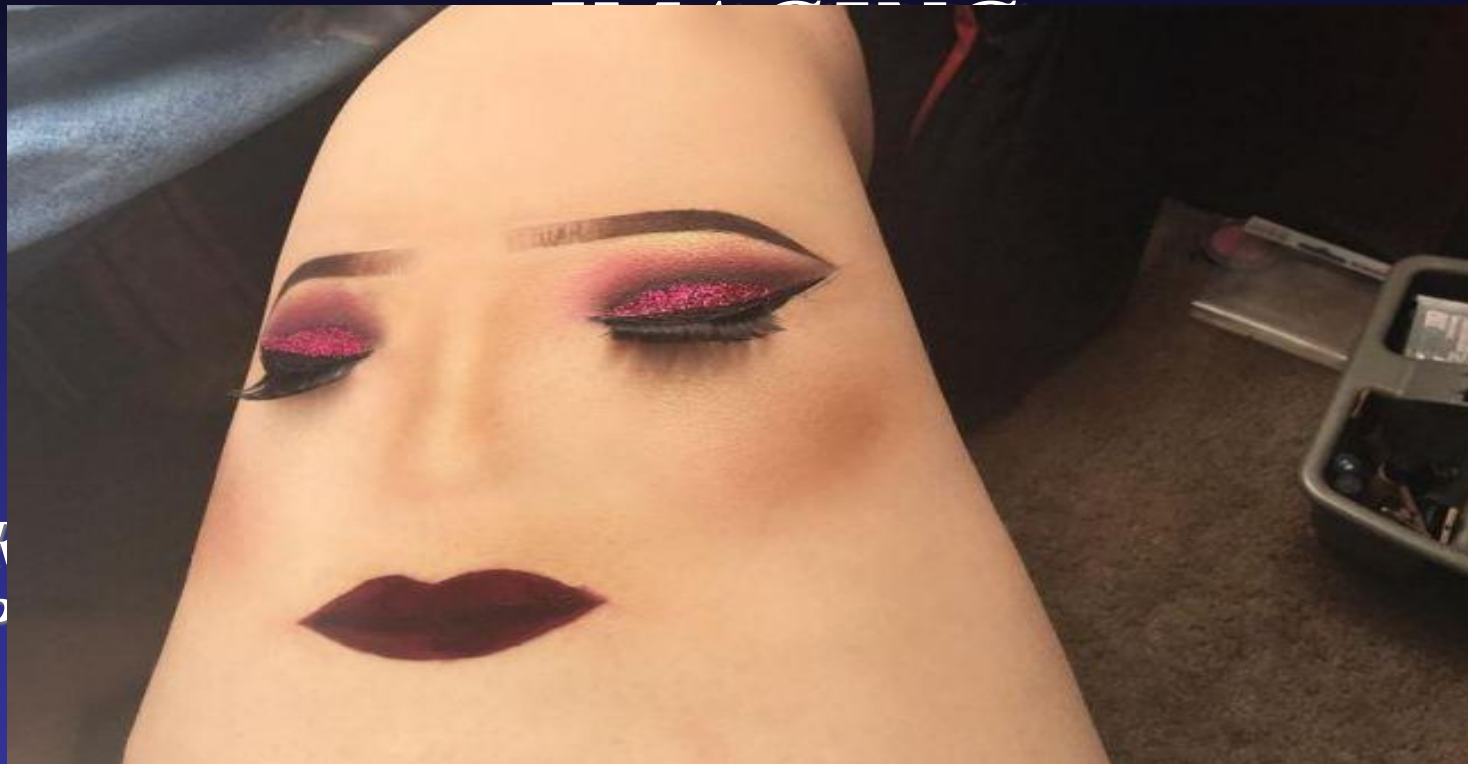
- ▣ Special software corrections apply interpolation techniques to substitute the over-range values in attenuation profiles.
- ▣ Usefulness is limited because, although streaking distant from the metal implant is reduced, there still remains a loss of detail around the metal-tissue interface, which is often the main area of diagnostic interest.
- ▣ Beam hardening correction software must also be applied when scanning metal objects to minimize additional artifacts.



Several techniques have been proposed for metal artifact reduction [28, 30-32]. Iterative method called the Metal Deletion Technique (MDT) which is based on the principle that projection data involving or near metal is less accurate, due to the mechanisms discussed above. MDT starts with raw projection data from the scanner, and then only uses high quality non-metal data to reconstruct the non-metal portions of the image. Metal pixels are deleted from the reconstructed image, and on each iteration, the inaccurate metal data are replaced with forward projected values from the previous iteration. This means that, instead of trying to look through the metal to see soft tissue, we look around the metal. It also means that metal objects that can only be seen in a few



RUOLO DELLE METODICHE DI

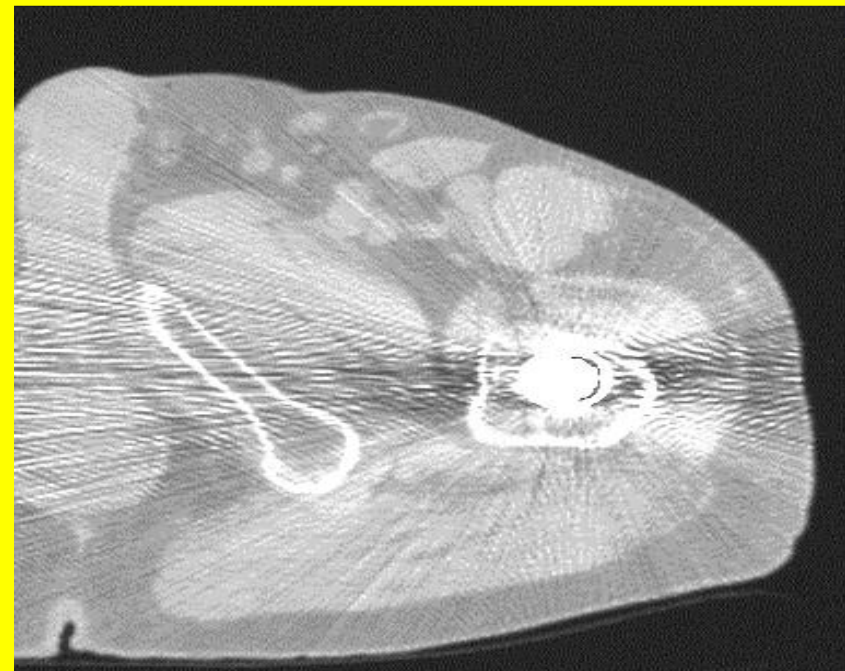
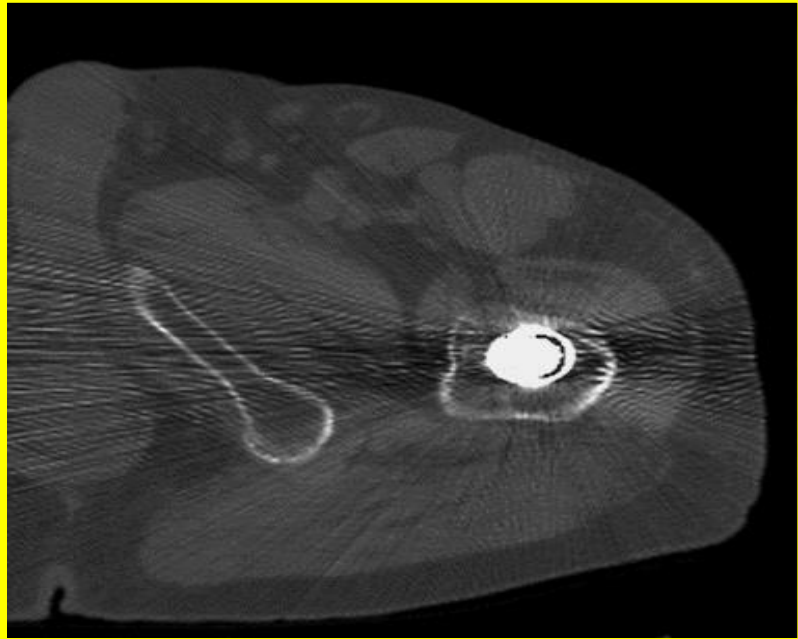


***PER
P***

***OSSO-
A IL***

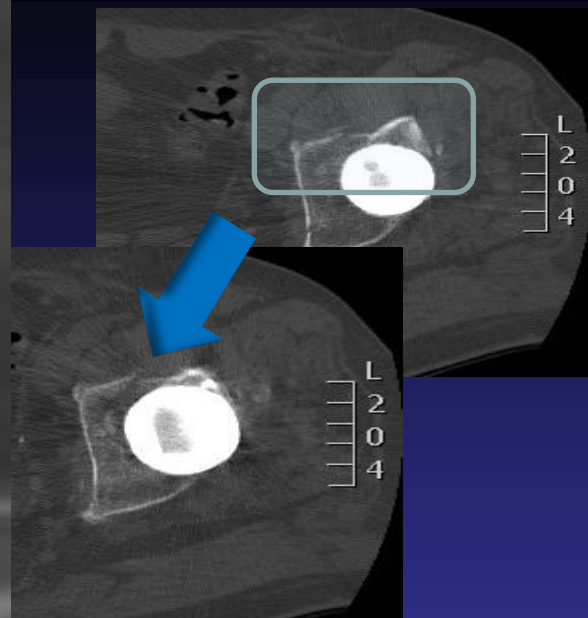
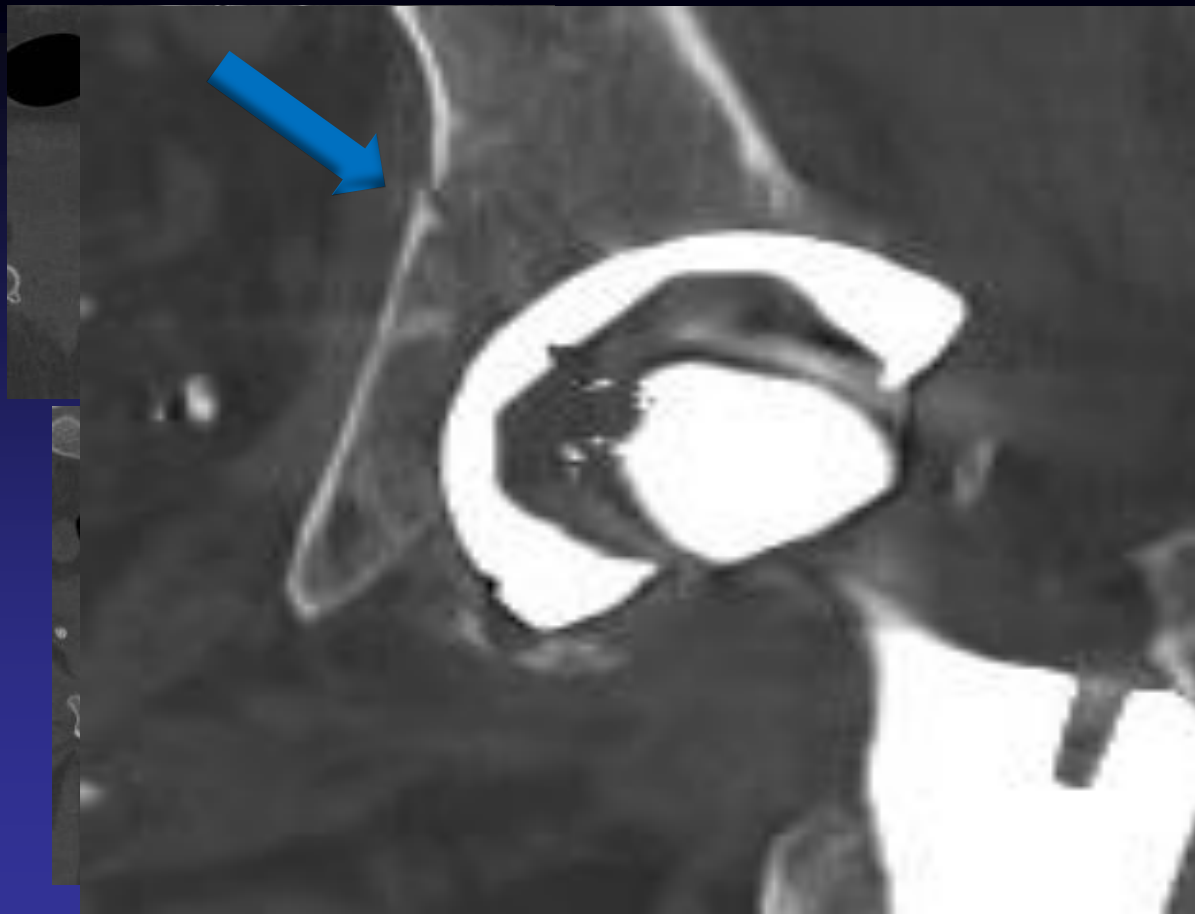
***GLI ARTEFATTI METALLICI RIDUCONO LA VALUTAZIONE
DELLE PARTI MOLLI***

CRITERI DI MOBILIZZAZIONE MEZZI PROTESICI: LIMITI FISICI

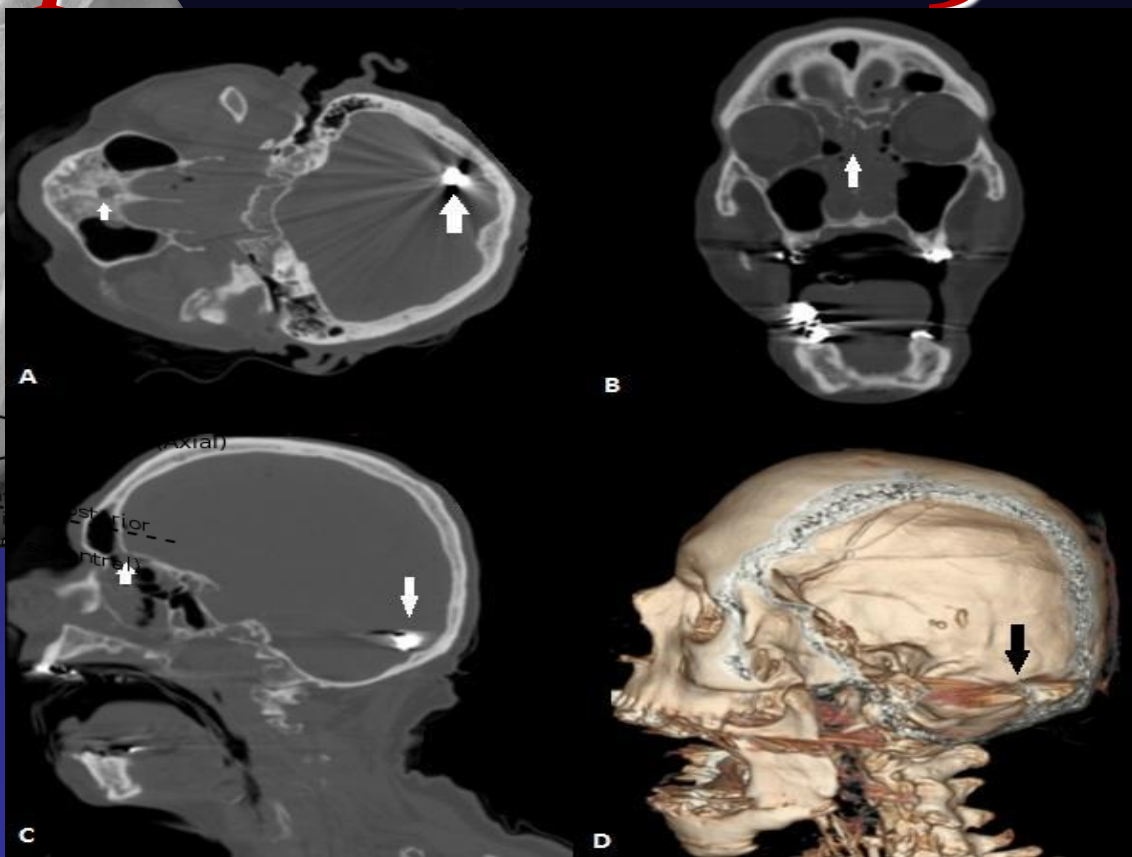
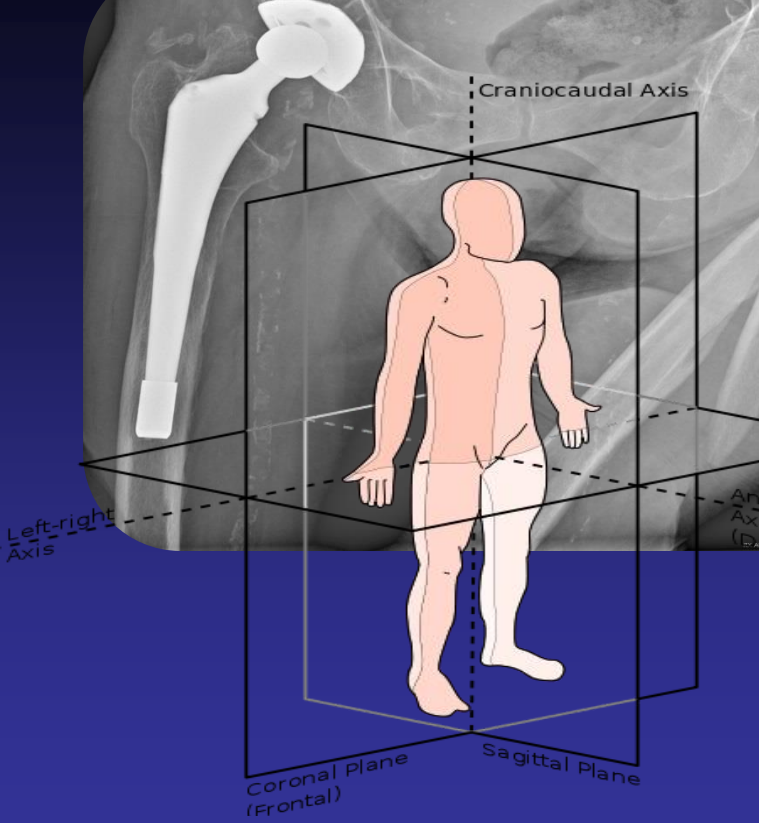


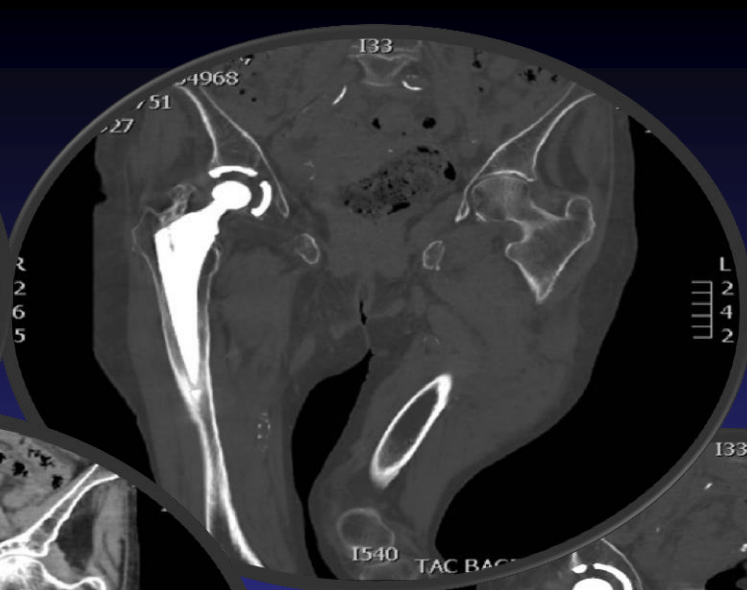
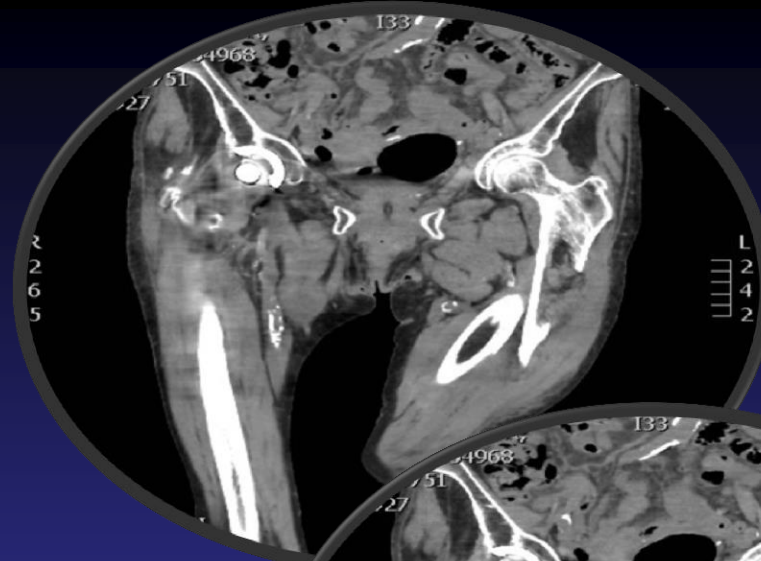
Diagnosi del dolore periprotetico

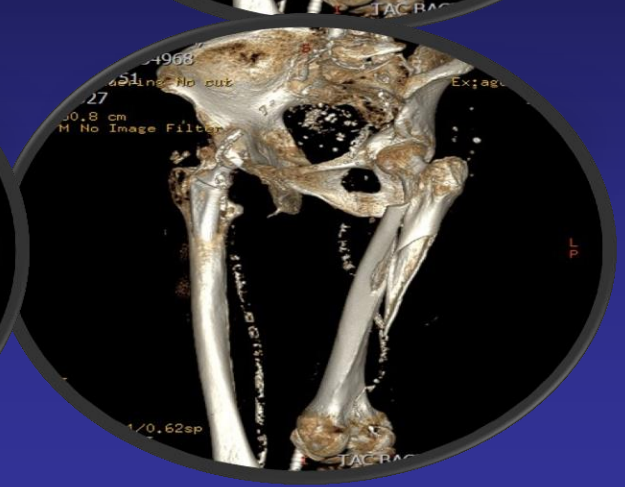
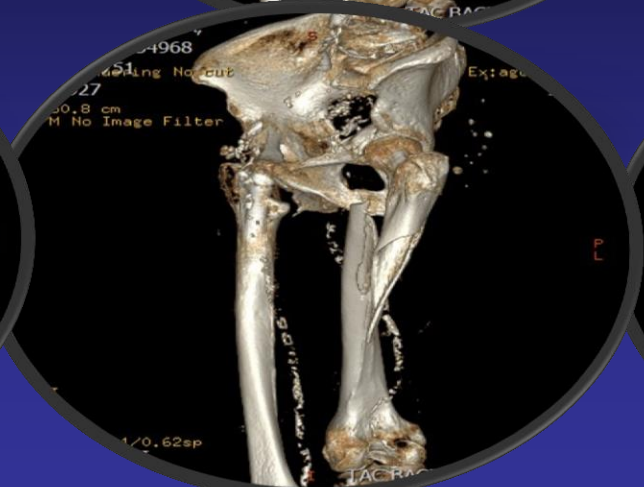
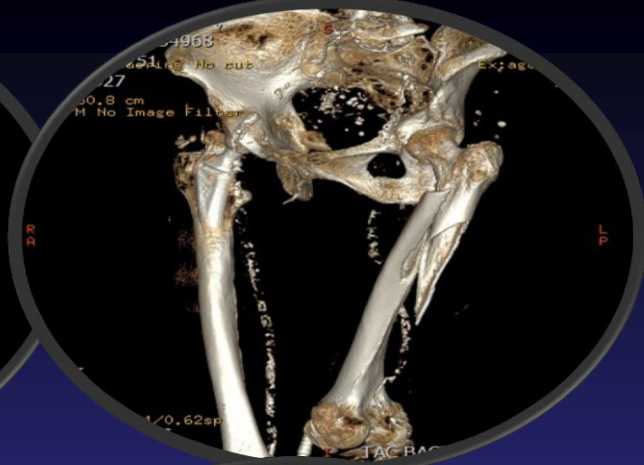
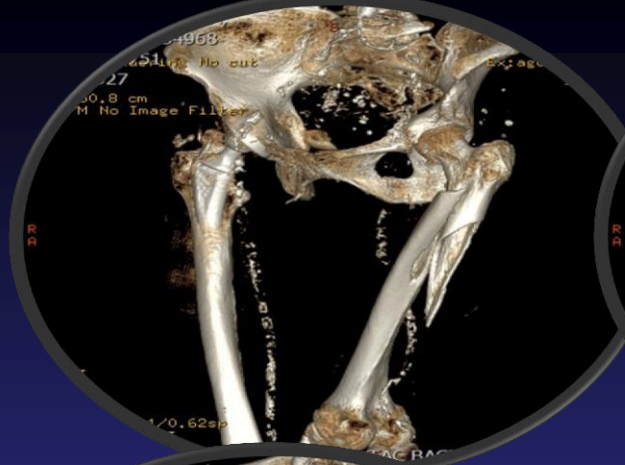
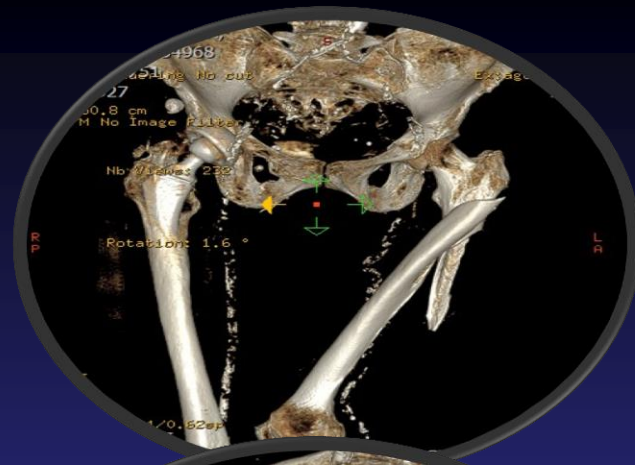


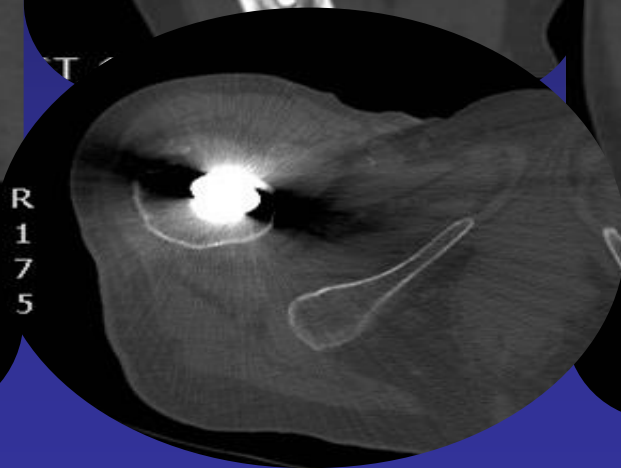
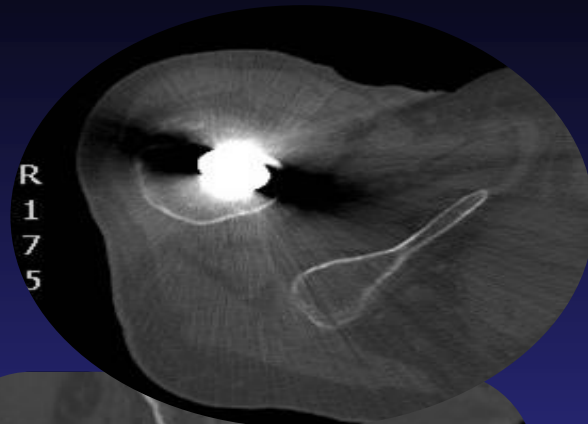
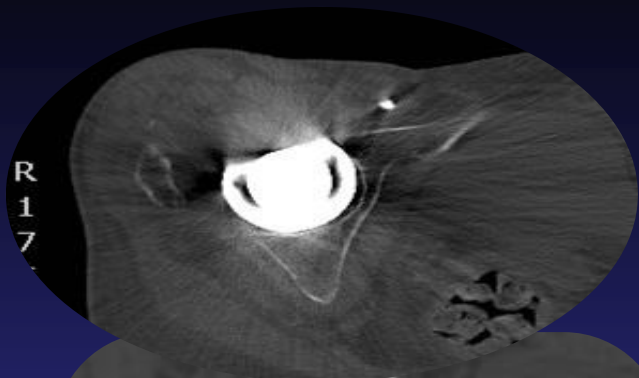


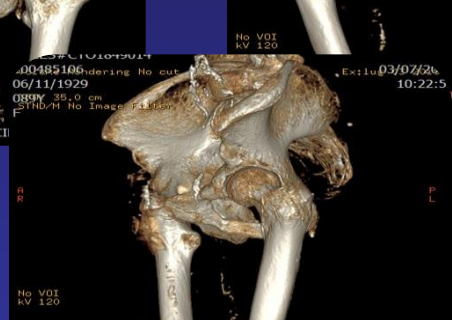
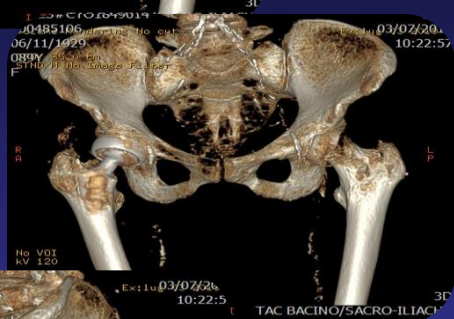
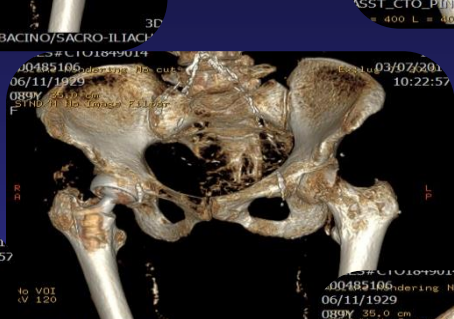
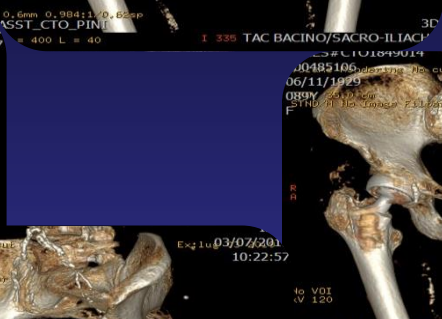
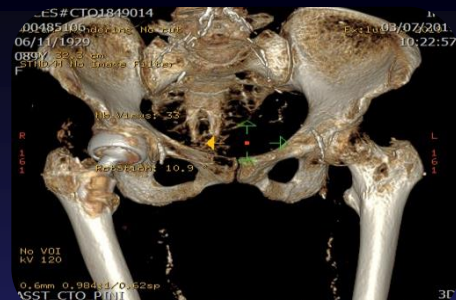
Fratture complessa ruolo delle 3D











RUOLO DELLE METODICHE DI IMAGING



CARATTERIZZA MEGLIO L'OSSO PERI-PROTESICO

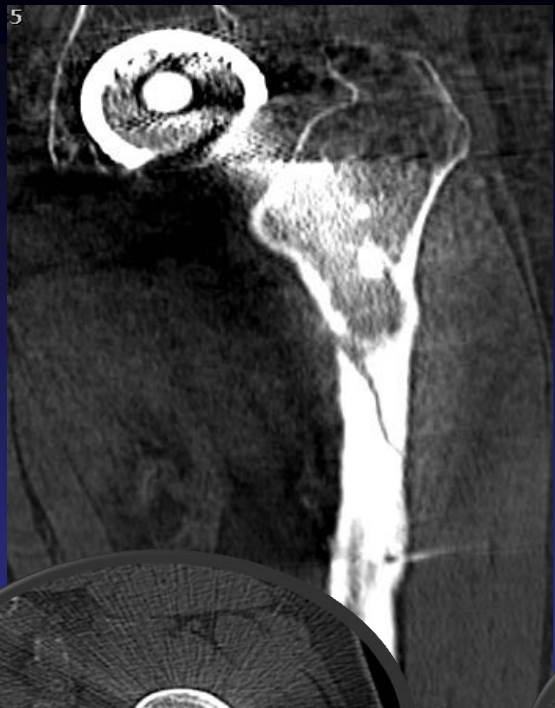
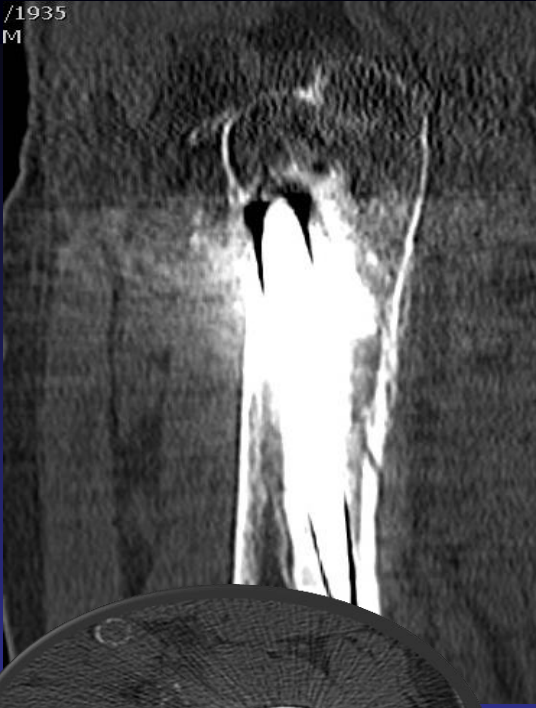
- ***PUO' EVIDENZIARE PIU' PRECOCEMENTE DELLA RADIOLOGIA TRADIZIONALE LE OSTEOLISI PATOLOGICHE PARTICOLARMENTE IN SEDE PERICOTILOIDEA***
- ***ESSENDO UNA TECNICA PANORAMICA PUO' DARE INFORMAZIONI AGGIUNTIVE***



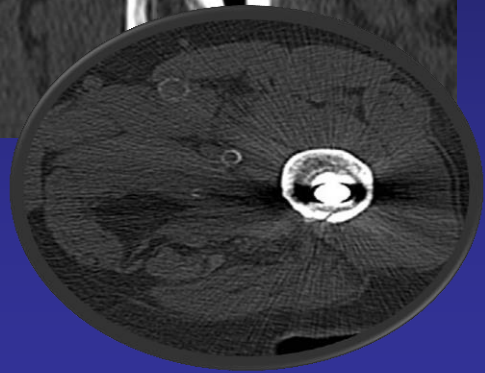
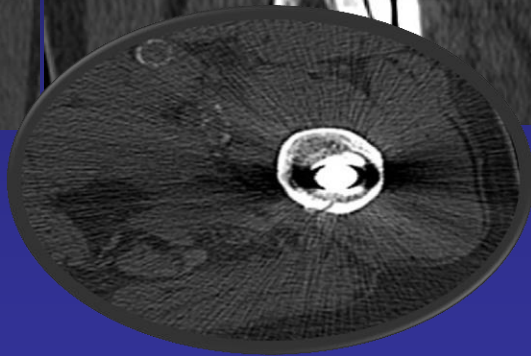
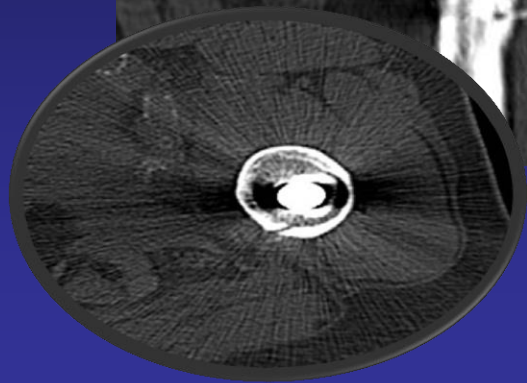
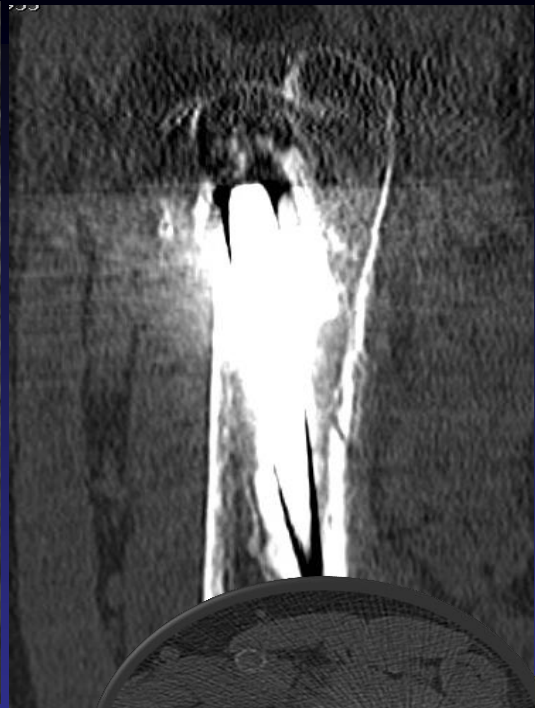




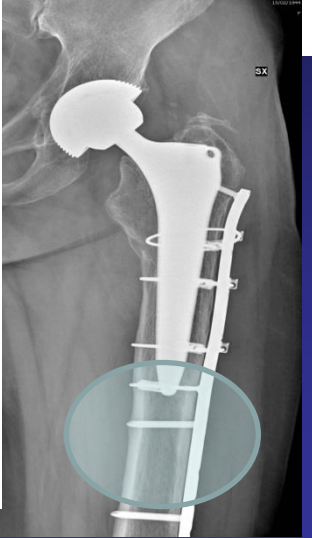
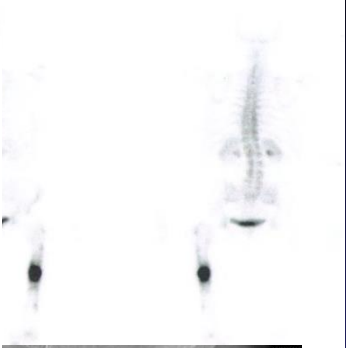
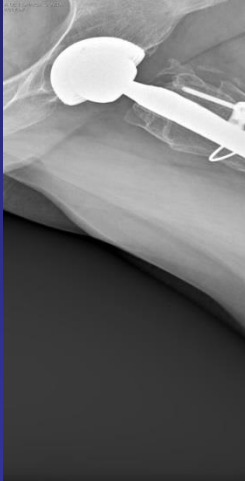
5

/1935
M

733

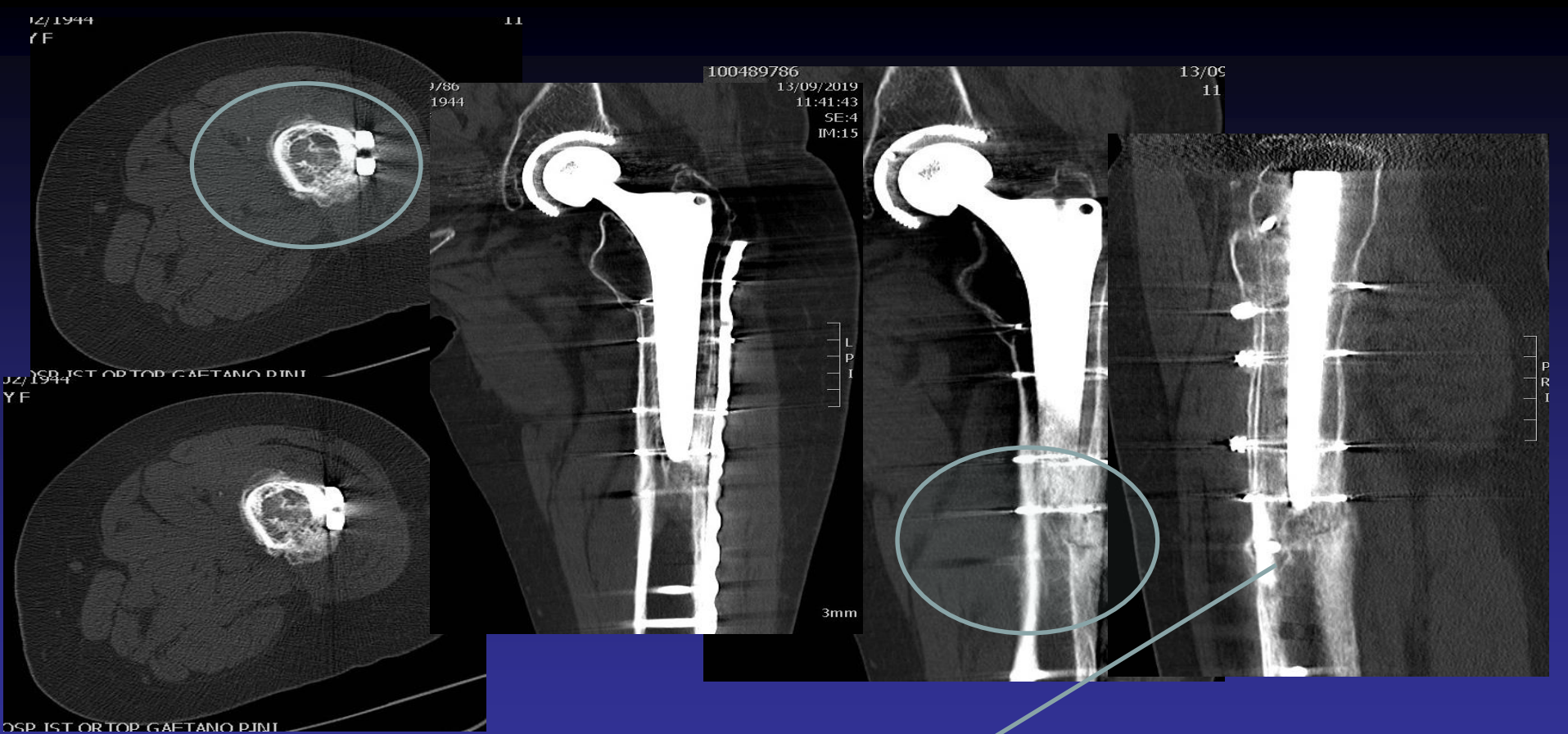






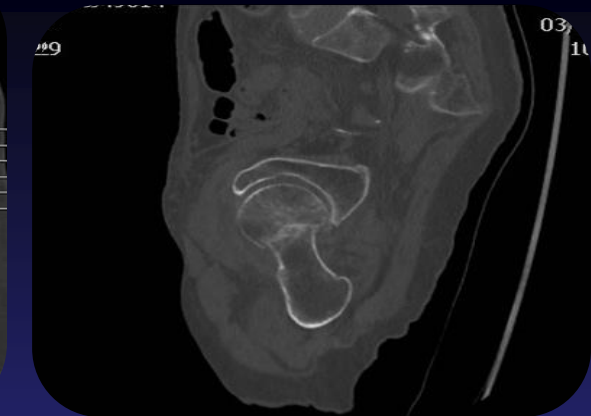
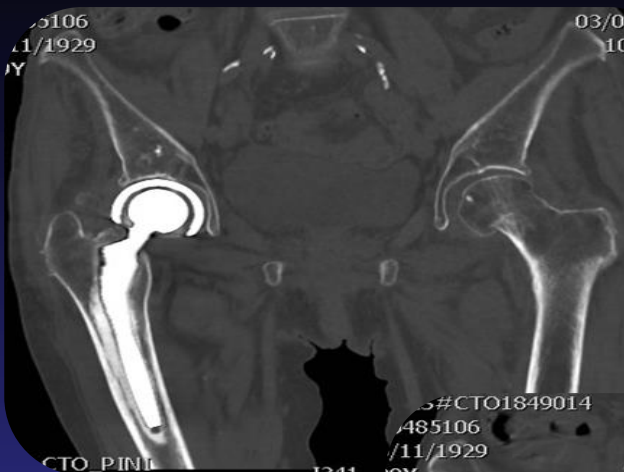


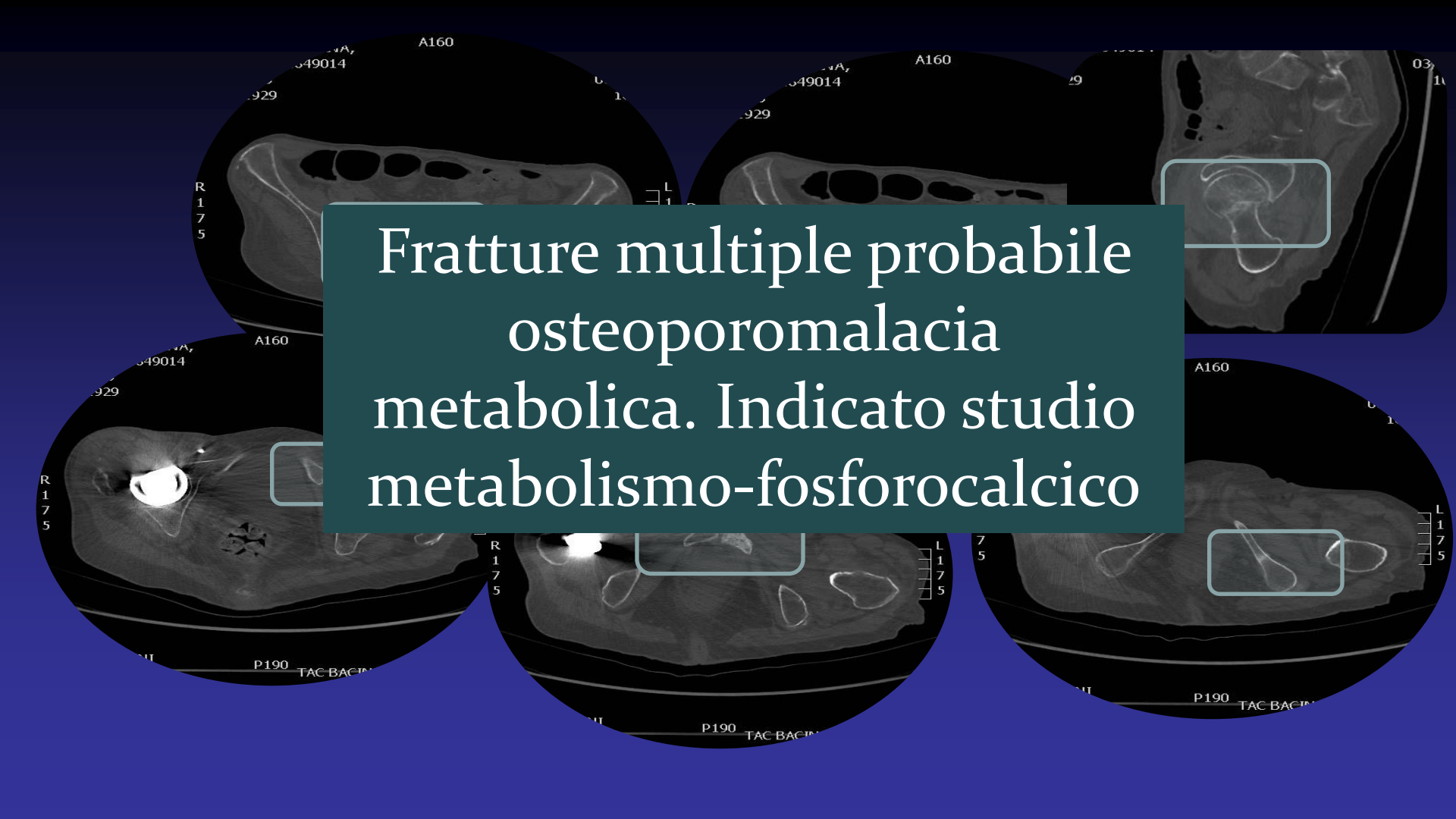
Protesi ben tollerata



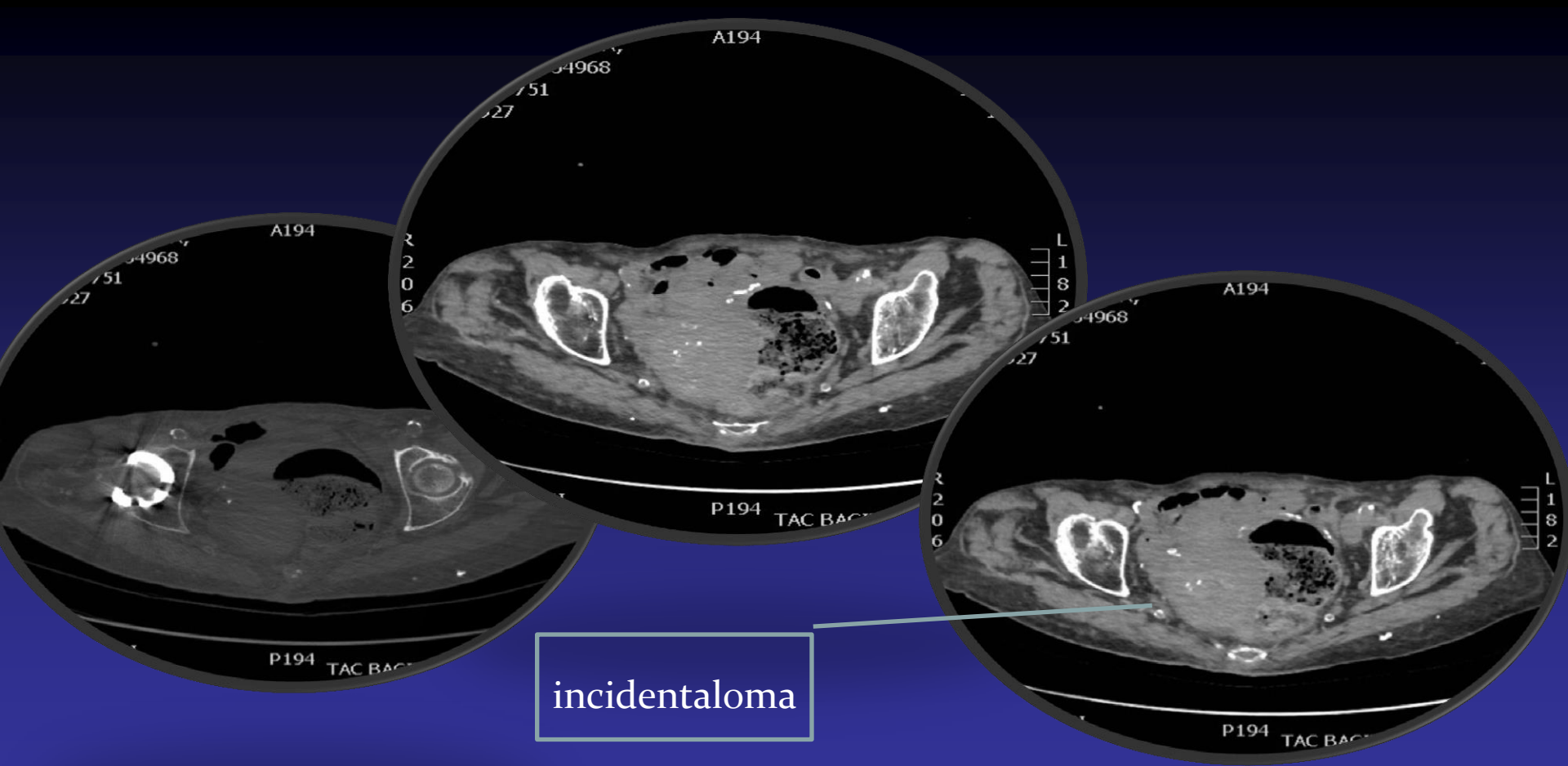
Fratture multiple



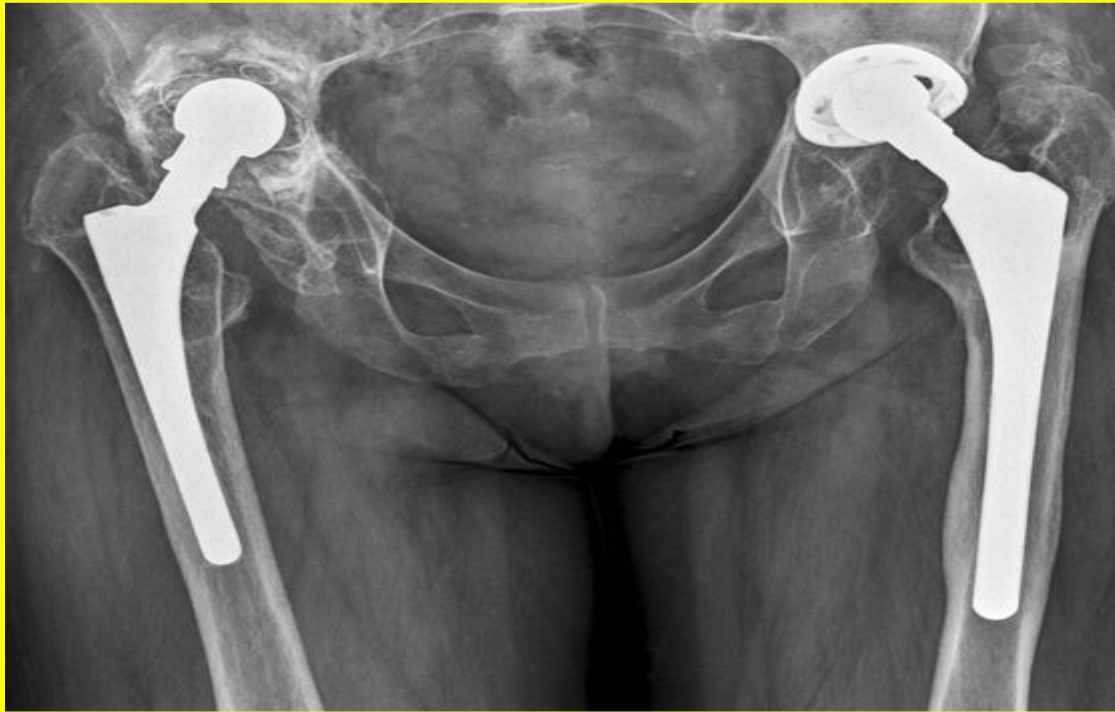


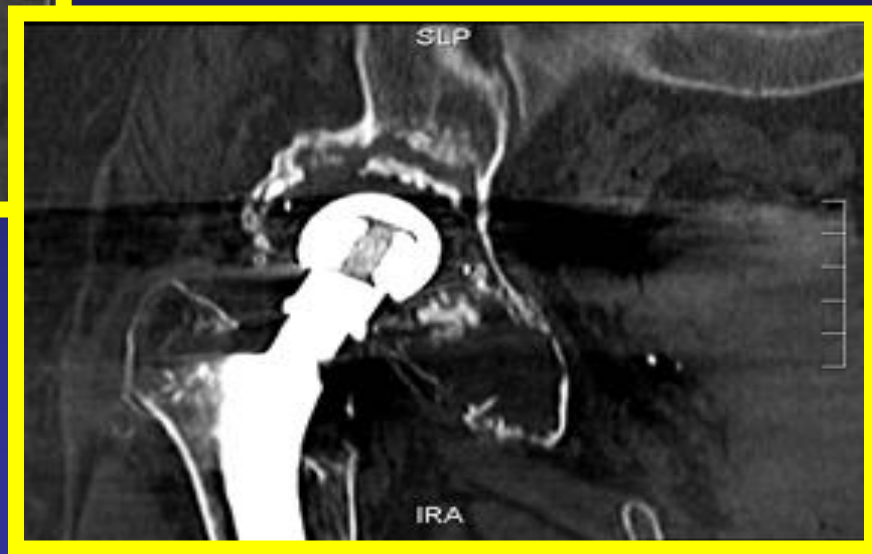
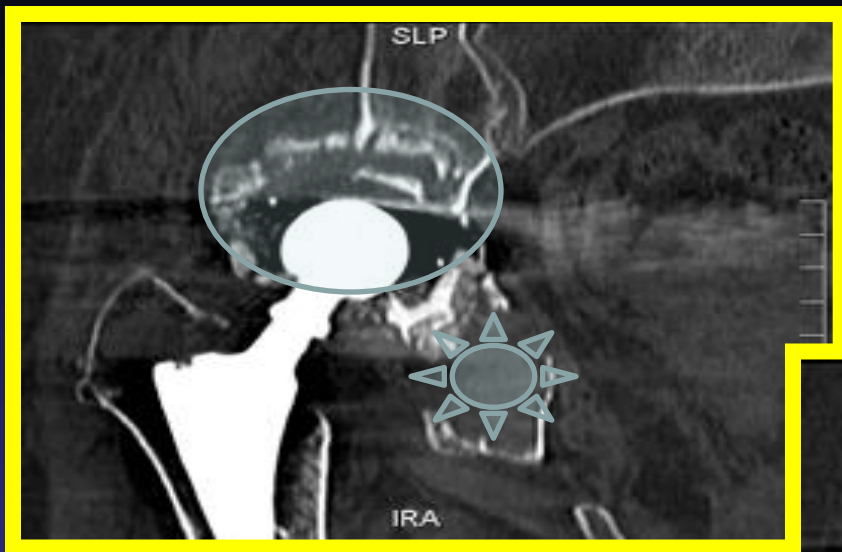


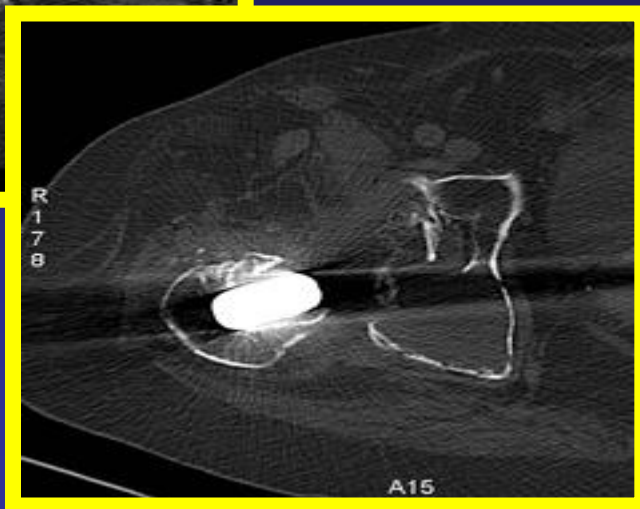
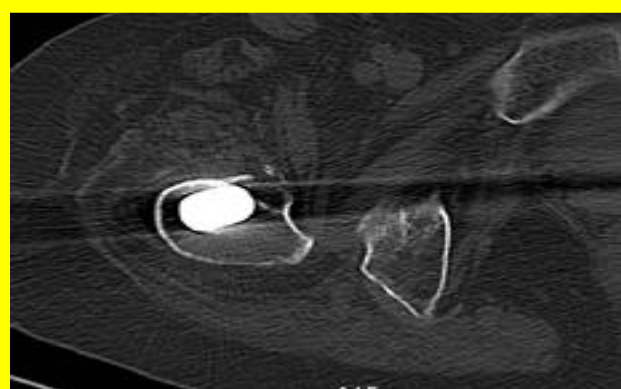
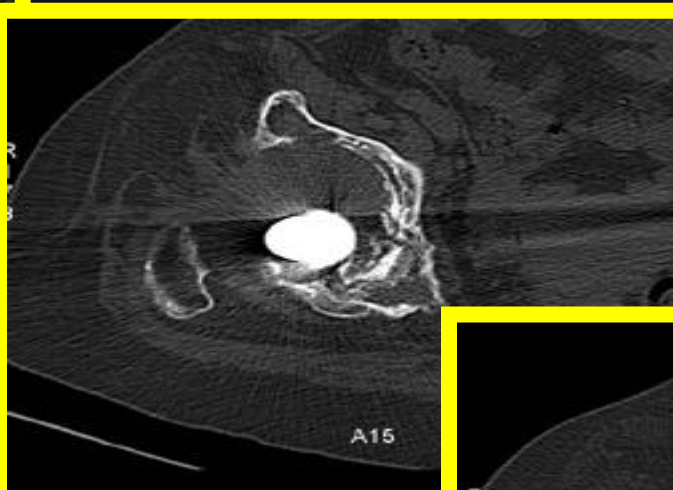
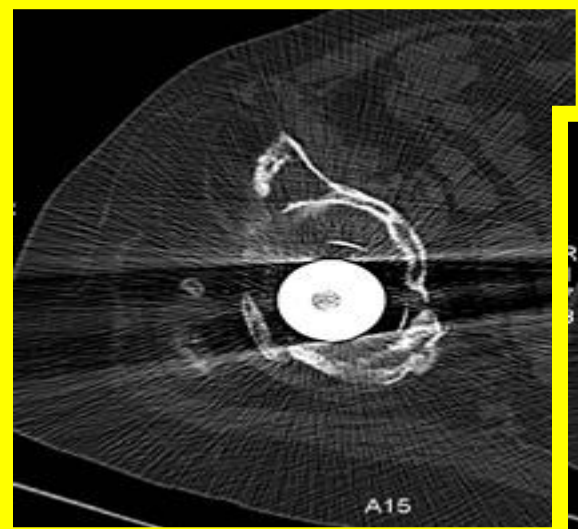
Fratture multiple probabile
osteoporomalacia
metabolica. Indicato studio
metabolismo-fosforocalcico

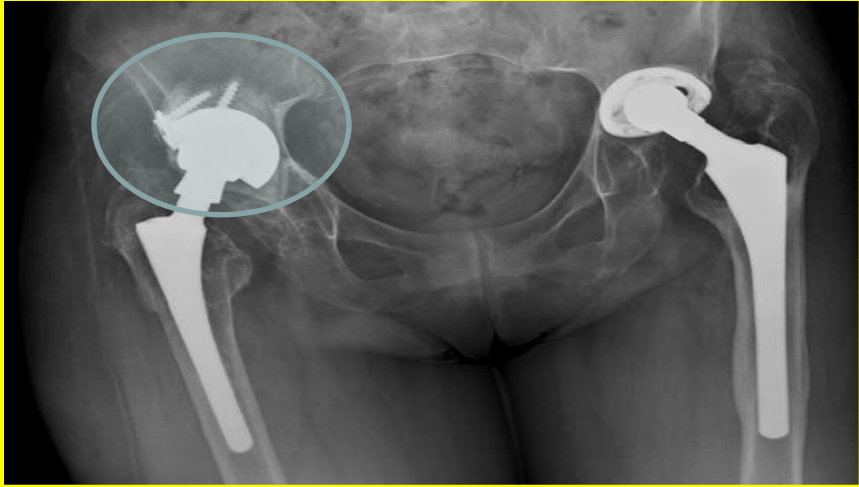


Osteolisi bicompartimentale metacroma con buon riempimento (osso morcellizzato+ MSCs) controllo postoperatorio :frattura della diafisi periprotetica da bone stock ridotto , ruolo delle ricostruzioni







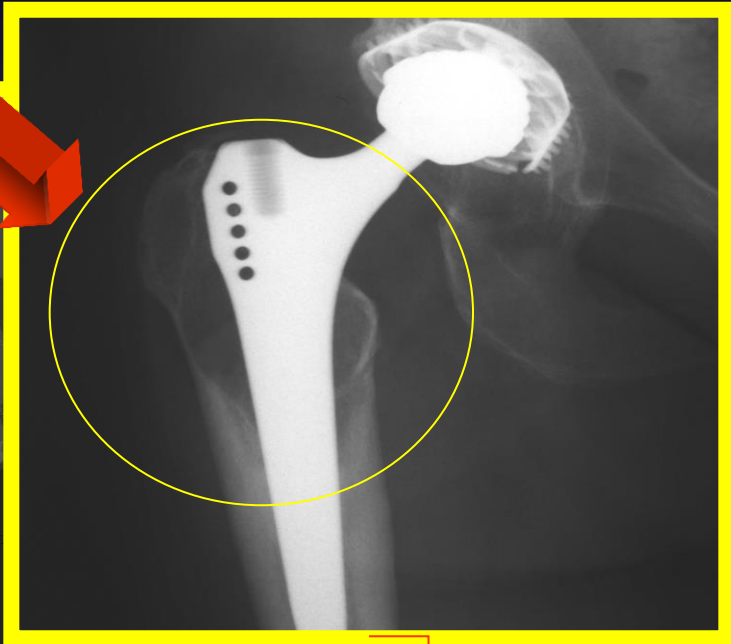


*CONTROLLO DOPO
1 ANNO*



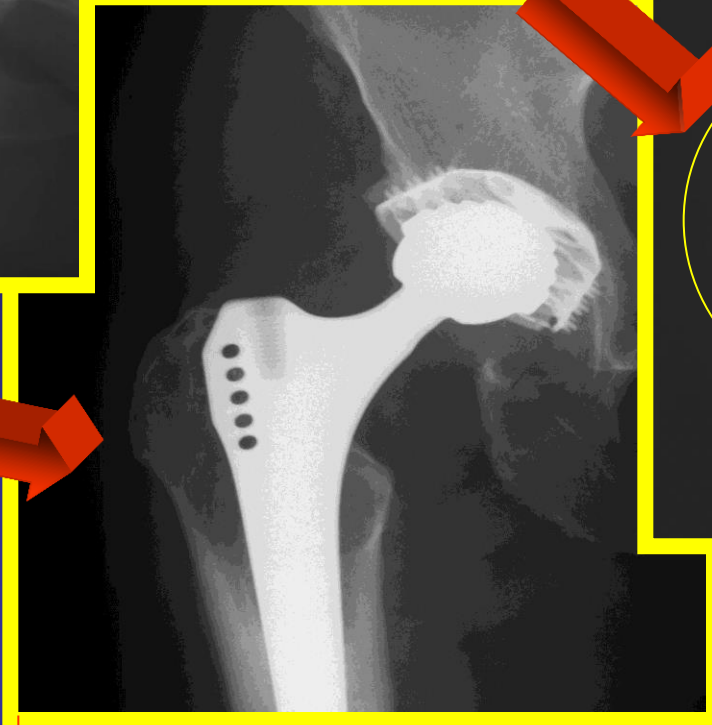
REAZIONE INFIAMMATORIA CRONICA PERIPROTESICA

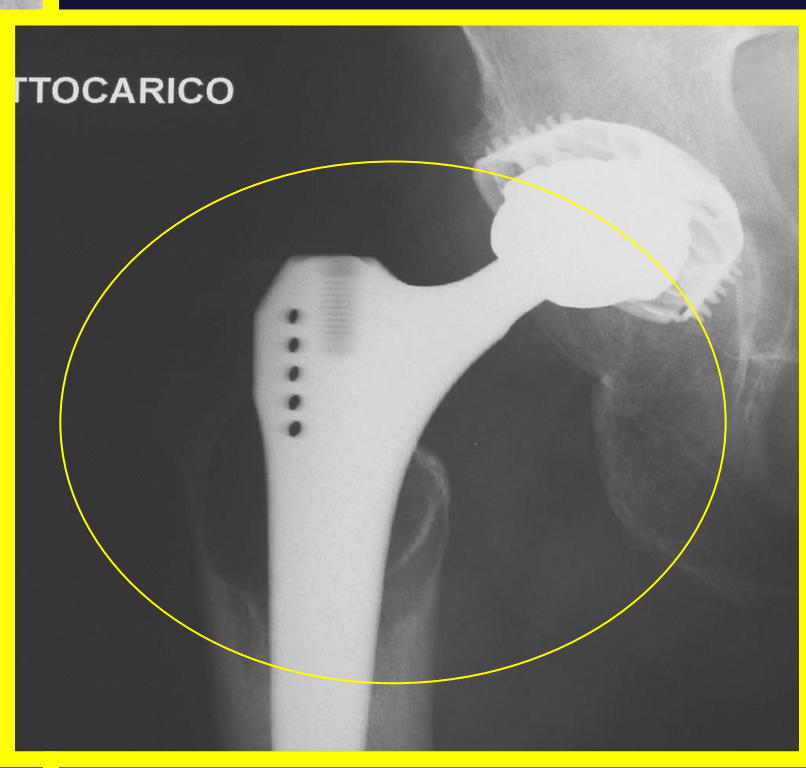
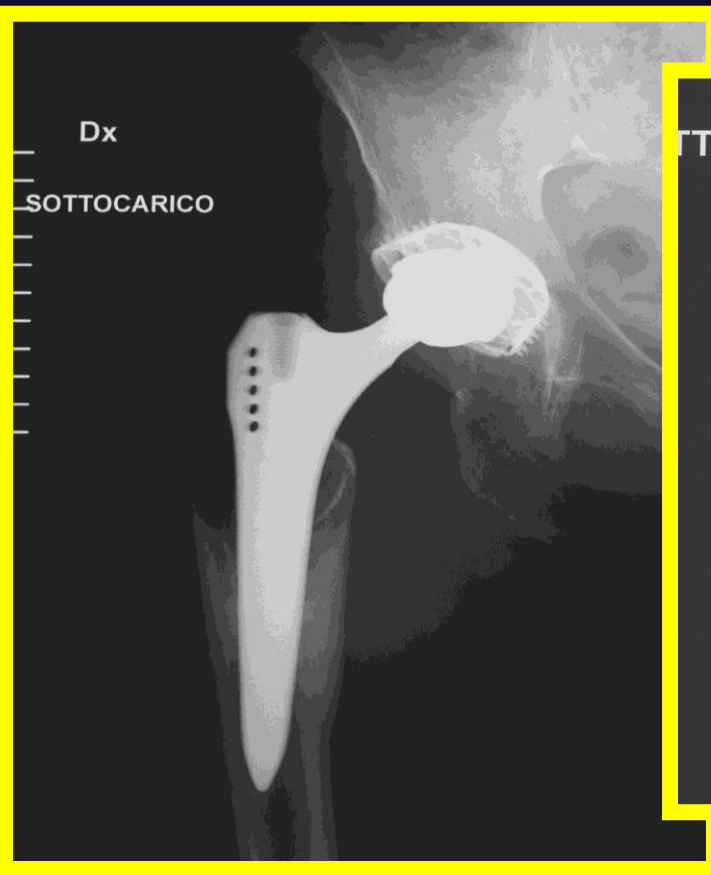
Gennaio



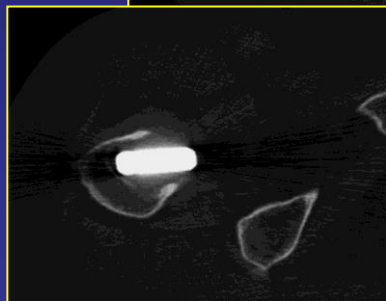
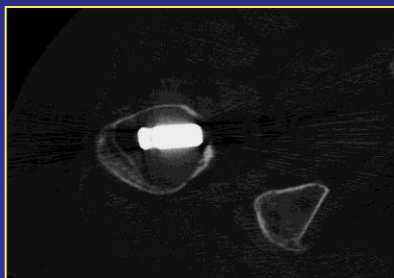
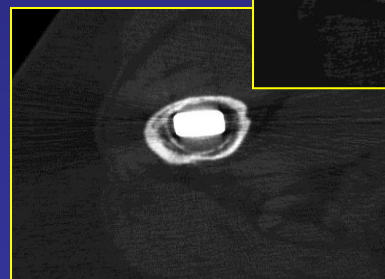
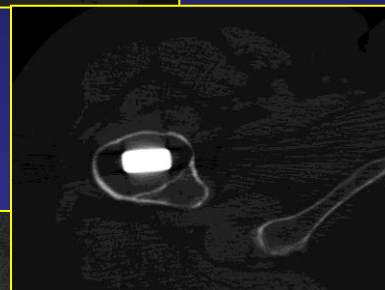
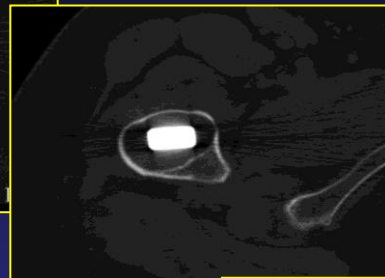
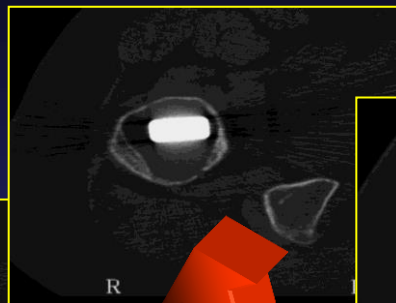
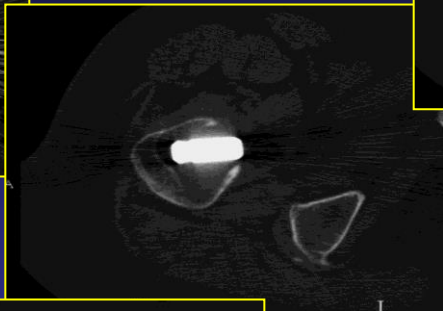
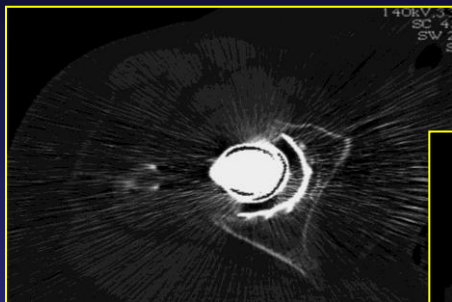
Aprile

Gennaio



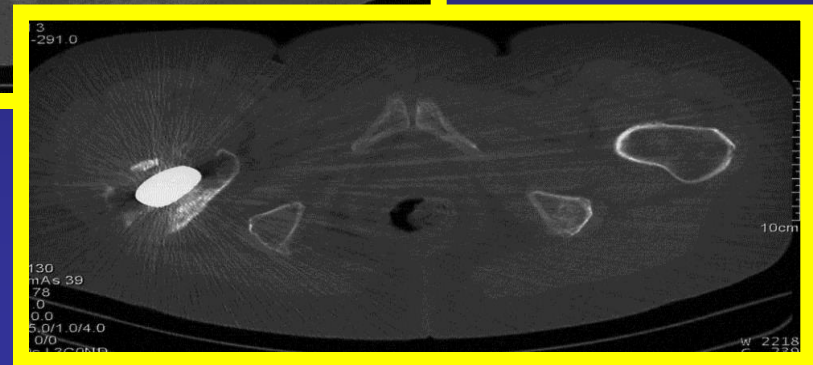
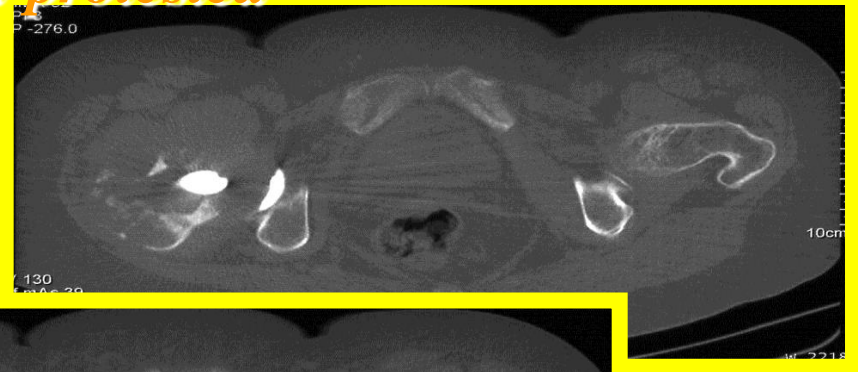


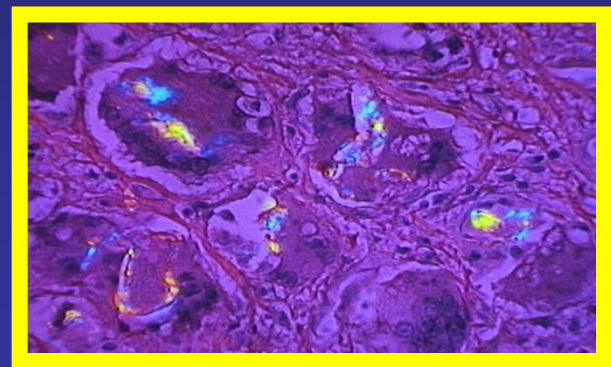
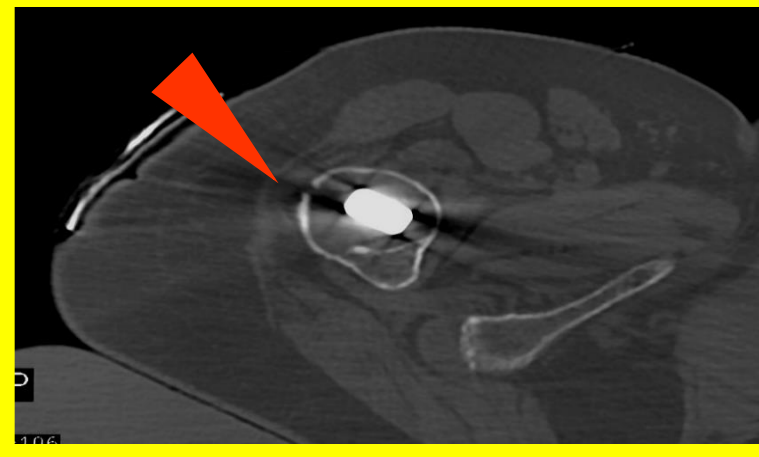
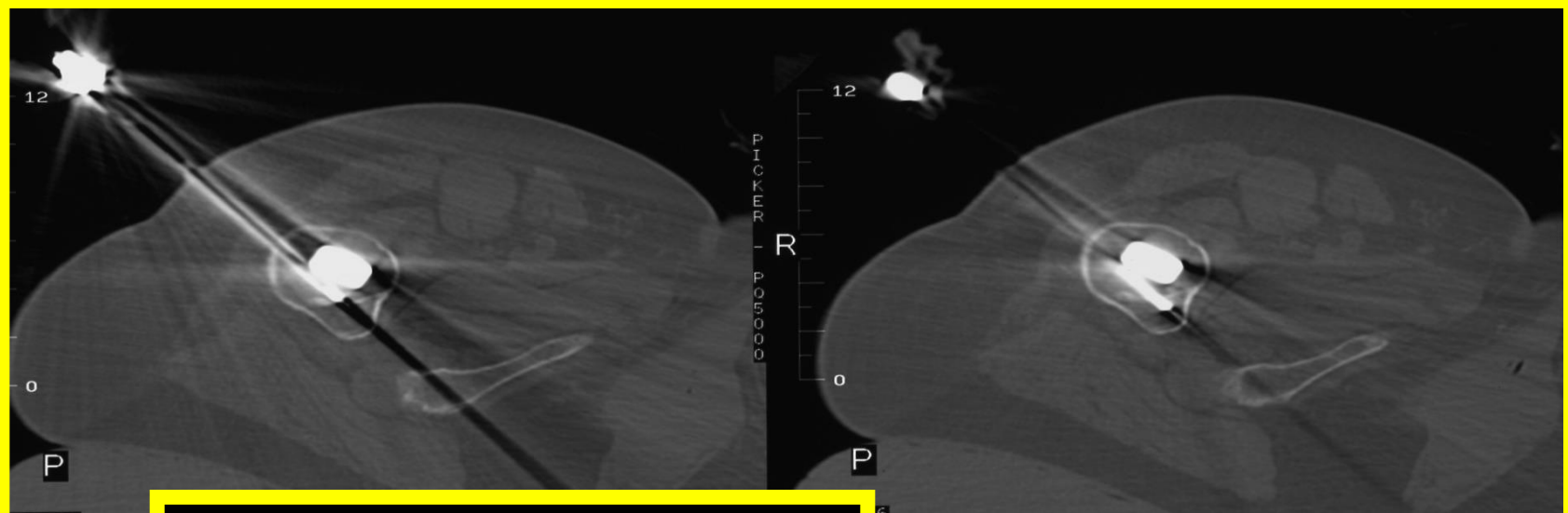
Maggio 16



Maggio 17

Neoplasia peri-protesica





CONGRESSO NAZIONALE DELLA
SOCIETÀ ITALIANA DELL'ANCA



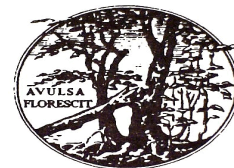
GRAZIE

19-20
settembre 2019

BERGAMO

L'importanza dell'imaging nelle protesi d'anca: la TC

*M. Gallazzi
UOC di Radiodiagnostica Pini-CTO
Asst Pini/CTO - Milano*



L'importanza dell'imaging e della collaborazione con il radiologo: vediamo quello che cerchiamo e cerchiamo quello che conosciamo

ALBERTO ALIPRANDI

*Responsabile Diagnostica Per Immagini
Istituti Clinici Zucchi – MB
Bergamo 19-20 Settembre 2019*



Preconcetti ..., sino ad un certo punto...



MRISAFETY.COM

YOUR INFORMATION RESOURCE FOR MRI SAFETY, BIOEFFECTS, & PATIENT MANAGEMENT

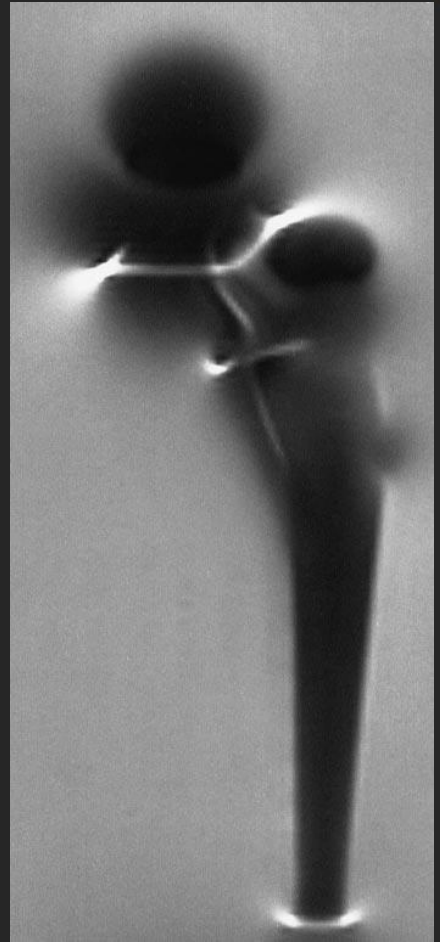
The Development of this site was
supported by an Unrestricted
Educational Grant From



**Magnetic Resonance
Safety Testing Services**

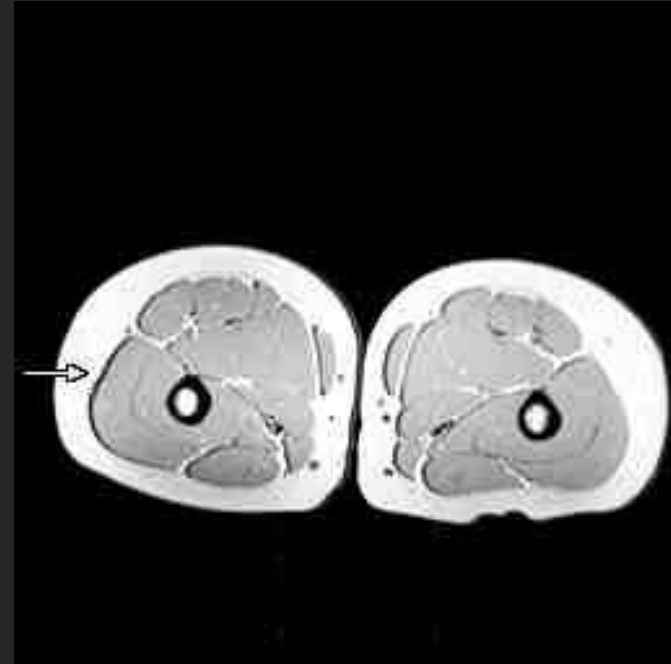
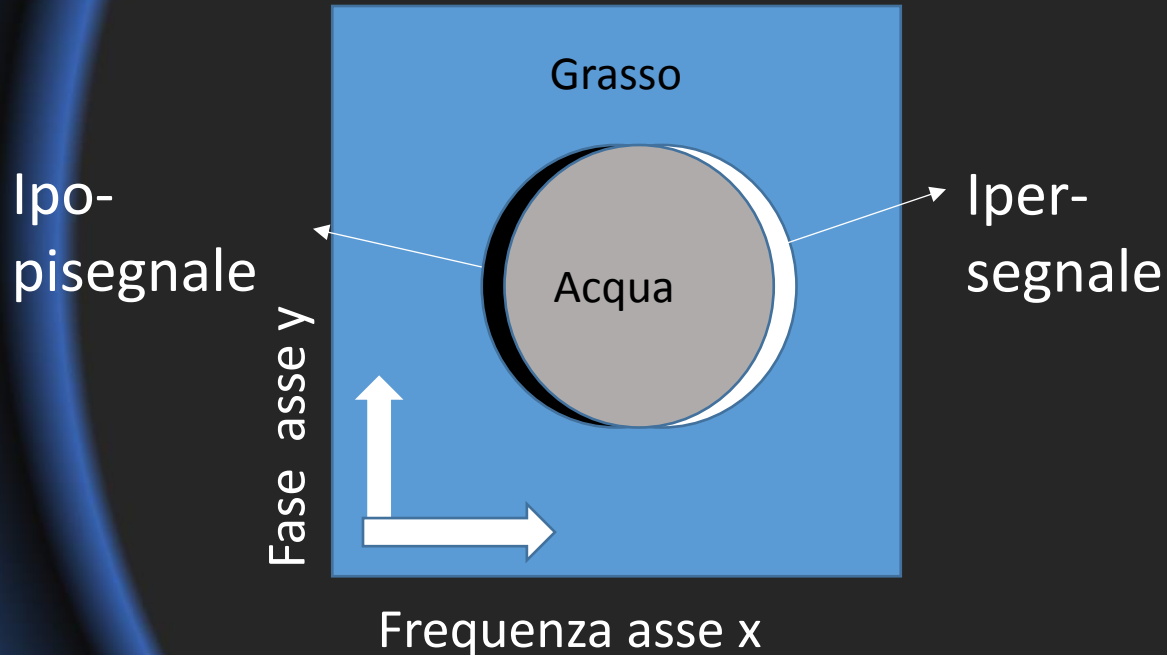
Artefatto RM

- Area che include “signal void” o vuoto di segnale
- “Signal pile-up” ovvero la linea/area di elevato segnale
- Area di mascheramento indistinto che determina effetto di “local blurring”



Chemical shift

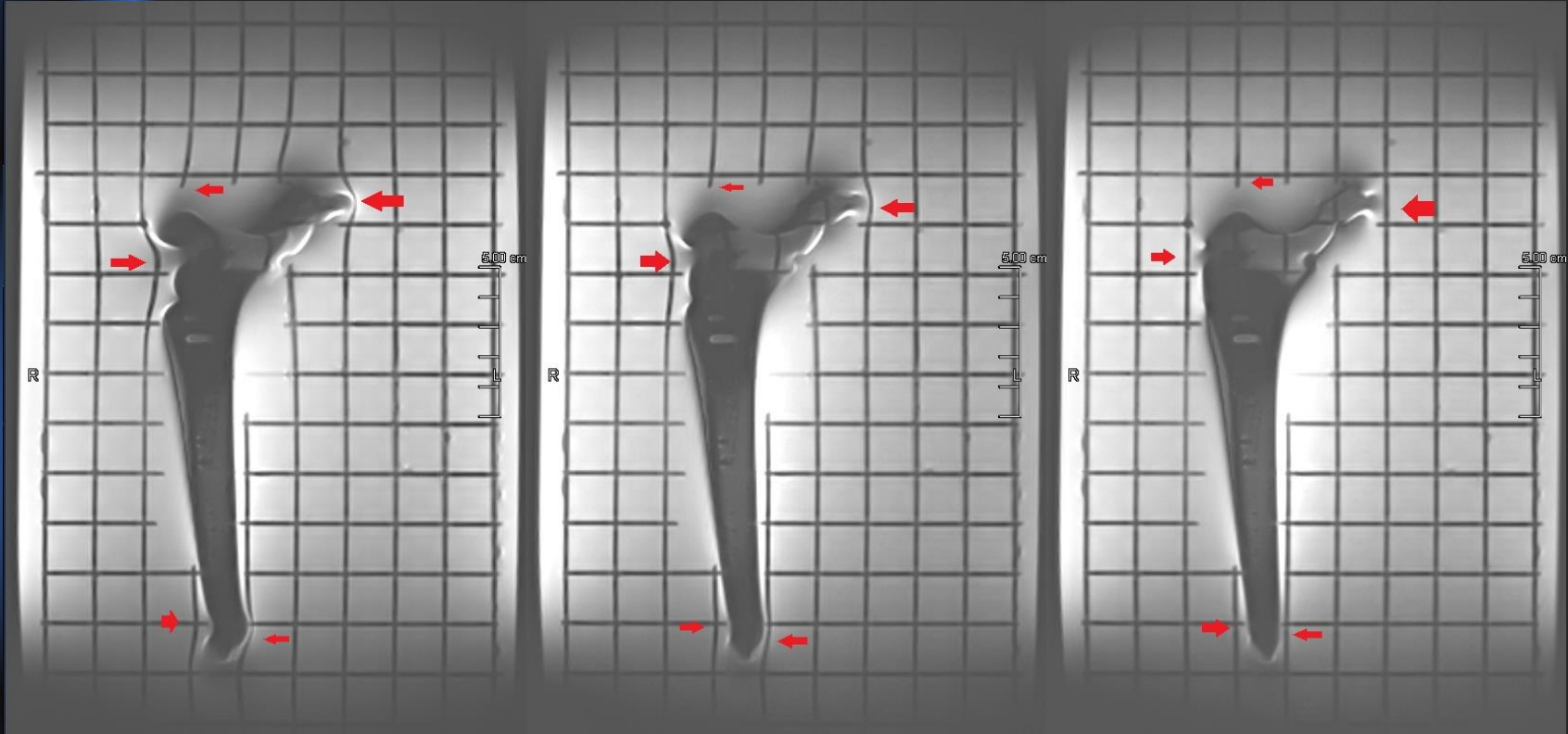
Al cessare del gradiente il voxel del grasso ha una codifica che differisce di 220 khz che lo fa registrare come fosse in un voxel spostato rispetto alla reale posizione



Routinari FSE

High BWD

VAT+BWD



..... compensating for the pixel shift caused by metal in the RO direction

MARS TECHNIQUE

METAL ARTIFACT REDUCTION SEQUENCES

Conventional techniques

1.5T instead of 3T

Fast spin echo sequences instead of gradient echo sequences

Increasing receiver bandwidth

Increasing matrix size

Decreasing echo times

Switching frequency and phase encoding direction

Decreasing slice thickness

Fat saturation: STIR sequences; alternatives: Dixon sequences or subtraction images

Advanced techniques

View angle tilting (VAT)

Slice encoding for metal artifact correction (SEMAC)

Multi-acquisition variable-resonance image combination (MAVRIC)

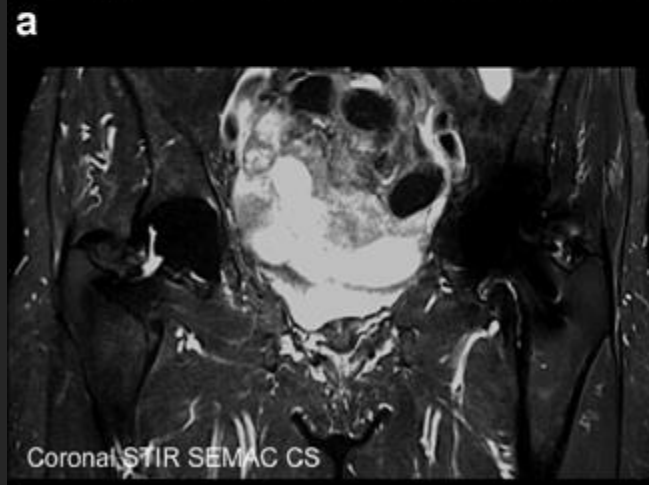
Off-resonance suppression (ORS)

Advanced acquisition and reconstruction techniques.

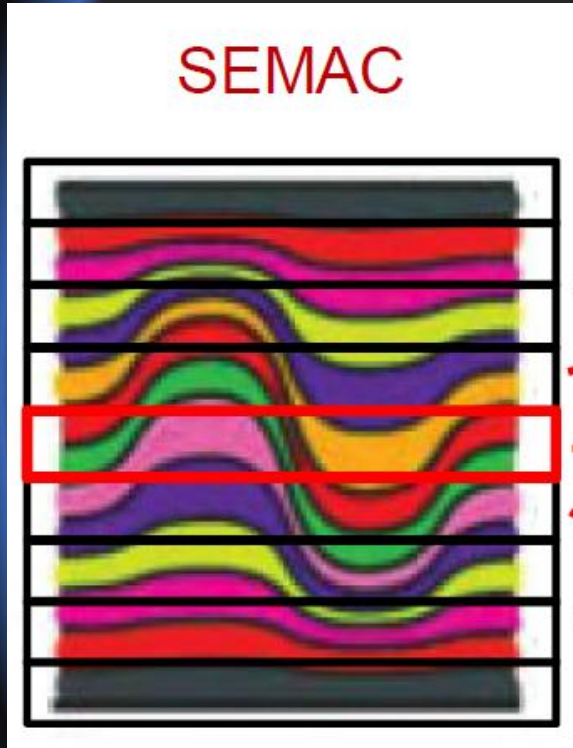
Parallel imaging

Partial Fourier techniques/ undersampling

Compressed sensing



SEMAC - Slice-encoding For Metal Artifact Correction



Questa tecnica permette di ricostruire le immagini che la distorsione ha “trascinato su strati differenti”



ELSEVIER

Contents lists available at ScienceDirect

European Journal of Radiology

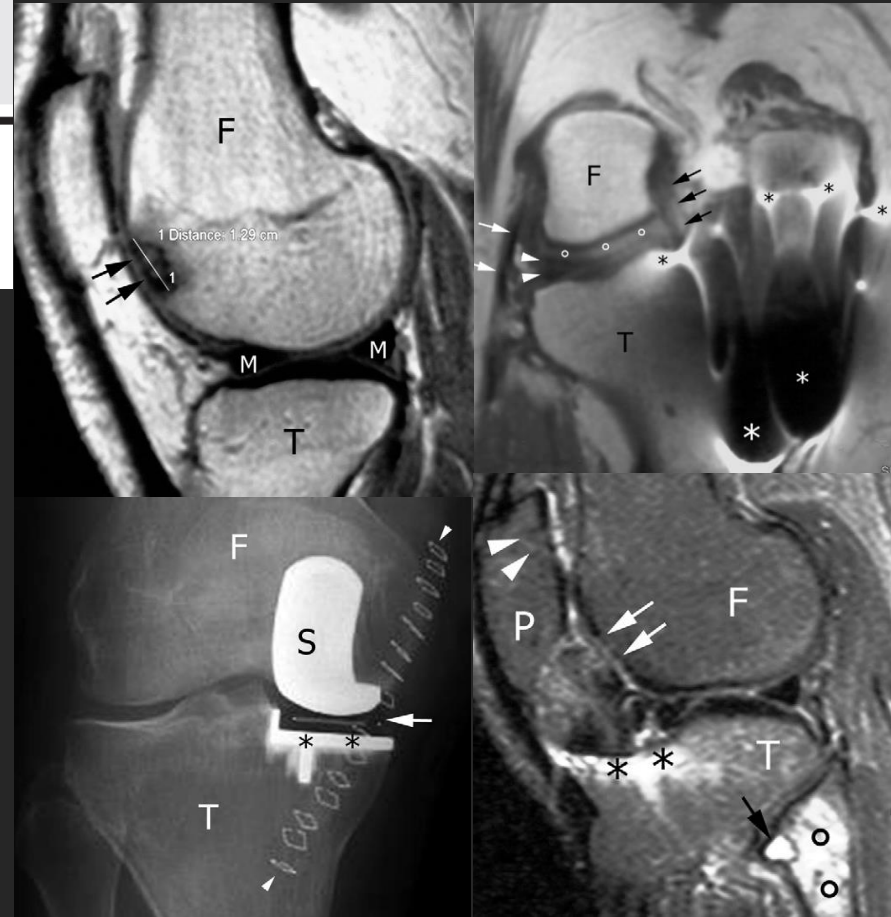
Journal homepage: www.elsevier.com/locate/ejrad

Magnetic resonance imaging of the knee after medial unicompartmental arthroplasty

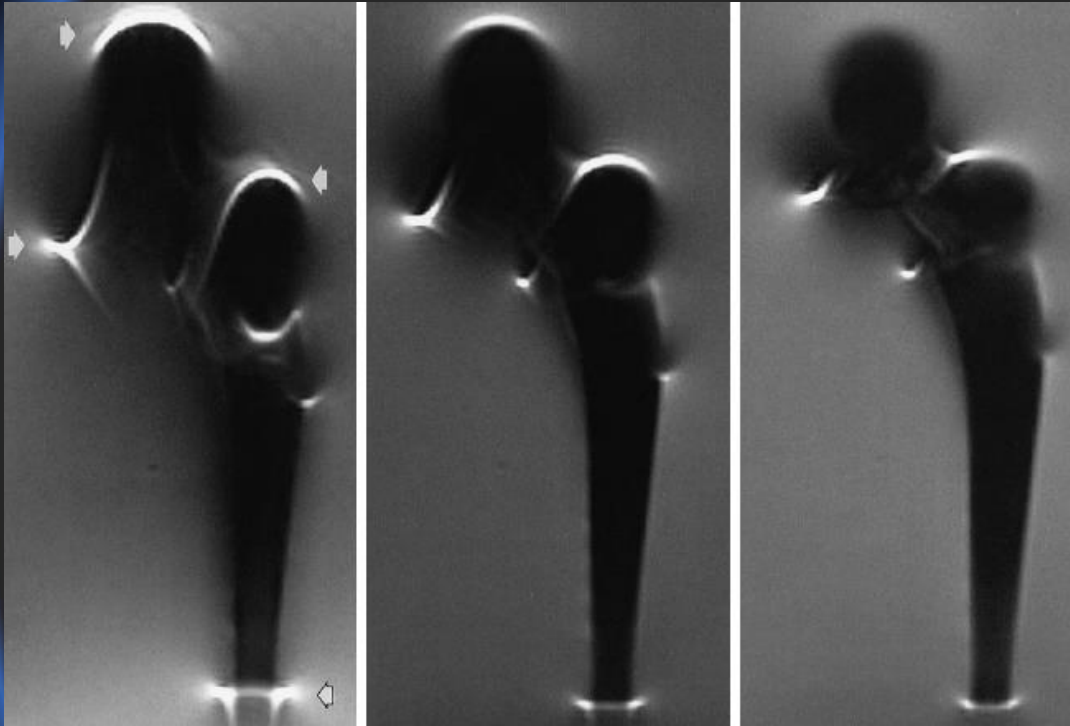
Scelta delle sequenze

- Turbo spin echo
- STIR
- Densità Protonica

A. Aliprandi et al 2011



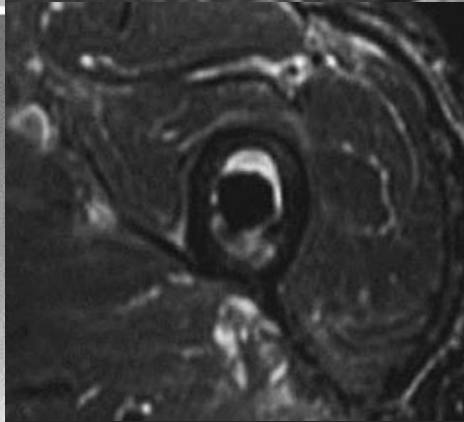
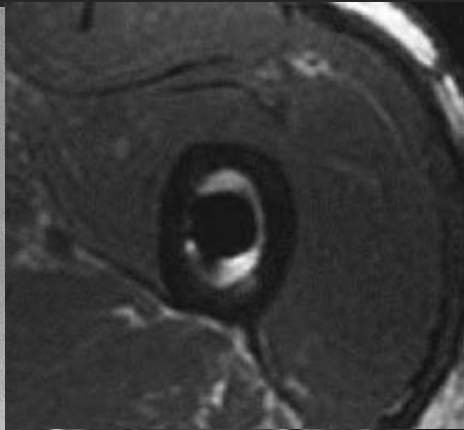
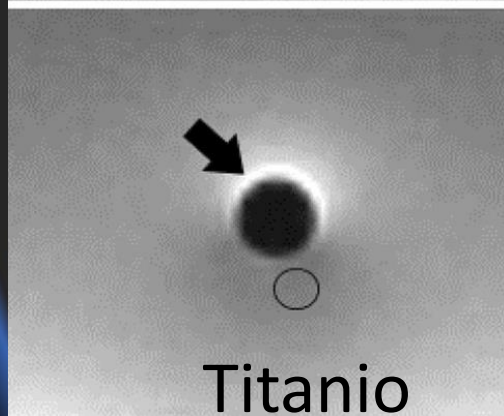
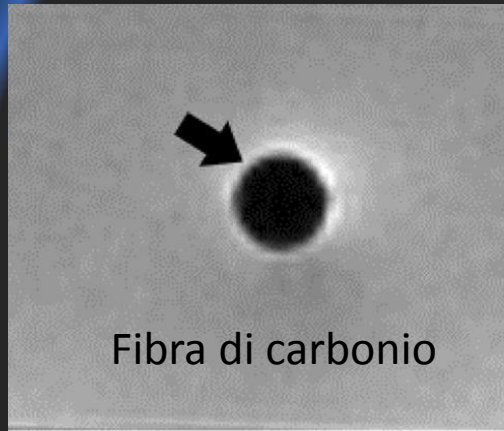
Aumento della frequenza di fase



Aumento della
frequenza di fase
Minore artefatto

da 8 a 16 a 32 khz

Certo la tecnologia

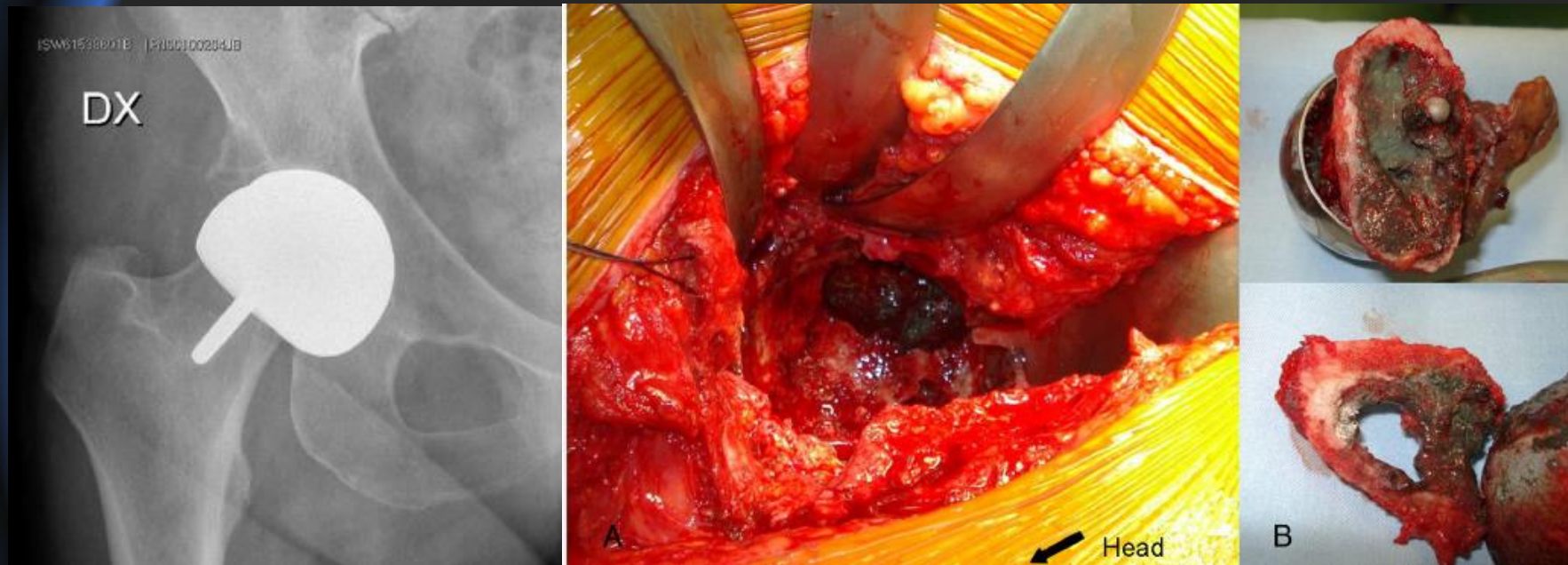


Indicazioni cliniche

Quando l'RM ?

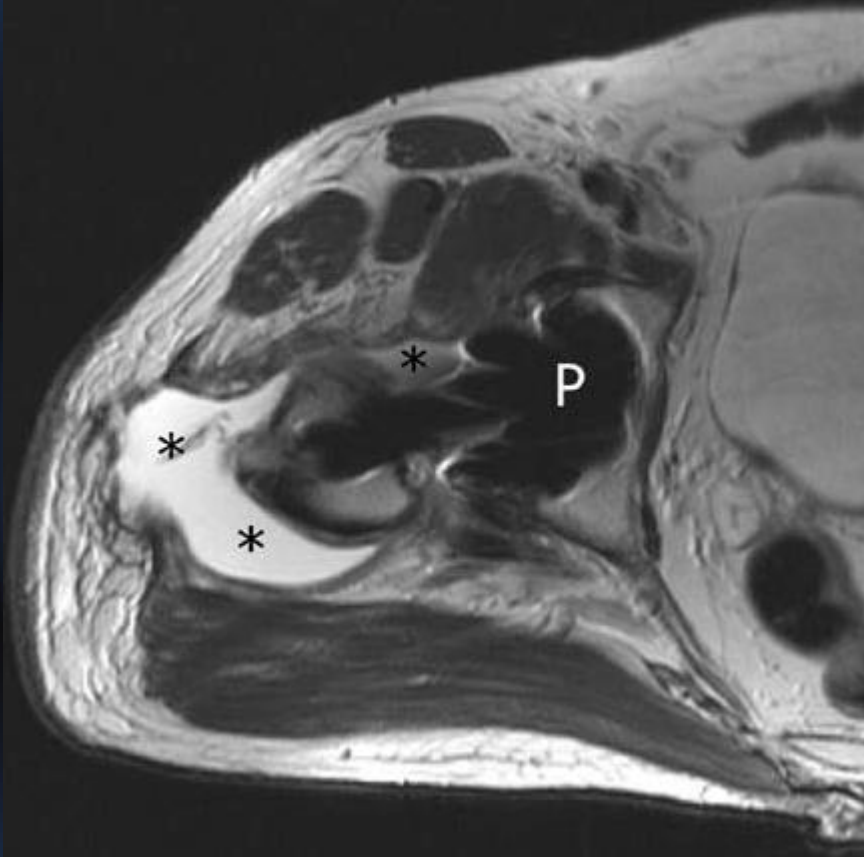
- Protesi dolorosa
- RX ECO positive
- Incongruenza clinico – strumentale
- Positività laboratoristica

le scelte terapeutiche



Radiographically Undetectable Osteolysis With ASR Implants The Implication of Blood Metal Ions
F. Randelli, A. Aliprandi et al 2016

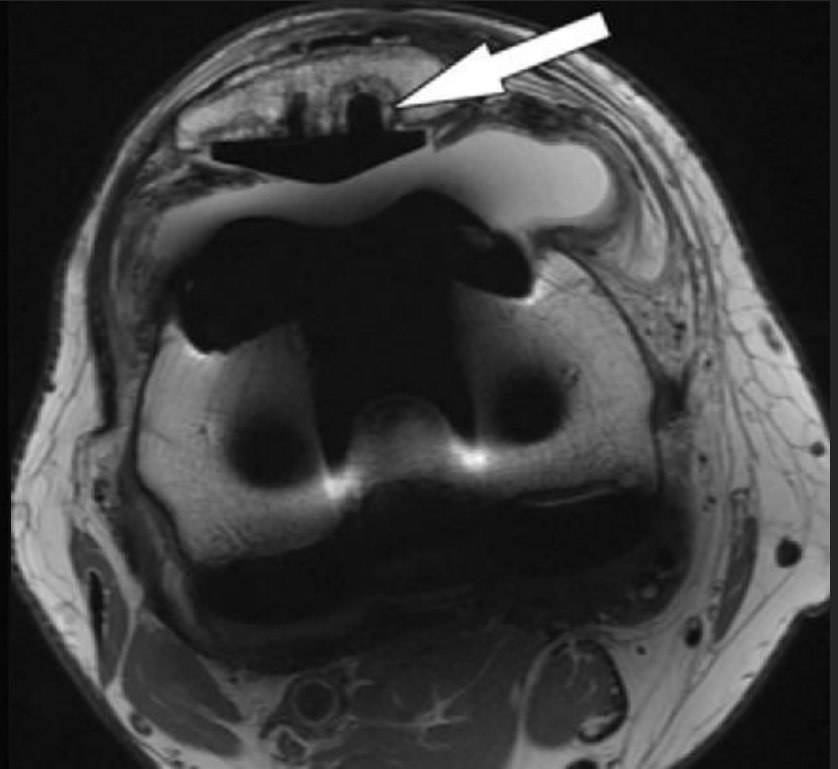
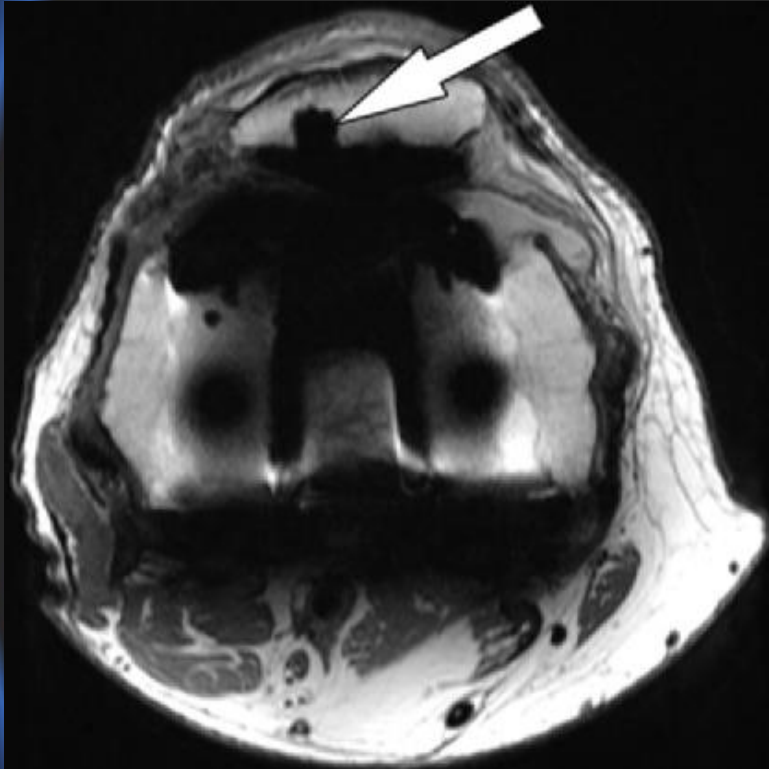
Mobilizzazione



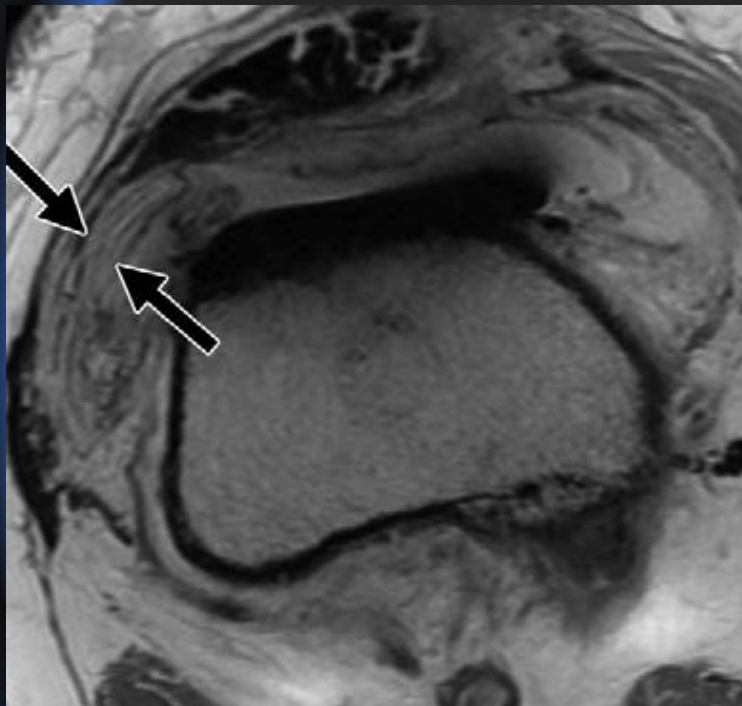
Raccolte sierose
trocanteriche
iperintense in TSE T2

Connessione con l'articolazione
sospetto per la possibile origine
infettiva

Mobilizzazione



Infezioni

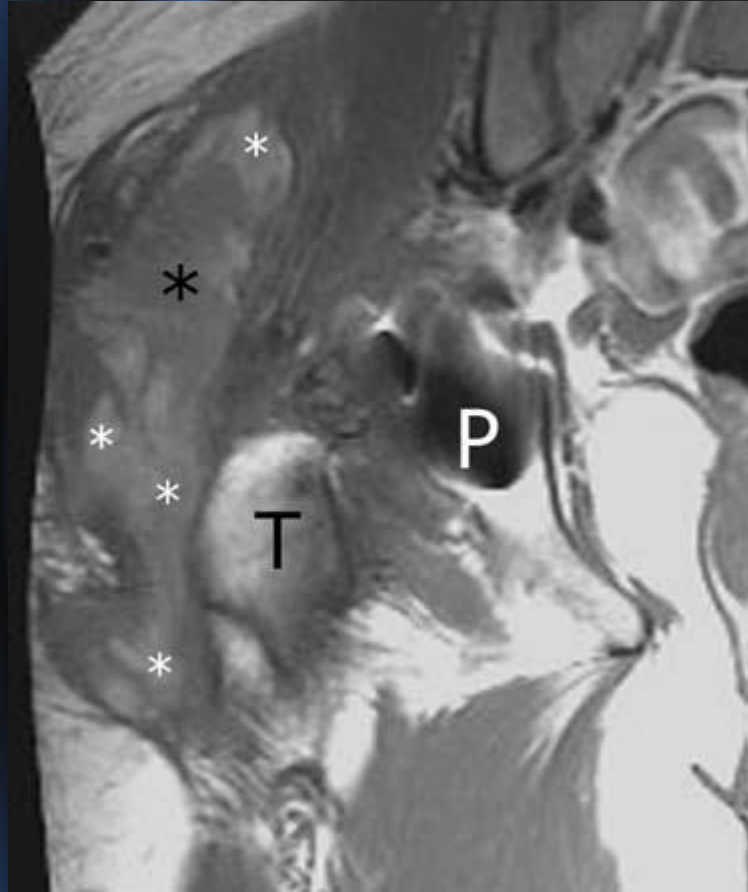


Lamellated Hyperintense Synovitis: Potential MR Imaging

*Sign of an Infected Knee
Arthroplasty*

In conclusion, the presence of lamellated hyperintense synovitis at MR imaging of knee arthroplasty is highly suggestive of infection. This sign is reproducible, with high inter- and intraobserver reliability.

Andrew J. Plodkowski et al 2012



Contenuto

La disomogeneità del segnale nelle sequenze T1w pone il sospetto di sanguinamento attivo nel contesto di una raccolta

Magnetic resonance imaging of painful total hip replacement: detection and characterisation of periprosthetic fluid collection and interobserver reproducibility

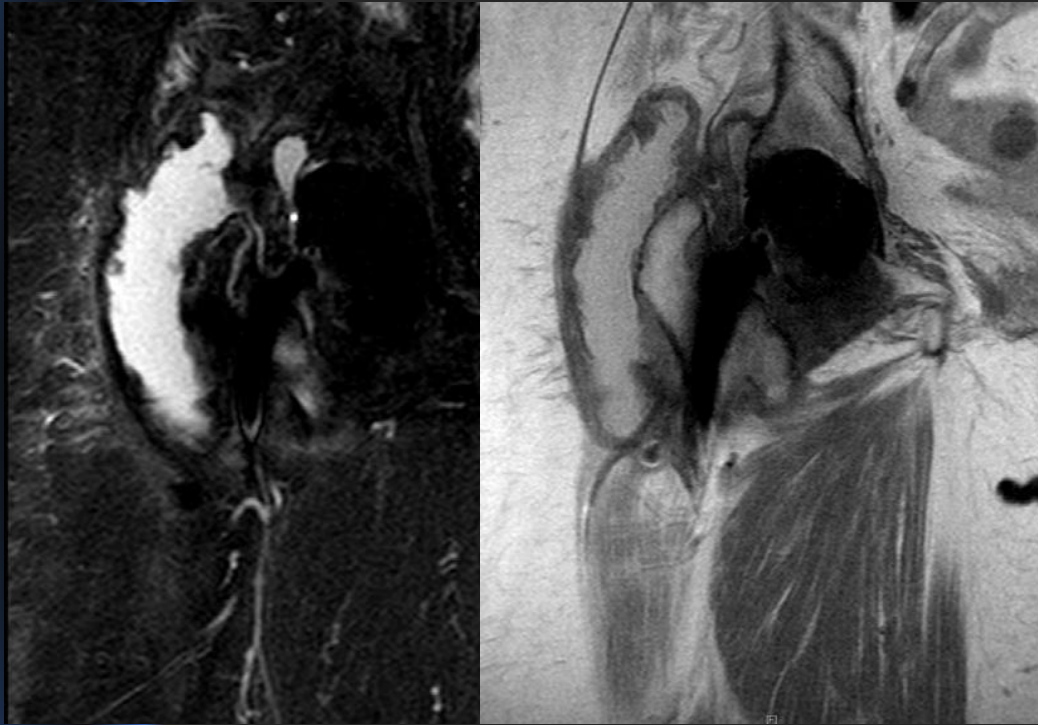
A.Aliprandi et al 2012 Radiologia Med.



Magnetic resonance imaging of painful total hip replacement: detection and characterisation of periprosthetic fluid collection and interobserver reproducibility

In conclusion, our data suggest that MRI is a highly reliable imaging technique in the detection, quantification, localisation, and characterisation of fluid collections in patients with painful THA when the presence of an infection is clinically suspected. Being free from ionising radia-

Pseudotumor



Accumulo di ioni metallo
nei tessuti periprotetici

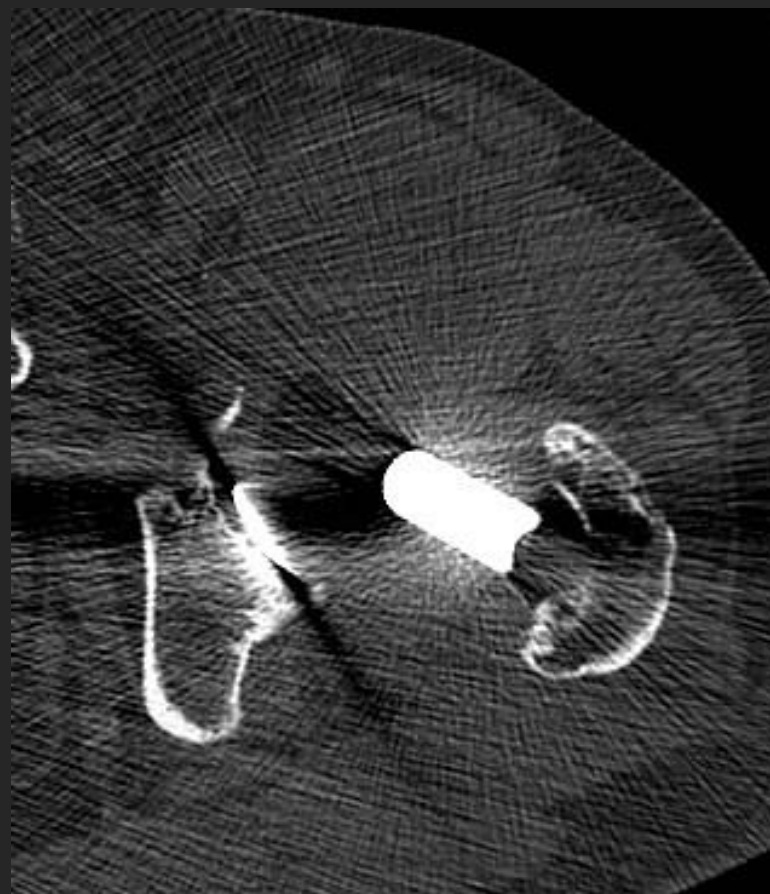
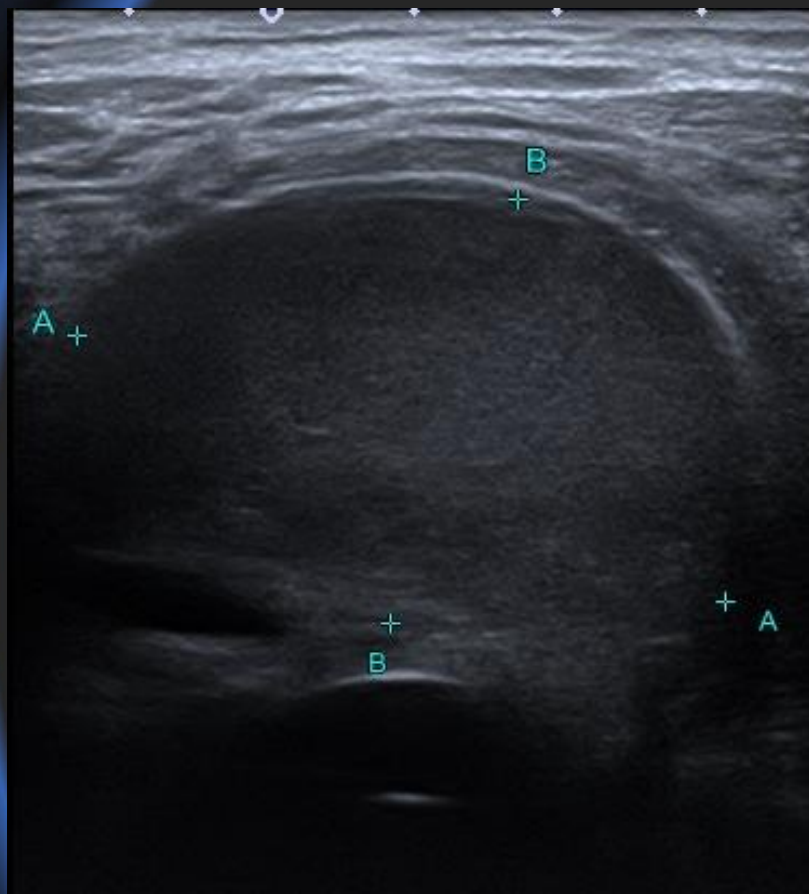
Diagnosi:

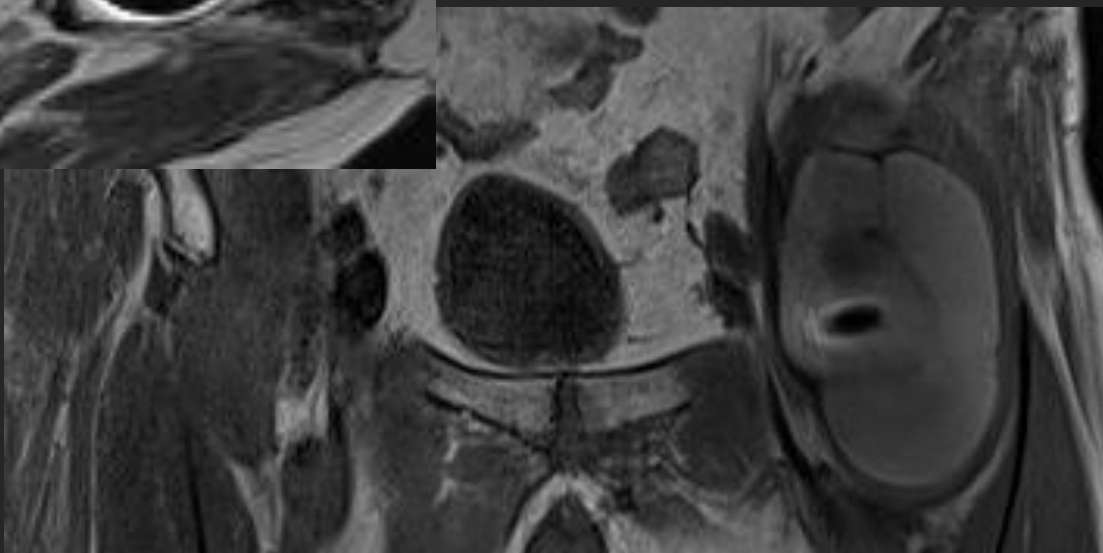
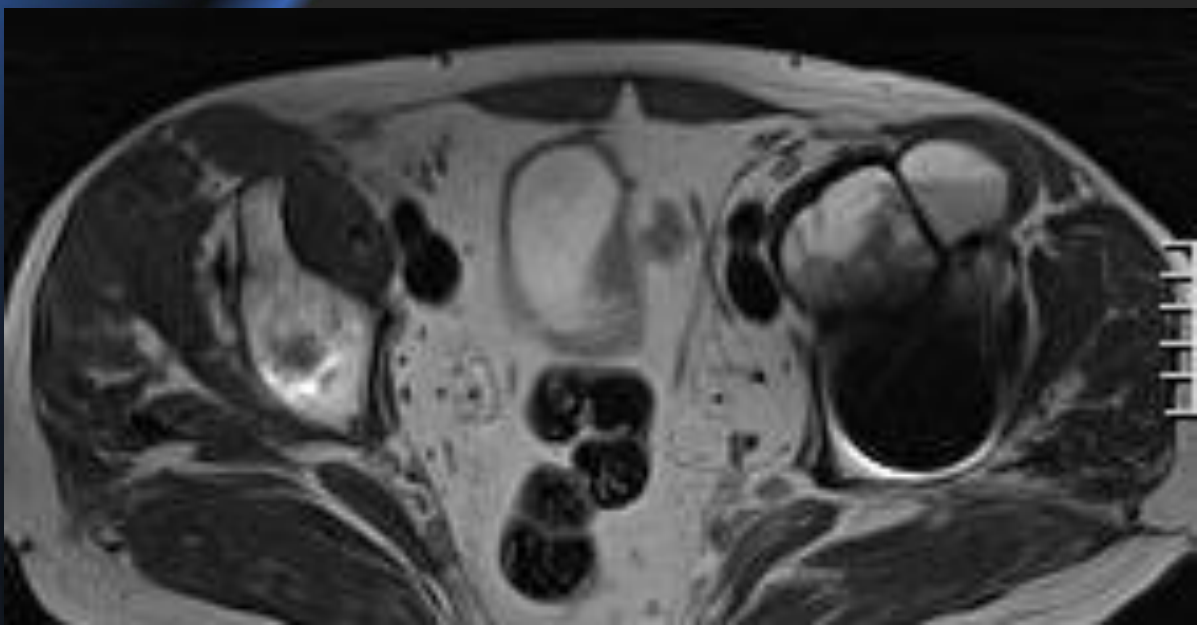
- MR per le caratteristiche
delle raccolte
- Drenaggio US guided

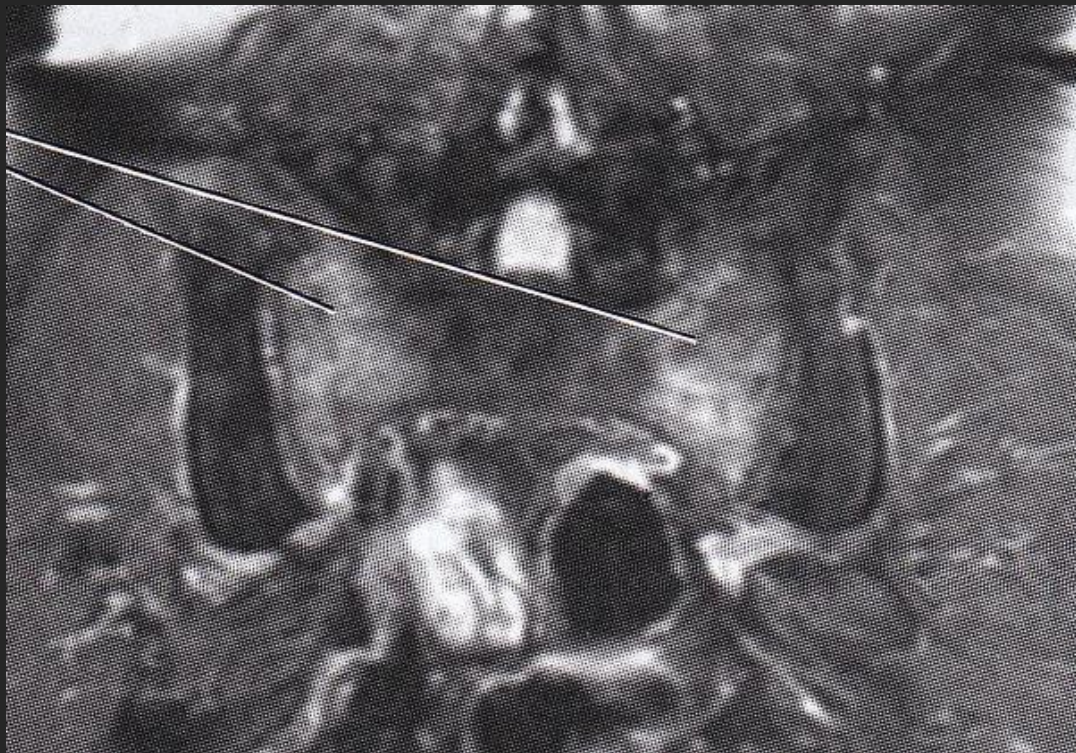
DX

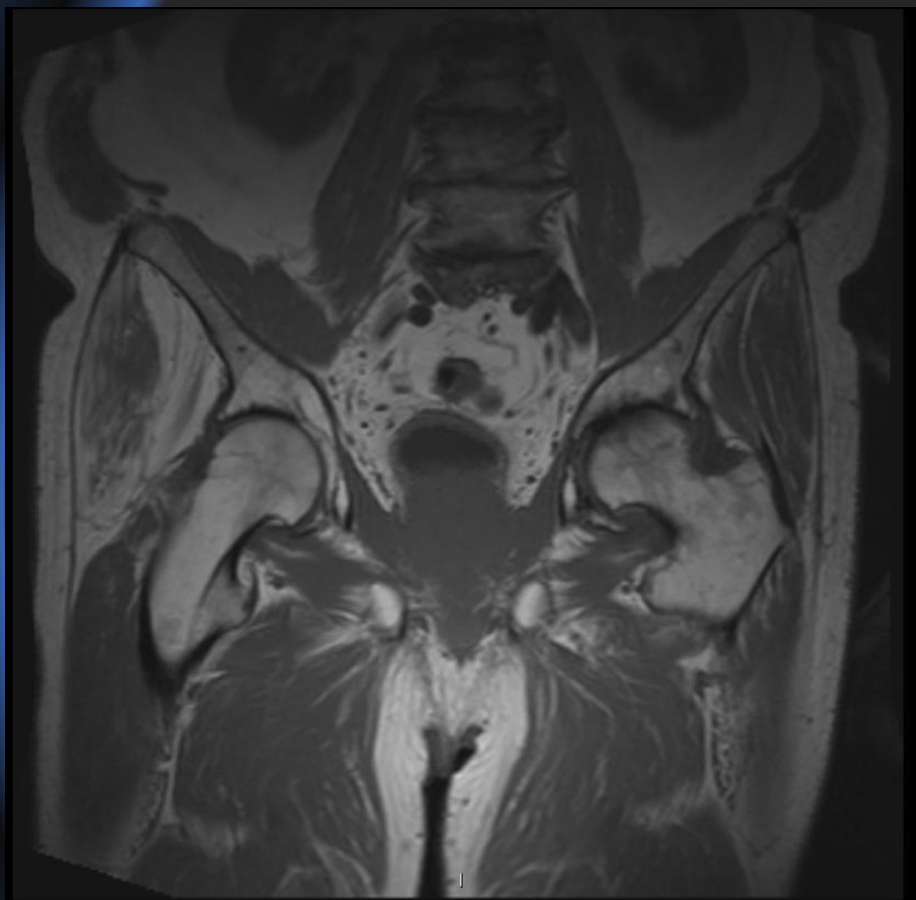


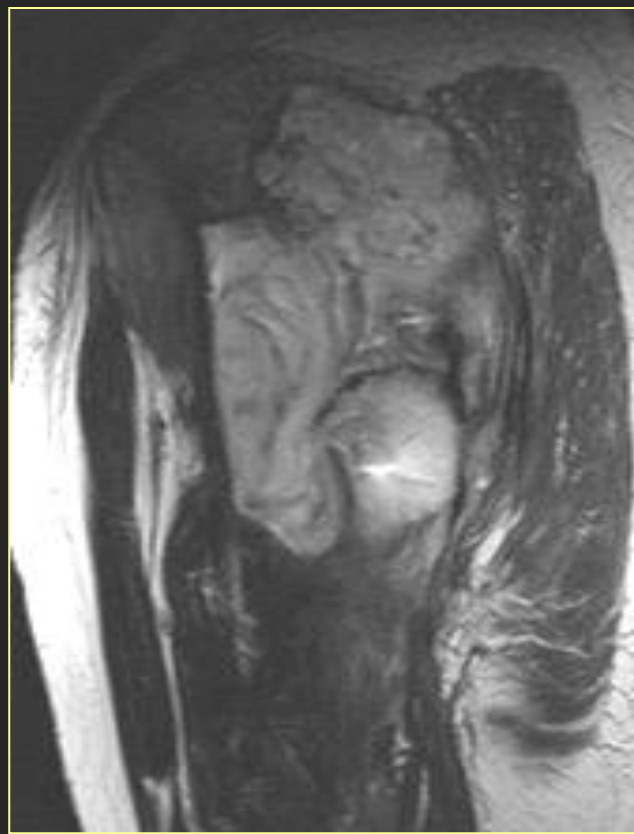
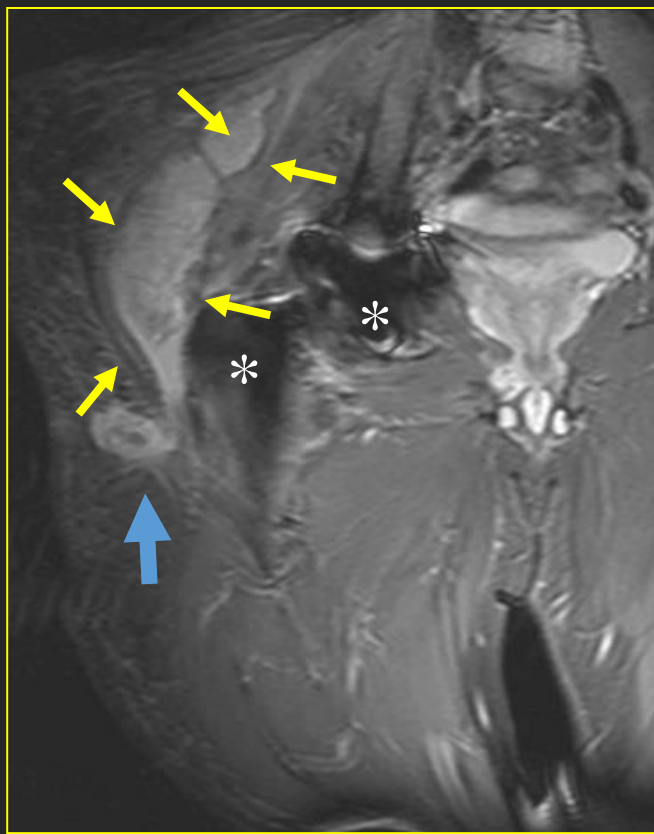






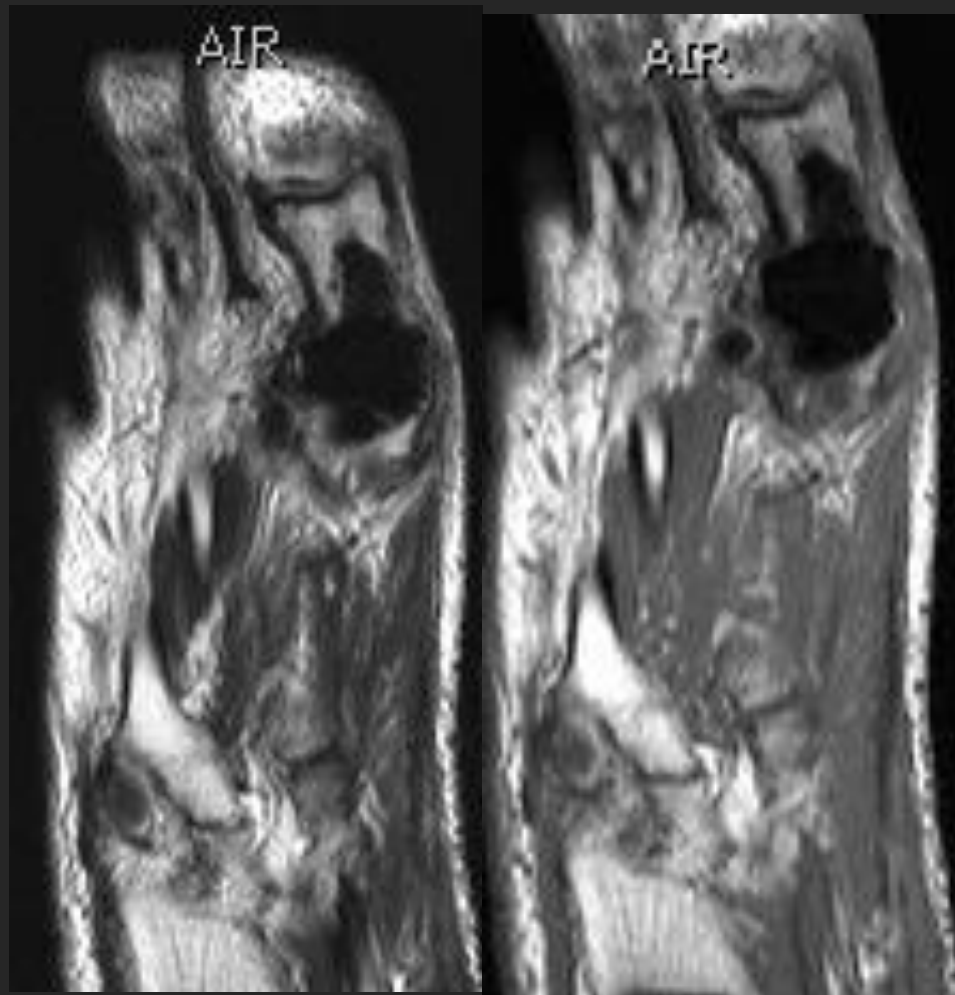






“IL NUOVO AVANZA ..

Nuove sedi
protesiche in RM



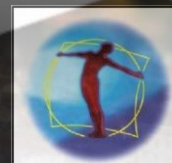
Conclusione

- inquadramento clinico
- Adattamento dell'esame alle singole esigenze
- Refertazione e, se possibile, discussione con il clinico
offrendo laddove possibile la fase di evacuazione eco-guidata

Grazie

alberto.aliprandi@grupposandonato.it

*Responsabile - Diagnostica Per Immagini
Istituti Clinici Zucchi – MB*



Osteolisi sintomatica e asintomatica

G. Zatti, G. Leone, A. Caminita



CONGRESSO NAZIONALE DELLA
SOCIETÀ ITALIANA DELL'ANCA

Bergamo, 19 settembre 2019

Definizione



Processo che provoca un riassorbimento progressivo del tessuto osseo periprotetico, caratterizzato all'esame radiografico da una linea di radiolucenza o da una cavità tra impianto e osso.



Clin Orthop Relat Res. 2004 Oct;(427):138-47.

Osteolysis: medical and surgical approaches.

Saleh KJ, Thongtrangan I, Schwarz EM.

Department of Orthopedic Surgery & Clinical Outcome Research Center, University of Minnesota, Minneapolis, MN 55454, USA.
saleh002@umn.edu

Eziologia

Risposta infiammatoria cronica a detriti dei materiali



Femoral osteolysis following total hip replacement

R Dattani

Osteolisi

Sorgente di usura

Debris (detriti)

- UHMWPE
- CoCr alloy
- PMMA
- ...

Particelle
microscopiche:
fagocitate

Particelle
maggiori:

reazione da
corpo estraneo -
granuloma

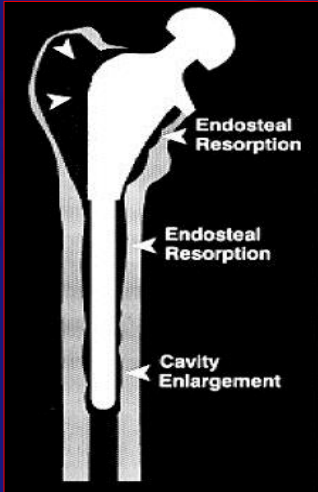
macrofagi

fibroblasti

**MORTE
CELLULARE**

**OSTEOLISI
MORTIFICAZIONE**

Produzione di fattori di
riassorbimento osseo:
IL-1 IL-6 TNF- α
PGE₂ collagenasi



© 2014
BCP-12131; No. of Pages 13

ARTICLE IN PRESS

Biochemical Pharmacology xxx (2014) xxx–xxx

Contents lists available at ScienceDirect

Biochemical Pharmacology

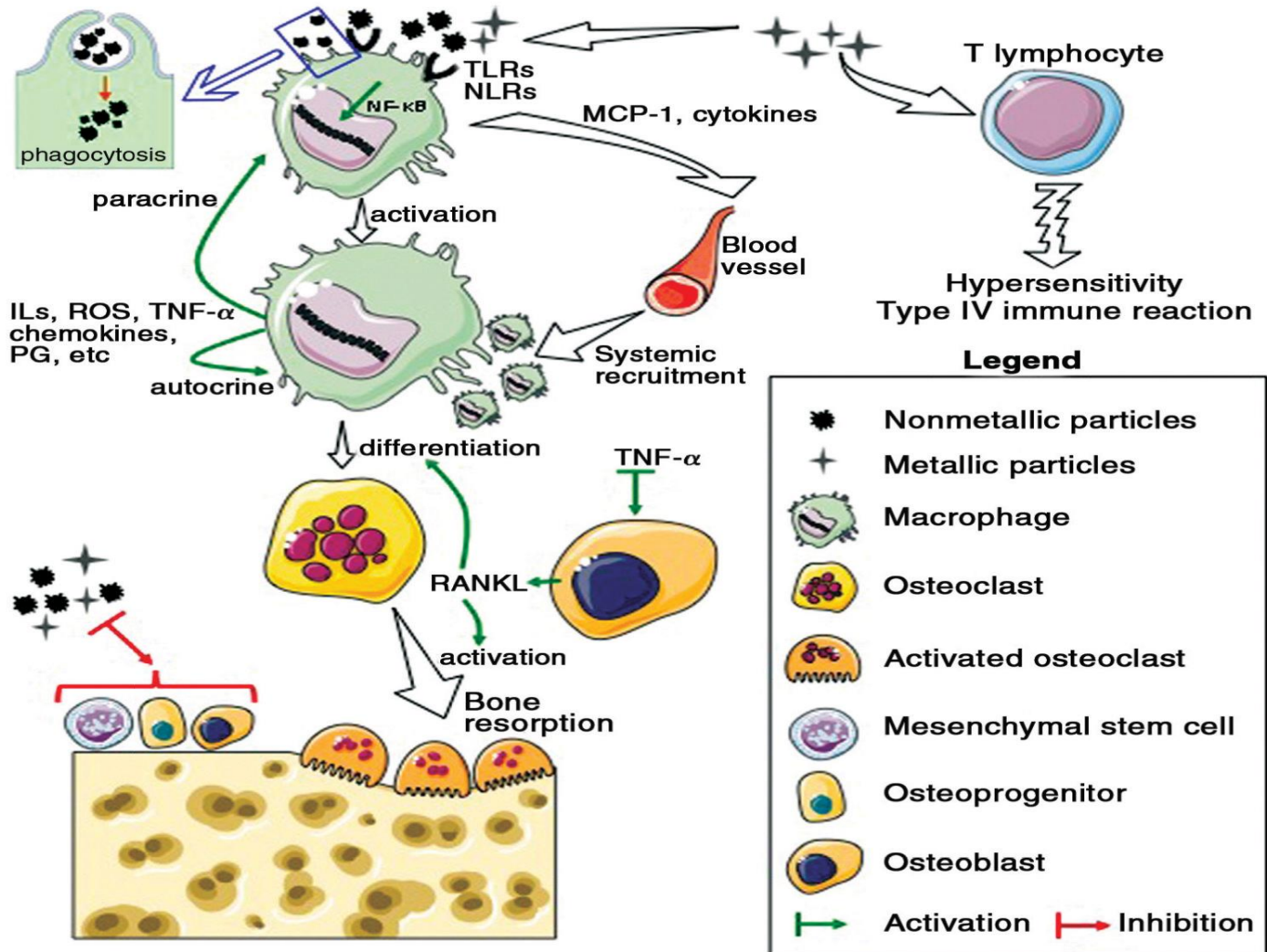
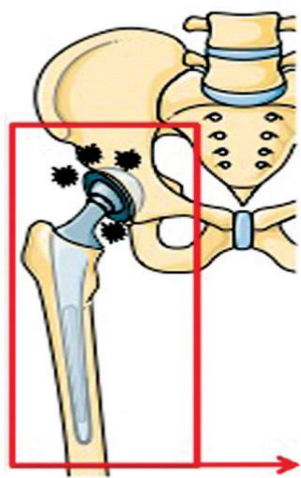
journal homepage: www.elsevier.com/locate/biochempharm



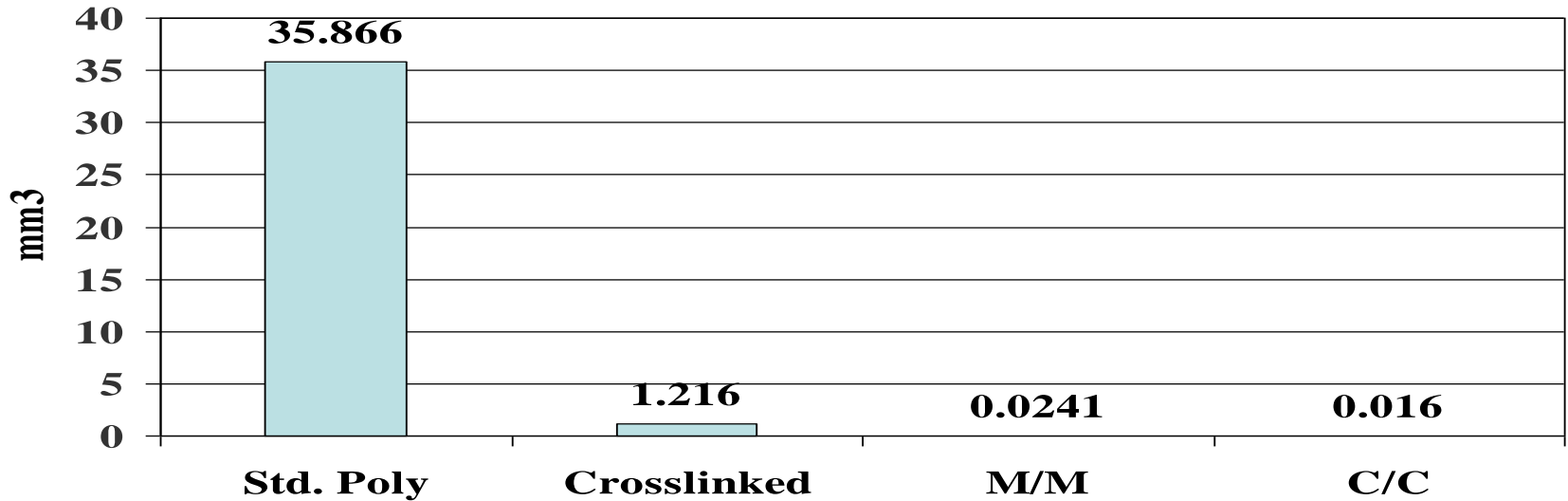
Myricetin prevents titanium particle-induced osteolysis *in vivo* and inhibits RANKL-induced osteoclastogenesis *in vitro*

Chuanlong Wu¹, Wengang Wang¹, Bo Tian¹, Xuqiang Liu, Xinhua Qu, Zanjing Zhai,

Haowei Li, Fengxiang Liu, Qiming Fan, Tingting Tang, An Qin¹, Zhenan Zhu¹
¹Shanghai Key Laboratory of Orthopedic Implants, Department of Orthopedics, Ninth People's Hospital, Shanghai Jiao Tong University School of Medicine, Shanghai, The People's Republic of China



Volumetric Wear Rates Per Million Cycles



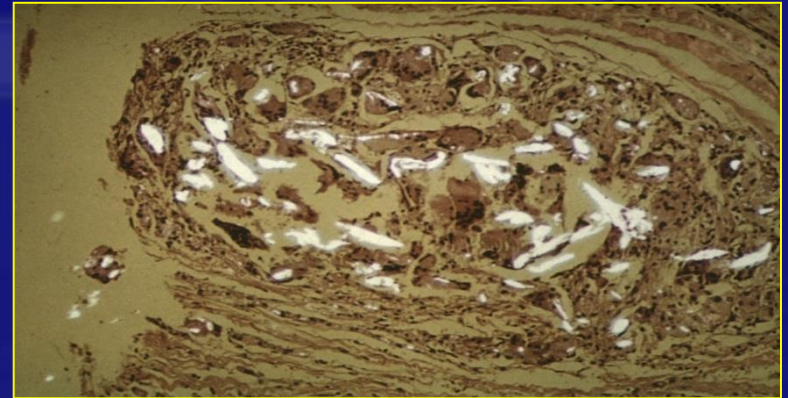
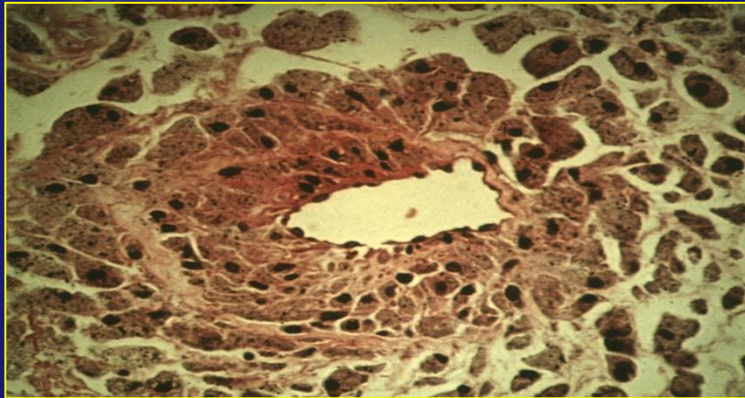
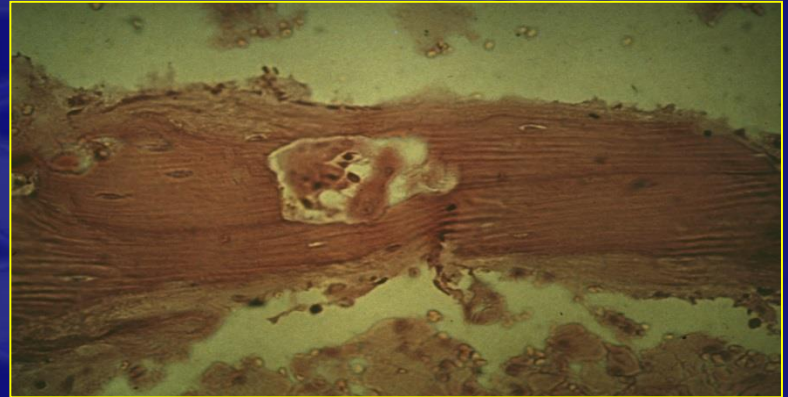
Relazione diretta fra il grado di consumo e la sopravvivenza dell'impianto:

Wear rate 0.1 mm/anno, 70% sopravvivenza a 25 anni

Wear rate >0.25 mm/anno, 20% sopravvivenza a 25 anni

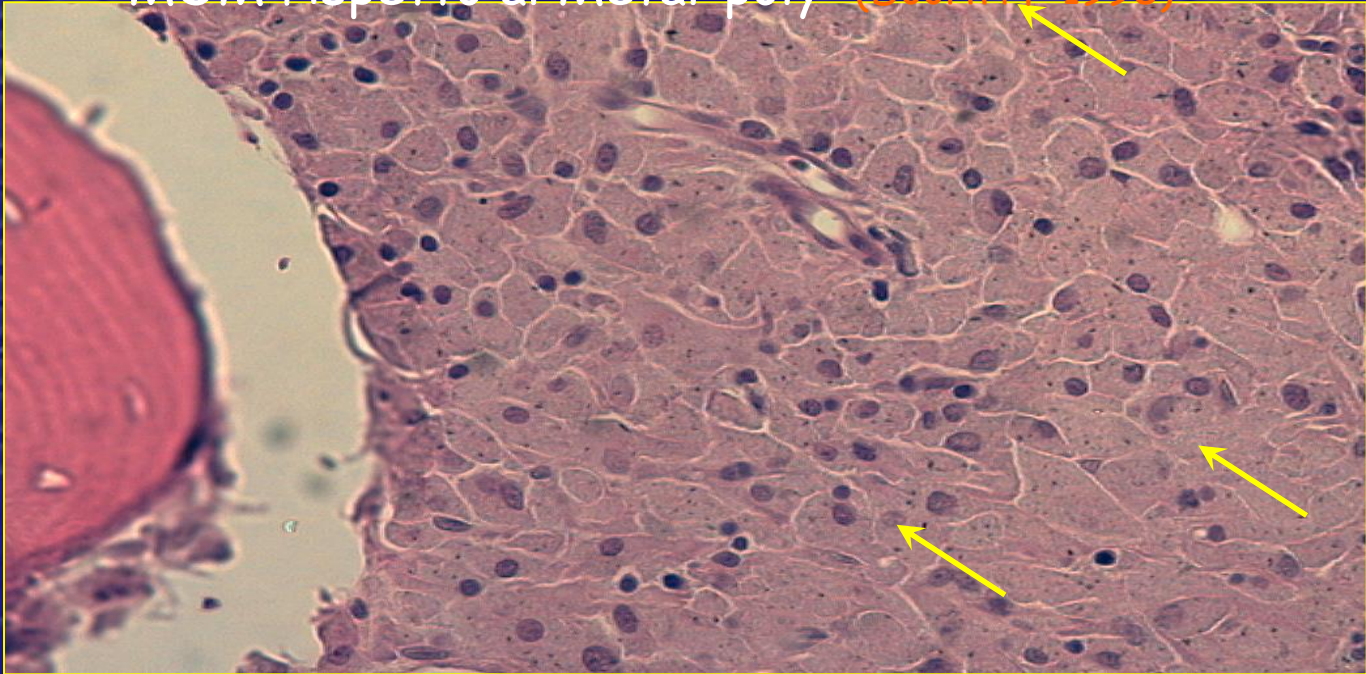
Polyethylene Debris

Dimensioni: 90% < 1 μm , media 0.5 μm (Shanbhag A2 1994, Maloney WJ 1995)



Metal Debris

Dimensione media: 50 nm, prodotte in numero superior negli impianti MOM rispetto al Metal-poly (Doorn PF 1998)



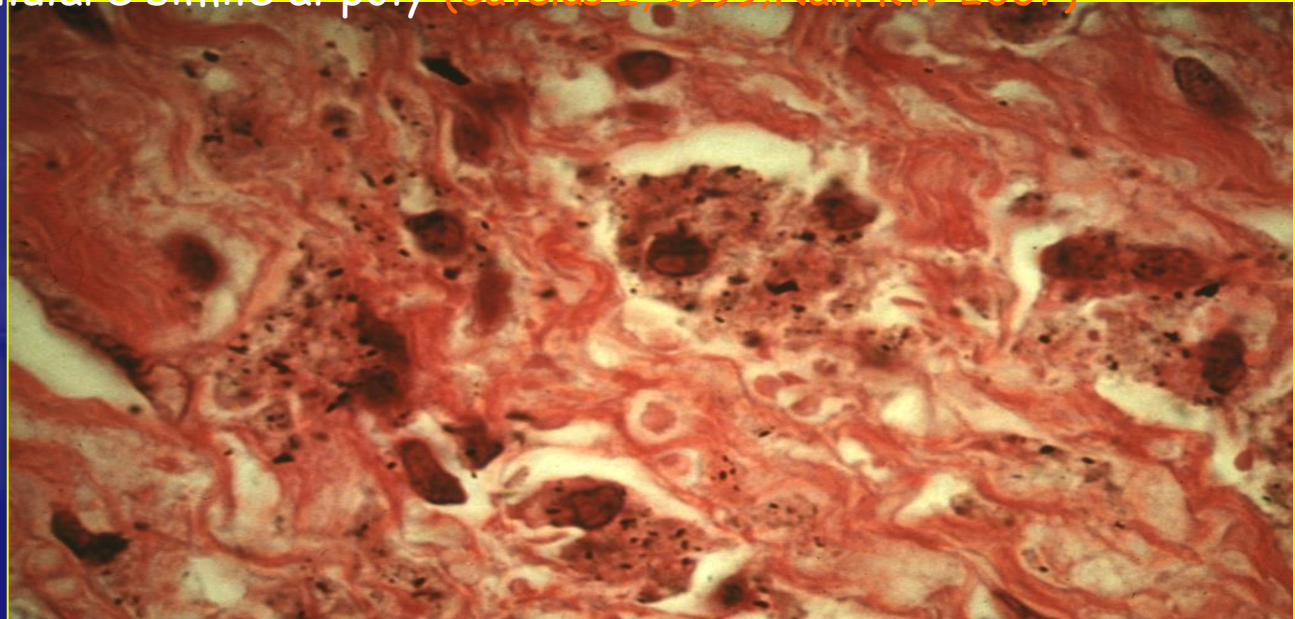
Inclusioni citoplasmatiche nei macrofagi

Ceramic Debris

Dimensione: bimodale, di pochi nanometric e di pochi micrometri;
media $0.7 \mu\text{m}$

Danno risposta fibroistiocitica (Yoon TR, 1998)

Risposta cellulare simile al poly (Catelas I, 1999; Nam KW 2007)



Processo multifattoriale

➤ Suscettibilità individuale

➤ Fattori chirurgici

Femoral osteolysis following total hip replacement

R Dattani

.....
Postgrad Med J 2007;**83**:312–316. doi: 10.1136/pgmj.2006.053215

Failure of dual radius hydroxyapatite-coated acetabular cups

Fabio D'Angelo*, Mauro Molina, Giacomo Riva, Giovanni Zatti and Paolo Cherubino



Osteolisi

Micromobilizzazione

Capello et al. 2005

CLINICAL ORTHOPAEDICS
AND RELATED RESEARCH

Usura da "terzo corpo" + Malattia da polietilene

Detriti Metal
Back

Detriti HA

**Discrepanza
Quadro clinico/Rx**

Scelta di Revisione

Non facile

Sospetto

Osteolisi nei primi 2 anni dall'impianto
(infezione?)

Osteolisi precoce in impianti metal-poly
(trunnionosi?)

Dolore e osteolisi in impianti MOM

Evaluation and treatment of patients with acetabular osteolysis after THA - Sheet, Rozell, Paprosky. Journal of the American Academy of Orthopaedic Surgeons, 2019.

Frequentemente in una protesi
ben funzionante



Monitoraggio

Pazienti asintomatici

Monitoraggio clinico e strumentale ad
intervalli regolari

TC superiore alla RX nella valutazione
delle dimensioni e della progressione
delle osteolisi

Evaluation and treatment of patients with acetabular osteolysis after THA - Sheer, Rozell, Paprosky. Journal of the American Academy of Orthopaedic Surgeons, 2019.
Advances in acetabular reconstruction in revision THA: maximizing function and outcomes after treatment of periacetabular osteolysis around the well-fixed shell - Hall et al., JBJS 2013

Quando intervenire

Pazienti sintomatici

Importante usura del polietilene

Evidenza di pseudotumor, trunnionosi o infezione

Evidenza di mobilitazione



Managing Bone Loss In Revision Total Hip Arthroplasty: The Acetabulum - David .A.L; O'brien . MD, Celi H. Rorabeck. AAOS Instr Course Lect, 2006.

Evaluation and treatment of patients with acetabular osteolysis after THA - Sheet, Rozell, Paprosky. Journal of the American Academy of Orthopaedic Surgeons, 2019.

Quando intervenire

Pazienti asintomatici:

- Erosione corticale
- Precoce sviluppo di lesioni osteolitiche
- Lesioni osteolitiche con progressione



Managing Bone Loss In Revision Total Hip Arthroplasty: The Acetabulum; David .A.L; O'brien .MD, Celi H. Rorabeck: AAOS Instr Course Lect 2006;

Possibili interventi

Zeppaggio dei difetti ossei

Zeppaggio dei difetti ossei + sostituzione
parti mobili

Revisione acetabolare (o totale)

Intervento complesso:

- La perdita di bone stock
- Alterazione della geometria



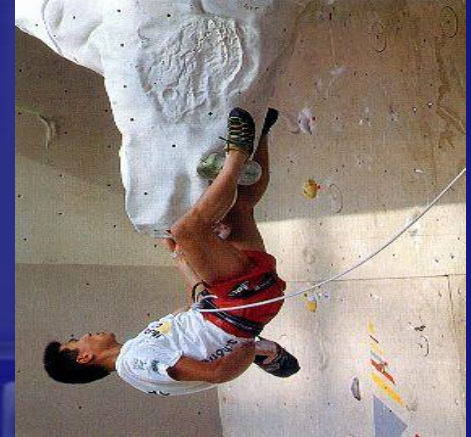
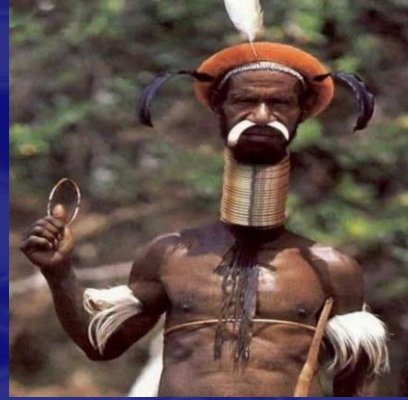
Pattyn C. et al (2011) Int. Orthop. Jun 24.
Paprosky WG (2002) J Arthroplasty 17(4 Suppl 1):134-137
Engh CA Jr, (2002) J Arthroplasty 17(8):955-960

Revisione

Obiettivi:

- Restaurare offset e lunghezza

- Fornire adeguato fissazione delle componenti



Pattyn C. et al (2011) Int. Orthop. Jun 24.

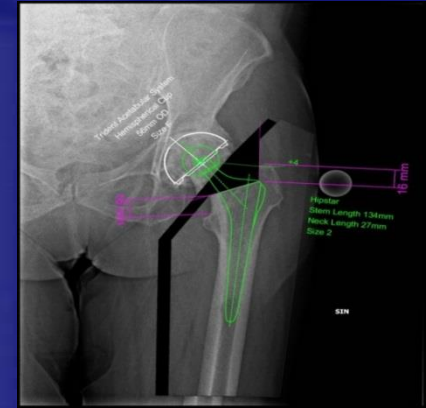
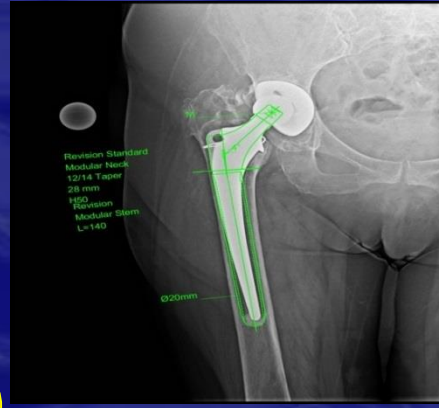
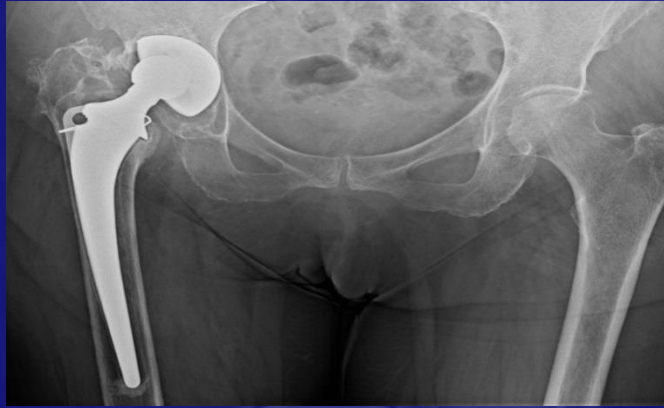
Paprosky WG (2002) J Arthroplasty 17(4 Suppl 1):134–137

Engl CA Jr, (2002) J Arthroplasty 17(8):955–960

Paprosky WG (1999) Clin Orthop Relat Res 369:230–242

- Ricambiare integrità strutturale

Importanza del planning pre-op



High Agreement between Planning and Real (90%)

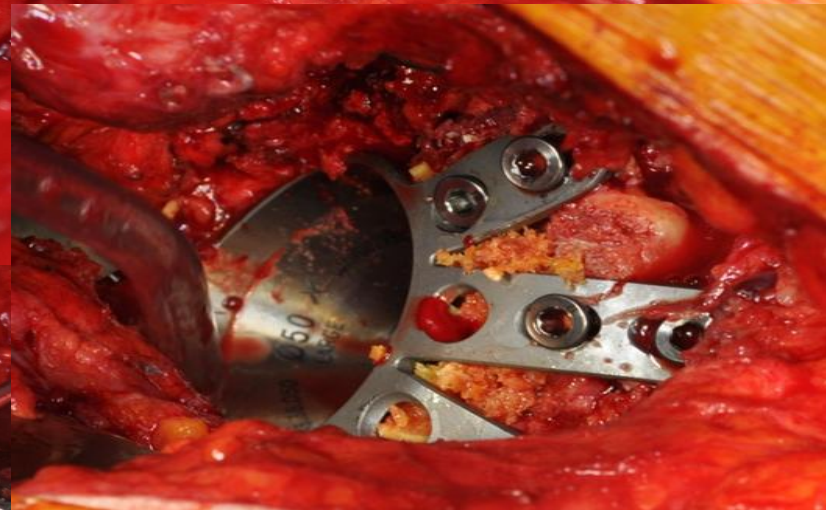
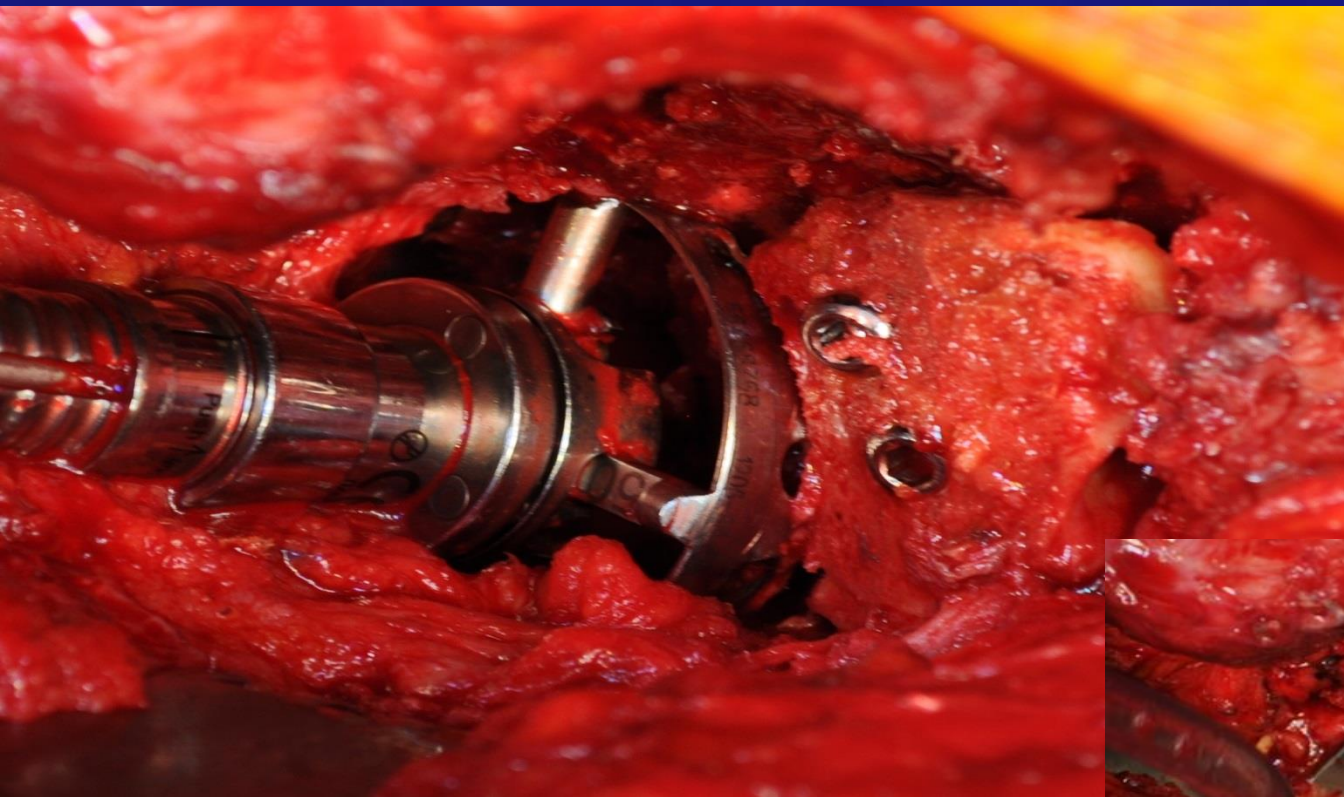
Eggi et al. CORR 2003



Caso clinico



O.L: Donna di 47 anni PTA sinistra di circa 18 anni in esiti di frattura sottocapitata e sostituzione polietilene 3 anni fa

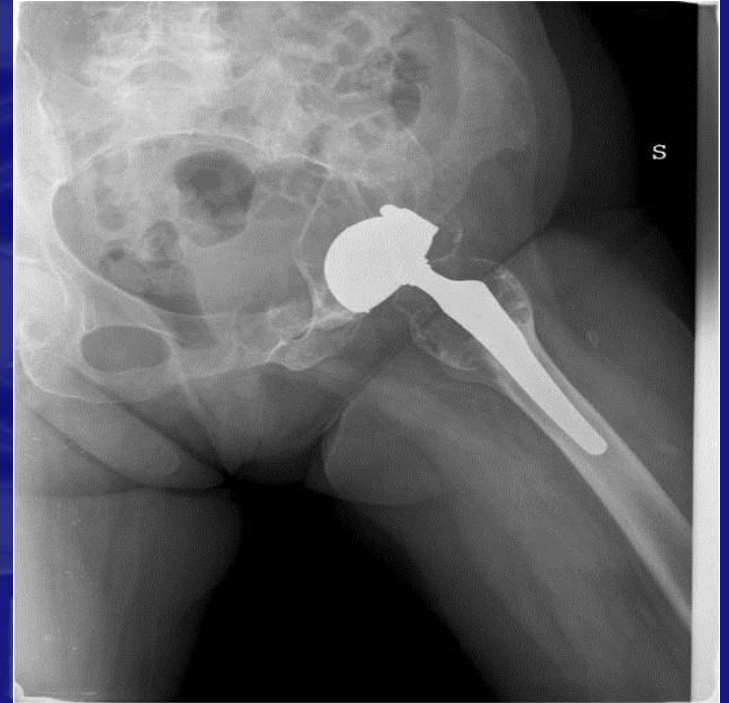
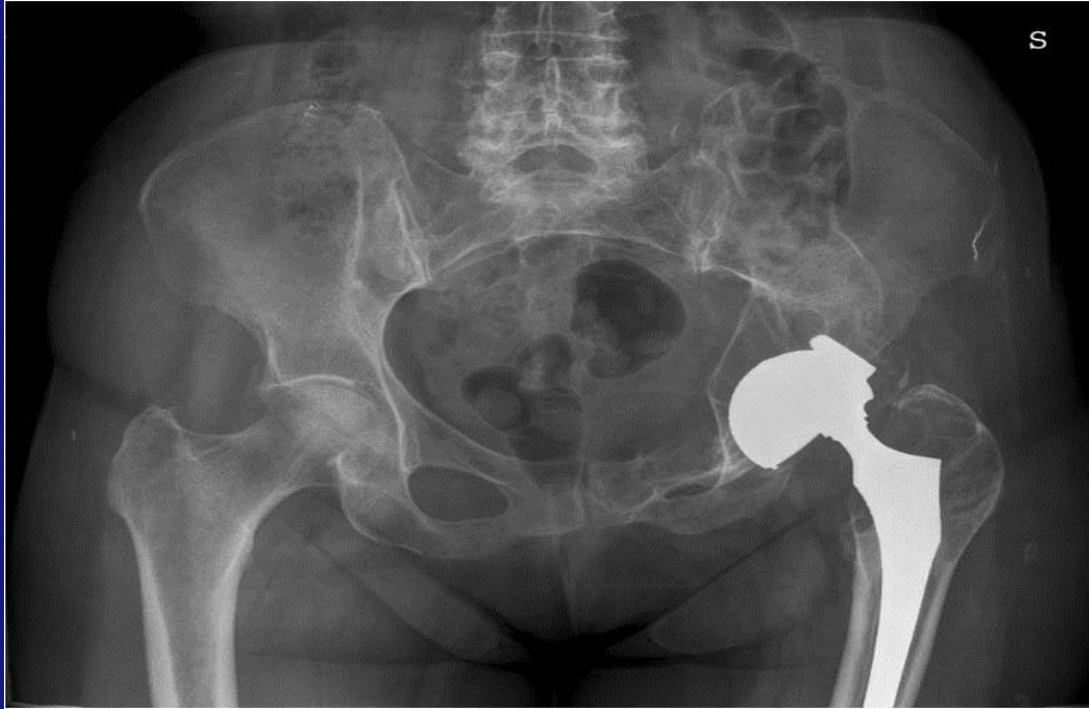




Osso morcellizzato + strutturale

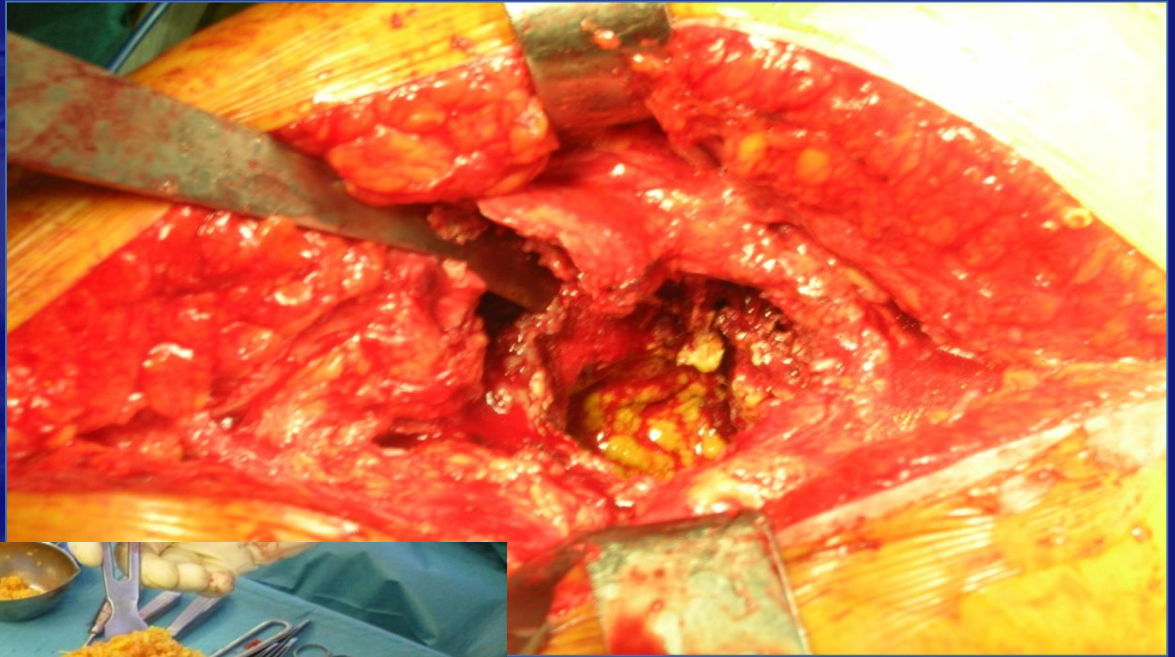
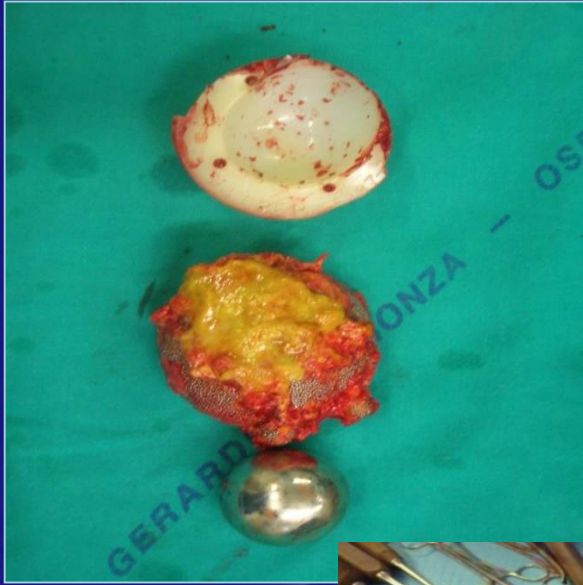


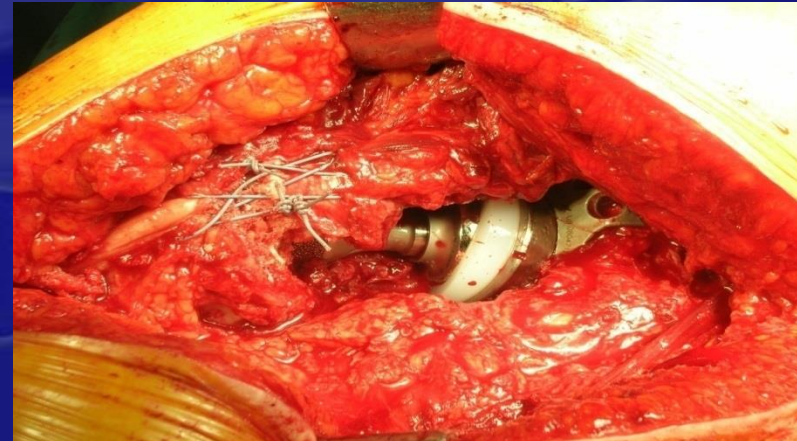
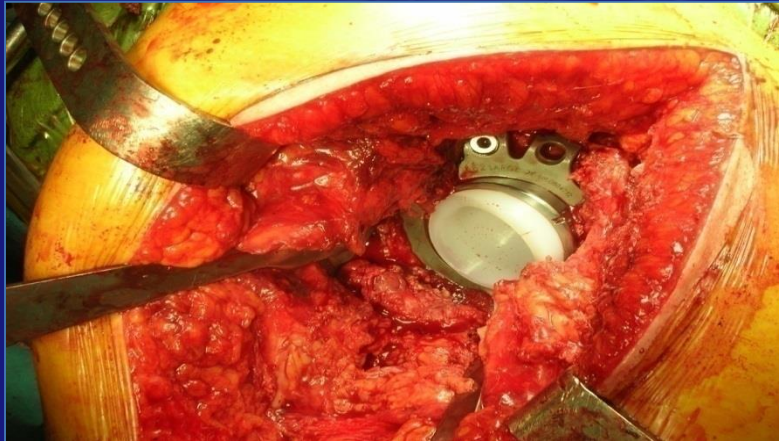
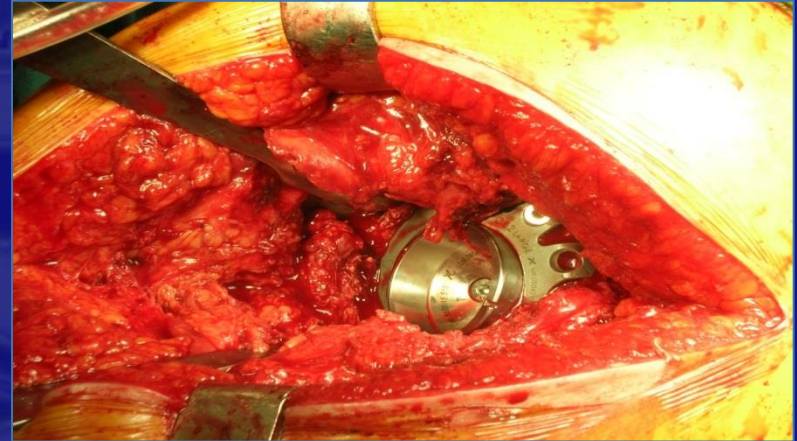
Caso clinico



Rx pre-op

L.G- Donna di 70 anni mobilizzazione asettica cotile - PTA sx in coxartrosi dopo 19 anni con lesione permanente del nervo sciatico

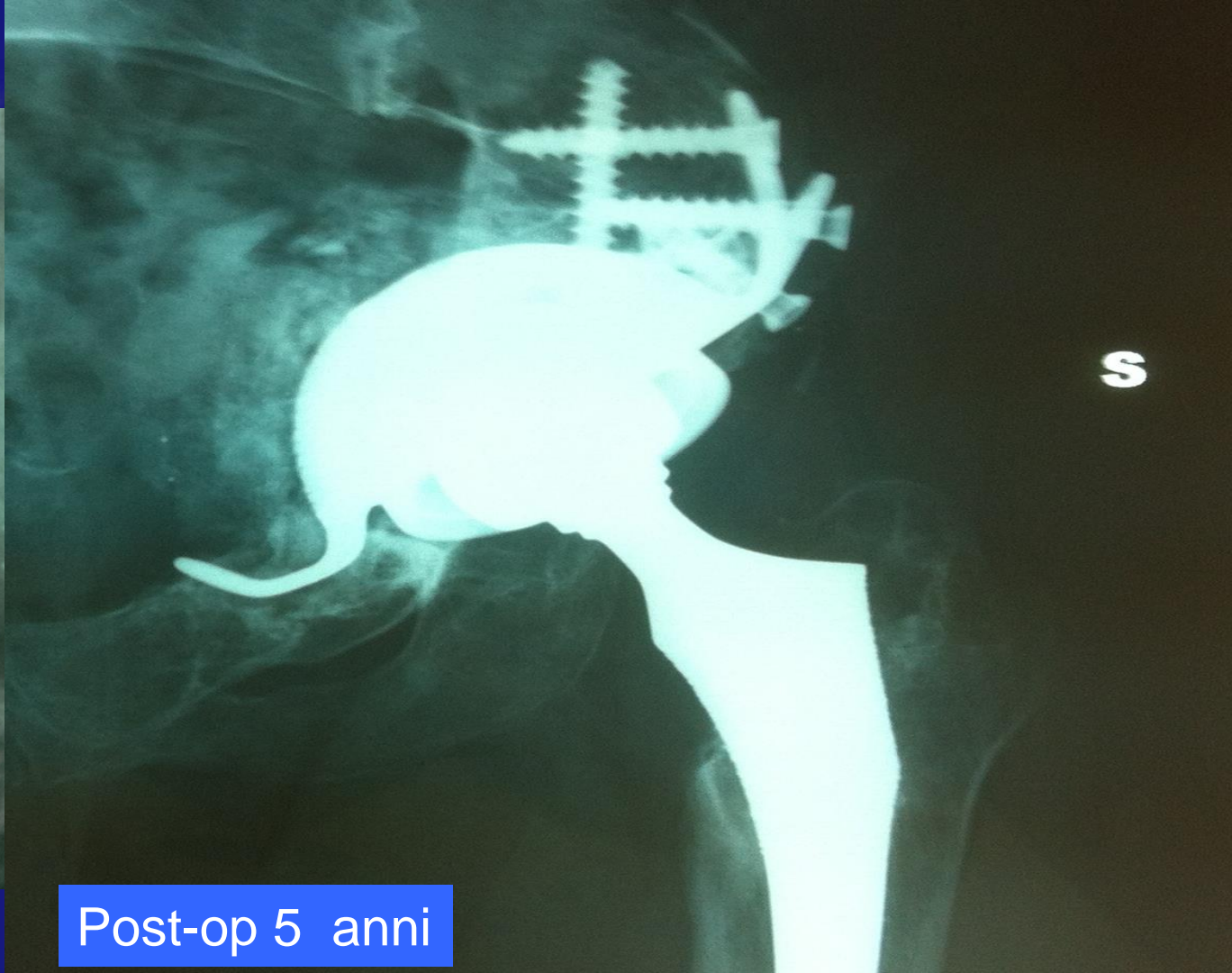
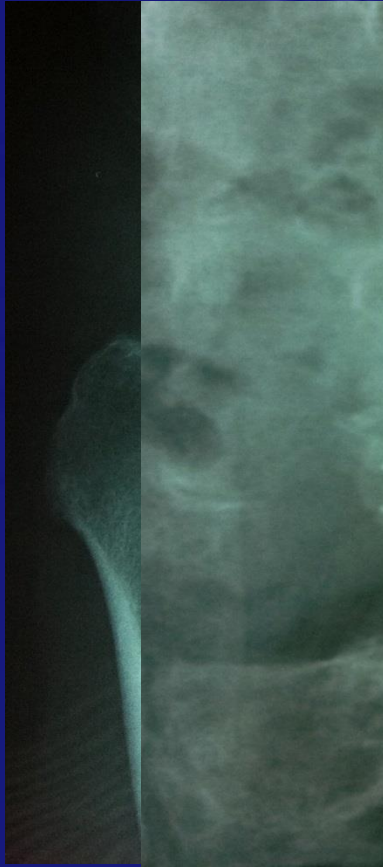






Revisione cotile - innesto
osseo autologo + sintetico
e gel piastrinico

Post op



Post-op 5 anni

Caso clinico



B.A - Donna di 72 anni mobilizzazione asettica cotile anca destra



Rx post- op - granuli di osso sintetico



Post-op 3 anni

Caso clinico 4



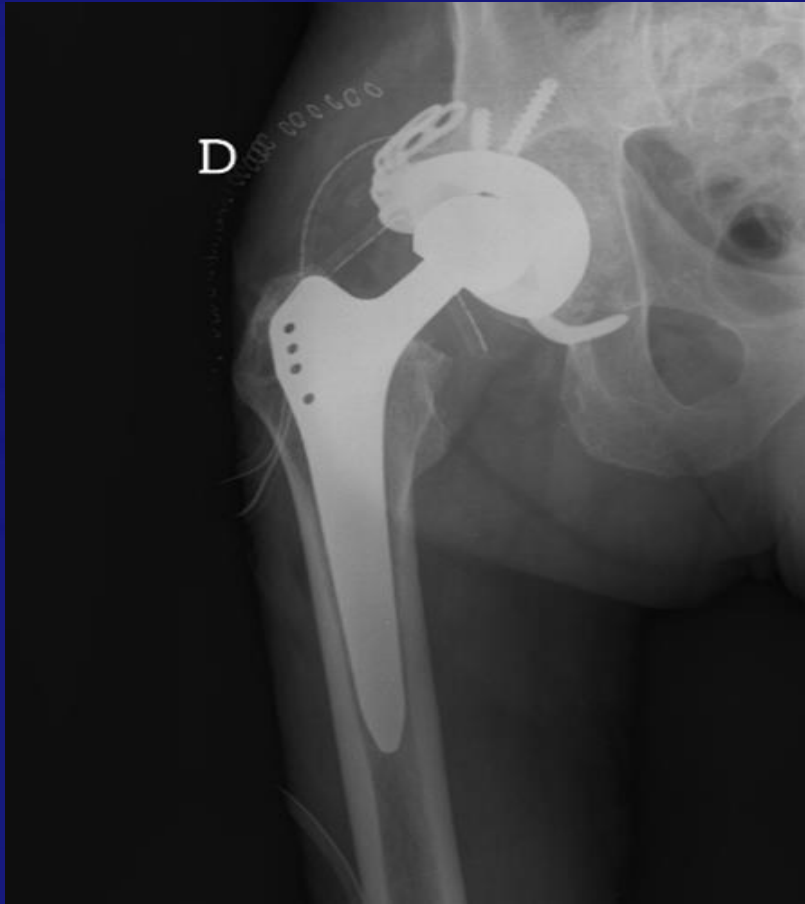
F.F-Uomo di 83 anni
mobilizzazione
asettica cotile dx
PTA dx nel 1998 in
esiti di coxartrosi

Rx pre-op





B I C



Rx post-op (osseo allogenico + gel piastrinico)

Coppe acetabolari mobilizzate

Coppe acetabolari stabili

- Malposizionamento ?
- Instabilità dopo rimozione viti ?
- Spessore del polietilene inferiore ai 6 mm ?

SI

NO

NO

➤ Osteolisi aggredibile?

SI

SI

➤ Consumo?
Testina in metallo?

NO

REVISIONE
ACETABOLARE

ZEPPAGGIO + CAMBIO POLY
+ CAMBIO TESTINA

VS

ZEPPAGGIO + CAMBIO POLY

Trattamento farmacologico:



Inibitori della risposta infiammatoria:

Azione sul TNF alfa (pentossifillina, etanercept)



Childs LM, Goater JJ, O'Keefe RJ, Schwarz EM: Efficacy of etanercept for wear debris-induced osteolysis. J Bone Miner Res 16:338-347, 2001.

Inibitori dell'osso
A systematic review assessing the effectiveness of alendronate in reducing periprosthetic bone loss after cementless primary THA.

Bifosfonati

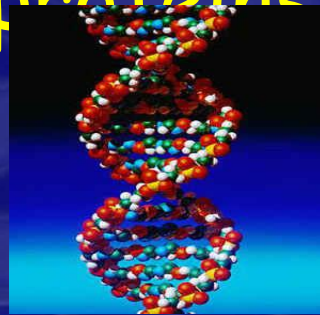
Orthopedics, 2011 Apr 11;34(4). doi: 10.3928/01477447-20110228-09.

Zeng Y, Lai Q, Shen B, Yang J, Zhou Z, Kang P, Pei F.

Department of Orthopedics, West China Hospital, Sichuan University, Chengdu, People's Republic of China.

Il futuro

- Mesenchymal stem cells
- Bone morphogenic proteins (BMPs)
- Gene Therapy



Femoral osteolysis following total hip replacement

R Dattani

Conclusioni

- Controlli ravvicinati per prevenire perdita di osso
- Chirurgia da modulare
- Ottenere un impianto meccanicamente stabile (AUGMENT)
- OVE POSSIBILE ricostituzione del Bone Stock





Grazie





CONGRESSO NAZIONALE DELLA
SOCIETÀ ITALIANA DELL'ANCA

19-20
settembre 2019

BERGAMO

Fallimento meccanico nella protesi d'anca

G.P. RINALDI

A.O. Niguarda – Milano

S.C. ORTOPEDIA E TRAUMATOLOGIA

Responsabile S.S. Chirurgia Protesica

Evitare il fallimento meccanico

- Scelta del “device” idoneo per le
• Istruzioni per l’uso al Paziente
caratteristiche del Paziente

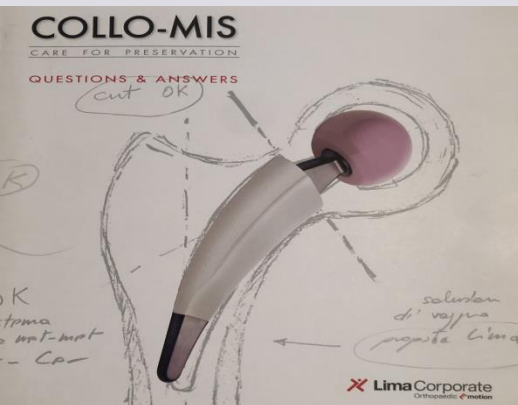


“Leggere le istruzioni”

- Le componenti hanno indicazioni e controindicazioni



Attenersi alle indicazioni del “device” utilizzato



QUESTIONS & ANSWERS

1 WHAT MAKES THE COLLO MIS STEM UNIQUE?

The COLLO MIS is unique because it:

- * reduces metaphyseal and diaphyseal invasiveness thanks to bone preservation and cancellous bone compaction;
- * obtains an excellent primary stability through a laterally tapered design that ensures a stable fixation in the neck diaphysis allowing early loading.
- * offers an optimal secondary fixation thanks to osteoinductive coating: porous Titanium plus Hydroxyapatite
- * calls for a straightforward surgical technique and easily adaptable to "Tissue Sparing" surgical approaches
- * features a versatile prosthetic design, that adapts to a wide range of femoral morphologies with contraindications limited to major proximal femur alterations.

2 WHICH ARE THE INDICATIONS?

2 WHICH ARE THE INDICATIONS?

The main indications are:

- * primary / secondary coxarthrosis
- * femoral head necrosis (post-traumatic and avascular)

The contraindications are:

- * Coxa valga > 145° / Coxa vara < 125°
- * Dysplasia > Crowe II
- * Proven osteoporosis
- * Fracture of the proximal femur involving the neck
- * Previous surgeries and/or diseases that altered the femoral meta-epiphyseal anatomy.

The warnings are:

- * patients with poor bone quality caused by metabolic diseases and / or pharmacologic treatments.
- * **BMI ≥ 30 kg/m²**

This choice is justified by:

- * absence of a real need: the implant follows the neck anatomy without altering the parameters.
- * higher mechanical safety
- * small proximal stem section dimensions would limit the coupling size.

4 WHY A SYMMETRICAL STEM?

Since the neck is fully preserved, the direction of the stem must follow that of the anatomical neck. The length of the stem (with a slight increasing 3 mm-step per size) and the shape of the distal part have been designed with the prerequisite of total neck preservation, optimized to avoid conflict either with the lateral cortex (extreme varus) or with the medial (extreme valgus) following the natural anteversion. These studies allowed also to avoid an asymmetrically curved design that would require a more complicated instrument set and a more challenging surgical technique, making the preparation of the neck canal more difficult in terms of stem introduction and orientation.

5 WHY IS A SINGLE CURVATURE SUFFICIENT?

The medial curvature of the COLLO MIS stem is the result of preliminary anatomical studies on femurs of different sizes, patient ages and sex. The medial curvature is not constant, but increases with stem size because anatomically the radius of the calcar is greater for larger femurs. This maximizes the medial contact area between the stem and the cortex, producing a physiological stress distribution to the proximal femur.

6 WHY IS A SINGLE CCD ANGLE SUFFICIENT?

Because the total neck preservation enables to maintain the natural CCD angle and the anatomic anteversion. The calculated CCD angle of the stem has to be considered nominal, measured between the axis of the distal tip and the neck. The choice of a 135° - CCD angle is associated with the lower risk of perforation and conflict with the posterolateral cortex, allowing a varus-valgus accommodation according to the proximal femur anatomy, while restoring the proper joint geometry without the risk of stress-shielding and thigh pain.

7 WHERE IS THE PROSTHETIC DEVICE FIXATION?

The stem fixation is in the neck diaphysis, and to obtain this the stem has a tapered side profile. Unlike other short stems that require three contact points, with COLLO MIS requires only two contact points, one on the calcar and another on the lateral neck region.

Tribologia

L'accoppiamento ottimale esiste?

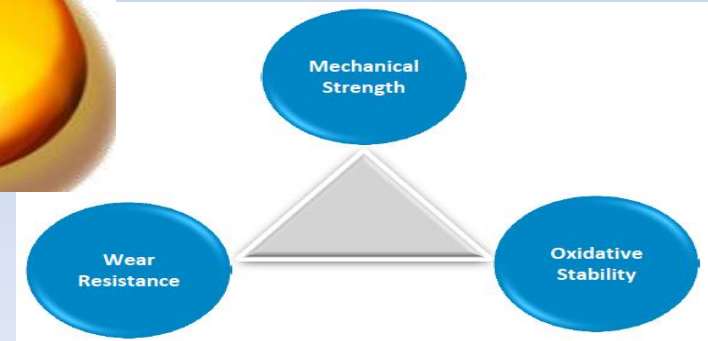
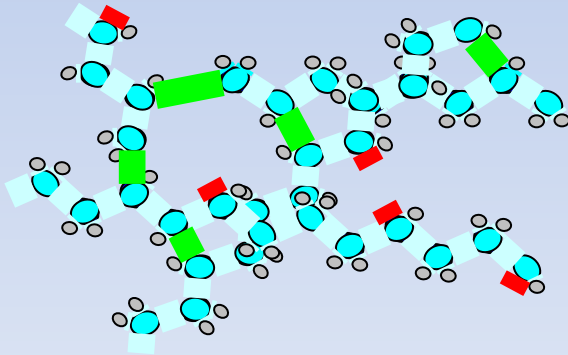


Il polietilene



Il polietilene - L'evoluzione

- PE sterilizzato in azoto
- PE reticolati
- PE reticolati e stabilizzati con vitamina E



***La Ceramica** - Evoluzione*

Pierre Boutin and Heinz
Mittelmeier introduce
ceramic components in
the field of arthroplasty



1974



1985



1995



2003



Problemi ceramica

Properties	Biolox Forte	Biolox Delta
Resistenza alla flessione [MPa]	630	1380
Durezza [HV]	2000	1925
Resistenza alla Rottura [MPa m ^{0.5}]	3.2	6.5

Biolox Delta: l'esperienza CoC

R. Raman, 14th CeramTec meeting, 2012

“I risultati di questo studio dimostrano un risultato clinico e funzionale eccellente e sostengono l'accoppiamento ceramica-ceramica. Tuttavia, il problema di rottura della ceramica esiste”



***Un punto fermo:
La testa ideale è in ceramica “Delta”***

PE-ceramica Delta: è il golden standard...
meglio ancora se PE con vitamina E

Accoppiamento ceramica-ceramica

- La criticità: l'inserto in ceramica da accoppiare
 - Il posizionamento dell'inserto: rischio di rim chipping
- L'elasticità
 - Risolto con ceramica delta: ?
- Squeaking
 - È significativo di un danno?



Accoppiamento metallo-metallo:

Importanza della metallurgia

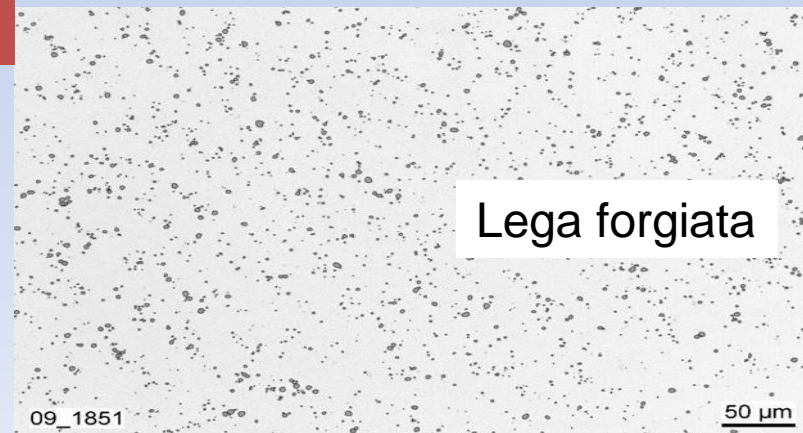
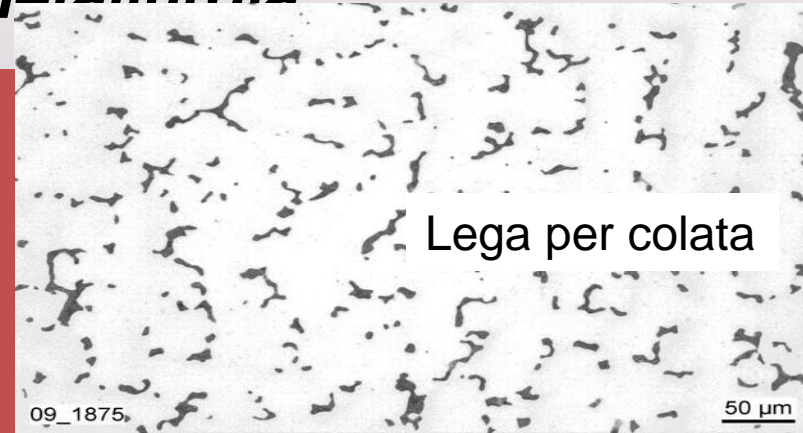
Differenza nella grandezza della microstruttura:

- Lega per COLATA: Dimensione dei grani 1 - 3 mm
Dimensione dei Carburi Up to 100 μm Durezza 310 Hv
- Lega per FORGIATURA: Dimensione dei grani 15 μm
Dimensione dei Carburi 2 μm Durezza **470 Hv**

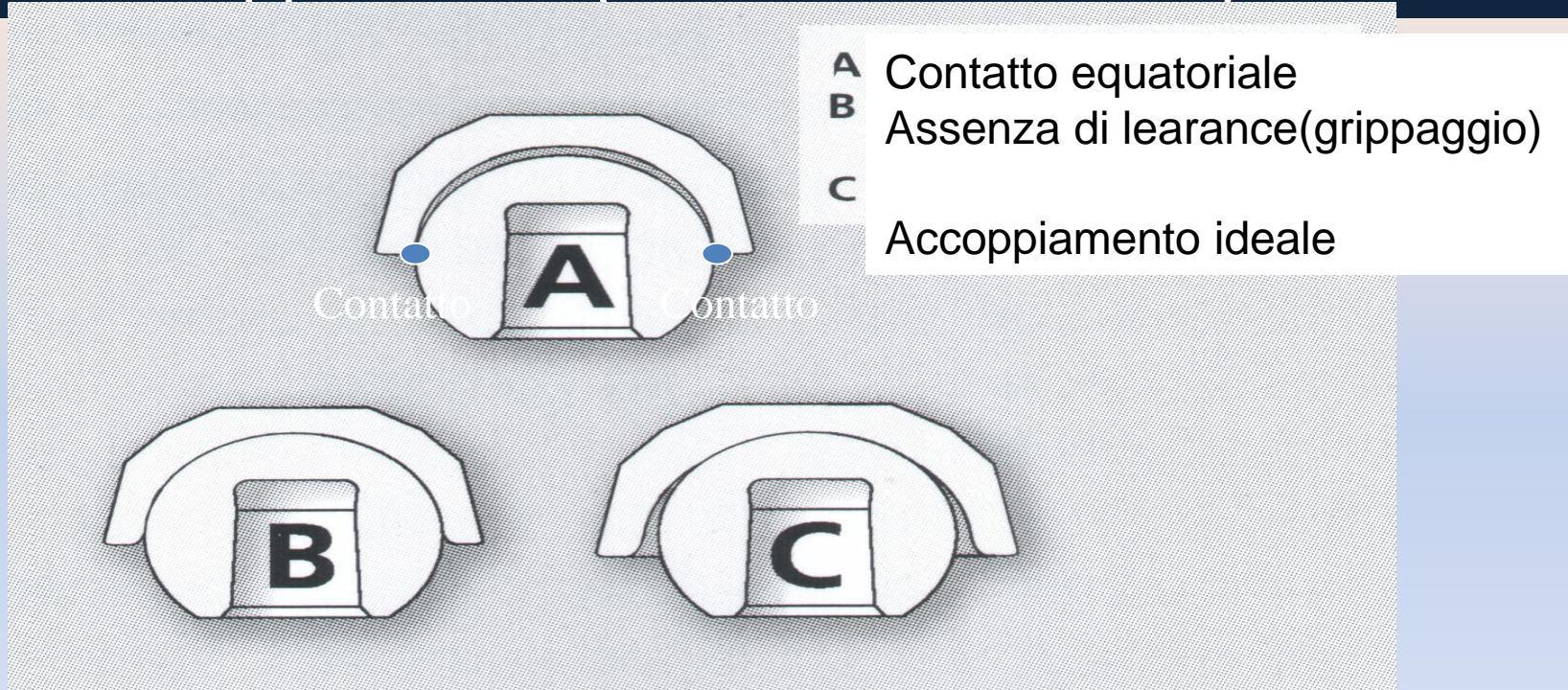
- Riduzione dei carburi
- Riduzione drastica della rugosità
- Aumento della durezza

Lega ad alto tenore di Carbonio

- Migliore resistenza all'usura



Non accoppiare componenti di differenti produttori



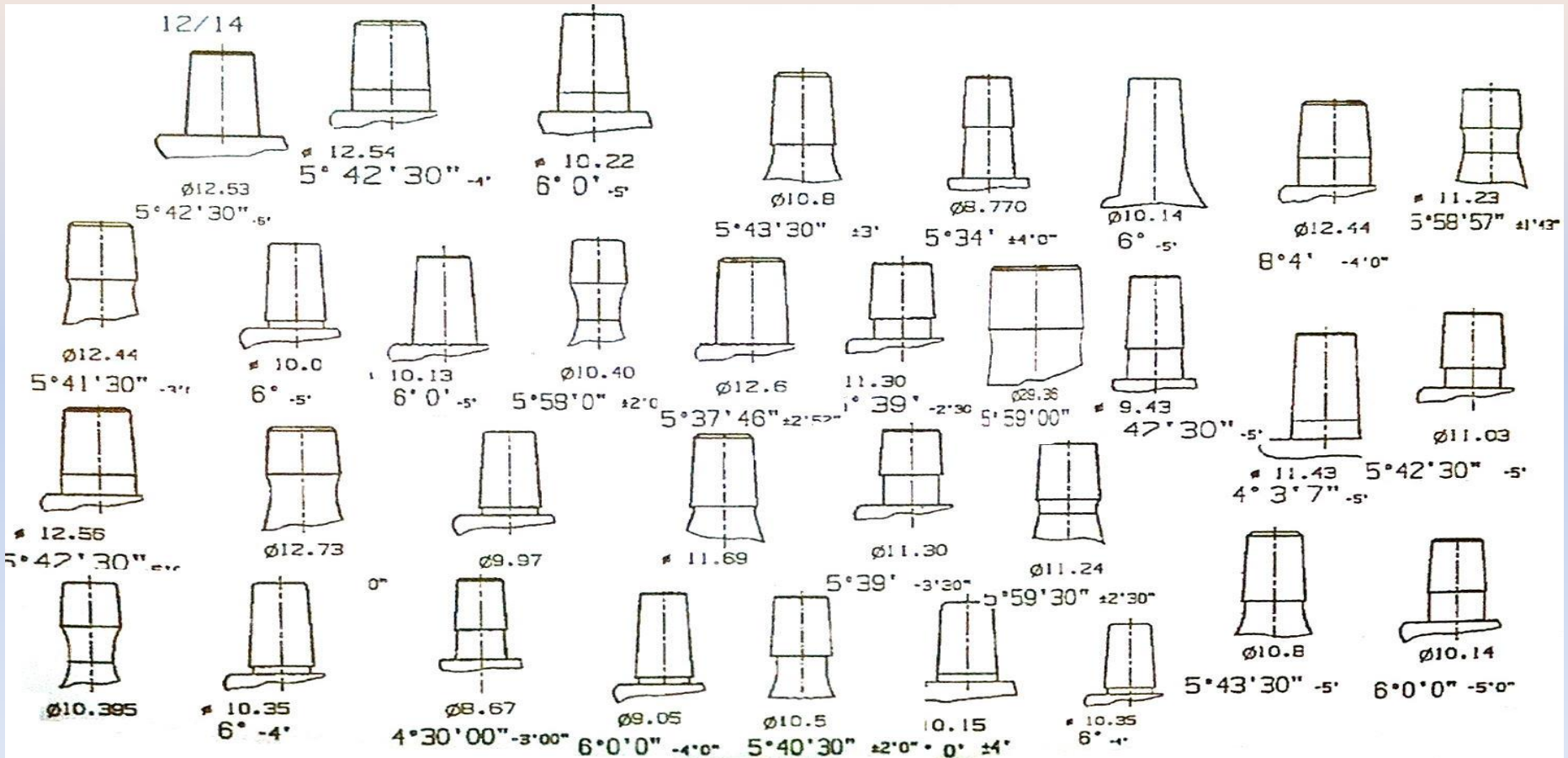
- **Importanza della clearance: testa-inserto**

- Clearance troppo stretta: grippaggio
- Clearance troppo larga: concentrazione del carico nei punti di

Corrosione: i principi base

- Ogni volta che un corpo estraneo viene introdotto nel corpo umano, innesca una risposta biologica.
- Tutti i materiali impiantabili devono essere **biocompatibili** – **devono produrre il minimo grado di risposta biologica**
- **Tutti I metalli impiantati nel corpo umano sono soggetti a corrosione passiva e rilasciano ioni**
- Metalli capaci d'innescare una reazione di ipersensibilità sono:

CONI MORSE



I coni morse più comuni:

Queste differenze non sono visibili a occhio nudo

Angoli dei Coni Morse:

- Il più piccolo: $4^{\circ} 30'00''$
- Il più grande: $8^{\circ} 40'00''$
- Angoli più comuni utilizzati per il 12/14
 $5^{\circ} 34'00'' \rightarrow 6^{\circ} 00'00''$

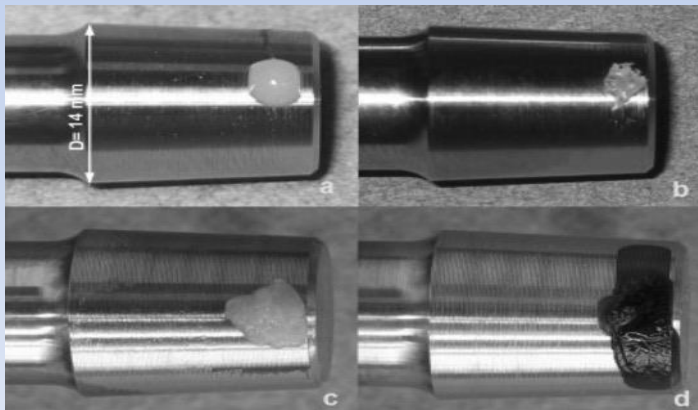
Diametri dei tapers 12/14:

- Il più piccolo: 12.44 mm
- Il più grande: 12.60 mm

*Influenza di **agenti contaminanti** nell'interfaccia testa-stelo sulla frattura della testa femorale in ceramica*

Applicazione di agenti contaminanti sull'apice del cono dello stelo:

- a) Resina epossidica
- b) Frammenti osso umano privo di grasso
- c) Grasso bovino
- d) Goccia di sangue secco



Risultato:

Riduzione del 50% della resistenza al carico statico.

B. Weisse et al, J. Engin. Med., 222, 2008, p. 829

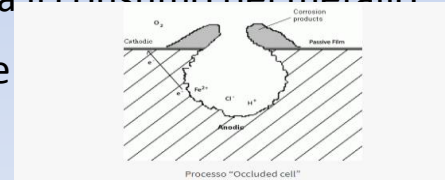
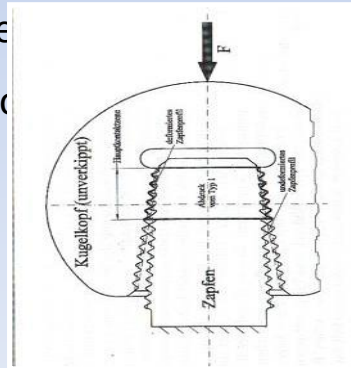
Trunnionosis: a pain in the neck

MACC

MECHANICAL ASSISTED CREVICE CORROSION

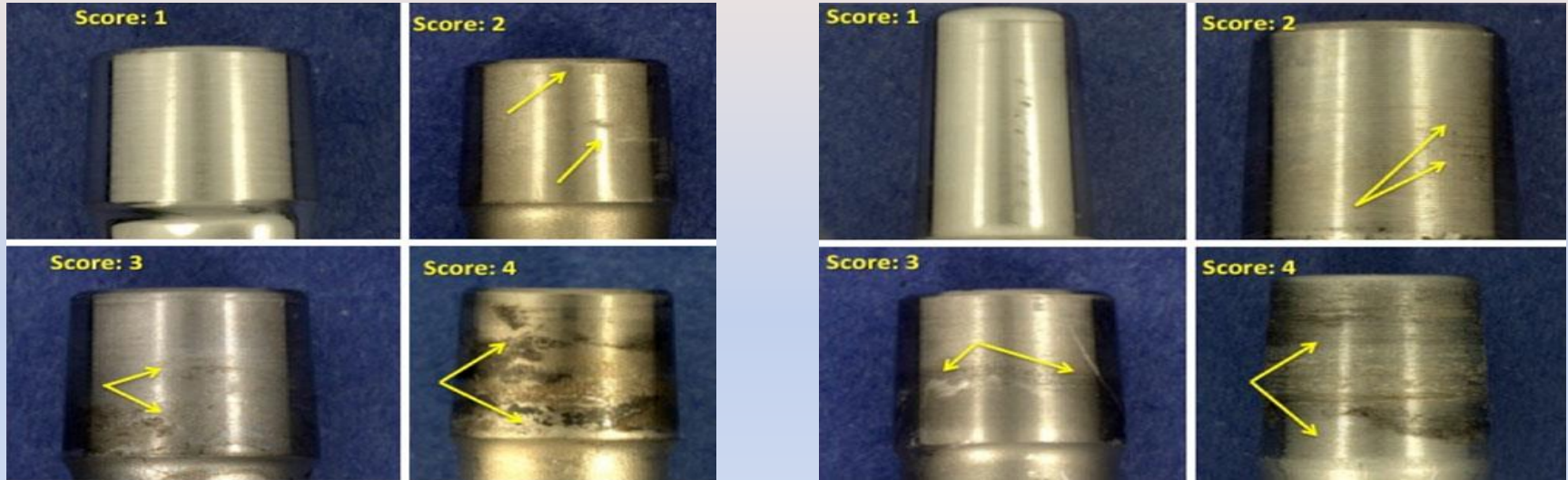
- È un fenomeno di **corrosione/usura** all'interfaccia del cono morse con la testa con un rilascio di ioni. Può portare a deformazione del cono morse, fino a rottura del collo o della testa.
- La corrosione all'interfaccia testa/stelo è maggiore con teste in metallo ma esiste anche con teste in ceramica.

- Meccanismo che porta alla formazione di una cella "occlusa": si ha il consumo del metallo
- L'ambiente articolare è un elettrolita: la crevice



P.S. Pastides et al, WJO., Vol.4 Issue4, 2013, p. 161

Do ceramic femoral heads reduce taper fretting corrosion in THA? A Retrieval Study



Le microrigature presenti sul cono dello stelo aumentano l'effetto corrosivo
I danni da micromovimento visti sui coni sono visibili sull'apice delle scanalature:

Se ci sono scanalature profonde, ci può essere un accumulo di debris adiacente al danno da contatto.

MACC

MECHANICAL ASSISTED CREVICE CORROSION

What do we know about taper corrosion in total hip arthroplasty?

Jacobs JJ, Cooper HJ, Urban RM, Wixson RL, Della Valle CJ.

J Arthroplasty. 2014 Apr;29(4):668-9. doi: 10.1016/j.arth.2014.02.014. Epub 2014 Feb 18.

Corrosion at the Head-Neck Junction: Why Is This Happening Now?

Jacobs JJ.

J Arthroplasty. 2016 Jul;31(7):1378-80. doi: 10.1016/j.arth.2016.03.029. Epub 2016 Mar 24. Review.

PMID: 27321963

Trunnion Corrosion in Total Hip Arthroplasty-Basic Concepts.

Urish KL, Giori NJ, Lemons JE, Mihalko WM, Hallab N.

Orthop Clin North Am. 2019 Jul;50(3):281-288. doi: 10.1016/j.ocl.2019.02.001. Epub 2019 Apr 16. Review.

Ten-Year Cross-Sectional Study of Mechanically Assisted Crevice Corrosion in 1352 Consecutive Patients With Metal-on-Polyethylene Total Hip Arthroplasty.

Hussey DK, McGrory BJ.


J Arthroplasty. 2017 Aug;32(8):2546-2551. doi: 10.1016/j.arth.2017.03.020. Epub 2017 Mar 18.

43 Pz = 3.2%

MACC

Corrosione interstiziale meccanica assistita

- IL DIAMETRO E LA LUNGHEZZA DELLA DELLA TESTA INFLUENZANO L'USURA LINEARE AL TRUNNION :

- Aumento dell'usura su teste $\geq 40\text{mm}$
- Aumento dell'usura  N TESTE MEDIE E LUNGHE

AUMENTO IL BRACCIO DI LEVA

> SOLLECITAZIONE M

[The onset of fretting at the head-stem connection in hip arthroplasty is affected by head material and trunnion design under simulated corrosion conditions.](#)

Rowan FE, Wach A, Wright TM, Padgett DE.

J Orthop Res. 2018 Jun;36(6):1630-1636. doi: 10.1002/jor.23813. Epub 2018 Jan 10.

La corrosione interstiziale



Corrosione interstiziale di un tubo in 316 L

La corrosione interstiziale è una forma di corrosione che rientra nella famiglia della corrosione localizzata e pertanto presenta alcuni aspetti molto simili alla corrosione per vaiolatura. Questa tipologia di corrosione si manifesta con una perdita di materiale principalmente localizzata in prossimità dell'accoppiamento tra due parti meccaniche in presenza di un ambiente umido. In queste zone, per motivi di tolleranze dimensionali, si creano degli interstizi sufficienti a instaurare un meccanismo auto-stimolante che porta alla formazione di crateri e caverne. La

La modularità

Maggiori sono
gli
accoppiamenti

Maggiori sono
i punti critici

Aumentano i rischi di fretting e rottura

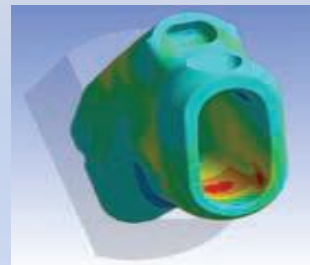
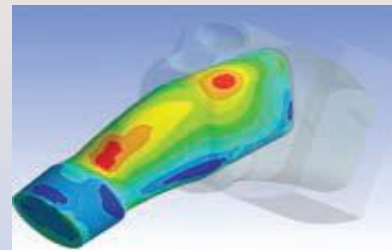
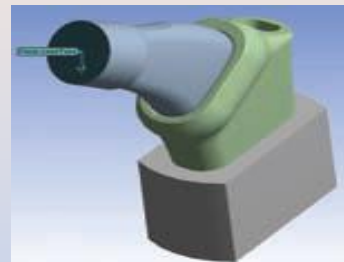
La modularità

Importante:

- Corretta metallurgia
- Corretto design
- La modularità **SI** per la

High Failure at a Minimum 5-Year Follow-Up in Primary Total Hip Arthroplasty Using a Modular Femoral Trunnion.

Nahhas CR, et al. J Arthroplasty. 2019.



Attenzione ai fallimenti:

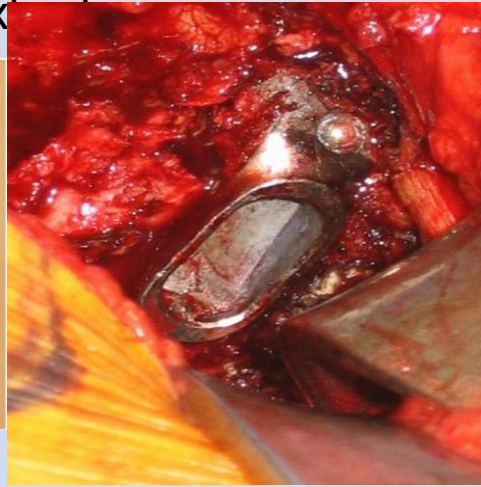
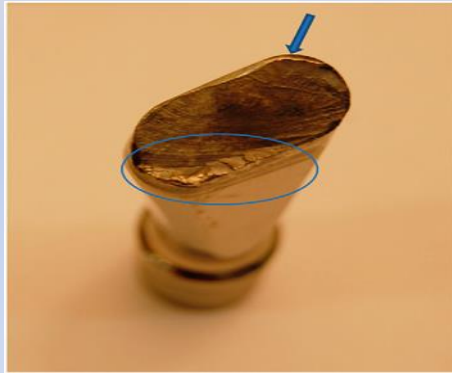
- Early Failure of a Modular Femoral Neck Total Hip Arthroplasty Component - A Case Report - David A.J. Wilson, et al. — JBJS — 2010
- **RISCHIO DI MACC**
- Fracture of a Modular Femoral Neck After Total Hip Arthroplasty - A Case Report -

Caso indicato all'utilizzo della modularità



Lateralizzare solo dopo una pianificazione accurata.

- Lo stelo lateralizzante (varo) solo in casi idonei
- Solo con stelo monoblocco
- Evitare teste x



Dual-taper modular hip implant: Investigation of 3-dimensional surface scans for component contact, shape, and fit

Nicholas B. Frisch, MD, MBA ^{a,*}, Jonathan R. Lynch, MD ^b, Robin Pourzal, PhD ^c, Richard F. Banglmaier, PhD ^b, Craig D. Silverton, DO ^b

^a Ascension Crittenton Hospital, Rochester, MI, USA

^b Henry Ford Health System, Department of Orthopaedic Surgery, Detroit, MI, USA

^c Rush University Medical Center, Department of Orthopaedic Surgery, Chicago, IL, USA



Fig. 3
The retrieved modular neck demonstrates fretting and corrosion damage (arrows) on the surface that had mated with the femoral stem.

In conclusione...

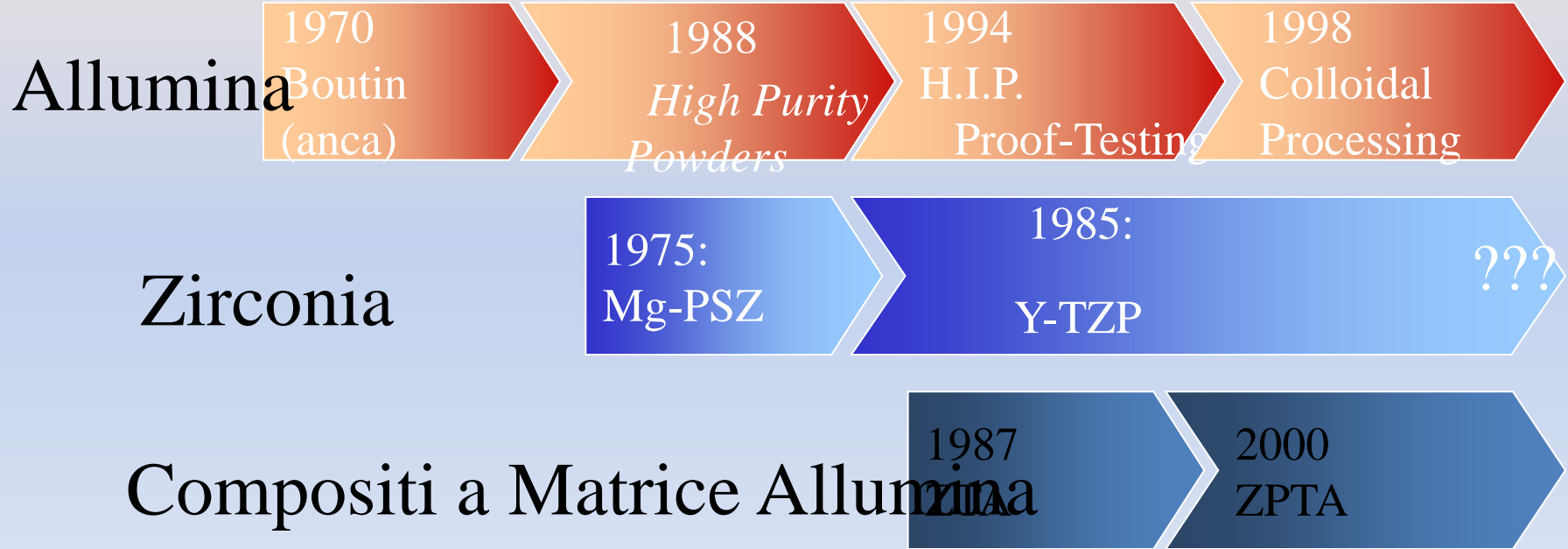
- Utilizzare device con progetti e FU idonei seguendo le indicazioni del produttore
- Eseguire assemblaggi accurati e di materiali compatibili, riducendo il rischio di MACC.
- Perforare impianti correttamente pianificati
- Ottenere l' utilizzo consapevole della protesi da parte del paziente

Allunga la vita dell' impianto



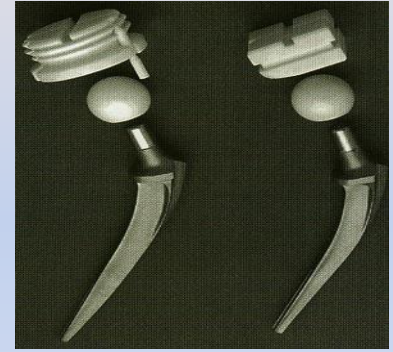
GRAZIE

Evoluzione delle bioceramiche



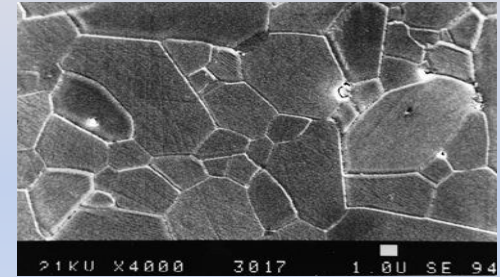
1^a Generazione (1970 Boutin)

- Allumina ad alta purezza sinterizzata in aria
- Dimensione dei grani elevata
- Marcatura con diamante
- Controllo visivo



2^a Generazione (1980)

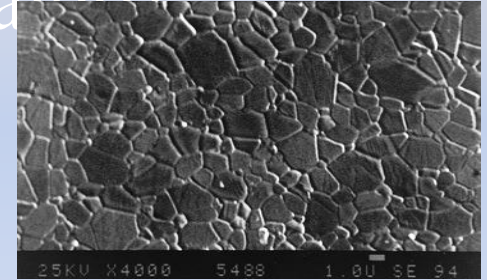
- Allumina ad alta purezza sinterizzata in aria
- Dimensione dei grani < 3,2 μm
- Marcatura con diamante
- Controllo visivo
- DIN 58 835 ed. 1979
- ISO 6474 1^a ed.



3^a Generazione (1994)



- Preparata in camera bianca (purezza della polvere)
- **H.I.P.** (Compressione Isostatica a Caldo)
- **Marcatura Laser**
- **Test di affidabilità** (Proof-Test)
- Controllo visivo mul
- **Nuove normative**



Perché la ceramica nelle articolazioni protesiche

Proprietà

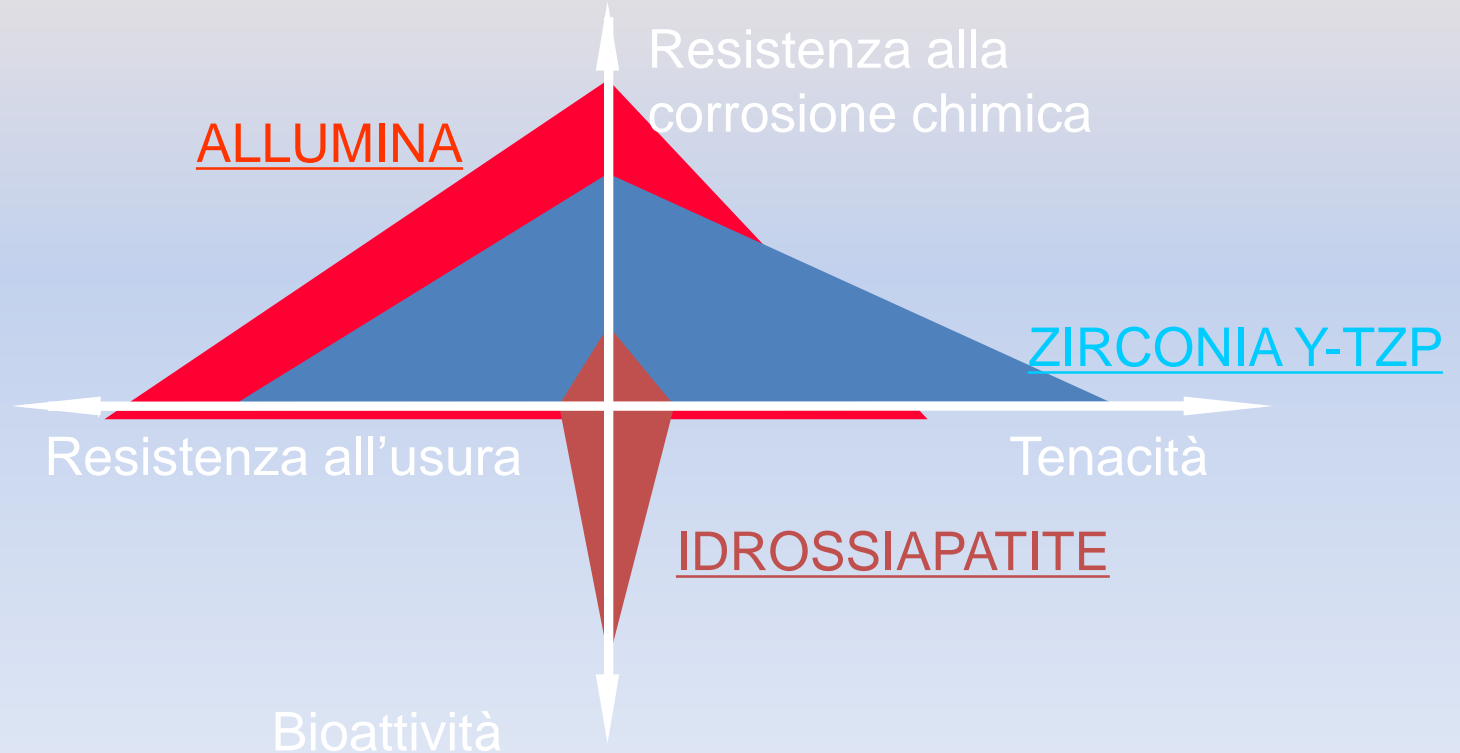
- Biocompatibilità
- Stabilità a lungo termine
- Finitura superficiale
- Resistenza all'usura



Caratteristiche:

- densità
- durezza
- resistenza meccanica

Proprietà delle Bioceramiche



L'allumina è biocompatibile e bioinerte

I Non causa osteolisi

I Non rilascia ioni metallo

I Non causa metallosi

-Griss et al. Biological activity and histocompatibility of dense Al_2O_3 -MgO ceramic implants in rats.

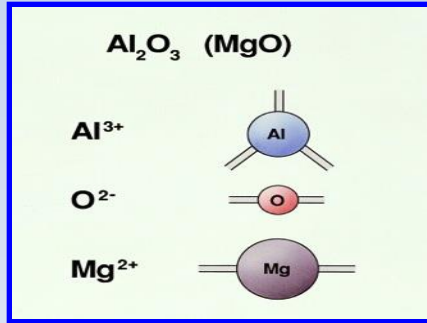
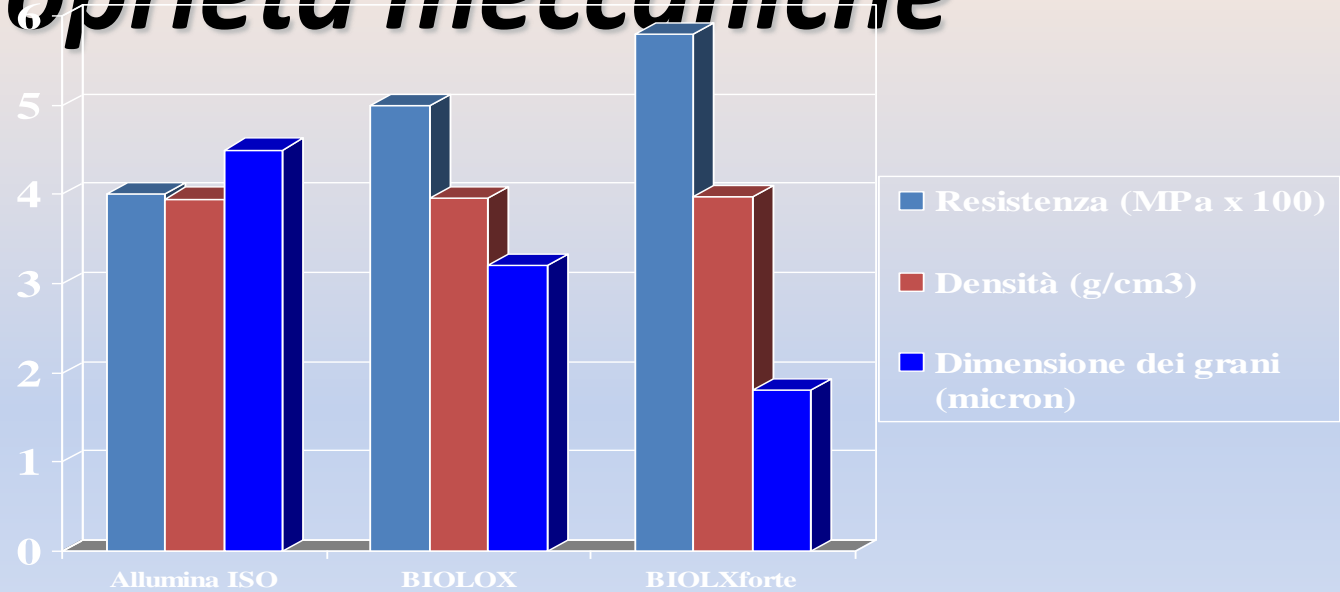
J Biomed Mater Res 1973; 7: 453-62

-Christel P. Biocompatibility of surgical grade dense polycrystalline alumina. Clin Orthop 1992; 282: 10-8

-Harms J et al. Tissue reaction to ceramic implant material. J Biomed Mater Res 1979; 13: 67-87

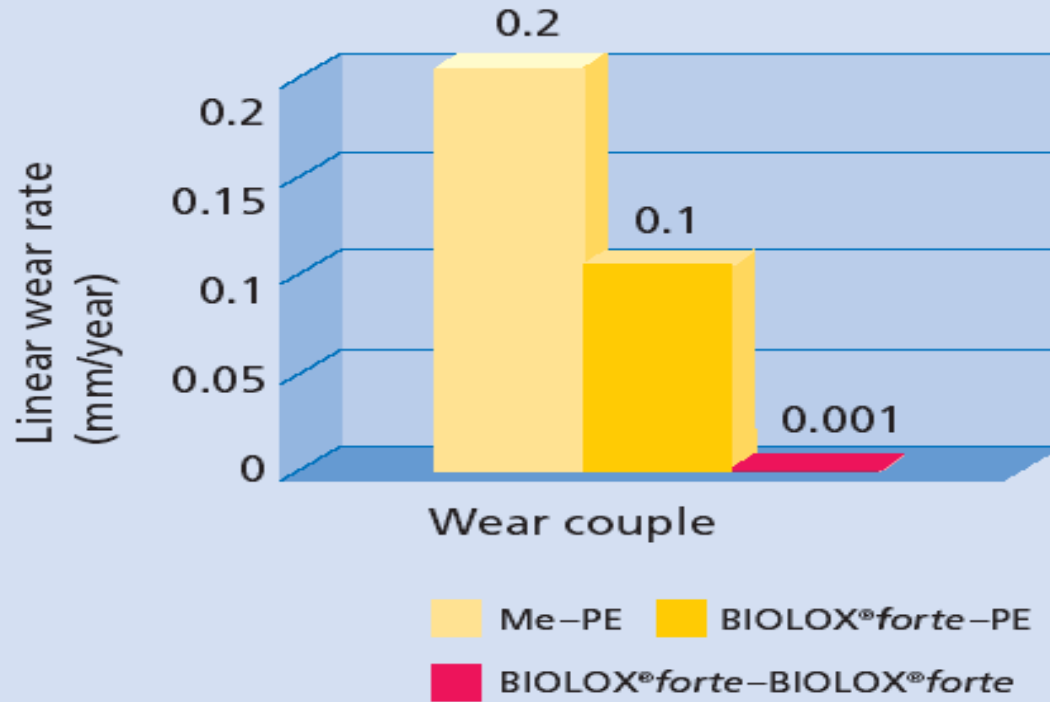
-Greco F. et al. Risposta biologica ai materiali ceramici: risultati delle prove in vivo e in vitro.

Proprietà meccaniche



Il BIOLOX®forte è composto da ossido di alluminio più una piccola % di ossido di magnesio (MgO) per controllare la crescita dei grani durante la sinterizzazione

BIOLOX[®]forte è resistente all'usura



L'allumina è sinoviafillica

CARICA RESIDUA SUPERF.



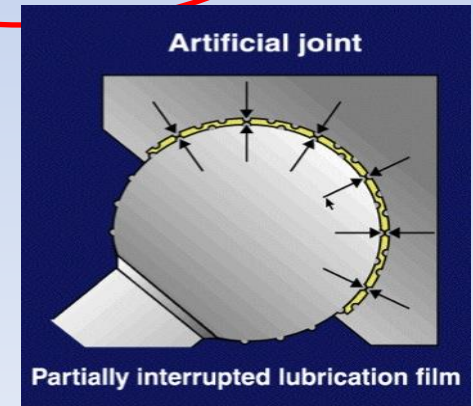
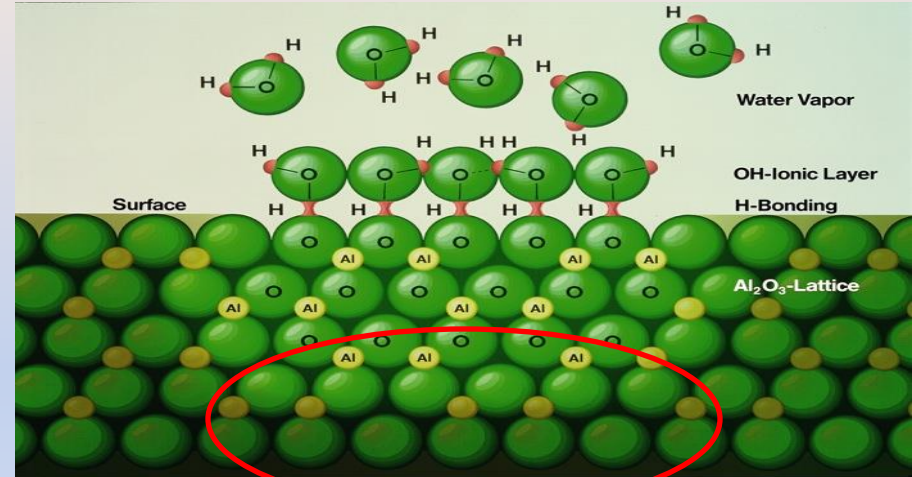
INTERAZIONE MOLECOLE
LUBRIFICANTE



LEGAMI DI VAN der WAALS



FILM FLUIDO

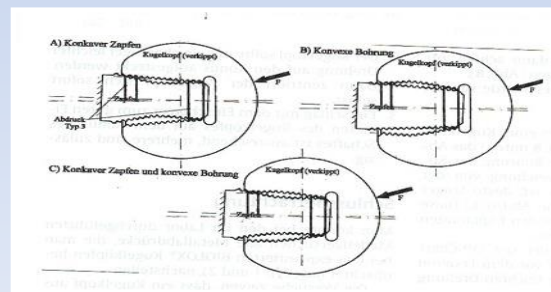
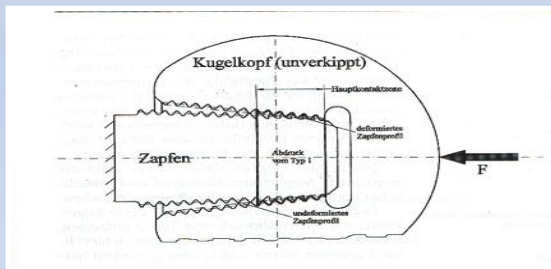
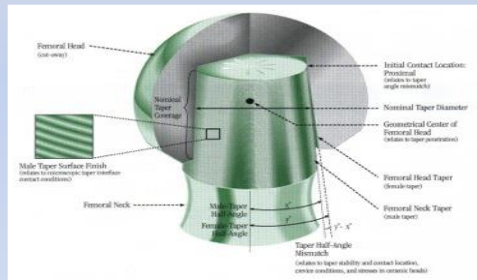


Progettazione

ISO 6474 2^a ed. 1994

ASTM F-603-83, 1995

Conical Fixation

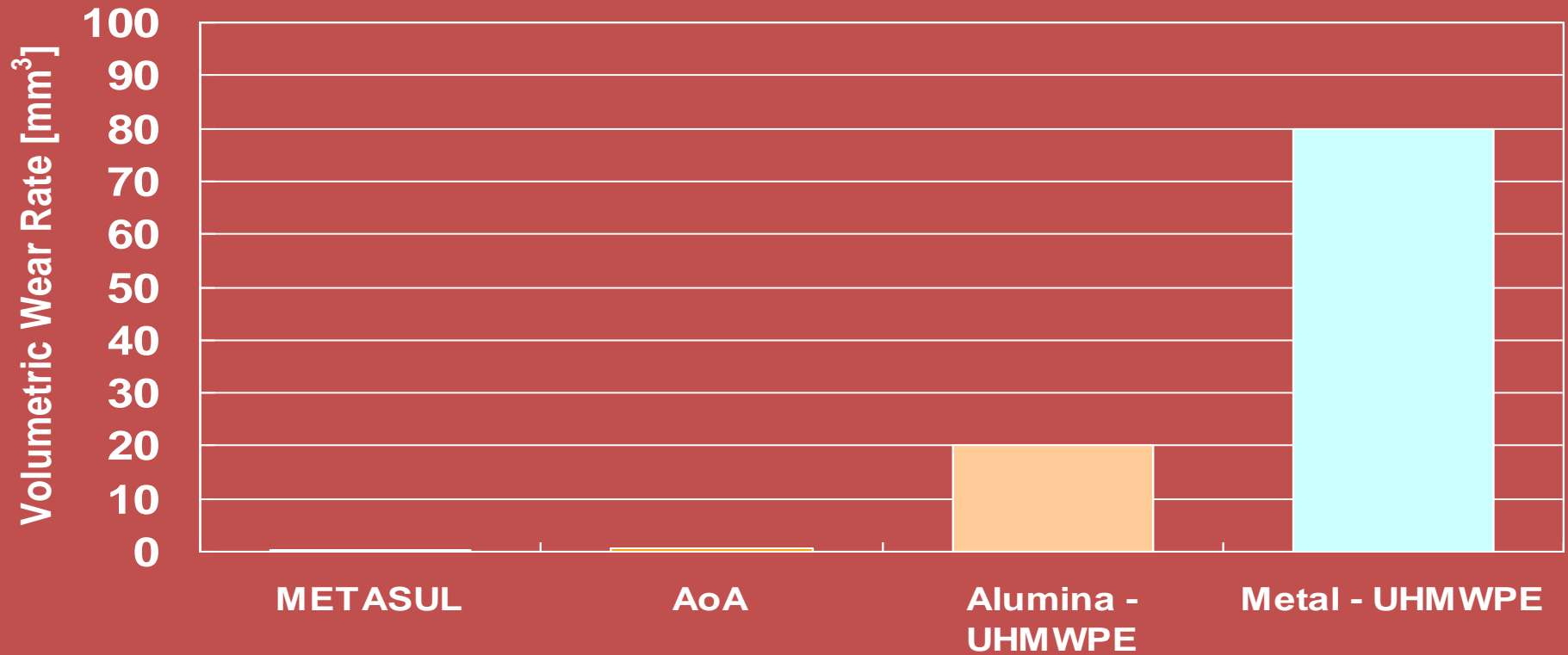


Cono Morse

10:12 - 12:14 - 14
PURTROPPO

Non ci sono standard per la
rugosità, la conicità, la
circolarità e la rettilinearità del
cono

VOLUMETRIC WEAR RATE



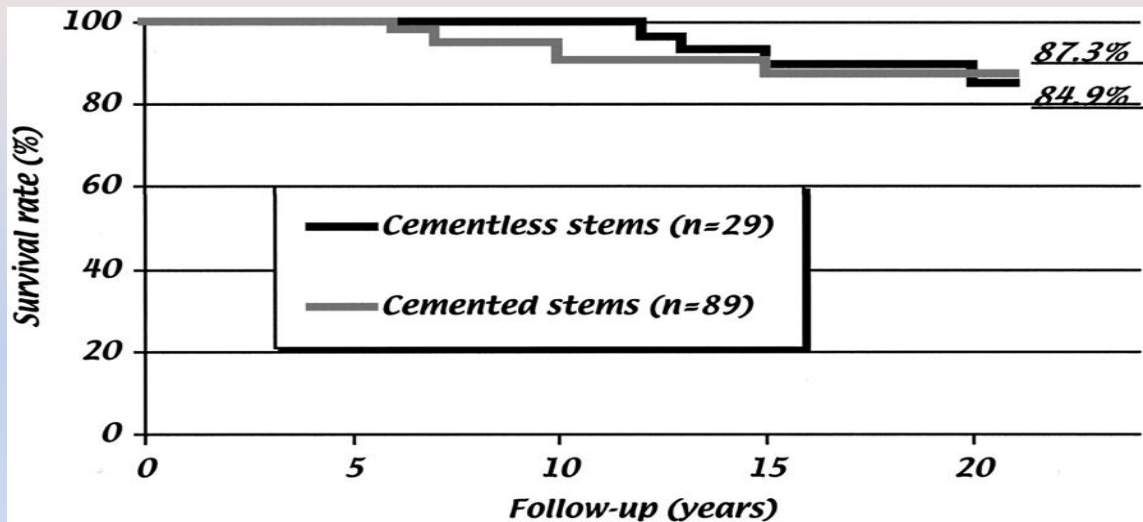
Rilevanza clinica

ALUMINA-ON-ALUMINA TOTAL HIP ARTHROPLASTY

A MINIMUM 18.5-YEAR FOLLOW-UP STUDY

BY MOUSSA HAMADOUCHE, MD, PHD, PIERRE BOUTIN, MD, JACQUES DAUSSANGE, MD,
MARK E. BOLANDER, MD, AND LAURENT SEDEL, MD

Investigation performed at the Orthopaedic Research Laboratory, Université D. Diderot Paris, Paris, France



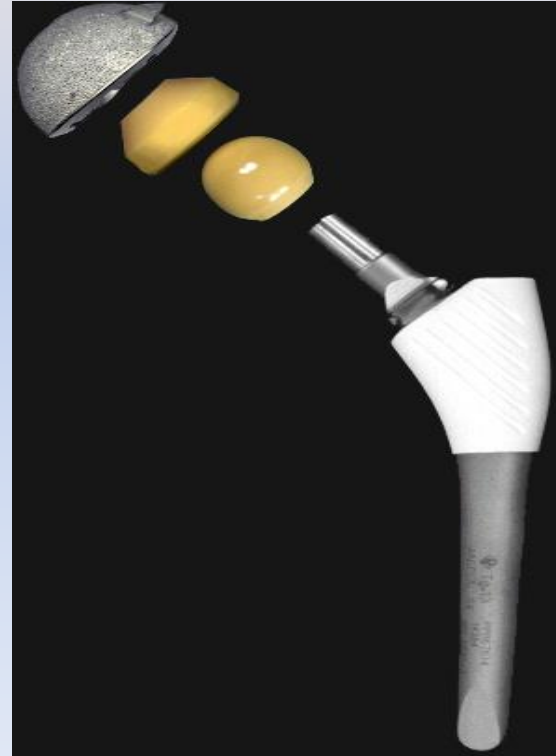
“Con l'accoppiamento in Ceramica, il problema dell'usura e dell'osteolisi a venti anni dall'intervento è molto limitato”

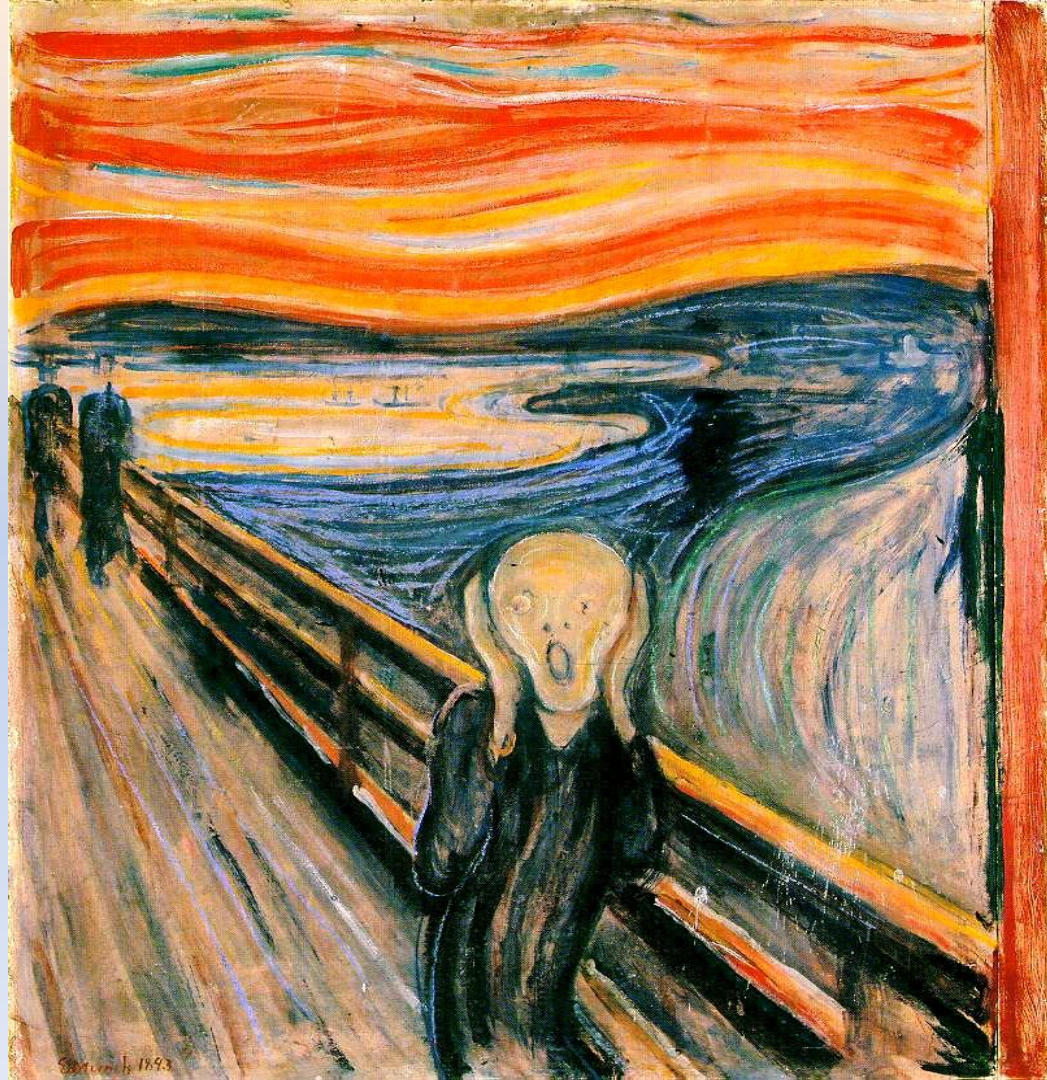
Hamadouche M et Al. J Bone Joint Surg Am 84-A, 2002

Problemi ceramica

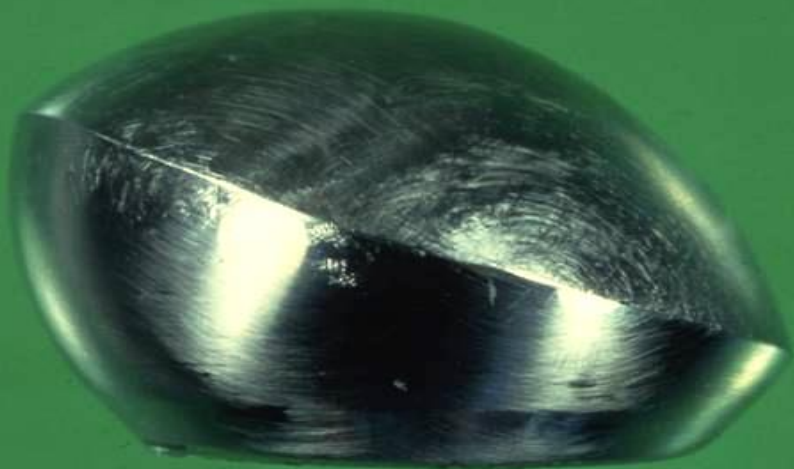
Accoppiamento in Biolox Forte® alumina

- Fragilità



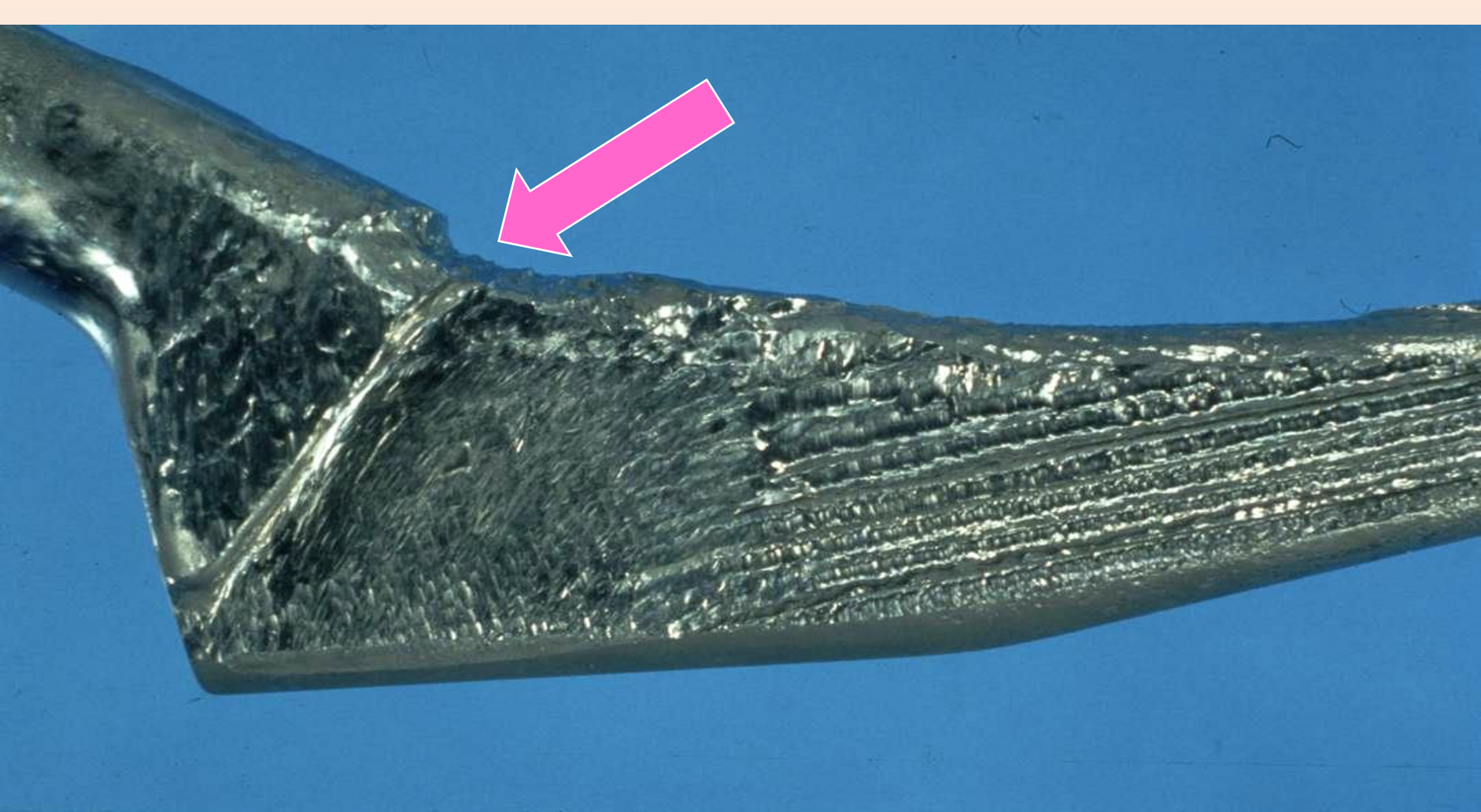


2 years in-vivo



Alumina
particles







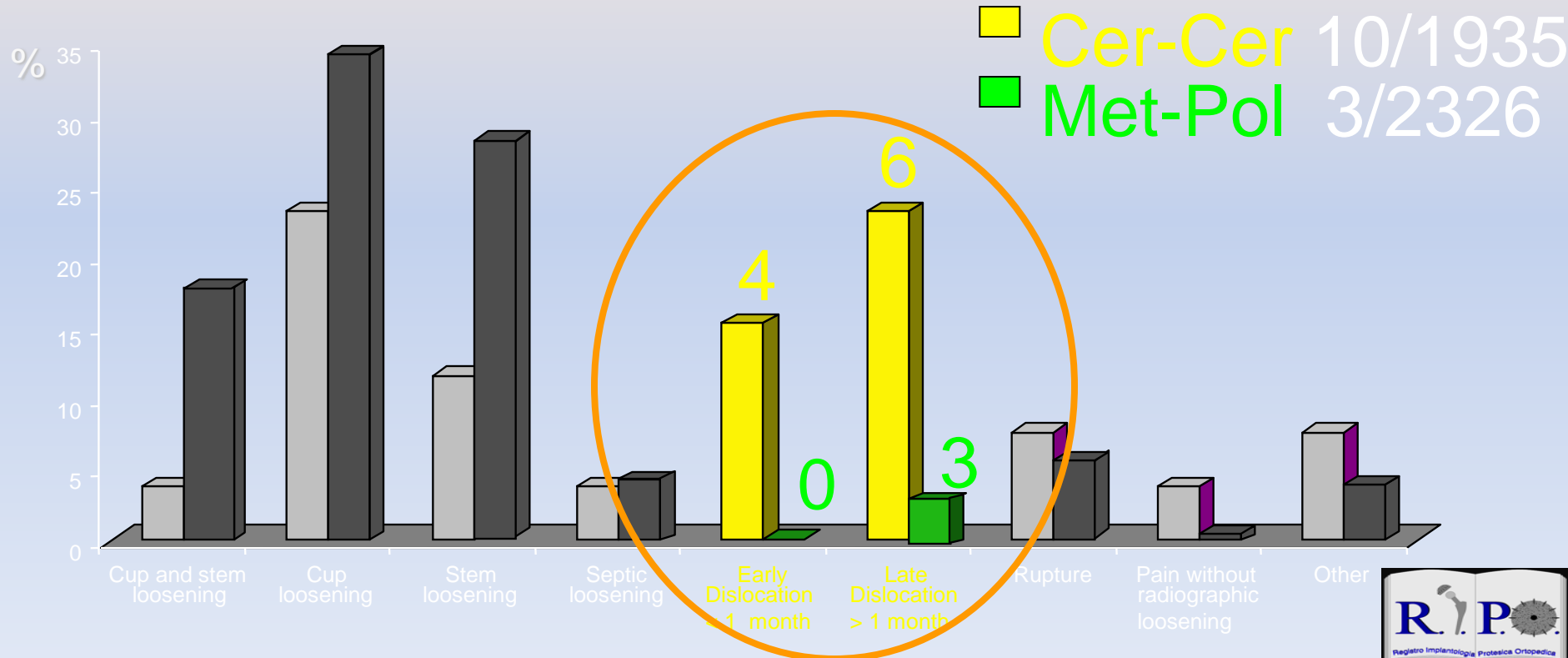
500 μm



Problemi ceramica

- Fragilità
- Lussazioni

Reimpianti per lussazione ricorrente



ReVisioni per lussazioni ricorrenti

Le lussazioni ricorrenti
hanno portato a
reintervento solo quando
è stata impiegata una

Revisioni per lussazioni ricorrenti

Testina da 28 mm

Cer-cer

Met-pol

Lussazioni < 60 gg

0.2% (4)

-

Lussazioni > 60 gg

0.3% (6*)

0.13% (3)

0.5% P < 0.05 0.13%

Fisher's exact test

*

Tra 1 aa e 5.4 aa

Prerequisiti per un basso tasso di complicazione dei componenti BIOLOX®

- Max inclinazione 45° e antiversione 10° -15°
- Cono in accordo con la testina (12/14 – 14/16.....)
- Utilizzare la teste e l' inserto di prova

Con la colla si applica la testina sulla testa e si inserisce l'inserto di prova.

BIOLOX[®] forte è la risposta alle applicazioni standard ma non può soddisfare richieste particolari (22mm, collo XL, inserti più fini, ginocchio etc...)

Vantaggi e limiti dell'allumina

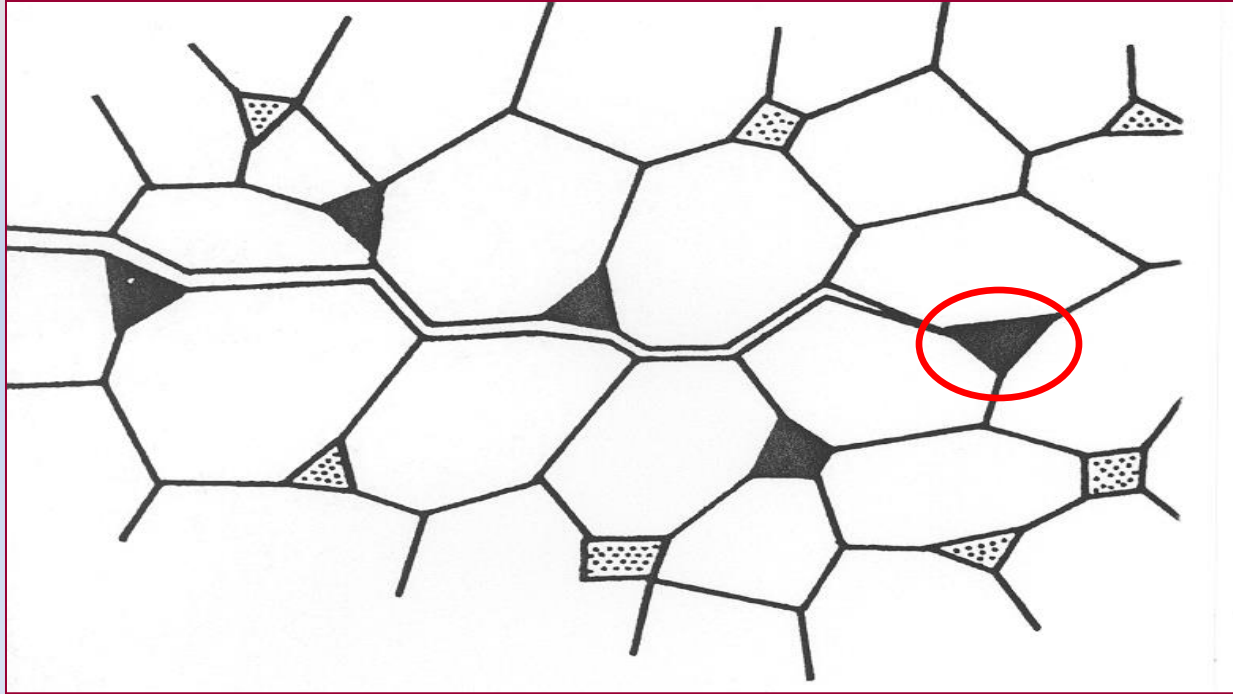
- Resistente ai graffi
- Usura ridotta
- Resistente alla corrosione
- Eccellente biocompatibilità
- Stabilità a lungo termine

- Innalzare la tenacità
- Minimizzare la probabilità di frattura
- Conservare l'eccellente resistenza all'usura
- Conservare la biocompatibilità
- Permettere più flessibilità nelle forme

- Proprietà meccaniche
- Limiti di forma
 - Testine
 - Inserti
- Applicazioni
 - da 28 mm
 - S, M, L

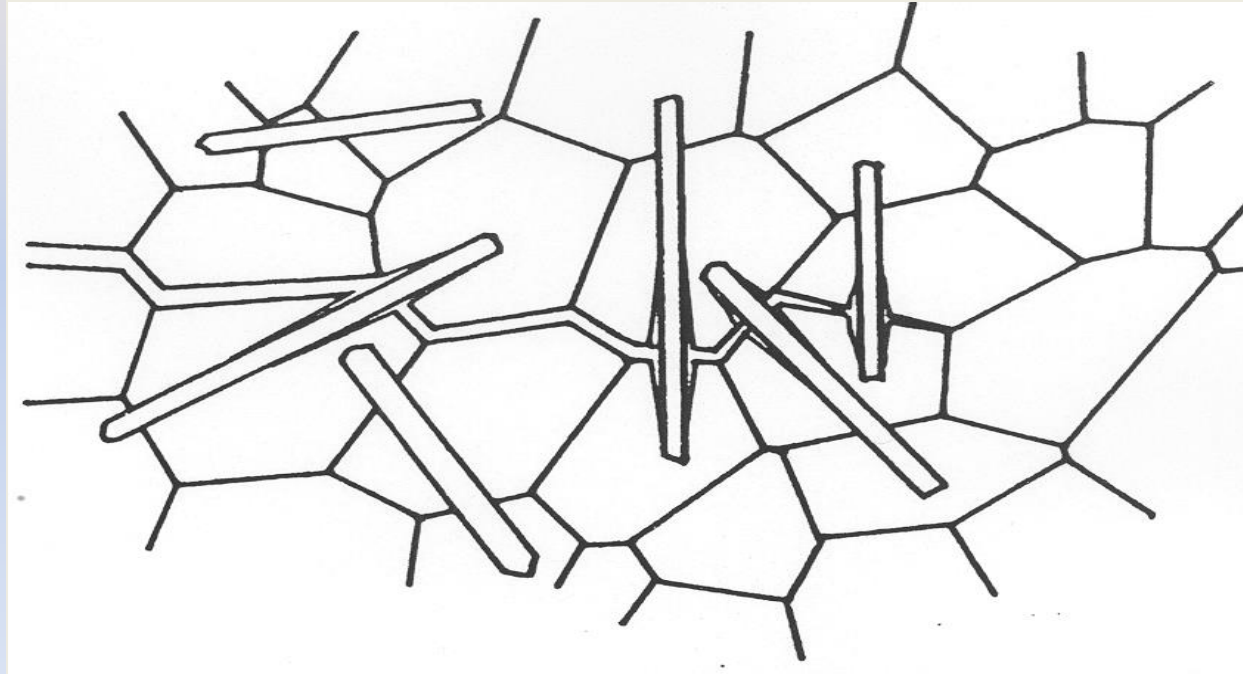
RINFORZO

1° - Trasformazione di fase (ZTA)



RINFORZO

2° - Deflessione delle cricche (w-SiC)

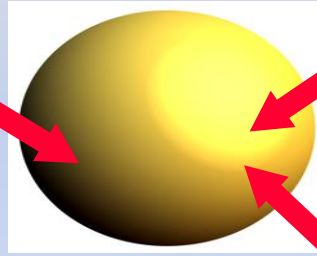


Biolox[®] delta – *effetti delle fasi*

Particelle di Y-TZP Coated
(per innalzare la resistenza alla frattura
tramite il meccanismo della trasformazione)



Ossido di Cromo (Cr_2O_3)
(per equilibrare la diminuzione di
durezza superficiale introdotta
dalla Y-TZP)



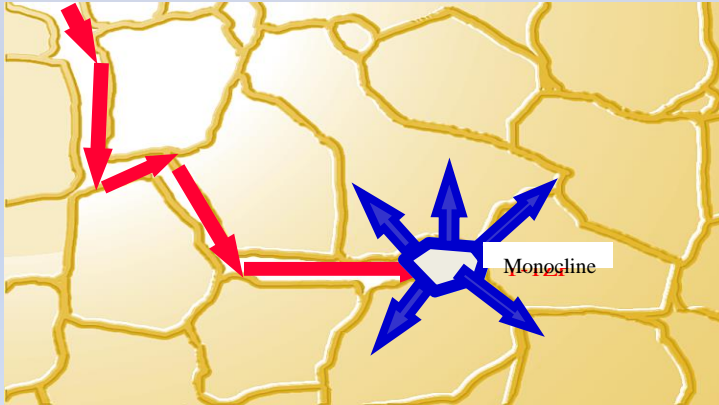
Matrice dell'Allumina

Ossido di Stronzio (SrO_2)
L'aggiunta di esso porta alla formazione,
durante la sinterizzazione, di particelle
allungate ($\text{SrAl}_{12-x}\text{Cr}_x\text{O}_{19}$) fondamentali per
il meccanismo del rinforzo.

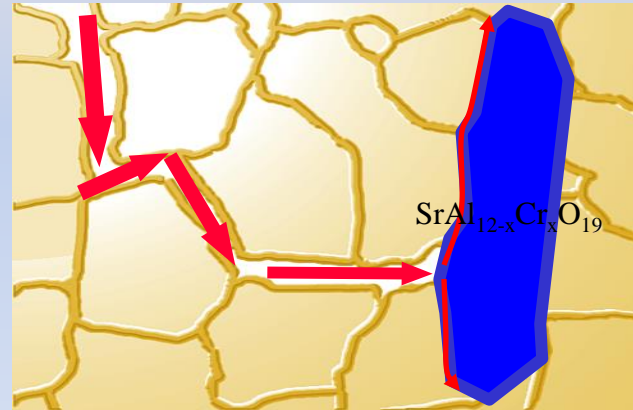


Biolox[®] *delta* — Meccanismi di rinforzo

Trasformazione



Deflessione

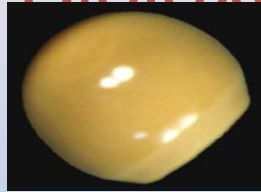


Fragilità: rotture della ceramica

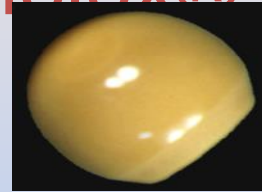
	Bilox® 32	Bilox® 28	Bilox® Forte 28
Casi	674	200	1735
Fratture	0	3	0
%	0	1.5%	0
Resistenza meccanica	<500MPa Non in questa serie	<500MPa	580MPa

Problemi ceramica

Biolox®



Biolox® Fort



Biolox® Delta



Casi

200

1276

Rischio

Fratture

3

0

frattura
ulteriormente
ridotto

%

1.5%

0

Resistenza
meccanica

<500MPa

580MPa

>1000MPa

Problemi ceramica

Reimpianto di protesi per lussazione ricorrente



Biolox®*delta*

La possibilità di sostituire il collo
modulare permette di reimpiantare
protesi lussate mantenendo
l'accoppiamento ceramica-
ceramica

GRAZIE



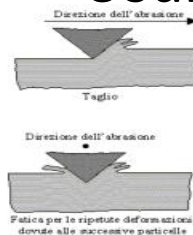
Adverse reaction to implant material

Accoppiamento (MoM, MoP, Ce-Ce)

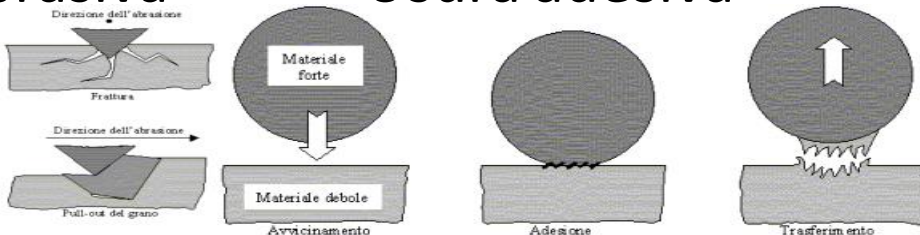
**Allergies. Could Infection be
Misdiagnosed?**

Reazioni avverse agli accoppiamenti articolari

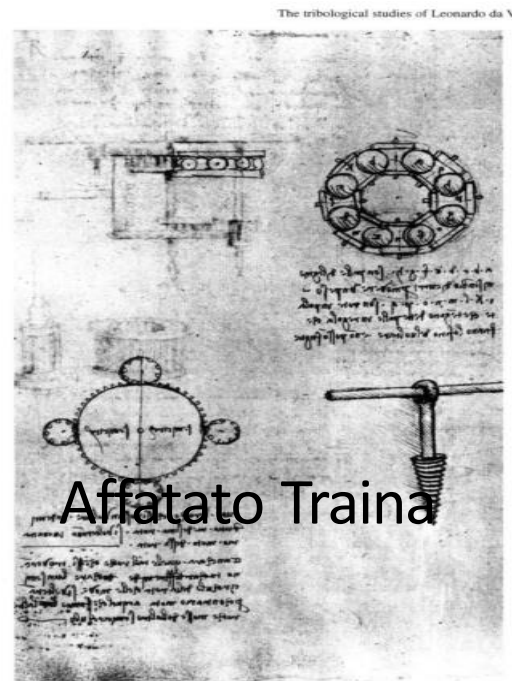
Usura abrasiva



Usura adesiva

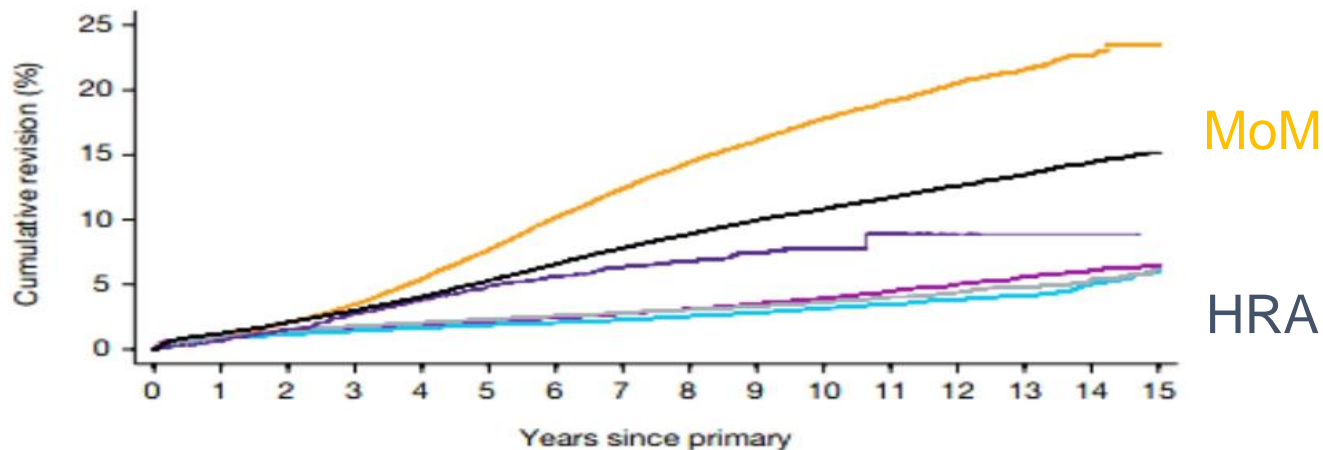


USURA



Sopravvivenza per accoppiamento

Figure 3.7 KM estimates of cumulative revision in uncemented primary hip replacements by bearing.



Number at risk

MoP	161,460	143,595	126,532	109,560	93,126	77,187	62,579	48,684	37,093	26,861	16,625	12,109	7,542	4,242	1,811	446
MoM	29,066	28,467	27,894	27,127	26,165	25,078	23,909	22,747	21,392	18,689	14,092	8,703	4,451	1,882	516	101
CoP	80,258	77,188	63,189	50,999	40,469	31,955	25,209	19,578	15,219	11,566	8,726	6,495	4,508	2,861	1,415	466
CoC	125,267	117,830	109,562	99,596	88,679	75,935	62,675	48,047	34,359	22,729	14,551	8,805	5,132	2,716	1,278	356
CoM	2,119	2,092	2,056	2,010	1,961	1,907	1,847	1,786	1,442	790	269	42	6	1	1	0
Resurfacing	39,246	38,120	37,096	35,950	34,651	33,268	31,869	30,273	28,022	25,128	21,518	15,971	10,835	6,665	3,349	1,102

Prebblema con accoppiamenti in metallo

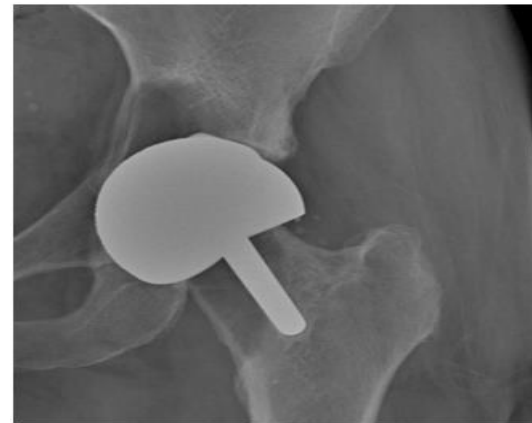
Int J Artif Organs 2011; 34 (12): 1155-1164

DOI: 10.5301/ijao.5000065

ORIGINAL ARTICLE

Wear of metal-on-metal hip bearings: metallurgical considerations after hip simulator studies

Saverio Affatato¹, Francesco Traina^{1,2}, Oddone Ruggeri³, Aldo Toni^{1,2}



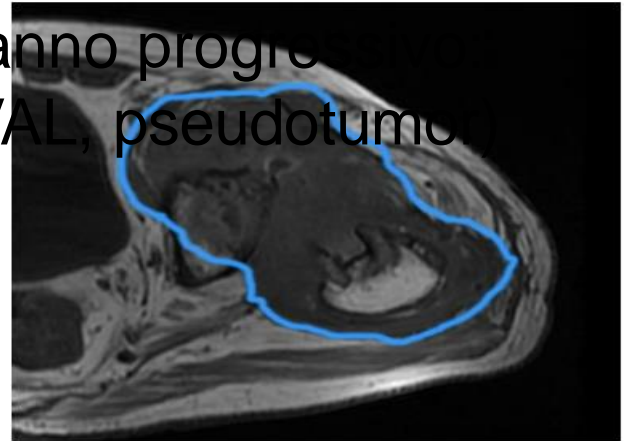
Elevato rischio di usura per leghe di metallo impiegate in chirurgia protesica di

Fallimenti MoM

Si accompagnano a danni del bone stock...

...e a danni dei tessuti molli...

(spettro di danno progressivo: osteolisi, ALVAL, pseudotumore)



Fallimenti MoM

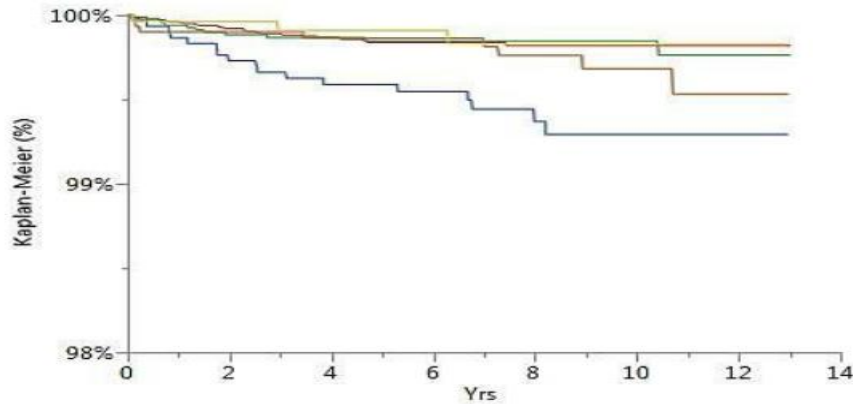
International Orthopaedics (2019) 43:103–109
<https://doi.org/10.1007/s00264-018-4097-2>

ORIGINAL PAPER



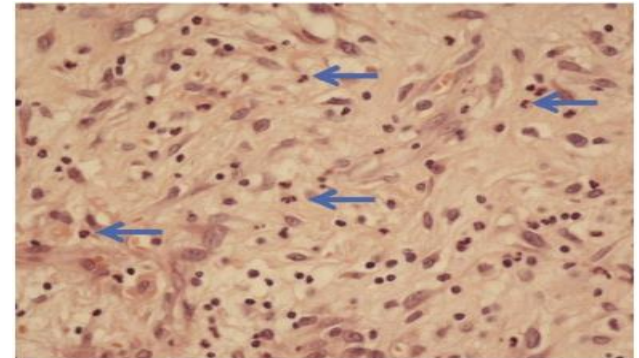
**The influence of bearing surfaces on periprosthetic hip infections:
analysis of thirty nine thousand, two hundred and six cementless total
hip arthroplasties**

Barbara Bordini¹ · Susanna Stea² · Francesco Castagnini² · Luca Busanelli² · Federico Giardina² · Aldo Toni^{1,2}



Altri
MOM

39.000 pazienti del RIPO



Fallimenti MoM

Systemic toxicity related to metal hip prostheses

S. M. Bradberry, J. M. Wilkinson & R. E. Ferner

To cite this article: S. M. Bradberry, J. M. Wilkinson & R. E. Ferner (2014) Systemic toxicity related to metal hip prostheses, Clinical Toxicology, 52:8, 837-847, DOI: [10.3109/15563650.2014.944977](https://doi.org/10.3109/15563650.2014.944977)

To link to this article: <https://doi.org/10.3109/15563650.2014.944977>

Tossicità generale da ioni metallo

- Compare raramente
- È legata ai livelli di cobalto
- Determina danni neurosensoriali, cardiomiopatie, ipotiroidismo
- Alcuni di questi danni non regrediscono neanche dopo la

Fallimenti MoP

G.I.O.T. 2007;33(suppl. 1)

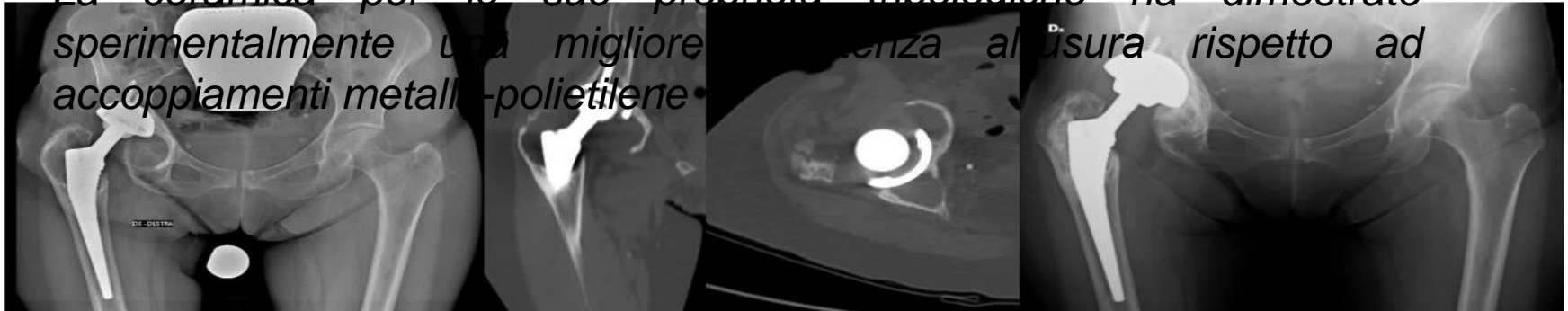
Protesi d'anca con accoppiamento articolare in ceramica

Ceramic total hip arthroplasty

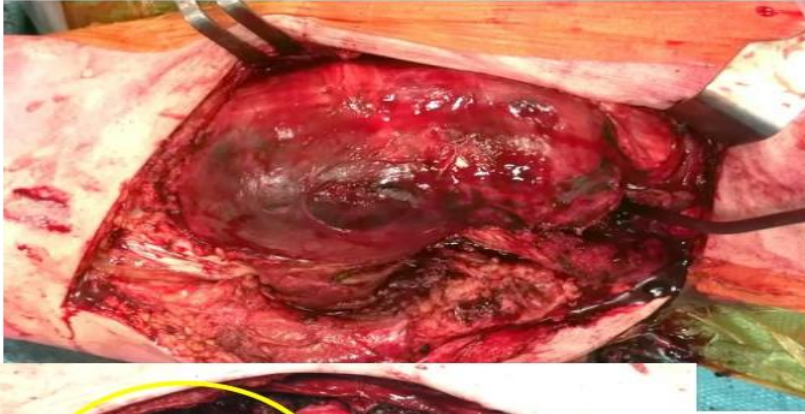
F. Traina, F. Giordano, M. De Fine, E. Tasslimari, F. Biondi, A. Galvani, S. Bordini, A. Toni

Osteolisi e severi danni al bone stock...

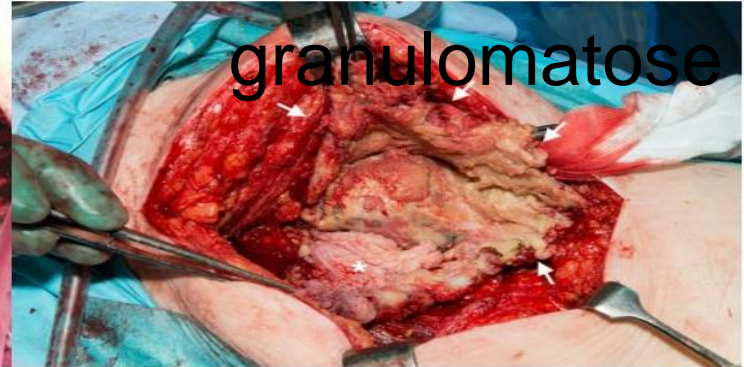
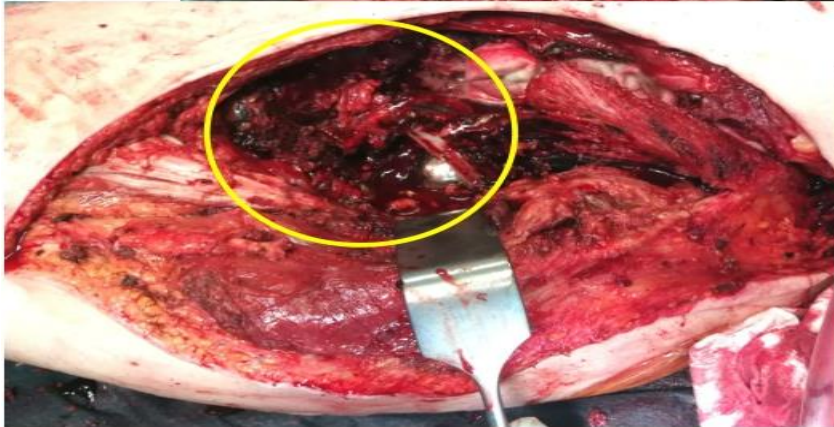
La ceramica per le sue proprietà tribologiche ha dimostrato sperimentalmente una migliore resistenza all'usura rispetto ad accoppiamenti metallo-polietilene.



Fallimenti MoP



..ma anche
severi danni ai
tessuti molli,
con ampie
reazioni



granulomatose

Fallimenti CoC

THE JOURNAL OF BONE & JOINT SURGERY
JB&JS

Early Diagnosis of Ceramic Liner Fracture. Guidelines Based On a Twelve-Year Clinical Experience

Aldo Toni, Francesco Traina, Susanna Stea, Alessandra Sudanese, Manuela Visentin, Barbara Bordini and Stefano Squarzoni
J Bone Joint Surg Am. 2006;88:55-63. doi:10.2106/JBJS.F.00587

Revisione casistica IOR:



6.805 Pazienti:

37 rumore all'anca

0.5%

0.14% *squeaking*

0.36% *clicking*

18 revisioni: 0.26%

Fallimenti CoC



Hip Int 2012; 22 (06): 607 - 614

DOI: 10.5301/HR2012.10339

ORIGINAL ARTICLE

Risk factors for ceramic liner fracture after total hip arthroplasty

Francesco Traina ^{1,2}, Marcello De Fine ¹, Barbara Bordini ², Aldo Toni ^{1,2}

Studio caso-controllo

26 COC fallite vs 49 COC clinicamente silenti.

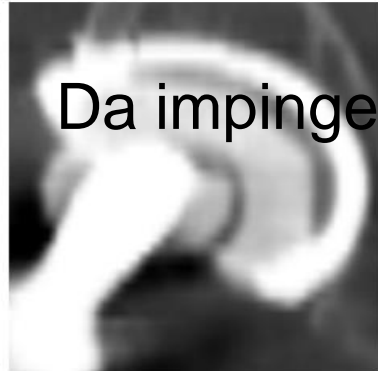
Popolazioni comparabili in termini demografici, tipo di ceramica e tipo di protesi.

L'orientamento delle componenti protesiche valutato con TC

Fallimenti CoC



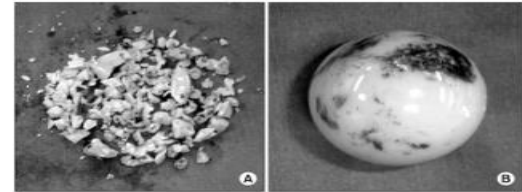
Da malposizionamento della
componente



Da impingement

Fallimenti CoC

Fallimenti catastrofici in assenza
di danno all'osso e ai tessuti molli
circostanti



*Particelle di ceramica
liberatesi in seguito al
danno della componente*

Fallimenti CoC

Is Ceramic-On-Ceramic Squeaking Phenomenon Reproducible *In Vitro*? A Long-Term Simulator Study Under Severe Conditions

S. Affatato,¹ F. Traina,^{1,2} C. Mazzega-Fabbro,^{1,2} V. Sergio,³ M. Viceconti¹

¹ Laboratorio di Tecnologia Medica, Istituto Ortopedico Rizzoli, Bologna, Italy

² Prima Divisione di Ortopedia e Traumatologia, Bologna, Italy

³ DMRN, University of Trieste, Trieste, Italy



Affatato S, Traina F et al.
J Biomed Mater Res B Appl Biomater. 2009.



Rumore in tutti i casi in cui c'era una violazione del film fluido



■ HIP

Alumina-on-alumina hip implants

A WEAR STUDY OF RETRIEVED COMPONENTS

Affatato S, Traina F et al. Int J Artif Organs. 2011

S. Affatato,
F. Traina,
M. De Fine,
S. Carmignato,
A. Toni

La microseparazione comporta usura della ceramica

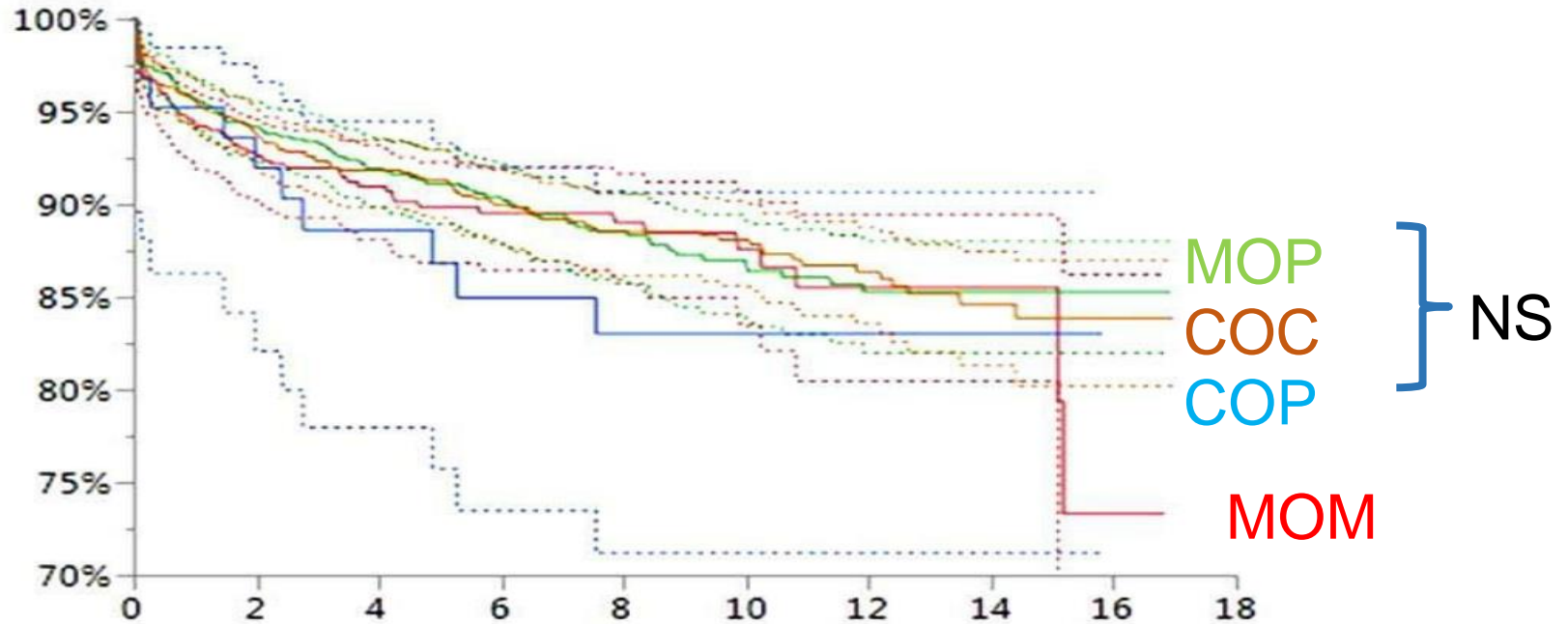
Obiettivi revisioni di tribologie fallite

Massimo risparmio di bone stock e tessuti molli
Impianto stabile e durevole (soprattutto nei giovani)

Possibili complicanze

- Lussazione
- Mobilizzazione asettica
- Infezione

Sopravvivenza delle revisioni stratificate per accoppiamenti



L'accoppiamento met-met è fallimentare a medio-lungo termine

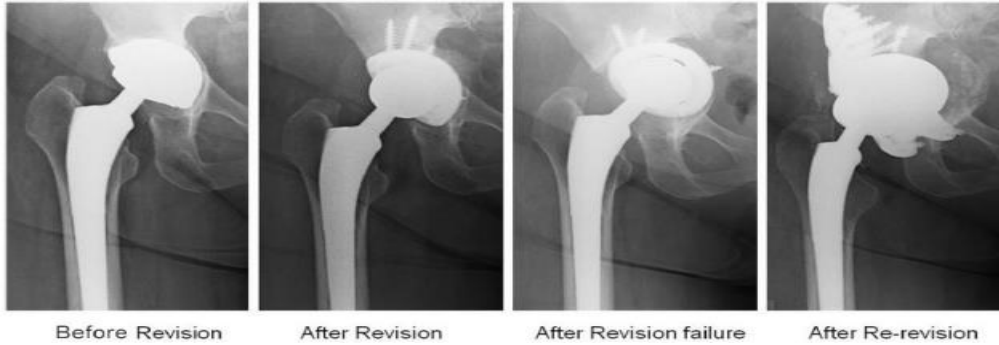
Lussazione

Causa di re-revisione più frequente dopo revisione di MoM

A	B	C	D	E	F	G	H	I	J
Grammatopoulos et al. (2009)	16 R	100% (16)	51.3 (20-71)	1.6* (0.01-6.7)	3.0* (0.8-7.2)	50% (8)	38% (6)	Dislocation ± ARMD recurrence (4) Loose cup (2)	Mean OHS 20.9
Rajpura et al. (2011)	11 R	36% (4)	53.5 (22-67)	3.8 (1.3-7.3)	1.8 (1.0-3.3)	18% (2)	18% (2)	ARMD recurrence (2)	Mean OHS 35.3
De Smet et al. (2011)	48 R	61% (NS)*	52.5 (18-71)	2.7 (0.3-8.4)	3.3* (0.3-10.1)	≤ 23% (11)*	≤ 13% (6)*	Loose cup or stem (2) Infection (2) ARMD recurrence (1)	Mean HHS 93.1*
Ebreo et al. (2011)	42 R+T	55% (23)	Median 61 (NS)	4.7* (1.3-7.8)	2.2* (1.2-4.0)	≤ 10% (4)*	≤ 2% (1)*	Infection (1)	Mean OHS 23.7*
Liddle et al. (2013)	32 R	81% (26)	57.7 (25-74)	4.3 (0.9-10.9)	Median 2.5 (1.0-4.5)*	≤ 6% (1)	≤ 6% (1)	Dislocation (1) ARMD recurrence with loose cup (1)	Median OHS 36.5*
Su and Su (2013)	13 R	85% (11)	NS	NS	2.3* (0.7-6.7)	≤ 15% (2)*	≤ 15% (2)*	Infection (2)	Mean HHS 96.4
Munro et al. (2014)	19 T	37% (NS)*	57.5 (46-76)	2.8* (0.6-4.9)	2.1* (0.8-4.0)	68% (13)	21% (3)	Dislocation and/or loose cup (3) ARMD recurrence (1) Infection (1)	Mean WOMAC (pain) 78 (function) 83 Mean HHS 93.2
Pritchett (2014)	90 R	48% (43)	49.8 (32-71)	2.8 (1.3-4.9)	5.1 (3.0-9.8)	4% (4)	3% (3)	Loose cup (1) Dislocation (2) ARMD recurrence (2)	Median OHS 39 Mean OHS 33
Matharu et al. (2014b)	46 R	72% (46)	57.8 (31-79)	5.5 (1.1-13.8)	4.5 (1.0-14.6)	20% (13)	13% (8)	Infection (1)	Mean HHS 85.1
Norris et al. (2014)	35 R	71% (25)	58.0 (30-76)	4.3 (1.5-9.6)	NS	NS	NS	Loose cup or stem (6) Dislocation (4) Infection (1)	NS
Cip et al. (2015)	20 T	47% (NS)*	49.6* (21-61)	4.6* (2.7-6.7)	2.3 (1.5-3.1)	10% (2)	5% (1)	Infection (7)	Mean HHS 85.1
Stryker et al. (2015)	58 T	65% (NS)*	60.0* (17-84)	3.9* (0.1-9.5)	1.2* (0-10.2)	20% (23)	16% (18)	Loose cup or stem (6) Dislocation (4) Dislocation (4)	NS
Lainiala et al. (2015)	49 R	60% (130)	62.1 (SD 10.1)	4.7 (SD 1.3)	2.3 (1.0-NS)	5% (11)	3% (6)	Infection (1)	Median OHS 40
van Lingen et al. (2015)	38 T	69% (NS)*	63.0* (44-75)	Median 3.7 (1.0-6.5)*	3.1* (2.1-4.7)	24% (9)	8% (3)	Dislocation (3)	Mean HOOS 61.9*
Liow et al. (2016)	25 R	36% (35)	62.0 (41-85)	5.1 (1.4-18.3)	2.5 (2.2-4.3)	14% (14)	7% (7)	ARMD recurrence (3) Dislocation (2) Loose cup (2)	Mean HSS 75.6
Matharu et al. (2017b) *	16 R	100% (16)	51.3 (20-71)	1.6* (0.01-6.7)	Median 10.3 (7-15)*	69% (11)	44% (7)	Dislocation ± ARMD recurrence (5) Loose cup (2)	Median OHS 21



Mobilizzazione asettica



Una causa di re-revisione in netta riduzione con i nuovi impianti ultraporosi

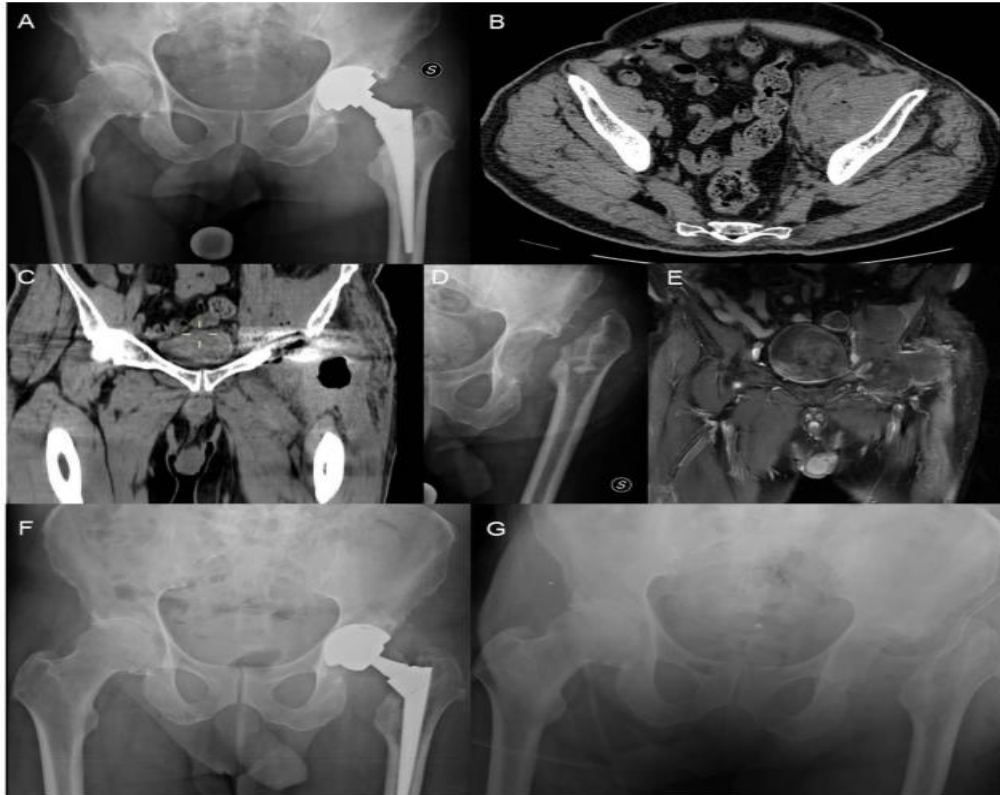
Table 2

Re-Revision Diagnosis for Failed Revision THA

Re-Revision Diagnosis (n=100)	n (%)
Instability	100 (51.7%)
Aseptic loosening	43 (20.4%)
Acetabular	19 (9.0%)
Femoral	24 (11.4%)
Peri-prosthetic fracture	24 (11.4%)
Infection	13 (6.1%)
Other	16 (7.6%)
Polyethylene wear/osteolysis	6 (2.8%)

THA, total hip arthroplasty.

Infezioni



Possibile persistenza
batterica nelle aree
necrotiche

*Paziente con protesi primaria
MoM e colpetto in CrCo:
evidenza di pseudotumor e di
infezione. Trattamento in due
tempi inefficace, con recidiva
dell'infezione*

Int J Med Sci 2012; 11(10): 1000-1005
<https://doi.org/10.1007/s00264-018-4097-2>

ORIGINAL PAPER



**The influence of bearing surfaces on periprosthetic hip infections:
analysis of thirty nine thousand, two hundred and six cementless total
hip arthroplasties**

Barbara Bordini¹ · Susanna Stea¹ · Francesco Castagnini² · Luca Busanelli² · Federico Giardina² · Aldo Toni^{1,2}

Nuovo fallimento tribologico



Revision of Ceramic Hip Replacements for Fracture of a Ceramic Component

AAOS Exhibit Selection

Francesco Traina, MD, Enrico Tassinari, MD, Marcello De Fine, MD, Barbara Bordini, BSc, and Aldo Toni, MD

Abbiamo rivalutato clinicamente e radiograficamente 40 reimpianti per rottura della ceramica: 16 testine e 24 liner.

La revisione è stata eseguita:

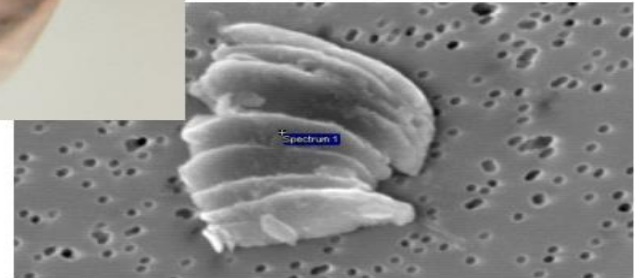
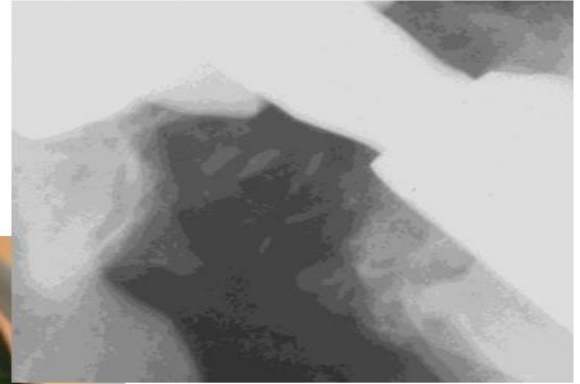
30 casi protesi COC (FU 3,3 anni, range 1-14),

2 casi protesi COP (FU 7,5 anni, range 4-11)

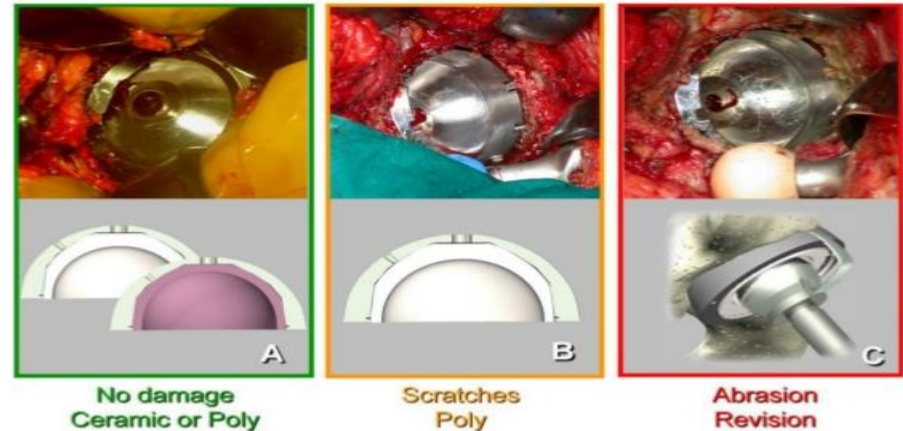
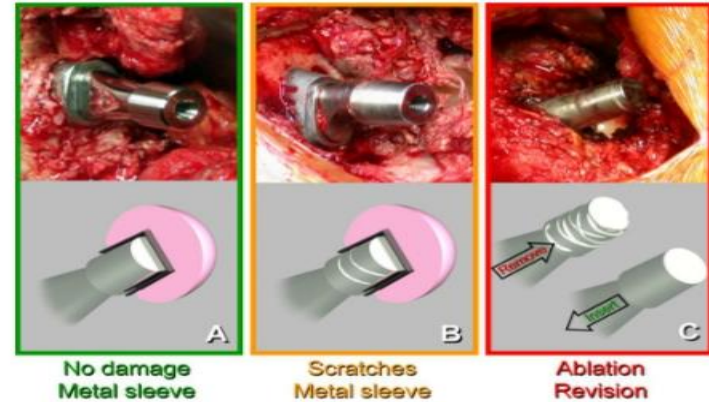
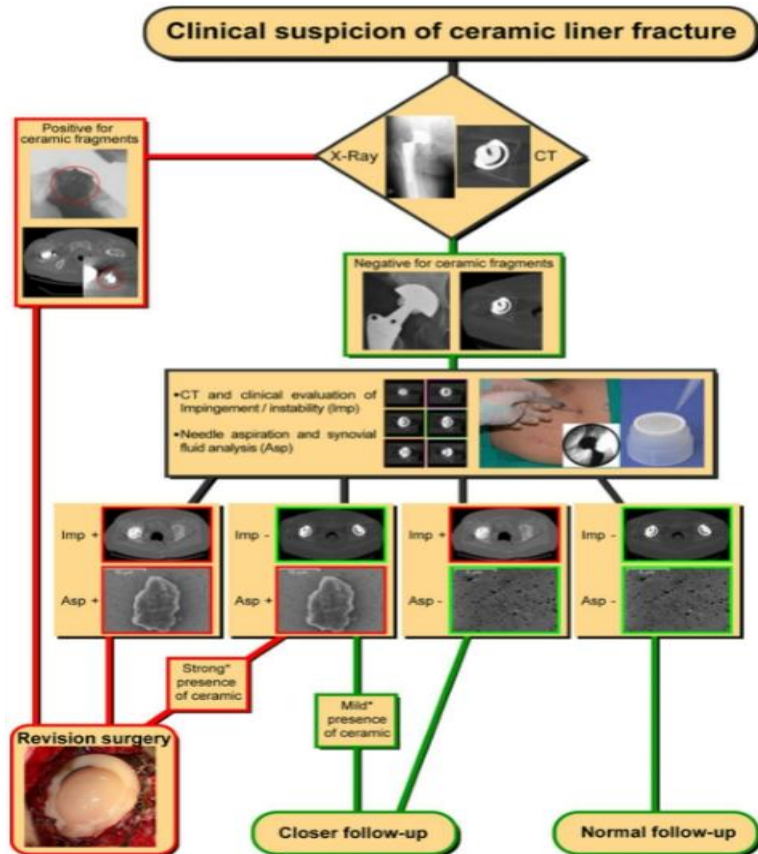
8 casi protesi MOP (FU 6.1, range 4-9)

Nuovo fallimento tribologico

Revisione di fallimento di Ce-Ce
con accoppiamento MoP: usura
da terzo corpo da residui ceramici



Come affrontare un fallimento COC



Quali possibili soluzioni tecniche

- Cotili da revisione ad alta porosità
- Accoppiamento articolare a bassa usura
- Adeguata gestione del taper
- Doppia mobilità

Cotili ad alta porosità

Original Research Article

HIP | HIP
International

Isolated acetabular revisions of Articular Surface Replacement (ASR) XL implants with highly porous titanium cups and Delta bearings

HIP International
1-8
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DOI: 10.1177/112070019874442
journals.sagepub.com/home/hip
SAGE

Francesco Castagnini¹, Federica Mariotti¹, Enrico Tassinari¹,
Barbara Bordini², Federica Zuccheri² and Francesco Traina¹

- Alto modulo di elasticità
- Ottimo scratch fit iniziale
- Migliorano l'osteointegrazione
- La produzione con tecnica EBM consente pori fino a 600 μm
- Un'alta porosità migliora la neoangiogenesi locale e la formazione di osso



Cotili ad alta porosità

Cotili da revisione convenzionali falliscono decisamente più spesso dei cotili porosi nelle revisioni MoM

- 18 ASR XL con riscontro di dolore/metallosi trattate con revisione isolata di cotile (cotile TiPor)

- A 5 anni nessun fallimento asettico



Accoppiamenti a bassa usura

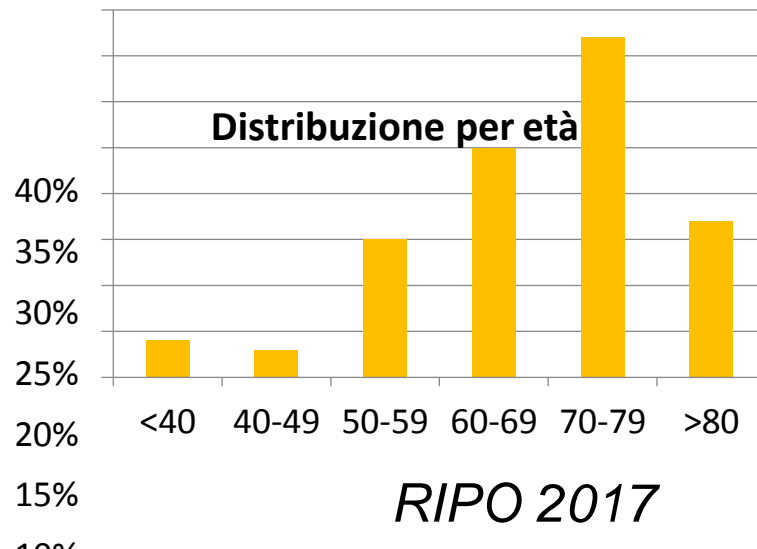
Revisioni Delta-Delta

Number of procedures per year



...e non solo per pazienti giovani...

Distribuzione per età



Ceramica Delta vs tutti gli altri

The Journal of Arthroplasty 34 (2019) 2065–2071



Contents lists available at ScienceDirect

The Journal of Arthroplasty

journal homepage: www.arthroplastyjournal.org



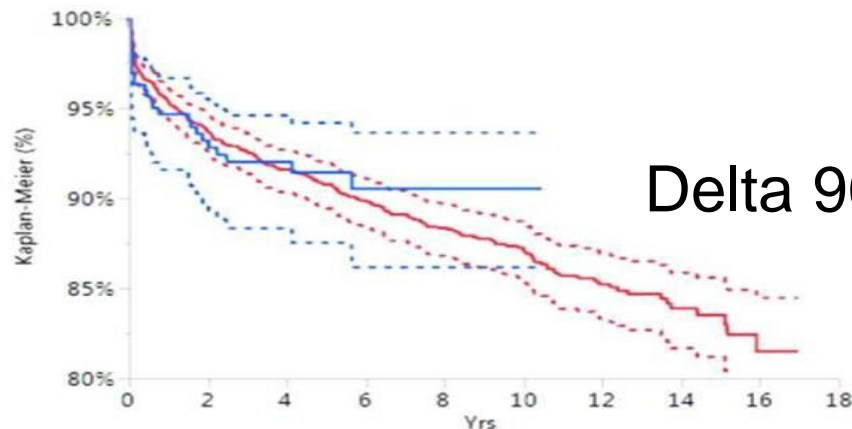
Revision Arthroplasty

Delta-on-Delta Ceramic Bearing Surfaces in Revision Hip Arthroplasty



Francesco Castagnini, MD ^{a,*}, Barbara Bordini, BS ^b, Enrico Tassinari, MD ^a,
Susanna Stea, BS ^b, Cristina Ancarani, BS ^b, Francesco Traina, MD ^a

^a Ortopedia-Traumatologia e Chirurgia protesica e dei reimplanti d'anca e di ginocchio, IRCCS Istituto Ortopedico Rizzoli, Bologna, Italy
^b Laboratorio di Tecnologia Medica, IRCCS Istituto Ortopedico Rizzoli, Bologna, Italy



Delta 90.5%

Altri 87.1%

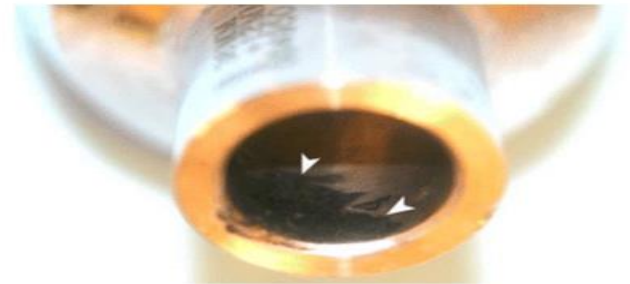
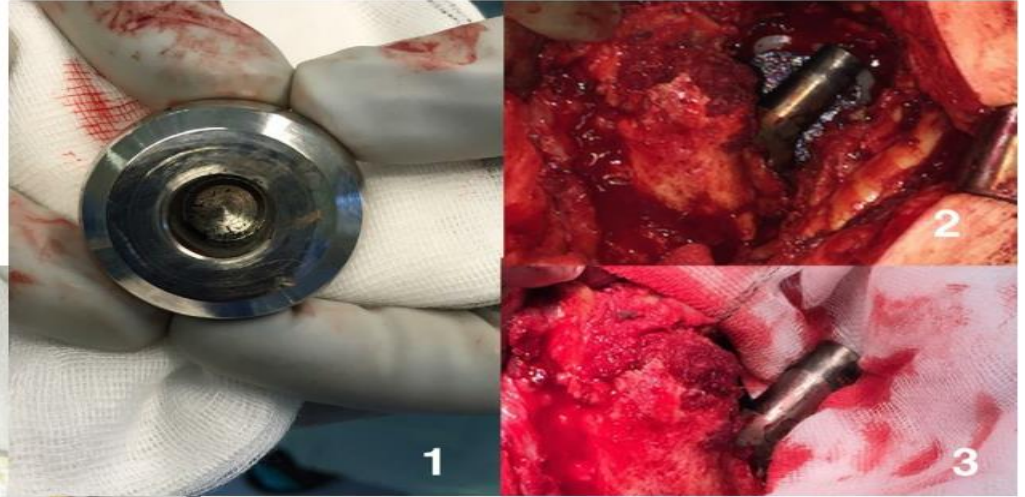
Migliore sopravvivenza
degli accoppiamenti Delta-
Delta nel medio-termine
(non superiorità statistica)
termine (ancora da
Vantaggio potenziale
importantemente
sul lungo

Ceramica Delta vs tutti gli altri

	DELTA DELTA			ALTRE REVISIONI		
Cause di re-revisione	Incidenza (327 rev)	Percentuale (%)	Distribuzione dei fallimenti (%)	Incidenza (327 rev)	Percentuale (%)	Distribuzione dei fallimenti (%)
Lussazioni	9	2.8	34.6	50	2.1	18.7
Mobilizzazione asettica coppa	5	1.5	19.2	52	2.2	19.5
Mobilizzazione settica	4	1.2	15.4	37	1.6	13.9
Frattura periprotetica	2	0.6	7.7	15	0.6	5.6
Mobilizzazione asettica stelo	1	0.3	3.8	45	1.9	16.9
Mobilizzazione asettica globale	1	0.3	3.8	23	1	8.6
Dolore senza mobilizzazione	1	0.3	3.8	3	0.1	1.1
Altre	2	0.6	7.7	13	0.6	4.9
Sconosciuta	1	0.3	3.8	29	1.2	10.9
TOTALE	26	8	100	267	11.5	100

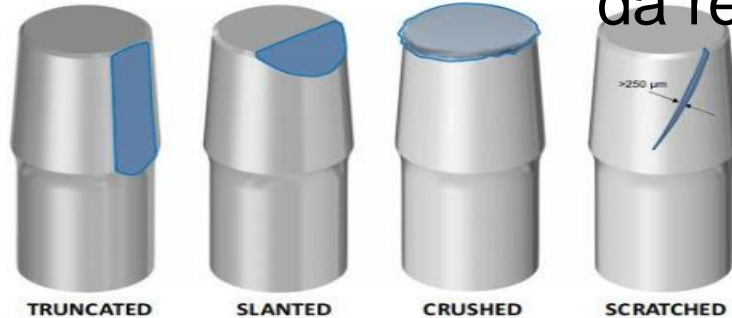
Gestione del taper

Una grave usura del taper
può compromettere la
giunzione modulare con la
testina



Gestione del taper

Rischio di reazioni tissutali avverse e rottura della testina da revisione

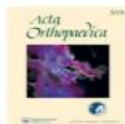


4 tipi di danno che secondo le case produttrici richiederebbero la revisione dello stelo



Si raccomanda l'utilizzo di sleeve per

Gestione del taper



Acta Orthopaedica



ISSN: 1745-3674 (Print) 1745-3682 (Online) journal homepage: <https://www.tandfonline.com/loi/fori20>

Registry study on failure incidence in 1,127 revised hip implants with stem trunnion re-use after 10 years of follow-up: limited influence of an adapter sleeve

Saverio Affatato, Monica Cosentino, Francesco Castagnini & Barbara Bordini

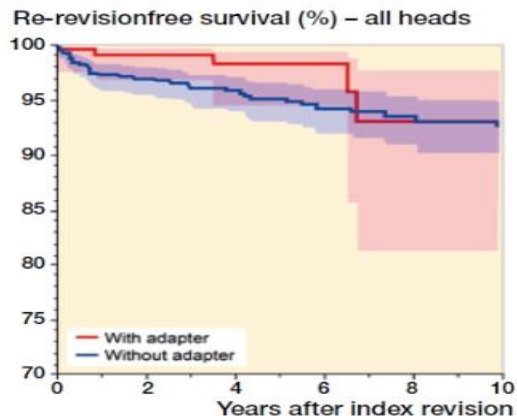


Figure 1. Kaplan–Meier survival rates of the 2 cohorts (with and without adapters).

At risk	Years after index revision				
	0	1	3	5	7
Adapter	296	227	137	79	30
No adapter	831	688	515	371	248

Attualmente non esistono evidenze che l'utilizzo di sleeve migliori la sopravvivenza a lungo termine delle revisioni

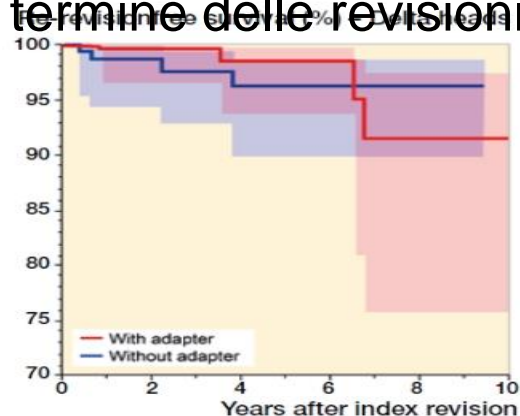


Figure 2. Kaplan–Meier survival rates of the 2 cohorts (with and without adapters) involving only the Delta head.

At risk	Years after index revision				
	0	1	3	5	7
Adapter	268	204	121	66	22
No adapter	160	127	89	45	20

Doppia mobilità



Un'ottima soluzione per ridurre
le lussazioni negli impianti da
revisione

La doppia mobilità riduce

Faldini et al. J Orthop Traumatol (2018) 19:17
<https://doi.org/10.1186/s10195-018-0510-2>

Journal of Orthopaedics
and Traumatology

REVIEW ARTICLE

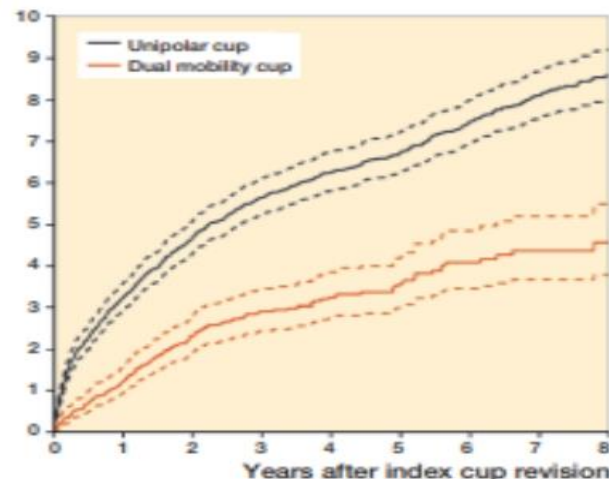
Open Access



How to prevent dislocation after revision total hip arthroplasty: a systematic review of the risk factors and a focus on treatment options

C. Faldini^{1*}, N. Stefanini¹, D. Fenga², E. M. Neonakis³, F. Perna¹, A. Mazzotti¹, F. Pilla¹, I. K. Triantafyllopoulos⁴ and F. Traina²

Cumulative cup re-revision rate (%)



Doppia mobilità



Basic Science

Damage Assessment of Retrieved Birmingham Monoblock Cups: Is Conversion to Dual-Mobility Head a Viable Revision Option?



Trevor C. Gascoyne, MSc, PEng^a, Brent A. Lanting, MD, FRCSC^b, Kieran J. Derksen^c,
Matthew G. Teeter, PhD^b, Thomas R. Turgeon, MD, MPH, FRCSC^{d,e,*}

Può essere una valida alternativa nei casi di lesione estesa dei tessuti molli conseguente a MoM, con l'obiettivo di conservare il cotile e risparmiare bone stock
Occorre valutare 2 fattori:

Doppia mobilità

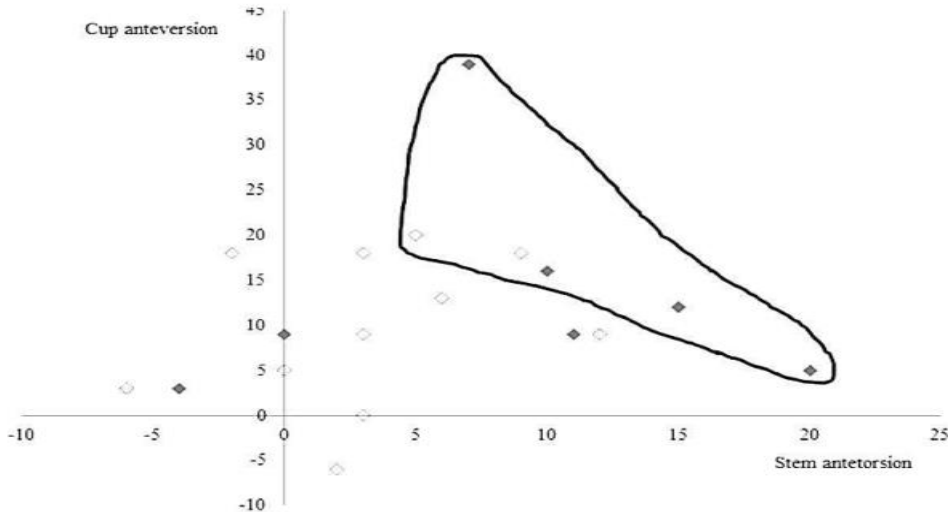
Original Research Article

Isolated acetabular revisions of Articular Surface Replacement (ASR) XL implants with highly porous titanium cups and Delta bearings

Francesco Castagnini¹, Federica Mariotti¹, Enrico Tassinari¹, Barbara Bordini², Federica Zuccheri² and Francesco Traina¹

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International

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1-8
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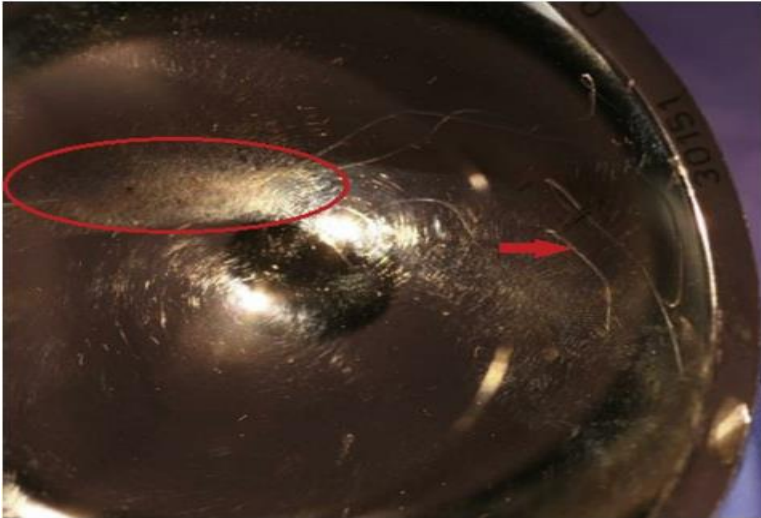


18 ASR XL revisionate per dolore o ALTR

Solo il 33% rientra nel normale range di antiversione combinata (25-50°)

Un ulteriore terzo ha un'inclinazione del cotile maggiore di 45° (losanghe bianche)

Doppia mobilità



Usura

Il 20% degli impianti ha delle asperità di superficie tali da accelerare del 10-20% l'usura di una doppia mobilità

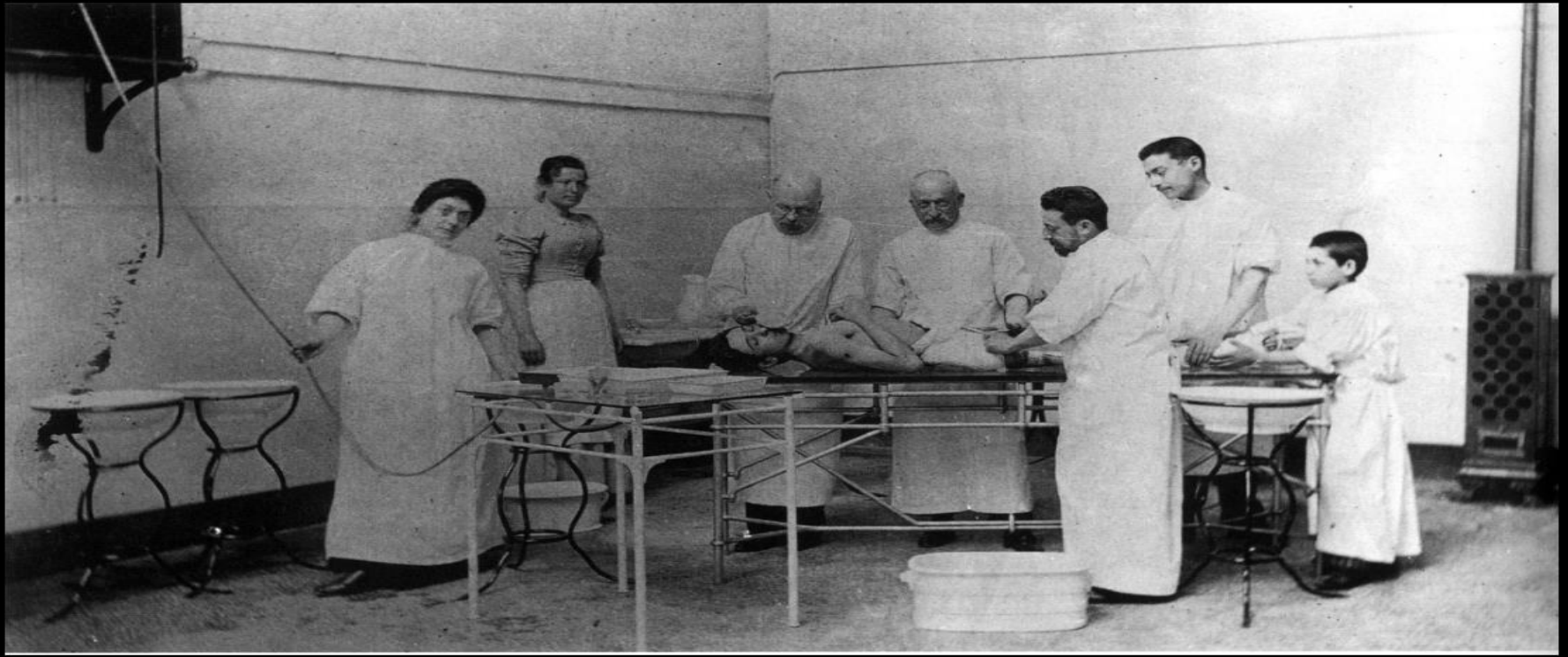
Doppia mobilità

Revisioni di HRA con doppia mobilità (senza revisione di cotile) danno buoni risultati (re-revisioni a 4 anni: 7.4% vs 9.1%). Fallimenti con grave usura in pazienti attivi e con malposizionamento delle componenti



Conclusioni

- Gli effetti avversi da accoppiamento articolare compromettono severamente il setting di una revisione (bone stock, tessuti molli) ed influenzano le scelte tecniche nella revisione
- In questi casi, cotili ultraporosi e accoppiamenti di lunga durata sono valide opzioni a medio termine
- La doppia mobilità sembra migliorare nettamente i



Rizzoli, 1896
Primo intervento di chirurgia ortopedica

DAPRI: INDICAZIONE, TECNICA E RISULTATI

Pier Francesco Indelli, MD, PhD
Ass. Professor Adult Reconstruction
Department of Orthopaedic Surgery
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Stanford
MEDICINE





- SIdA "guest nation" al 2018 Annual Meeting della American Association Hip and Knee Surgeons



LIFE ON MARS? Life may exist on Mars in the form of 'tough bacteria', scientists claim

Tests suggest rare salts below the Red Planet's -55C surface keep water from freezing

TYPES OF BACTERIA FOUND ON *CURIOSITY*

Gracilibacillus

These organisms may eat perchlorates—salts used in rocket fuel that also occur naturally in Martian soil—for breakfast. Enough said.

Pseudomonas

Humans can go a few days without water; these bacteria can last weeks. Some species have been found to be resistant to antibiotics such as penicillin.

Staphylococcus

Beyond occupying open wounds, colonies of staph can thrive in water more than six times saltier than Earth's oceans.

Moraxella

These bacteria often infect sinuses and lungs. Half the *Curiosity* sample emerged intact from an hour-long bath in hydrogen peroxide.

Streptomyces

Strep colonies (not the ones that cause strep throat) can grow in the soil.

**THE
Sun**

Periprosthetic Joint Infections (PJI)



- Diagnosis
- Prevention



Treatment

Management Periprosthetic Infections

- Debridement, antibiotic pearls and retention of implant (DAPRI)
- Single Stage Revision



I&D with retention of implants (DAIR)

- Approximately 2/3's will fail this form of treatment
- Acute infections → best chance of cure
- Streptococcal infections → up to 65% success rate
- Staph infections = predictor of failure
- MRSA infections have approximately 80% failure rate

Fehring TK et al CORR 471 2013

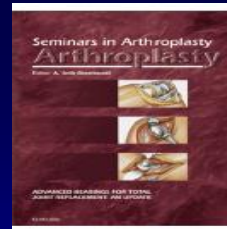
SEMPLICE SINOVIECTOMIA E
LAVAGGIO ALTAMENTE INEFFICACE

Debridement, antibiotics and implant retention in management of infected total knee arthroplasty: A systematic review

S Horriat^{a,*}, S Ayyad^a, RR Thakrar^b, and FS Haddad^a

^aUniversity College London Hospital NHS Foundation Trust, United Kingdom

^bHampshire Hospitals NHS Foundation Trust, United Kingdom



2018



SEMINARS IN ARTHROPLASTY 29 (2018) 244–249

- 19 articles
- 2 Years minimum FU
- 835 patients
- Success rate: 65.9 %

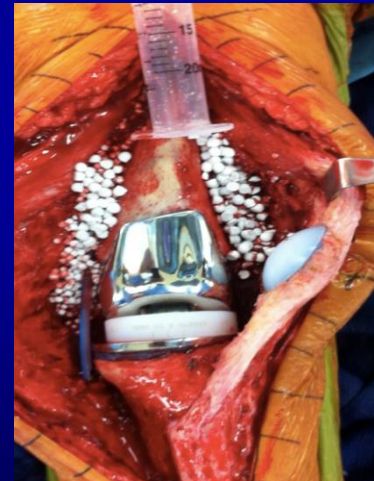
Study	Year	No. of patients included in review (knees)	Mean F/U in years	Organisms	No. of reinfection percentage	Level of evidence
Duque et al. [1]	2016	67	4	SA 24, MRSA 5, strep 4, entro 3, psuedo 3	21(31%)	IV R
He et al. [33]	2016	11	5	SA 1, CNS 1, Strep 7	2(18%)	IV R
Holmberg et al. [35]	2015	129	3	SA 53, CNS 33, Strep 7, poly mic 30	29(22.4%)	IV R
Font-Vizcarra et al. [31]	2012	35	7	GP 14, GN 21	6(17%)	III
Bradbury et al. [28]	2009	19	4	MRSA	16(84%)	IV R
Zhang et al. [34]	2017	35 (25 P - 10 R)	4	SA 14, MRSA 4, CNS 5	24(14 P- 10R)(68%)	IV R
Chung et al. [38]	2014	16 Arthroscopic	3	SA 4, SBH 5, MH 2, MRSA 1, CNS 1	6(37.5%)	IV R
Kim et al. [54]	2015	28	4	MRS 11, Neg cult. 8, SA 2, other staph 3	11(39%)	IV R
Kim et al. [55]	2015	101	9	SA 30, CNS 26, Gram neg 38, strep 14	44(44%)	IV R
Klare et al. [36]	2018	99	2	Staph 32, Strep 19, MRSA 11	35(35%)	IV R
Koh et al. [56]	2015	52	3	SA 11, CNS 19, MRS 19, Strep 7	15(28.8%)	IV R
Konigsberg et al. [32]	2014	22	2	Staphylococcus	5(22.7%)	IV R
Matsumoto et al. [43]	2015	50	4	SA 25, CAN 10, Strep 4	22(44%)	IV R
Parvizi et al. [30]	2009	11	2	MRSA, MRSE, PA, Proteus, Entrobacter	6(54%)	IV
Siddiqui et al. [29]	2013	12	2	MRSA	8(66%)	IV R
Son et al. [37]	2017	25	3	Neg Growth 12, SA 2 MRSE 2, MRSA 1, Strep 5	3(12%)	IV R
Stryker [57]	2013	72	4	SA 12, CNS 7, Strep 7	20(27%)	IV R
Vilchez et al. [31]	2011	35	2	SA	11(31%)	IV P
Wang et al. [27]	2015	16	5	MRSA 6, SA 4, CNS 3	0	IV P

In highly selected series of patients DAIR with less morbidity can have a plausible



Debridement + Antibiotic Pearls + Retention of Implants (DAPRI)

- Only in acute postoperative (4-6 weeks from surgery) or acute hematogenous (1 week)
- Known Bacteria (Antibiogram from Culture)



Indelli PF, Calanna F, Risitano S, Indelli PF et al.: ISAKOS 2019

Calanna F, Risitano S, Indelli PF et al.: J Orthopaed Surg 2019



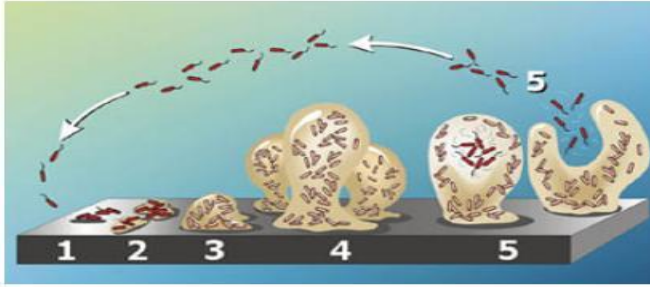
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Orthopaedic Surgery

Biofilm

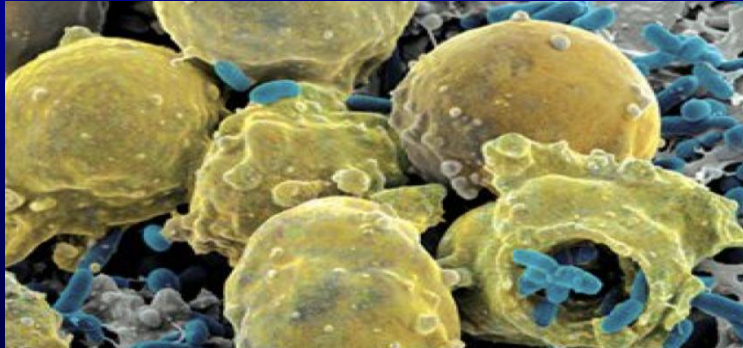
Biofilm Growth Characteristics

- **Stage 1:** Attachment (initial adhesion) of bacteria to a surface.
- **Stage 2:** Aggregation and irreversible binding (not removable by gentle washing).
- **Stage 3:** Layering of bacterial aggregates (maturation).
- **Stage 4:** Reaching ultimate thickness ($>100\text{ }\mu\text{m}$).
- **Stage 5:** Cell dispersion (streamer formation, dispersion). Persister cells remain in core of biofilm matrix.



Coating of
exopolysacchari
de protecting
from

©CACMLE 2012



Time	Abundance of Biofilms	Morphological Description
0 min	-	
30 min	-	
1 hr	+	coccoid shaped cells
2 hrs	+	coccoid and rod shaped cells
16 hrs	++	coccoid and rod shaped cells
72 hrs	++	coccoid and rod shaped cells

DAPRI: Surgical Debridement

- Real open exploration
- 5 specimens for Culture/Sensitivity
- Intra-op WBC Cell Count
- Tumor-like Debridement: Methylene Blue
- Argon Beam treatment + Scrubbing brush
- Calcium sulphate antibiotic added beads
- Irrigation with 9 L high-volume warm saline
(a. Bacitracin; b. Clorexidine; c. Betadine)



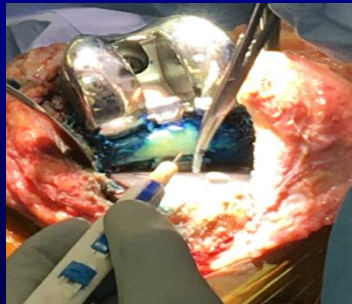
Tumor-like Debridement

- Aggressive synovectomy and posterior capsulotomy

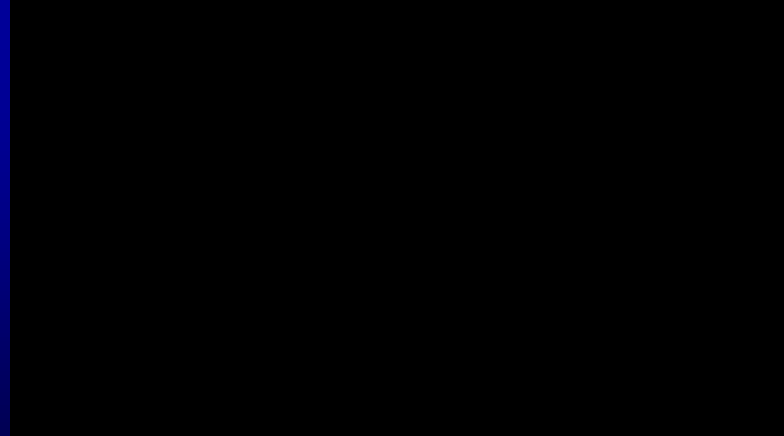
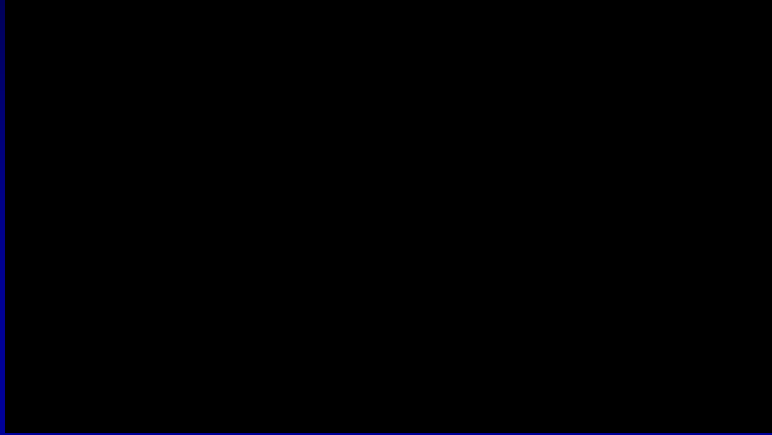


40 cc Saline

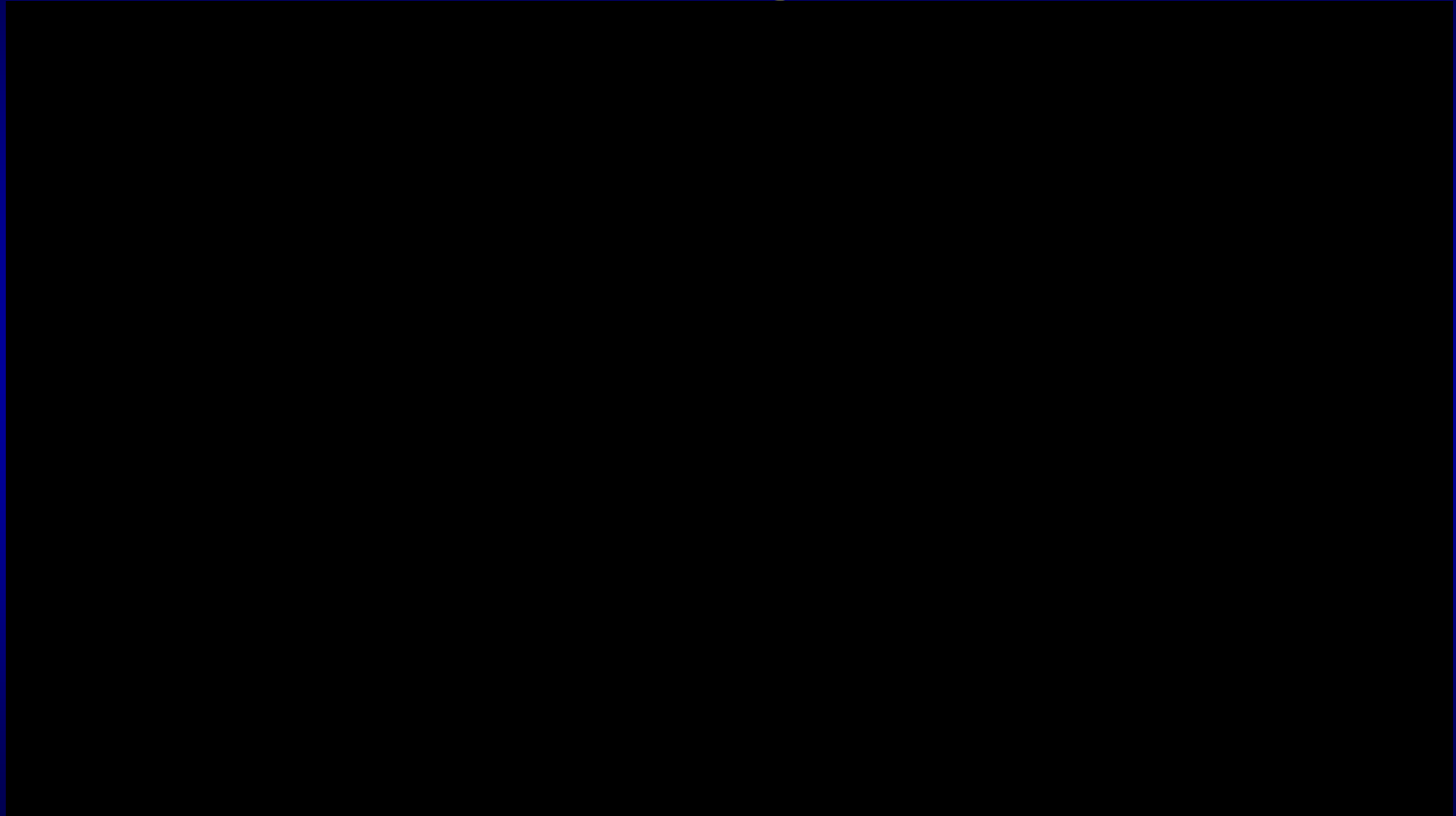
10 cc 0.5% MB



Argon Beam



Scrubbing brush

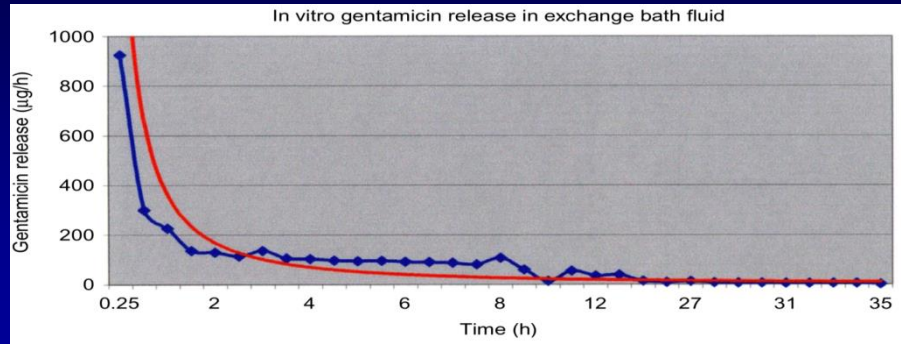


Antibiotic Added Beads

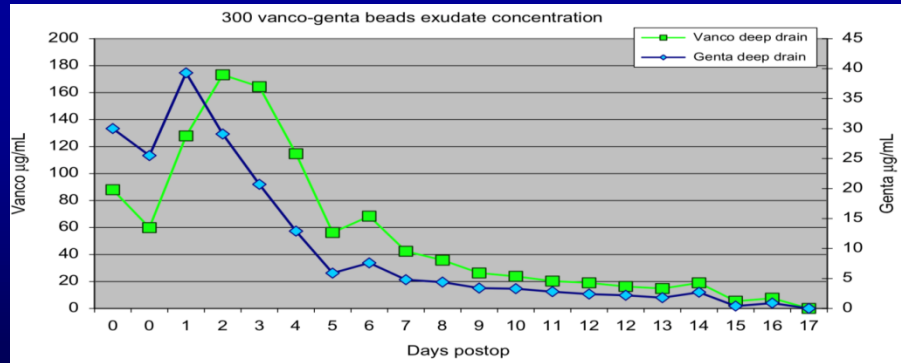
- Pharmaceutical-grade Calcium Sulfate with a unique crystal structure and properties (Stimulan, Biocomposites, UK):
 - Physiologic pH level
 - Hydrophilic
 - Fast, easy mixing
 - Absorbed at an optimal rate
 - Leaves no nidus, therefore



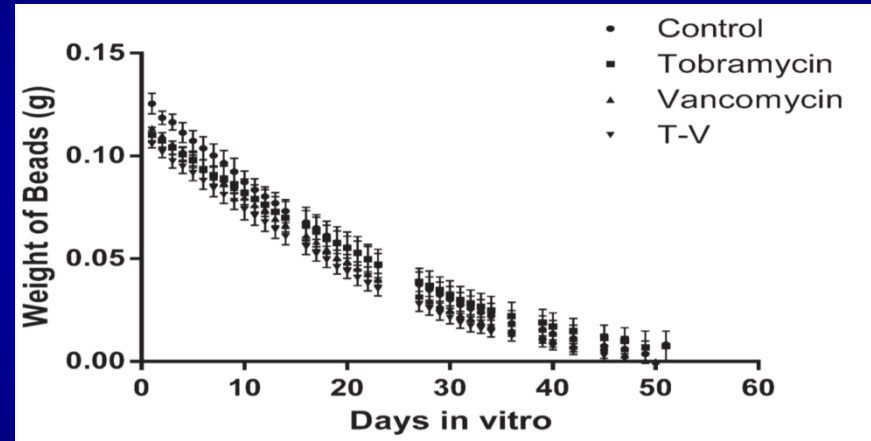
Spacers vs PMMA vs Stimulan Beads Atb Elution



Antibiotic Spacers



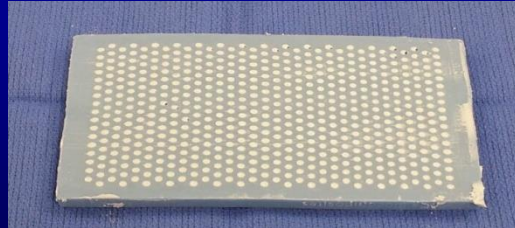
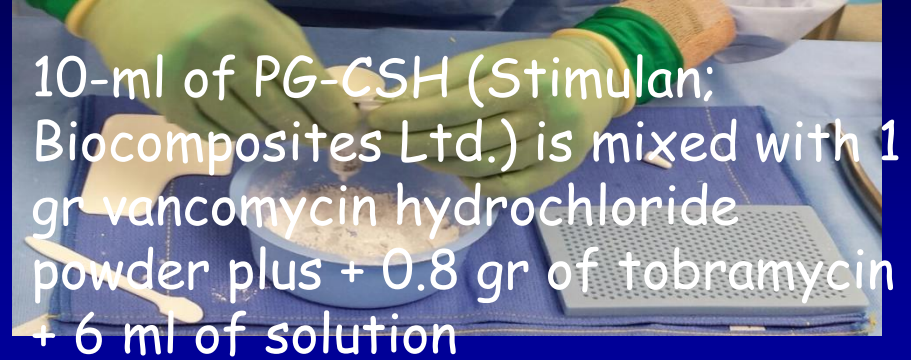
Antibiotic PMMA



Stimulan Beads

Howlin et al, Antimicrob Agents Chemother, 2015
Udomkusonsri et al, J Vet Med Sci 2012
Dehghani et al, J Dis Med Res 2014

Stimulan Preparation



Stimulan beads (Calcium sulfate antibiotic added beads) + Poly Exchange



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Debridement + Antibiotic Pearls + Retention of Implants (DAPRI) in Italy: 2017

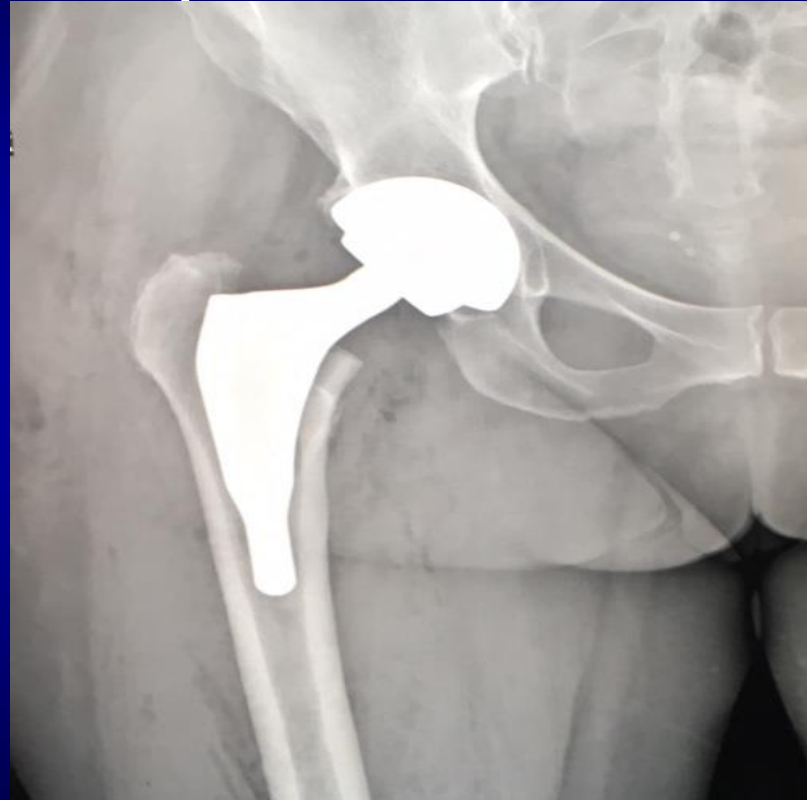
55 yo Female

OR date: April 4th

Surgical Time: 65'

No risk factors

No intraop/postop complications



Courtesy of Dr. Paolo Prati, Treviglio

Debridement + Antibiotic Pearls + Retention of Implants (DAPRI) : May 5th 2017

- Poly Liner + Femoral Head Exchange
- Stimulan Calcium Sulphate :20 mg
 - 480 mg Gentamycin
 - 2 gr Vancomycin
(According to Antibigram)



Courtesy of Dr. Paolo Prati, Treviglio

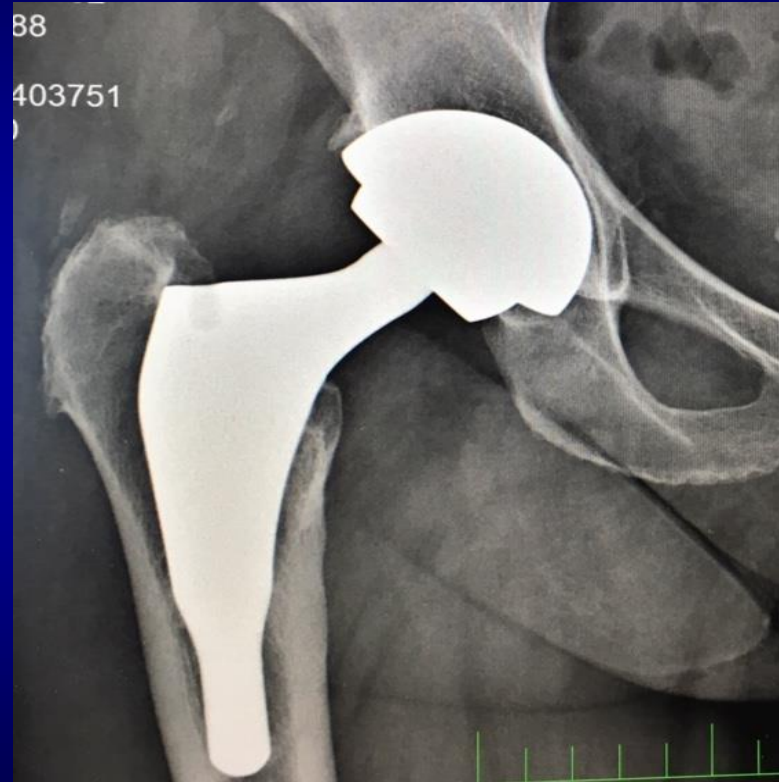
June 2017



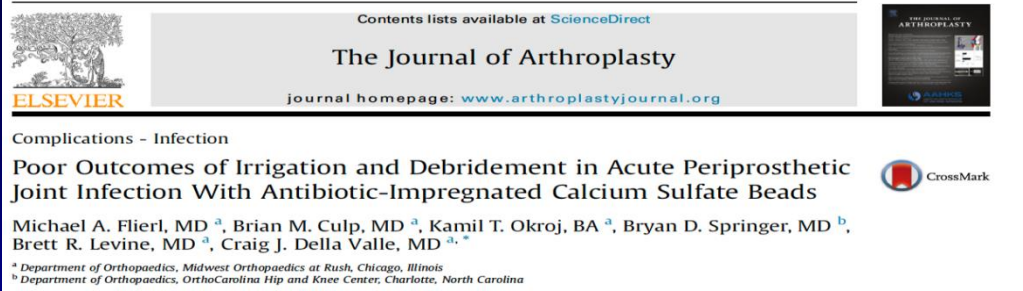
Courtesy of Dr. Paolo Prati, Treviglio

May 2019

- VES, PCR, D-Dimer: Neg.
- No clinical symptoms PJI



Courtesy of Dr. Paolo Prati, Treviglio



Follow
the indications !

- 32 patients acute hematogenous PJI and 14 patients postoperative (Tot. 48)
- NO Known Bacteria
- DAIR + No bacterium-specific antibiotic-impregnated calcium sulfate beads



DAPRI: FIRST TRIAL



- 10 PATIENTS
- MALES: 90 %
- AVERAGE AGE: 69 years (63-92)
- MEAN BMI: 35 (30- 48)
- ORIGINAL SURGERY: **Primary TKA** followed by acute (<6 weeks) or early hematogenous (< 7 days) PJI with a known microorganism
- PJI ORGANISM:
 - *S. Aureus*: 60%
 - MRSA 20%
 - *Streptococcus*: 30%

DAPRI FIRST TRIAL : RESULTS

- DAPRI: 2 days from surgery (1-4 days)
- 6 WEEKS I.V + 6 WEEKS ORAL ATB. THERAPY
- ALL PATIENTS AVAILABLE AT FU
- MINIMUM FU: 2 YEARS

80 %

- NO PJI, ASYMPTOMATIC PATIENT
- NEGATIVE SEROLOGIC MARKERS FOR PJI
(VES, PCR, D-DIMER)

20 %



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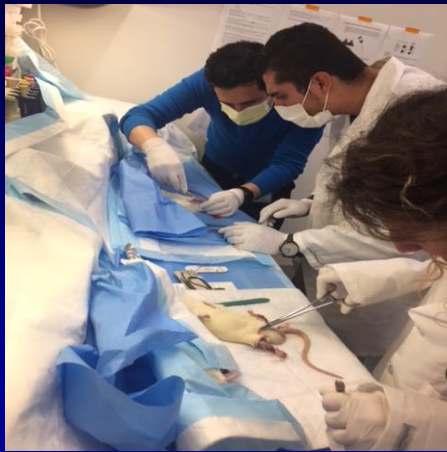
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CONCLUSION

- Ad oggi la ritenzione dell'impianto infetto e' consigliabile solo in casi di infezioni "acute" con isolamento del germe
- La visualizzazione e rimozione del biofilm accompagnata da un "local delivery" di antibiotico + 12 settimane di antibiotico-terapia sistemica rappresenta una metodica di trattamento molto promettente





THANK YOU



pindelli@stanford.edu



CONGRESSO NAZIONALE DELLA SOCIETÀ ITALIANA DELL'ANCA

19-20
settembre 2019
BERGAMO

AUDITORIUM

13.30
16.00

**SIMPOSIO 2: LE REVISIONI CONSERVATIVE: LA DIAGNOSI
PRECOCE E LE OPZIONI CHIRURGICHE. QUANDO È POSSIBILE E COME**
In collaborazione con SIRM (Società Italiana di Radiologia Medica)

“Instabilità protesica”



**UNIVERSITÀ
DEGLI STUDI DI BARI
ALDO MORO**

*Dipartimento di
Scienze Mediche di Base,
Neuroscienze ed Organi di Senso*
UU.OO. ORTOPEDIA E TRAUMATOLOGIA
Direttore: Prof. B. Moretti

GIUSEPPE SOLARINO

REVISION



J Orthop. 2019 May 2;16(5):393-395. doi: 10.1016/j.jor.2019.04.011. eCollection 2019 Sep-Oct.

A systematic review of the causes of failure of Revision Total Hip Arthroplasty.

Kenney C¹, Dick S¹, Lea J², Liu J², Ebraheim NA².

Author information

- 1 University of Toledo College of Medicine and Life Sciences, Toledo, OH, 43614, United States.
- 2 University of Toledo Medical Center, Toledo, OH, 43614, United States.

Abstract

This study reviewed literature published in the last 10 years to investigate the reasons for revision failure. A total of 9952 revisions were identified and it was determined that the number one cause of failure was aseptic loosening (23.19%), followed by instability (22.43%) and infection (22.13%). Further analysis of applicable revisions investigated BMI and age at the failure rates. The rate of revision in obese patients was markedly higher ($p < 0.01$) compared to non-obese patients and individuals receiving a revision THA under the age of 55 are at a higher risk of rerevision ($p < 0.01$).

Second cause



INSTABILITY

International Orthopaedics (SICOT)
DOI 10.1007/s00264-016-3345-6



REVIEW ARTICLE

Total hip arthroplasty instability in Italy

Francesco Falez¹ • Matteo Papalia² • Fabio Favetti¹ • Gabriele Panegrossi¹ •
Filippo Casella¹ • Gianluca Mazzotta¹

2017

- In the Italian register, dislocation is among the most frequent causes of revision of THA 9.3%, after aseptic loosening and infection
- The risk of dislocation does not remain constant but increases with time, reaching 7% at 25 years due to surgery, polyethylene wear, increased pseudocapsular laxity and muscle deterioration
- It represents 26% of cases of re-intervention in the first two years after surgery
- It is the first cause of multiple revision (22.5%)
- Posterior dislocation is the most frequent





Risk factors for dislocation are considered in 5 subgroups:

- patient factors,
- surgeon factors,
- implant design,
- implant orientation
- and soft tissue factors.

Jones SA, The Prevention and Treatment of Dislocation following Total Hip Arthroplasty: Efforts to Date and Future Strategies, Hip Int. 2015

The causes must first be understood.

- **patient factors:** diagnosis, age, medical comorbidities, female gender, and patient education
- **surgeon factors:** annual quantity of procedures and experience, surgical approach, adequate restoration of femoral offset and leg length, component position, and soft-tissue or bony impingement
- **implant factors:** the design of the head and neck region, and so-called skirts on longer neck lengths. There should be offset choices available in order to restore soft-tissue tension.

Brooks PJ, Dislocation following total hip replacement: causes and cures, Bone Joint J 2013



PATIENT FACTORS_{Pre-op}



✓ **Sex:** Women have twice rate of men

Berry D et al, Effect of femoral head diameter and operative approach on risk of dislocation after primary hip arthroplasty. JBJS(Am) 2005

✓ **Obesity:** higher dislocation rate in obese patients than non-obese patients (RR:2.08)

Liu W et al, The influence of obesity on primary total hip arthroplasty outcomes: A meta-analysis of prospective cohort studies. Orthop Traumatol Surg Res. 2015

✓ **ASA:** The dislocation risk was 10 times higher in patients with high ASA scores

Jolles BM et al, Factors predisposing to dislocation after primary total hip arthroplasty: a multivariate analysis. J Arthroplasty 2002

✓ **Neurological disease:** 12 primary THAs for Charcot arthropathy, 3 recurrent dislocations

Chalmers BP et al, Primary Total Hip Arthroplasty for Charcot Arthropathy is Associated With High Complications but Improved Clinical Outcomes. J Arthroplasty 2018

✓ **Age & Femoral neck fracture:** because of the poor muscular strength and the attempts made to regain the preinjury full range of motion

Geesink R, Eur Instr Course Lecture 2005

✓ **Lumbar Spinal fusion:** Patients with a history of lumbar spinal fusion are at a significantly increased risk of dislocation and revision after THA

An VVG, et al, Prior Lumbar Spinal Fusion is Associated With an Increased Risk of Dislocation and Revision in Total Hip Arthroplasty: A Meta-Analysis. J Arthroplasty 2018

✓ **Previous surgery:** Conversion THAs: rate of dislocation of greater than 15%

✓ *Pui CM et al, Increased complication rate following Conversion Total Hip Arthroplasty after cephalomedullary fixation for intertrochanteric hip fractures: a multi-center study. J Arthroplasty 2013*

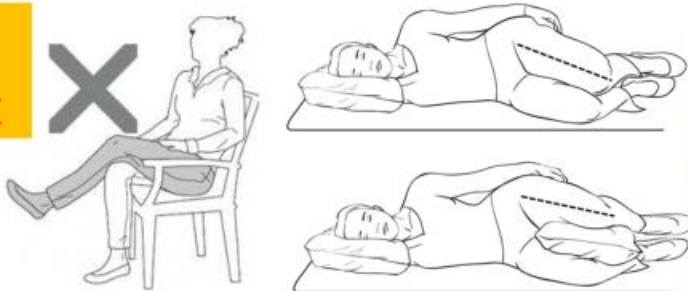


PATIENT EDUCATION Post-op

- Pillows
- High Chairs
- Toilet Seats
- Limited ROM



**6 weeks
limitations**



“Patient restrictions following THA are current practice, regardless of the surgical approach.”

Peters A et al, Patient restrictions following total hip arthroplasty: A national survey. Acta Orthop Belg. 2017



Table 3. Dislocation details.

	Minimal restricted group (n = 1'49)	Restricted group (n = 1'12)
Number of dislocations (%)	17 (1.6)	28 (2.5)
Days to dislocation (median, IQR)	8 (1-19)	4 (1-14.8)
Cup inclination angle		
<55° (n)	10	16
≥55° (n)	4	6
Missing (n)	3	6
Femoral offset		
<° mm (n)	4	7
≥° mm (n)	7	9
Missing (n)	6	12
Reason for dislocation (n)		
Falls	3	4
Transfer sitting or lying down/	4	8
standing up		
Other	6	9
Unknown	4	7
Anterior direction of dislocation (n)	10	16
Posterior direction of dislocation (n)	7	12
Patients with multiple dislocations (n)	10	10
Revised for dislocation	7	10

“Patients can be managed safely with minimal restrictions following posterior approach THA if combined with frequent use of larger femoral heads.”

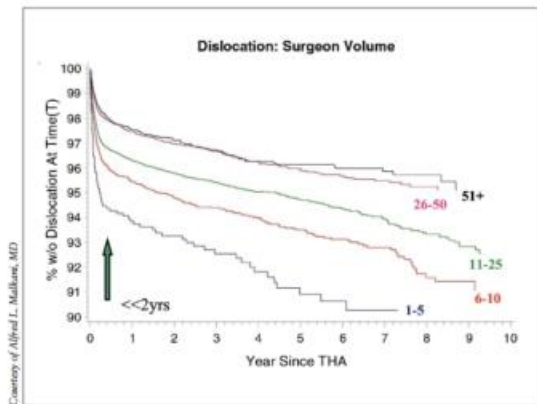
Walter van der Weegen et al, It is safe to use minimal restrictions following posterior approach total hip arthroplasty: results from a large cohort Study, Hip International 2019

SURGEON FACTORS

- **Experience**
- **Volume**
- Surgical Approach
- Surgical Technique
- Implant Selection

The present study has demonstrated no difference in the rate of dislocation when trainees perform THA compared with consultant surgeons.

Singh P, Madanipour S, Fontalis A, . A systematic review and meta-analysis of trainee versus consultant surgeon performed elective total hip arthroplasty. EFORT Open Reviews, 2019 Feb 13;4(2):44-55



SURGEON FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- Implant Selection

Surgical approach	Rate of dislocation
Transtrochanteric	1.27%
Anterolateral	2.18%
Direct lateral	0.55%
Posterior	3.23%
with capsular repair	2.03%
without capsular repair	3.95%

“posterior approach gives a dislocation rate six times higher than the direct lateral approach”

“the lateral transgluteal approach with capsular repair was accompanied by an 86% reduction in dislocation”

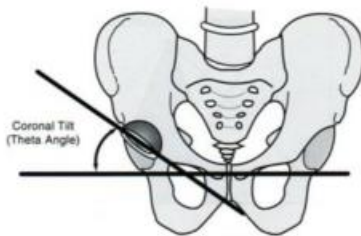
Jurkutat J et al., The impact of capsular repair on the risk for dislocation after revision total hip arthroplasty a retrospective cohort-study of 259 cases. BMC Musculoskeletal Disorders (2018)



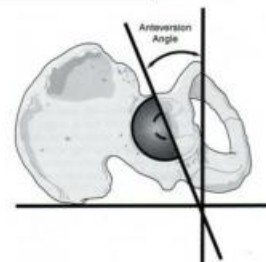
SURGEON FACTORS

- Experience
- Volume
- Surgical Approach
- **Surgical Technique**
- Implant Selection

COMPONENT POSITION



40 +/- 10 degrees abduction



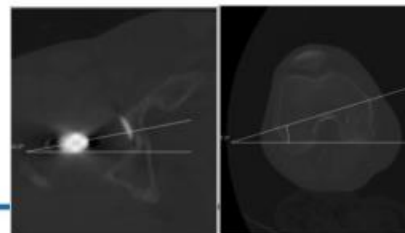
15 +/- 10 degrees anteversion

“Safe-zone”

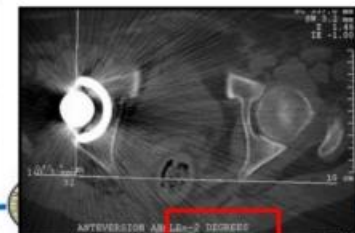
Lewinnek GE et al, Dislocations after total hip-replacement arthroplasties. J Bone Joint Surg Am. 1978

Six fold reduction in dislocation, but does not prevent it!

Slight retroverted stem



Anteverted cup



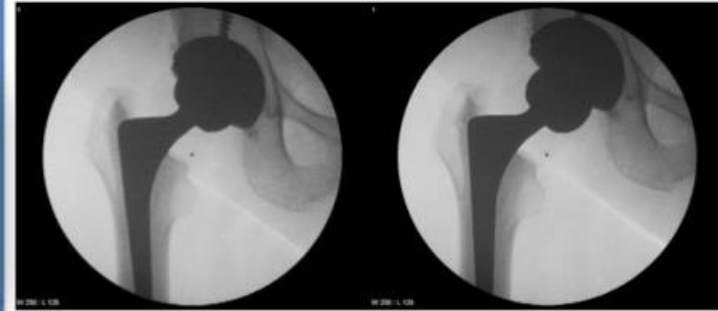
Assessment of Component Position: CT Scan

Wines AP-McNicol D, Computed tomography measurement of the accuracy of component version in total hip arthroplasty. J Arthroplasty 2006

SURGEON FACTORS

- Experience
- Volume
- Surgical Approach
- **Surgical Technique**
- **Implant Selection**

Peripheral osteophytes must be removed to avoid bony impingement.



PE liners with malpositioned elevated rims



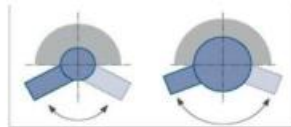
- Improved stability in one direction
- Possible correction of anteversion error
- Surgeon safety



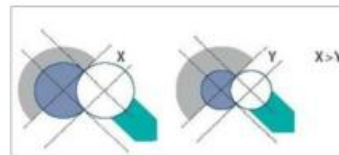
- Risk of impingement
- Decrease arc of motion
- Increase polyethylene wear and debris



Diameter Heads: The largest, the best



Increased ROM, greater primary Arc before impingement & levering out.



Increased jump distance

- ✓ Vertical leg length difference – laxity and separation
- ✓ Horizontal decreased offset – laxity and separation
- ✓ Short neck lengths (Socket – neck impingement)
- ✓ Skirted long neck lengths (Socket – neck impingement): the resulting prosthetic head-neck ratio is increased

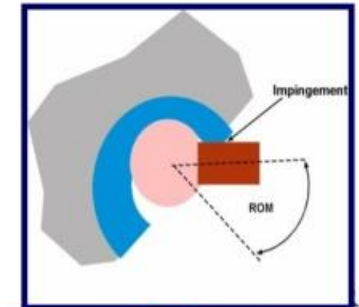
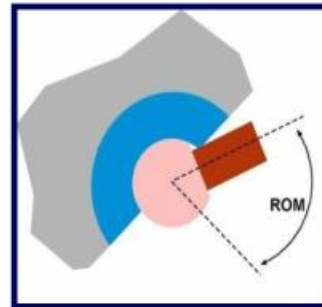
SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

Choice of the bearings for Late Instability



Correlation between wear and risk of impingement:
7° of ROM are lost for each mm. of penetration



SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

REVISIONE CONSERVATIVA
con sostituzione dell'inserto in
polietilene



**Choice of the bearings for
Late Instability: wear of PE**



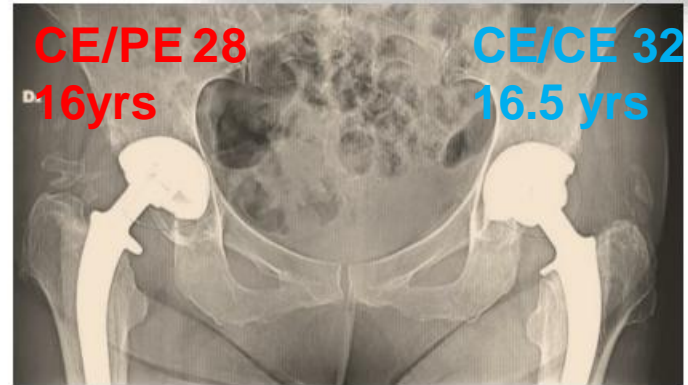
SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

Choice of the bearings for Late Instability: **CE/PE** Vs **CE/CE**

Shah SM et al, Late Dislocations After Total Hip Arthroplasty: Is the Bearing a Factor? J Arthroplasty. 2017

RESULTS: The cumulative percent revision for dislocation at 13 years for MoXLPE, CoXLPE, and CoC groups was 1.2 (95% confidence interval [CI], 1.1-1.3), 1.0 (95% CI, 0.7-1.4), and 0.9 (95% CI, 0.8-1.1), respectively. There was an increased risk of revision for dislocation for MoXLPE compared with CoXLPE and CoC. When stratified for head size, there was no difference in the risk of revision for dislocation between MoXLPE, CoXLPE, and CoC in the 28- and 32-mm head sizes. With a head size of 36 mm, MoXLPE had a higher rate of dislocation compared with other materials.



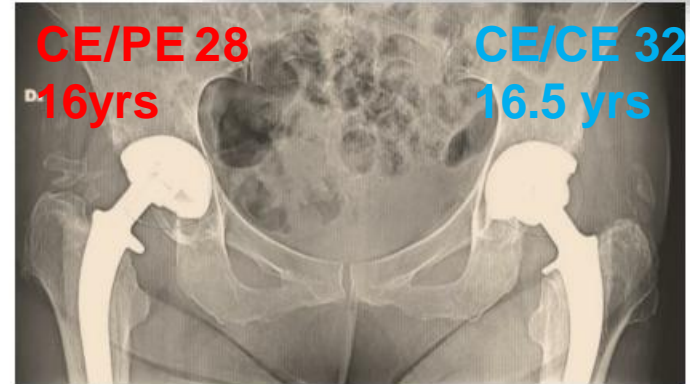
Different bearings, different behaviour



SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

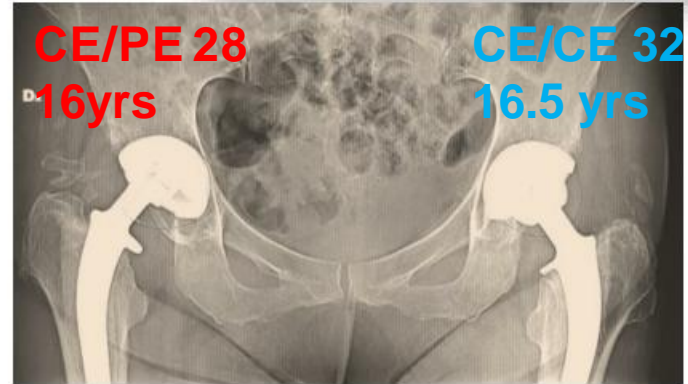
**Choice of the bearings for Late
Instability: CE/PE Vs CE/CE**



SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

**Choice of the bearings for Late
Instability: CE/PE Vs CE/CE**



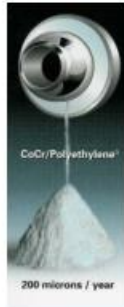
**REVISIONE CONSERVATIVA con cementazione di
coppa in polietilene nello shell originale**



SURGEON/IMPIANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

Choice of the bearings for Late
Instability: **ME/PE**



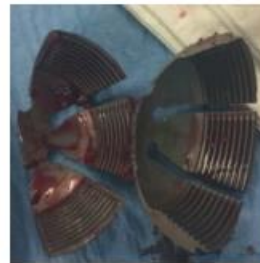
**REVISIONE CONSERVATIVA
con sostituzione della sola
componente acetabolare**

SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

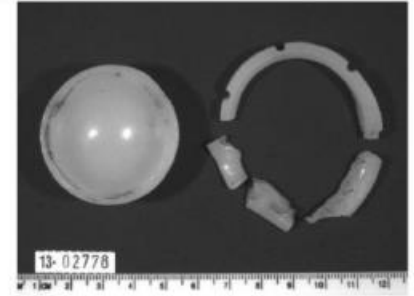
Late Instability: breakage of liner and shell

REVISIONE CONSERVATIVA/PARZIALE acetabolare con
Revision Shell+augment+buttress in TMT e cementazione di
coppa Dual Mobility



SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

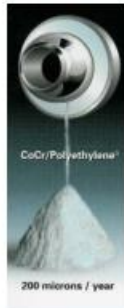


Small acetabular shells (≤ 54 mm) combined with large diameter heads (≥ 36 mm) decrease LINER THICKNESS

“Liners less than 7 mm thick at the weight bearing or 4.8 mm thick at the rim should be used with caution.”

Ast MP et al, Fractures of a single design of highly cross-linked polyethylene acetabular liners: an analysis of voluntary reports to the United States Food and Drug Administration. J Arthroplasty. 2014

Choice of the bearings for Late Instability: breakage of XPE



SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

- **Choice of the stem and its offset to respect soft tissues**
- **Choice of the head length to avoid impingement**



- ✓ Restoration of the hip center is considered important for a successful THA and requires achieving the right combination of offset, anteversion, and limb length.
- ✓ Modular necks offer a multitude of choices in offset, length and anteversion, but at the risk of fretting, corrosion, or fracture at the additional modular junction.

“Because of their reported higher risks, there is no clear indication for modularity with a primary THA”

Duwelius PJ et al, **Modular versus nonmodular neck femoral implants in primary total hip arthroplasty: which is better?** Clin Orthop Relat Res. 2014



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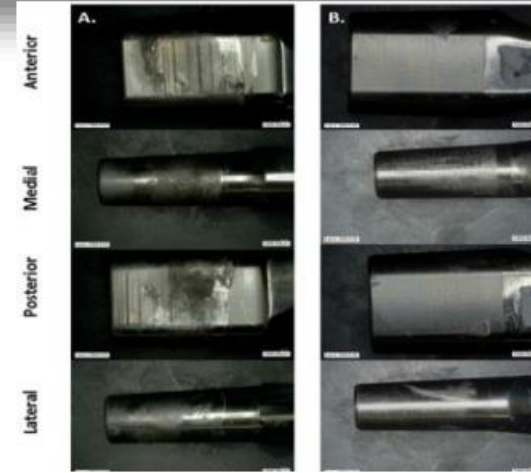


SURGEON/IMPLANT FACTORS

- Experience
- Volume
- Surgical Approach
- Surgical Technique
- **Implant Selection**

“...mixed metal couples suffered more corrosion than homogenous couples...”

Su SL et al., Retrieval Analysis of Neck-Stem Coupling in Modular Hip Prostheses, J Arthroplasty. 2017



- Choice of the stem and its offset to respect soft tissues
- Choice of the head length to avoid impingement
- **Choice of the material neck and stem**

Design	Manufacturer	N	Neck Material	Stem Material
Short Monolithic Femoral Hip System (SMFTM)	Smith & Nephew	7	CoCr	Ti-6Al-4V
REDAPT™ Modular Revision Stem	Smith & Nephew	6	CoCr	Ti-6Al-4V
M/L Taper Hip Prosthesis with Kinectiv® Technology	Zimmer	5	Ti-6Al-4V	Ti-6Al-4V
ABGII Modular Femoral Stem	Stryker	4	CoCr	TMZF
PROFEMUR®	MicroPort Orthopedics, Inc.	2	Ti-6Al-4V	Ti-6Al-4V
AFLA II Modular Femoral Stem	Encore Medical, LP	1	CoCr	CoCr
ARC Hip	OMNI	2	Ti-6Al-4V	Ti-6Al-4V

Instabilità PTA su Displasia

M.N. Uomo 57 anni
Coxartrosi secondaria
dx

Artroprotesi MicroPort

- Via postero-laterale
- **Collo medio antiverso**
- Testa lunga

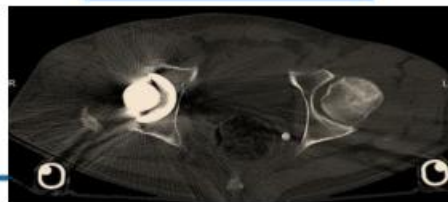
Lussazione
atraumatica a due
settimane

Revisione conservativa

**Collo varo lungo
retroverso**
Testa lunga 32mm

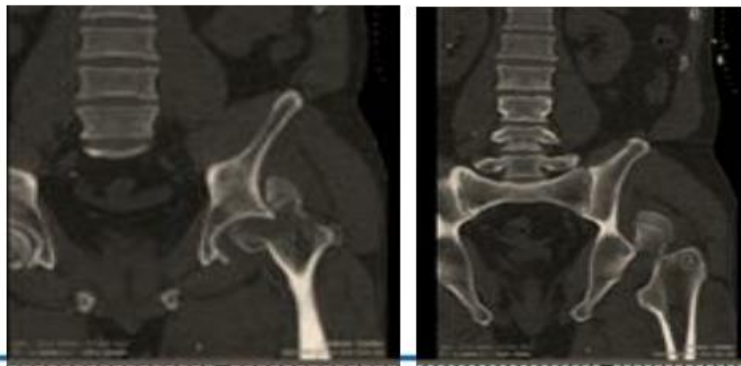
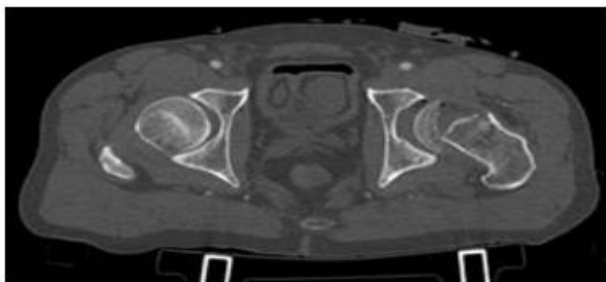


TAC

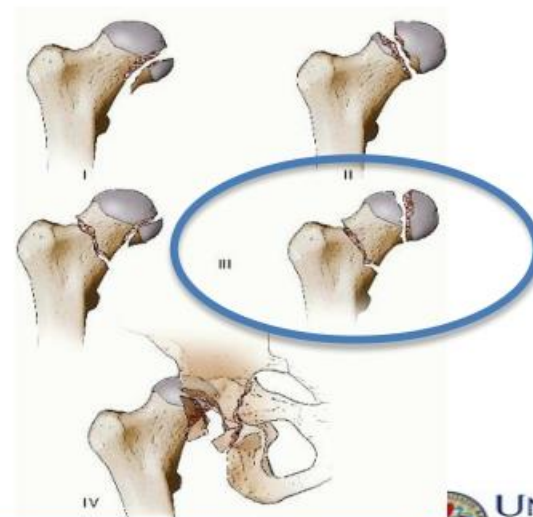


Instabilità PTA su trauma

A.A.: 43 anni, Uomo
Politrauma della strada con fratture costali multiple,
Frattura epifisi prossimale femore sinistro Pipkin tipo III
Emoperitoneo da lacerazione del letto epatico della colecisti con avulsione e rottura della colecisti trattato
con colecistectomia



Pipkin



Instabilità PTA su trauma

Artroprotesi MicroPort

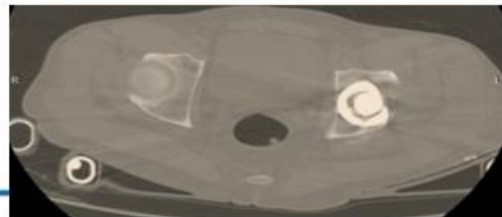
- Via postero laterale
- Cotile: procotyl size 50
- Stelo: profemur z size 7
- Testina: ceramica Biolox delta size 32
- **Collo corto retto**



Lussazione atraumatica a 5
giorni post operatori



TAC



Revisione conservativa

- **Collo corto retroverso di 8°**
- Testa lunga 32mm



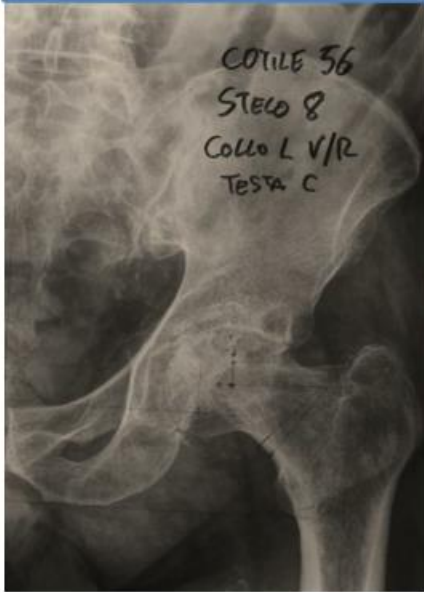
Instabilità PTA da Mobilizzazione Acetabolare

C.C. Uomo 70 anni
Coxartrite psoriasica
sinistra

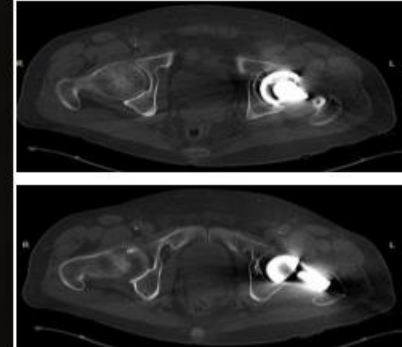
Artroprotesi MicroPort

- Via laterale
- **Cotile 54**
- Inserto in polietilene
- Stelo size 7
- **Collo corto varo retto**

Mobilizzazione aseptica acetabolare ad 80 giorni



TAC



Instabilità PTA da Mobilizzazione

Acetabolare

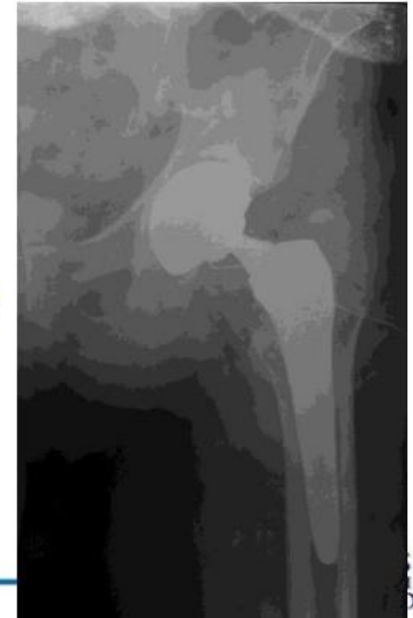
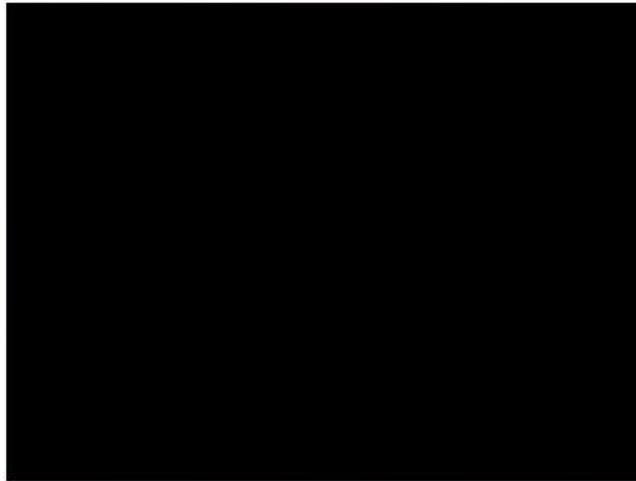
Componenti
espiantate



Revisione conservativa: componente acetabolare,
testina e collo femorale

- **Collo modulare retroverso corto**
- Testina Biolox Delta da 32mm
- Componente acetabolare in TMT da 58mm

Rimozione
colletto



Instabilità Endoprotesi

P.L.: 91 anni, Donna,
Frattura mediale collo
femore destro
portatrice di PM,
PTG dx 1985; revisionata
2005, K uterino, Iperptrofia
ventricolare sinistra,
Plavix

Endoprotesi Microport a dx:

- Via Laterale
- Stelo size 2 cementato
- **Collo corto retroverso**
- Testina media size 28mm
- Coppa biarticolare da 46mm

Instabilità in 5a
giornata post-op

Revisione conservativa

- **Collo lungo retroverso 15°**
- Coppa biarticolare size 45
- Testina media size 28



CONCLUSION

- ✓ THA dislocation is the second cause of revision surgery
- ✓ Multiple factors can lead to dislocation
- ✓ Different etiopathogenesis between early and late
- ✓ Plan your THA, choose the best implant and position it correctly
- ✓ Patient informed consent must include risk of instability (and dislocation).

In hip prosthetic instability, is the modularity of the neck of the primary implant an advantage for the surgeon?

**PREVENTION
IS THE BEST
TREATMENT**



"Let's just start cutting and see what happens."



*"When we want your opinion,
we'll give it to you."*



CONGRESSO NAZIONALE DELLA
SOCIETÀ ITALIANA DELL'ANCA

19-20
settembre 2019
BERGAMO

AUDITORIUM

13.30
16.00 **SIMPOSIO 2: LE REVISIONI CONSERVATIVE: LA DIAGNOSI PRECOCE E LE OPZIONI CHIRURGICHE. QUANDO È POSSIBILE E COME**
In collaborazione con SIRM (Società Italiana di Radiologia Medica)

“Instabilità protesica”

THANK YOU



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DEGLI STUDI DI BARI
ALDO MORO

CONGRESSO NAZIONALE DELLA SOCIETÀ ITALIANA DELL'ANCA

BERGAMO 19-20 settembre 2019

Impingement ileo-psoas in PTA

G. GRANO

REGIONE DEL VENETO



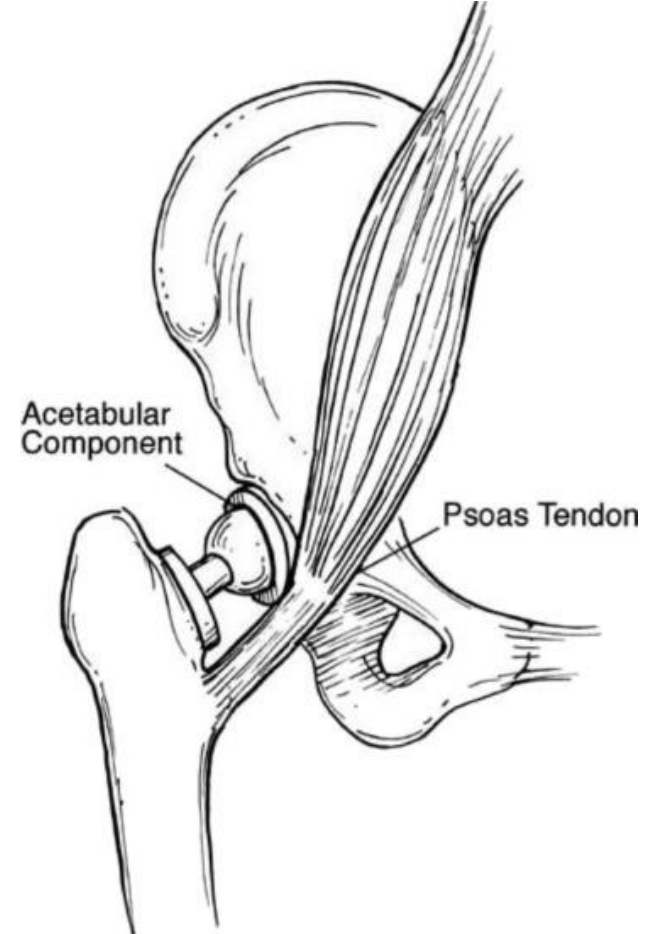
ULSS7
PEDEMONTANA

U.O.A. ORTOPEDIA E TRAUMATOLOGIA
Centro Regionale per la chirurgia protesica e
mininvasiva dell'anca e della spalla
Ospedale di Bassano del Grappa (VI)
Direttore: Dott. G. Grano



Cause di una protesi d'anca dolorosa

- Mobilizzazione asettica
- Mobilizzazione settica
- Instabilità
- Ossificazioni periprotetiche
- Reazione allergica
- **Impingement ileopsoas**

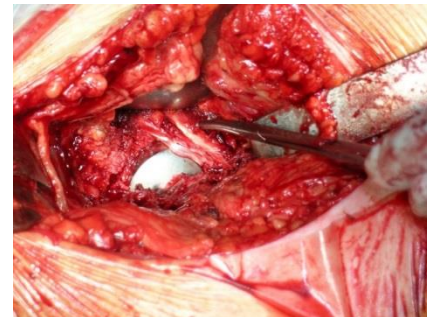
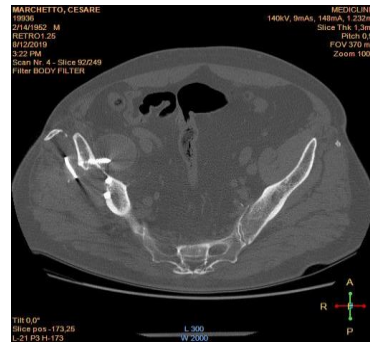
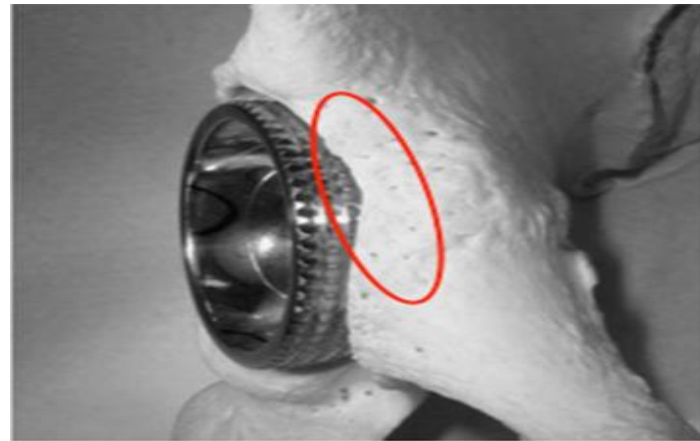


Impingement ileopsoas in PTA

Frequenza 4.3%

**Cause
Meccaniche** →

Eccessiva retroversione della coppa
Eccessiva dimensione della coppa
Eccessiva lateralizzazione della coppa
Eccessiva fresatura del bordo anteriore
Inserti antilussanti
Sporgenza di viti e/o cemento
Testa di grande diametro



Il dolore



- Può comparire in regione inguinale già dal 1° mese post-operatorio
- Spesso non condiziona la deambulazione
- Si manifesta durante i movimenti di flessione attiva dell'anca
- Compromette la ripresa delle normali attività quotidiane

Heaton K, Dorr LD. Surgical release of iliopsoas tendon for groin pain after total hip arthroplasty. J Arthroplasty 2002;17:779–781.

Allacciare le scarpe



Salire le scale



Car- Sign

Salire in auto



Scendere dall'auto



Esame clinico

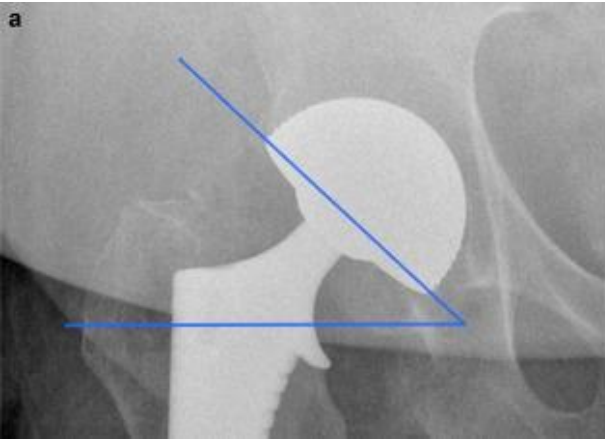
- Dolore in regione inguinale e difficoltà alla flessione attiva dell'anca a ginocchio esteso e paziente supino in un arto non dolente alla mobilizzazione passiva



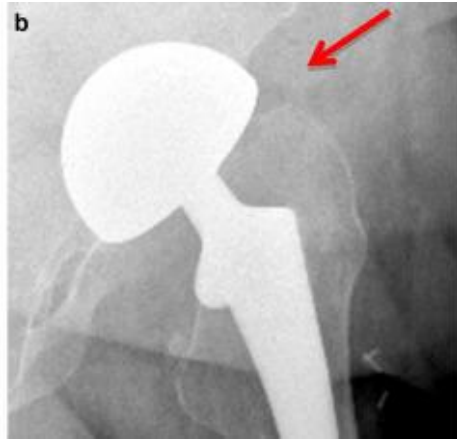
- Dolore in regione inguinale alla flessione controresistenza dell'anca in posizione seduta



Imaging – RX



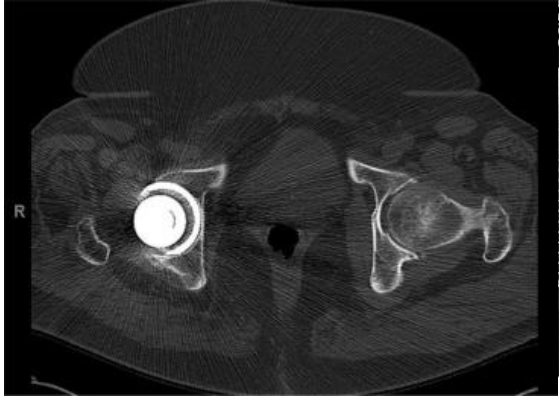
Proiezione AP



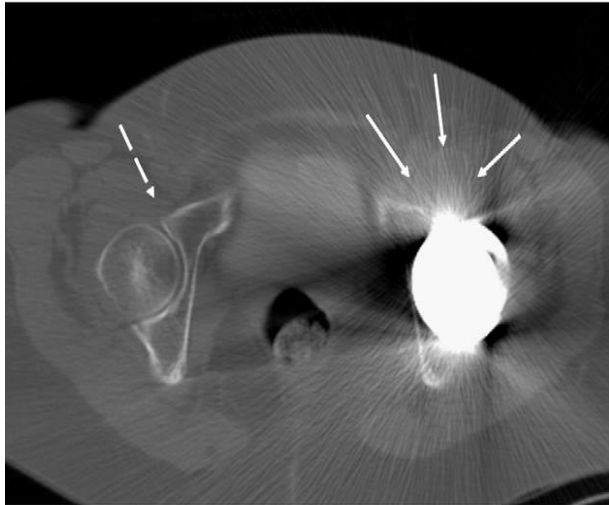
Proiezione assiale di Lequesne

- valutazione della dismetria
- offset
- sporgenza della componente acetabolare
- mobilizzazione o migrazione della componente acetabolare

Immagini - TC

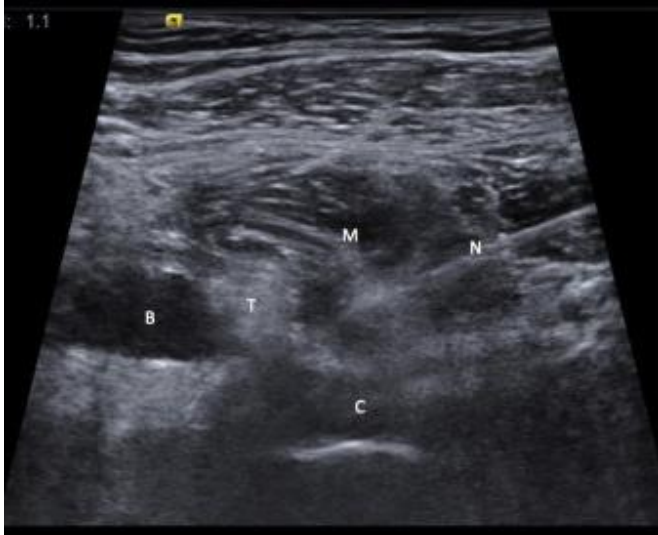


- protusione anteriore della componente acetabolare
- frammenti di cemento
- protusione di teste di grande diametro
- posizione delle viti acetabolari



Impingement dello psoas in PTA

Test diagnostico



Infiltrazione con anestetico locale e cortisone

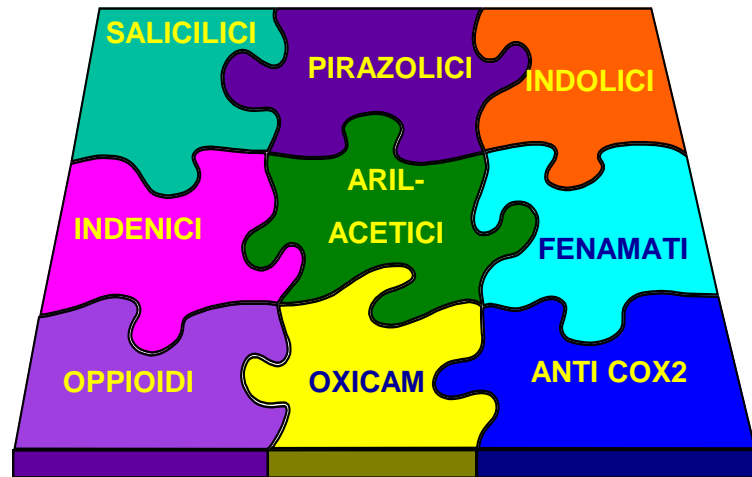
Nunley RM, et Al. Iliopsoas bursa injection can be beneficial for pain after arthroplasty.
Clin. Orthop.Relat. Res. 2010;468:519-26

Impingement dello psoas in PTA

Trattamento conservativo:

Quasi sempre inefficace con tasso di insuccesso superiore al 70%

- Analgesici,
- NSAIDs,
- Esercizi di rinforzo e stretching,
- Infiltrazioni con anestetico locale e cortisonici



Lachiewicz PF, Kauk JR. Anterior iliopsoas impingement and tendinitis after total hip arthroplasty
J Am Acad Orthop Surg 2009;17:337-44

Impingement dello psoas in PTA

Trattamento chirurgico:

Fallimento del trattamento conservativo, segni clinici e radiografici di impingement meccanico
Tenotomia eccellenti risultati senza perdita di forza nella flessione dell'anca

- Chirurgia open: buoni risultati 77.8%
 complicanze 33%
- Chirurgia artroscopica: buoni risultati 91.8%
 complicanze 0%-1.7%

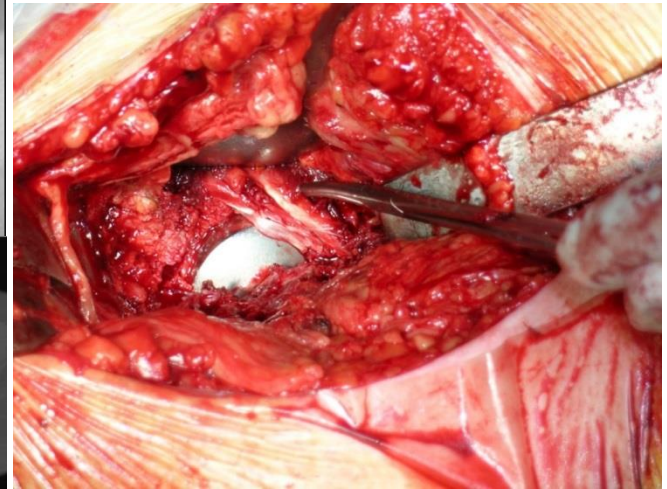
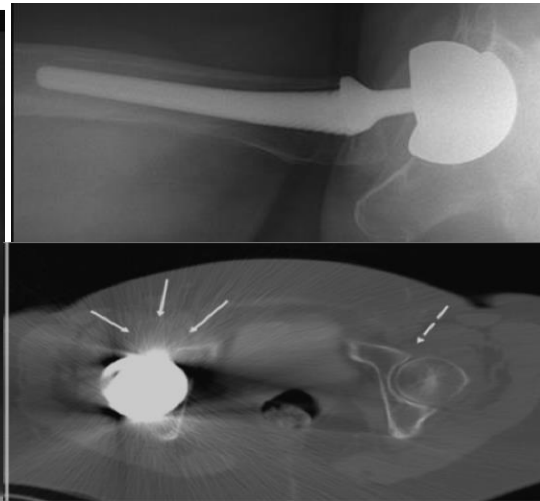
A Systematic Review of Arthroscopic Versus Open Tenotomy of Iliopsoas Tendonitis After Total Hip Replacement
Robert S. O'Connell, M.D., David S. Constantinescu, B.S., Daniel J. Liechti, M.D., Justin J. Mitchell, M.D., and Alexander R. Vap, M.D.
Arthroscopy, 2018; Apr;34(4): 1332-1339

Chirurgia Open

PTA M-M + tendinite ileopsoas

Donna aa 58

Dolore inguinale e alla coscia
a distanza di 4 anni dall'intervento



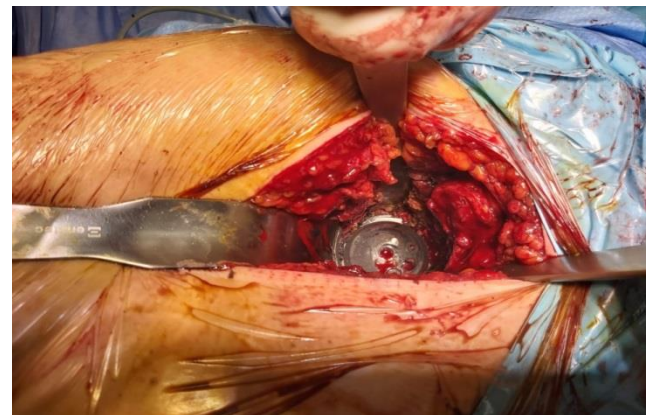
Chirurgia Open

Rottura inserto in ceramica

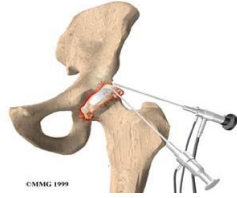


Donna aa 65

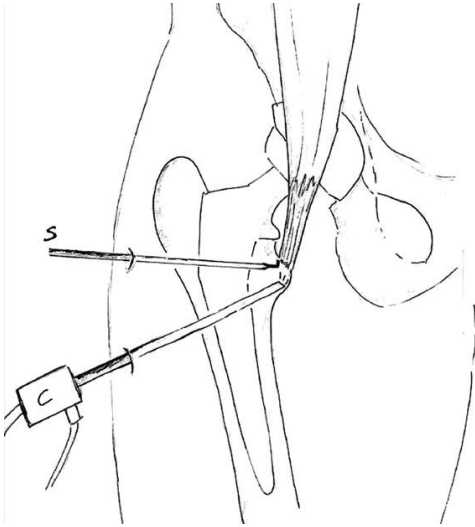
Dolore inguinale a distanza
di 1 anno dall'intervento



Chirurgia Artroscopica

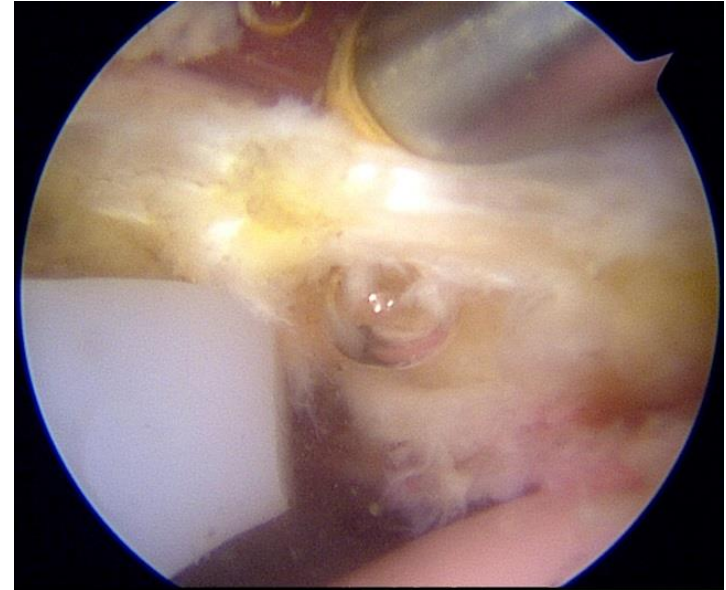


Tecnica endoscopica



Ilizaliturri VM et Al. Internal snapping hip syndrome:
Treatment by endoscopic release of the iliopsoas tendon
Arthroscopy 2005;21:1375-1380

Tecnica artroscopica

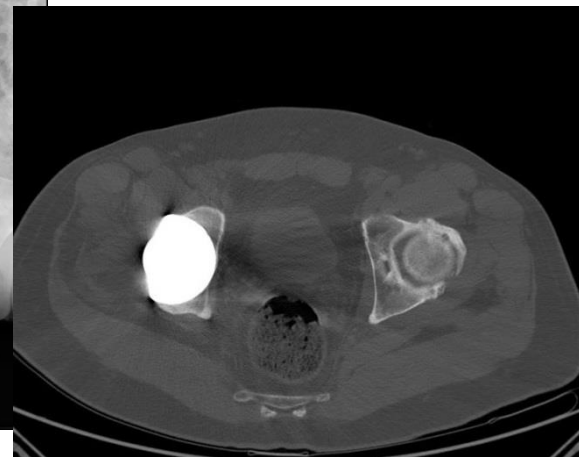


Wettstein M, Jung J, Dienst M. Arthroscopic psoas tenotomy
Arthroscopy 2006;22: 907

Caso clinico

- Maschio di 52 aa
- Revisione di PTA M-M anca dx
- Dolore all'anca dx dopo un anno
- Test clinici positivi per IPI
- Insuccesso del trattamento conservativo

Imaging



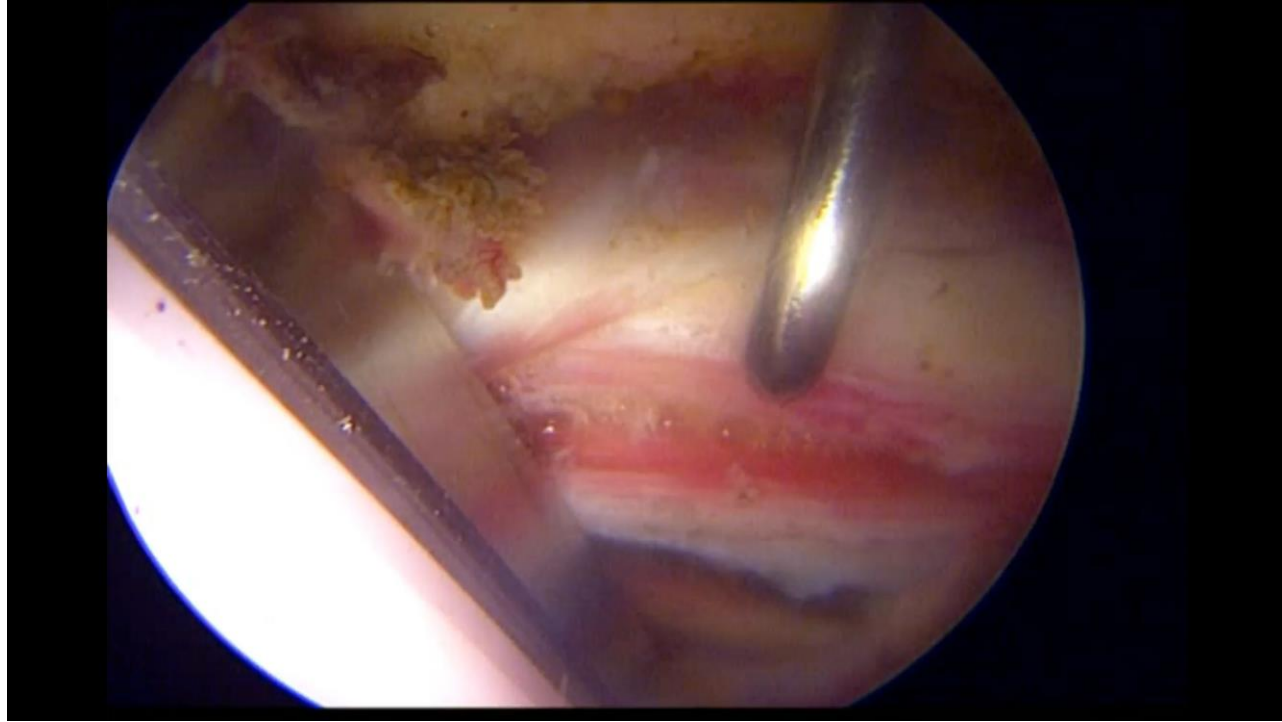
Clinica



Trattamento artroscopico

Tecnica di Wettstein

- Decubito supino
- Minima trazione
- Portali AL e A
- Ottica 70°
- Pompa 60 mm Hg



Post-operatorio



Riabilitazione

1°-30°giorno post-op

- Controllo del dolore
- Cauta mobilizzazione passiva dell'anca in flessione, intrarotazione, adduzione
- Deambulazione libera e senza stampelle
- Progressivo stretching dell'ileopsoas
- Progressivo rinforzo dei flessori dell'anca

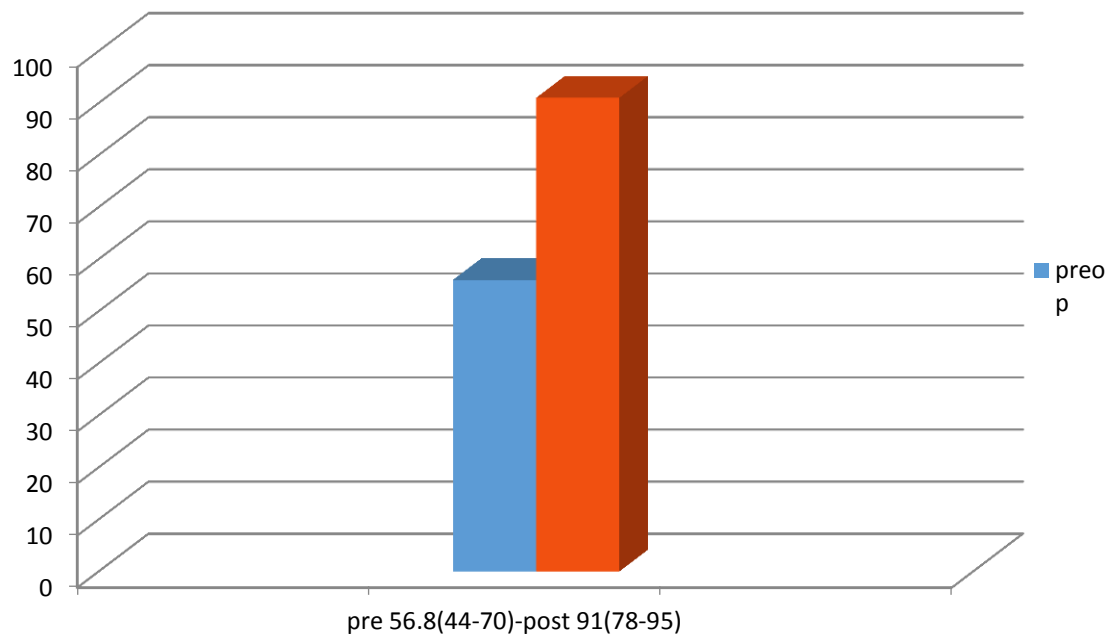
Casistica

2012-2018

25 Artroscopie in IPI (tecnica artroscopica)

- 25 Pazienti
- Età Media: 50.5 (29 – 67)
- Sesso: 9 Femmine 16 Maschi
- Follow-up 36 mesi (12-60)
- Cause:
 - 16: Malposizionamento del cotile (retroverso)
 - 6 : Oversized Metal-back
 - 2 : Teste di grande diametro
 - 1 : Inserto antilussante

Risultati sec. MHHS



Nessuna complicanza

CONCLUSIONI

L'impingement dell'ileopsoas è una causa di protesi d'anca dolorosa

La tenotomia dell'ileopsoas è una valida opzione per la risoluzione del dolore e rappresenta una chirurgia di revisione «conservativa»

La tenotomia artroscopica o endoscopica è da preferire alla chirurgia aperta

L'iniziale debolezza dell'ileopsoas si risolve con un corretto programma riabilitativo tra i 3 ed i 6 mesi



GRAZIE



Le Rotture della cuffia abduttoria

**Institut Universitari
Dexeus**

Ribas, Manuel MD (Hip Unit , chair)
Cárdenas-Nylander, Carl. MD (Hip unit, consultant)
Bellotti, Vittorio (Hip Unit, consulant)
Astarita, Emanuele (Hip Unit, staff)

Disclosure

- MICROPORT : *RTAP & royalties for implants design. SOV.*
 - STRYKER : *RTAP & consulting – SOV.*
 - CONMED : *consulting. SOV.*
 - ADLER-ORTHO : *consulting, implants design.*
 - SMITH & NEPHEW : *consulting – SOV.*
- nessun conflitto di interessi o presentazione

Introduzione

“GTPS” (*Sindrome del dolore dal Grande Trocantere*)

- Patologia sottovalutata con notevole prevalenza (10-25%). Kelly et al. SMA 2010

Introduzione

“GTPS” (*Sindrome del dolore dal Grande Trocantere*)

- Dal 48 al 60% dei pazienti con diagnosi di GTPS presenta un certo grado di rottura gluteale, che potrebbe richiedere una riparazione chirurgica..

Riscchio ... degenerazione grassa

Cornier G et al. Gluteus tendon rupture is underrecognized by french orthopedic surgeons: results of a mail survey. Joint Bone Spine 2006 Jul;73(4):411-3

Introduzione

- Diversi studi LE IV , manca lungo termine, basso numeri di casi
- Ilizaliturri et al. Arthroscop 2005
- Pierce et a. 2018
- Lackiewicz et al. IAAOS 2011

TABLE II Studies on Outcomes of Arthroscopic Surgical Management of Hip Abductor Tendon Tears*

Reference	No.	Age† (yr)	Follow-up‡ (mo)	Harris Hip Score† (points)	VAS Pain§ (points)	Retear Rate (%)
Bogunovic ¹⁹ (2015)	30	62 (37 to 89)	35 (minimum 24)	81	1.7	7
Chandrasekaran ⁴¹ (2015)	34	57 (20 to 79)	27 (24 to 46)	NR	2.4	0
McCormick ³⁹ (2013)	12	66 (60 to 74)	23 (13 to 39)	85	NR	0
Domb ⁴⁰ (2013)	15	58 (44 to 74)	28 (24 to 37)	85	1.4	7
Thaunat ³⁸ (2013)	4	69 (64 to 79)	Minimum 6	74 (46 to 84)	NR	NR
Voos ³⁷ (2009)	10	50 (33 to 66)	25 (19 to 38)	94 (84 to 100)	NR	0

*NR = not reported. †The values are given as the mean, with the range in parentheses. ‡Unless otherwise noted, the values are given as the mean, with or without the range in parentheses. §The values are given as the mean.

TABLE III Studies on Open Surgical Techniques of Abductor Tendon Repair*

Reference	No.	Age† (yr)	Follow-up‡ (mo)	Harris Hip Score† (points)	Oxford Hip Score§ (points)	Retear Rate (%)
McGonagle ³³ (2015)	15	63 (49 to 82)	NR	66 (35 to 88)	NR	NR
Betz ⁴⁵ (2014)	20	73	Minimum 12	87	NR	NR
Bucher ³⁴ (2014)	22	62 (49 to 74)	Minimum 12	NR	41	0
Davies ⁴³ (2013)	23	68 (45 to 85)	71 (61 to 100)	88	NR	9
Betz ⁴⁶ (2012)	9	66 (53 to 74)	33 (12 to 60)	61 (40 to 79)	NR	0
Walsh ⁴² (2011)	72	62 (36 to 88)	Minimum 6	NR	NR	6
Fearon ⁴⁶ (2010)	18	56 (38 to 76)	22 (12 to 56)	71 (40 to 88)	NR	NR
Davies ⁴⁴ (2009)	16	63 (47 to 82)	23 (6 to 48)	NR	39	25
Kagan ⁹ (1999)	7	69 (52 to 81)	42 (21 to 60)	NR	NR	0

*NR = not reported. †The values are given as the mean, with or without the range in parentheses. ‡Unless otherwise noted, the values are given as the mean, with the range in parentheses. §The values are given as the mean.

Scoppo

Valutazione dei risultati a
medio-lungo termine
della nostra procedura
mini aperta per il
trattamento delle rotture
dei gluteo medio e
minimo



Metodo

Studio retrospettivo e comparativo (L. di E. III)

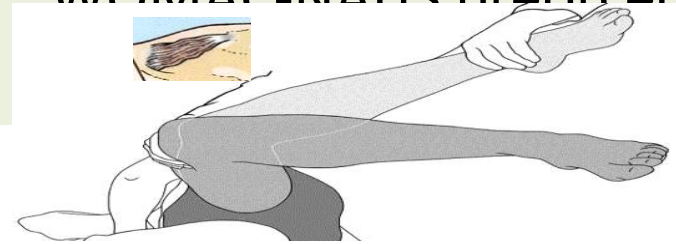
- Pazienti operati dal 2007 al 2015: **135**
- Genere: 104 pazienti femine, 31 maschi.
- Età: media 53 anni (24-78)
- Follow-up: **8,2 anni**, R: 4 - 9)

Metodo

Criteri di inclusione

- GTPS sintomatico con rotura G III
- Rotture parziali (Thomas II): durata > 4 mesi, fallimento del trattamento conservativo (PRP + RHB).
- Esami clinici positivi
- (+ Test Ossendorf obbligatorio)
- Risonanza magnetica: ipersegnale all'inserimento del gluteo medio nel segnale T2 o GAP alterato nei tagli coronale T1, obliqua-assiale o sagittale.
- (Pazienti OA che richiedono THA)

- Test di Ossendorf- SAAT
- Patrick-Faber test
- Lequesne test
- Segno di Trendelenburg
- WOMAC-NAHS preop ed



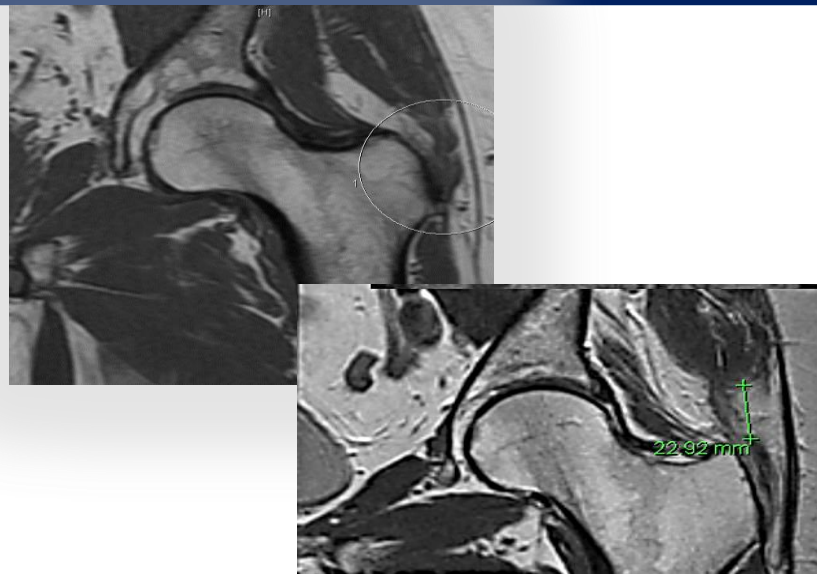
Test di Ossendorf

100% patognomónico ad I F I
Ossendorf et al. Int Orthop. 2011

Metodo

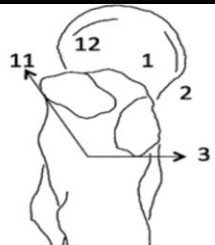
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- GTPS sintomatico
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- (Pazienti OA che richiedono THA



MRI: preop e ai 6 mesi Follow-up
Esame ecografico mensile postoperatorio

Complicazioni registrate



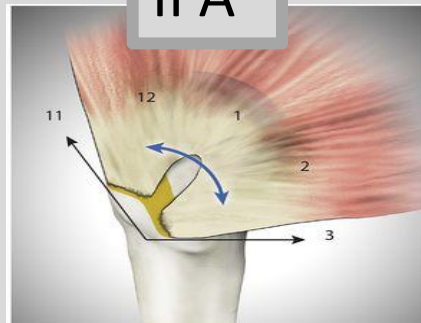
Classificazione delle rotture di glutei

Combinata di Thomas e Milwaukee

- Rottura **PARZIALE** (Thomas II, Milwaukee I-II) ...

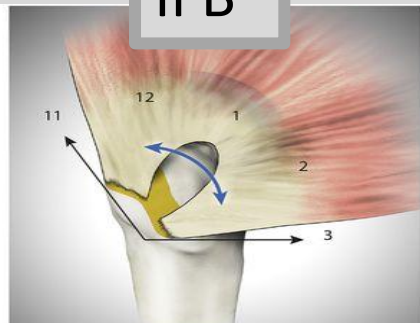
81

II A



Grade I tear going from 12:35 to 1:25

II B



Grade II tear going from 12:05 to 1:55

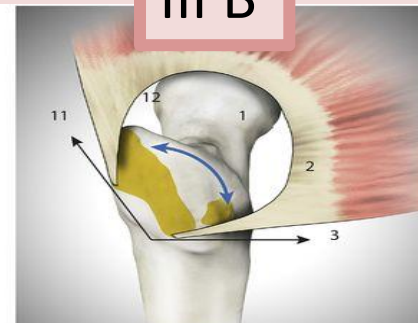
Thomas II

III A



Grade III tear going from 11:35 to 2:25

III B



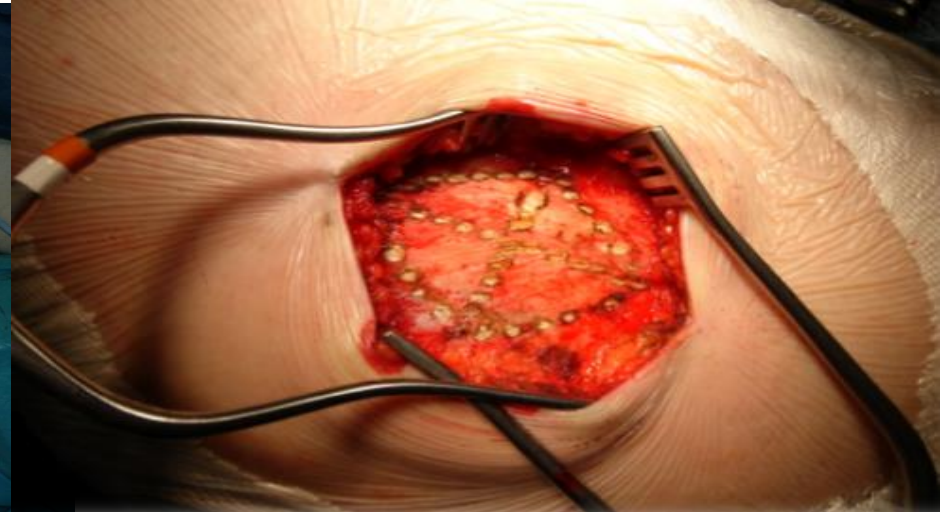
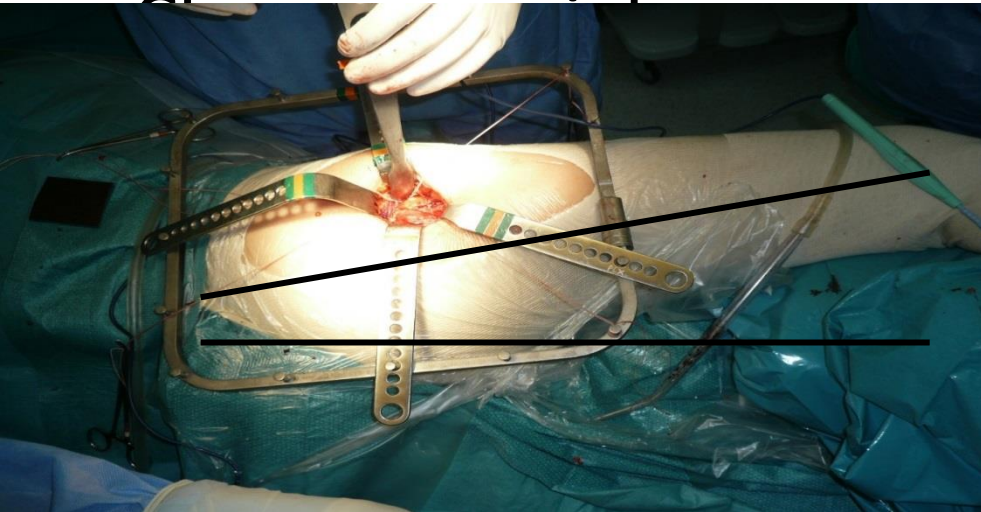
Grade IV tear going from 11:15 to 2:45

Thomas III

Thomas et al. IOT 2006

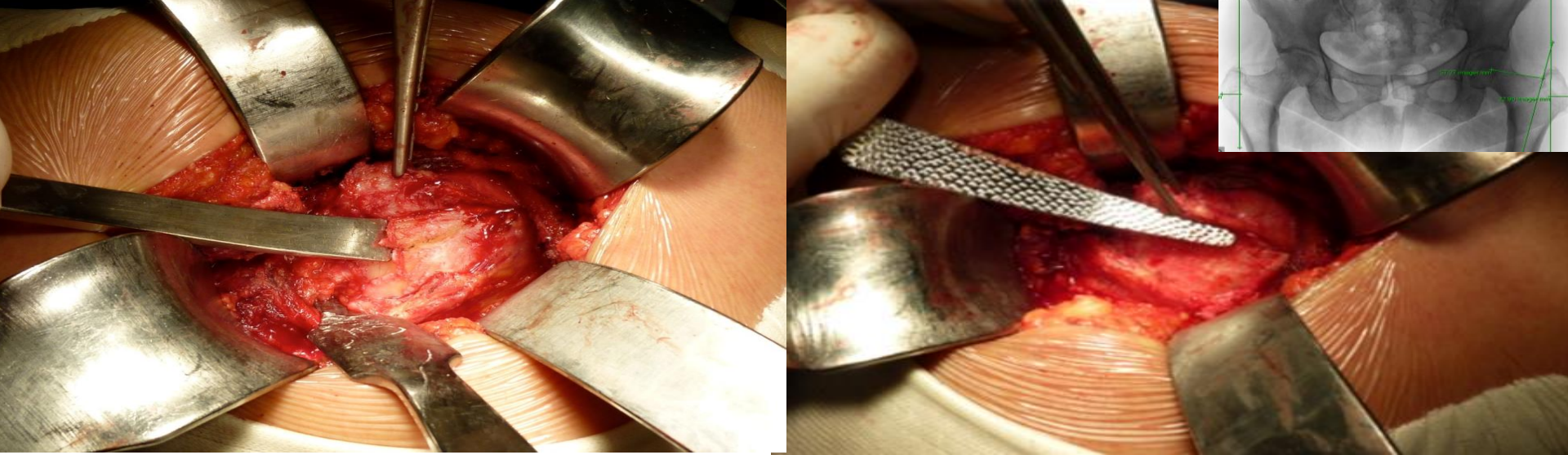
Tecnica chirurgica

- Incisione cutanea laterale di 4 - 12 cm lungo il GT
Se osservata marcata coxa saltans molto: tecnica di



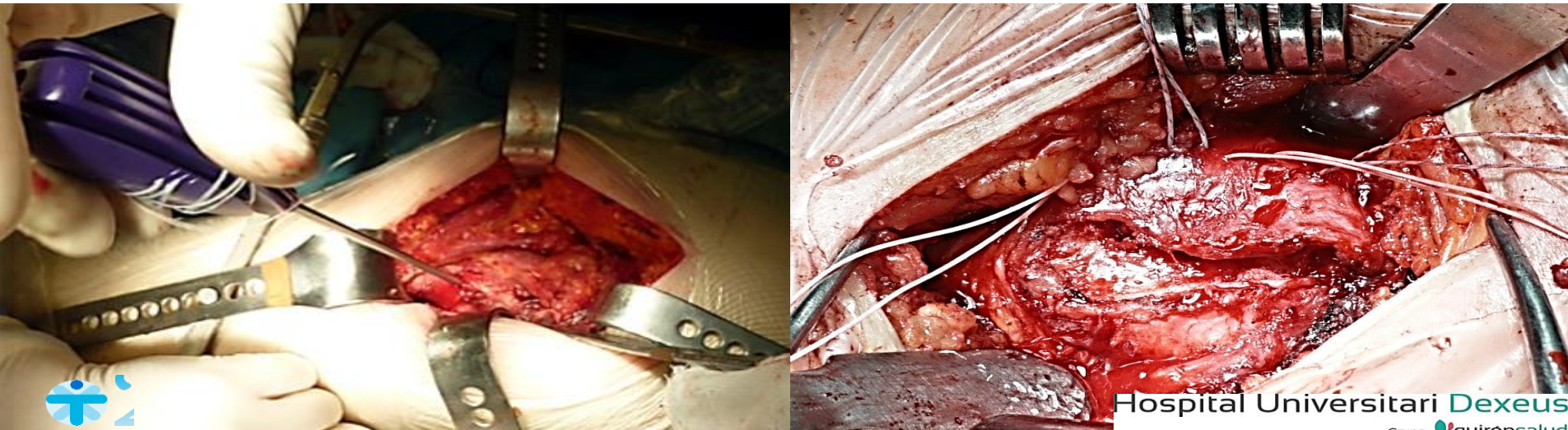
Tecnica chirurgica

- Osteoplastica GT *ad minimum* secondo pianificazione con effetto rimodellante e riduzione dell'offset



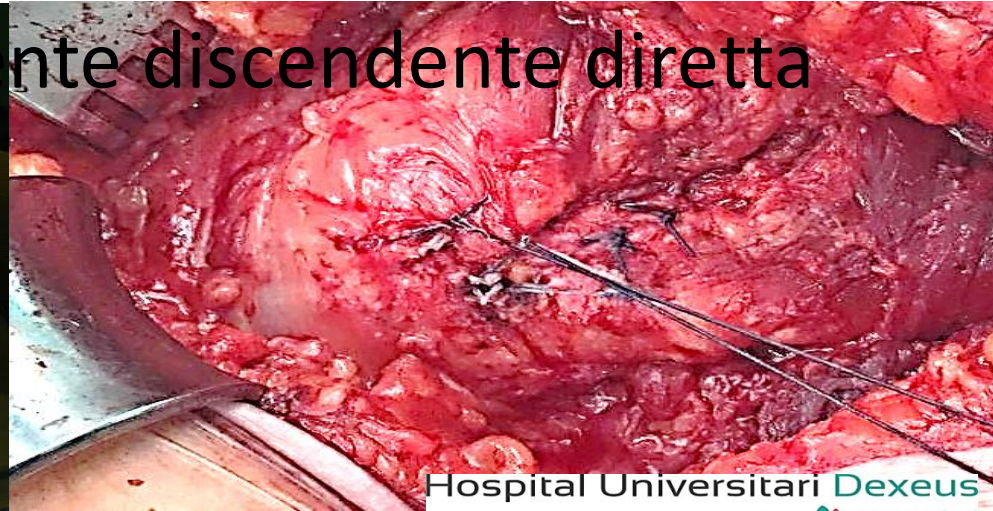
Tecnica chirurgica

- Ricollocamento della cuffia abduktoria mediante suture non assorbibili ad alta fissazione.
- Sutura di aumento della cuffia : ascendente di



Tecnica chirurgica

- Ricollocamento della cuffia abduktoria mediante suture non assorbibili ad alta fissazione.
- Sutura di aumento della cuffia : ascendente di Krakow e successivamente discendente diretta



Regime Post-op

- Catetere intralesionale con Ropivacaina e keterolaco per 48 ore.
- Ricovero in ospedale per 2 giorni.
- Carico parziale immediato per 6 settimane.



• RHB immediata: ABD attiva ed

Risultati

	Ossendorf -	p	Patrick-Fabere	Lequesne -	Trendelemburg -
Thomas II	75/81 (92,6%)	<0,001	71/81	76/81	75/81 (92,6%)
Thomas III	47/54 (84,5%)	<0,032	47/54	48/54	38/54 (70,4%)
Global	122/135 (92,4%)	<0,01	118/135 (87,6%)	128/135 (94,8%)	113/135 (83,7%)

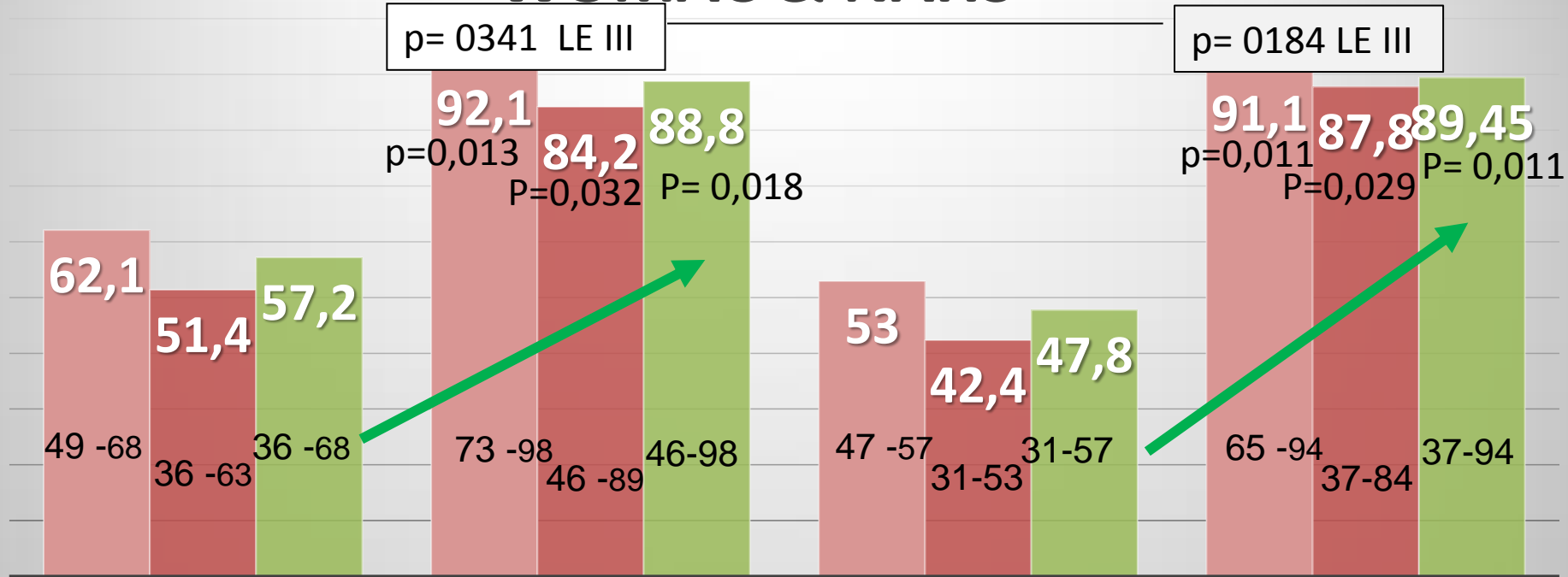


Ossendorf (-)

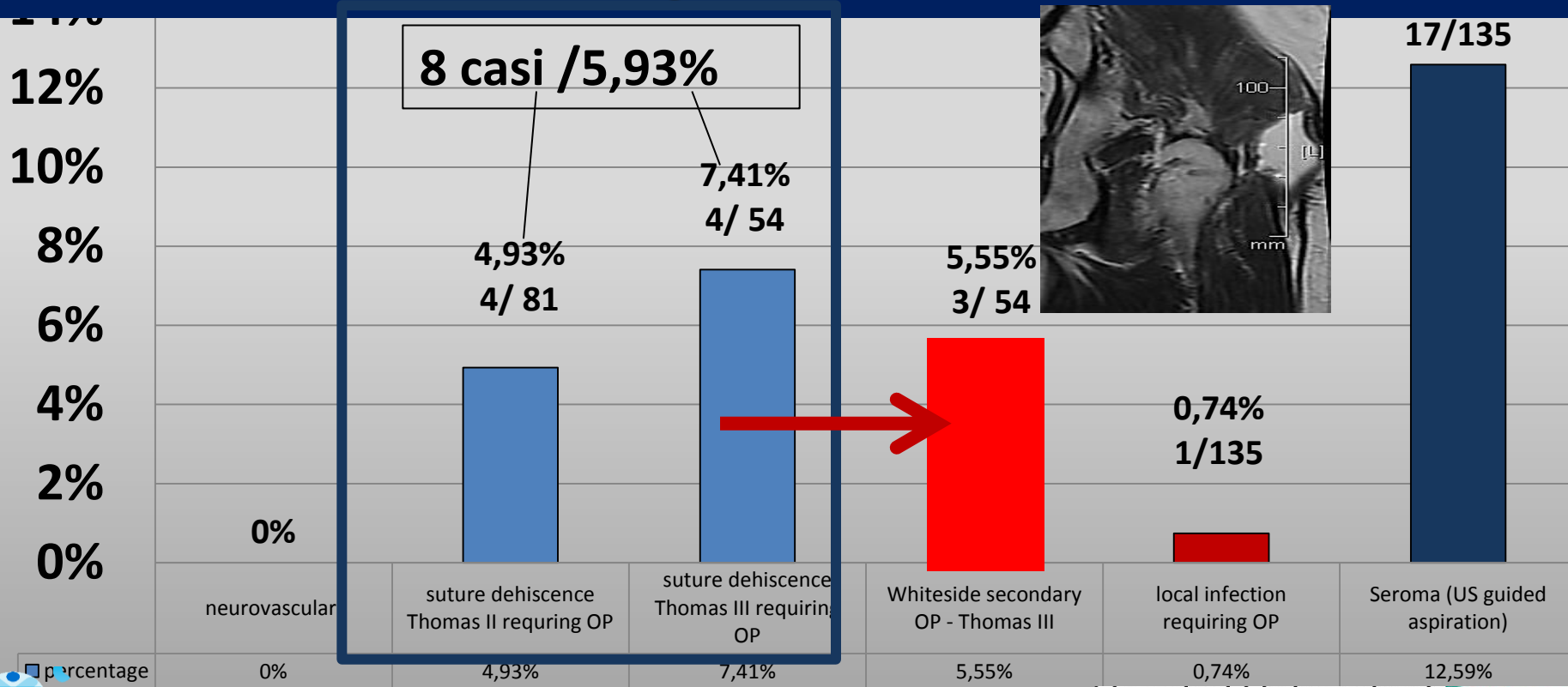


Resultati

WOMAC & NAHS

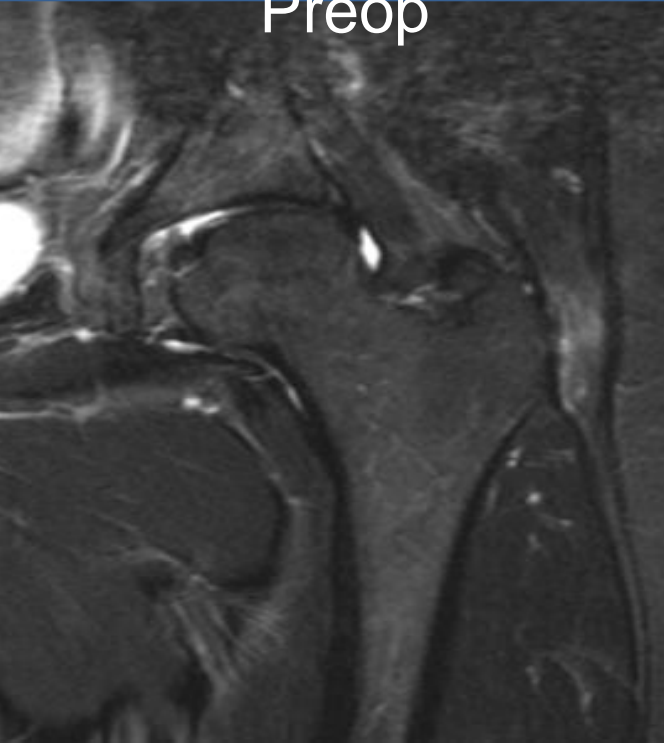


Complicazioni

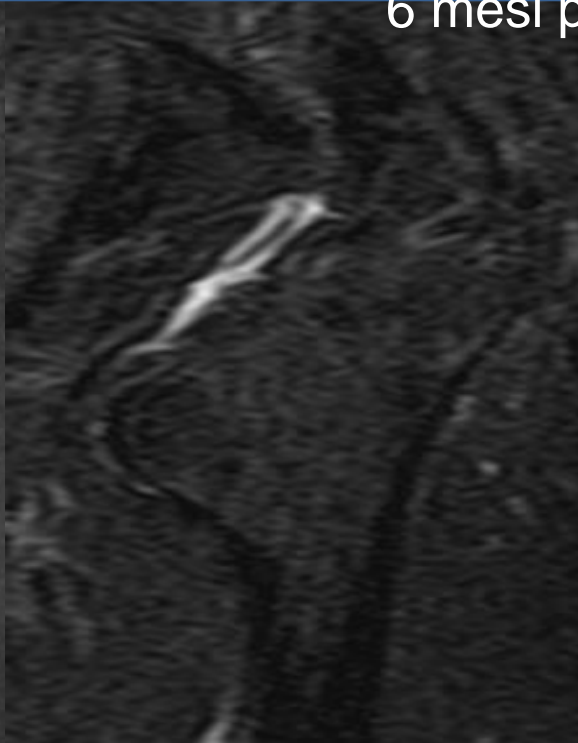


Esempi

Preop



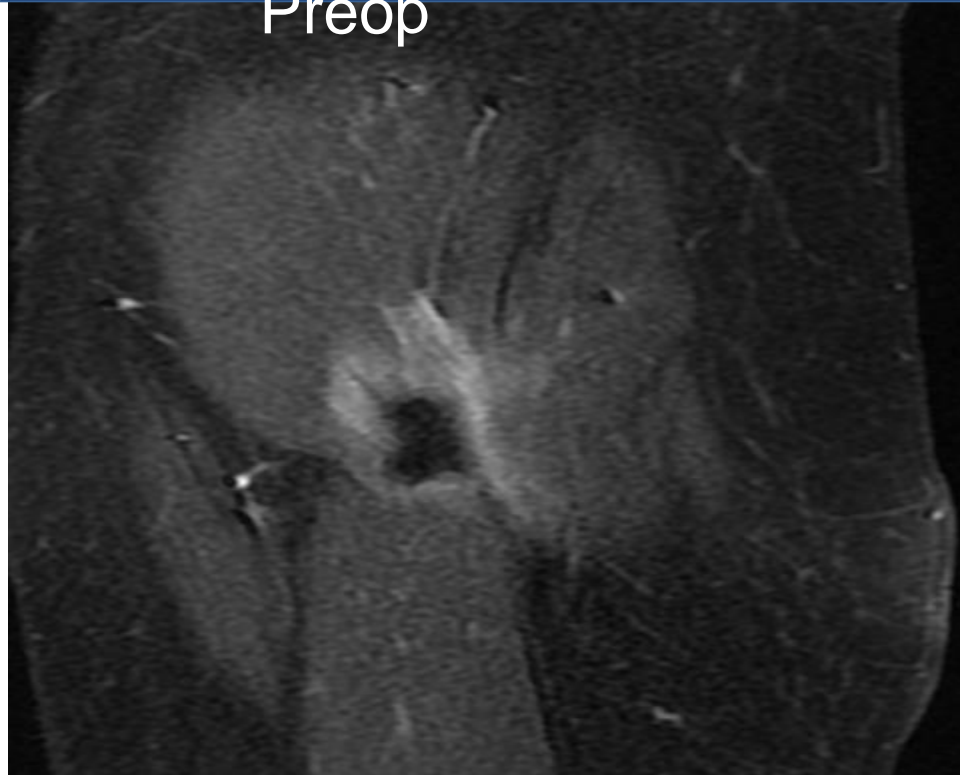
6 mesi postop



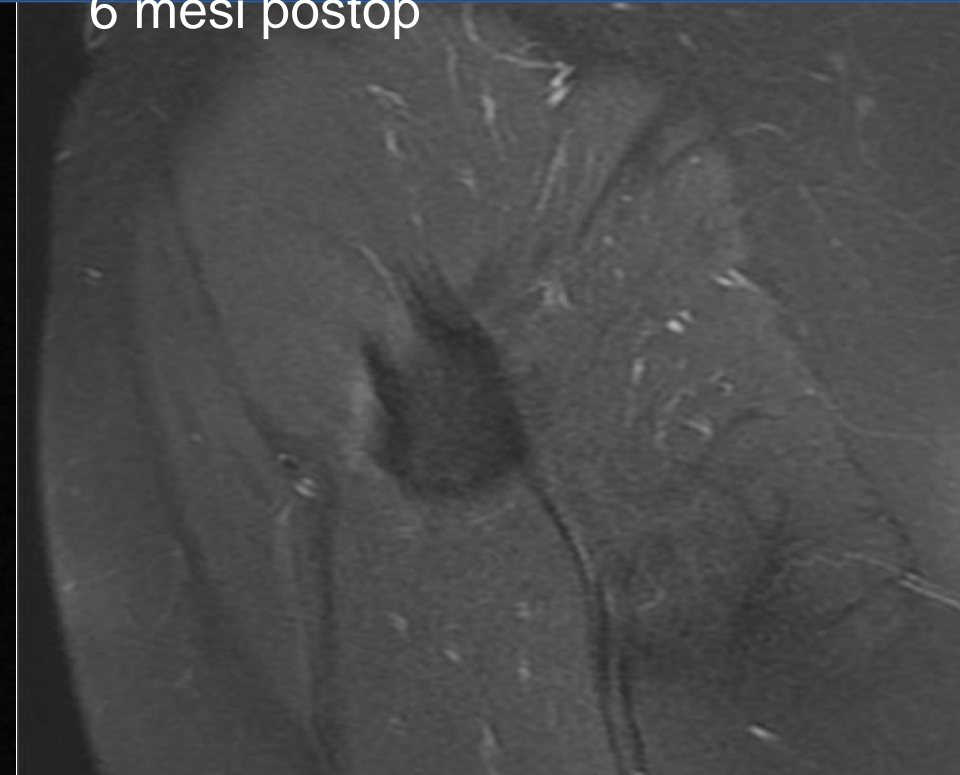
Rottura gluteo medio - Thomas II

Esempi

Preop



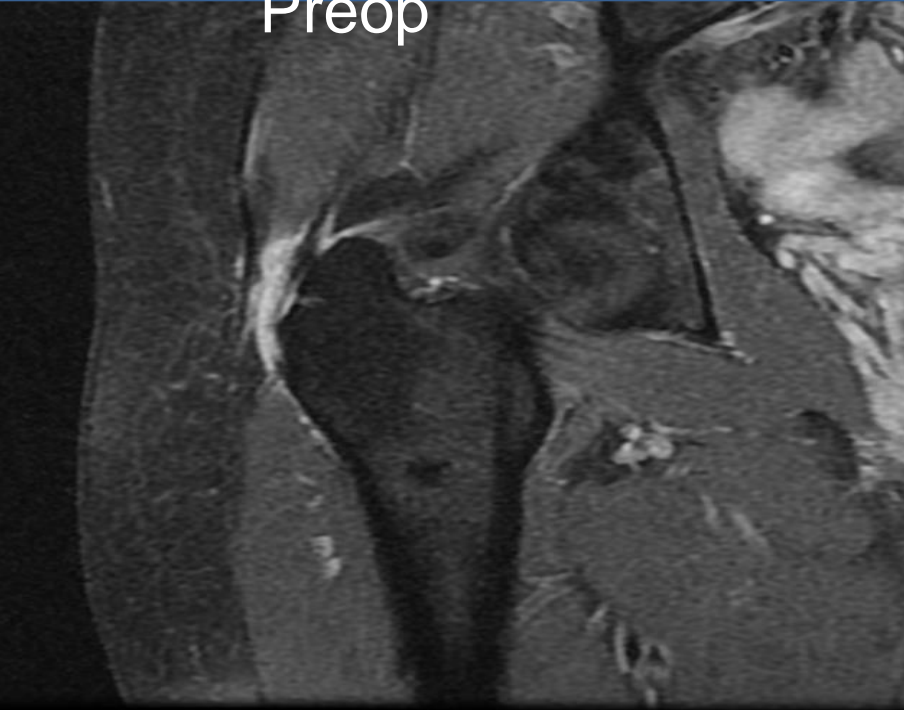
6 mesi postop



Rottura gluteo medio - Thomas II

Esempi

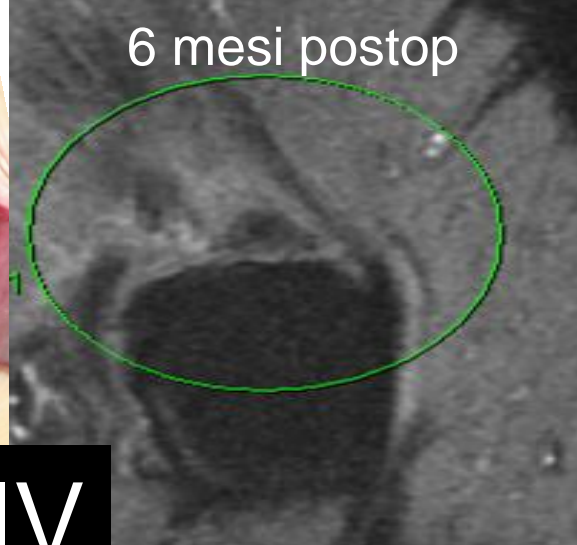
Preop



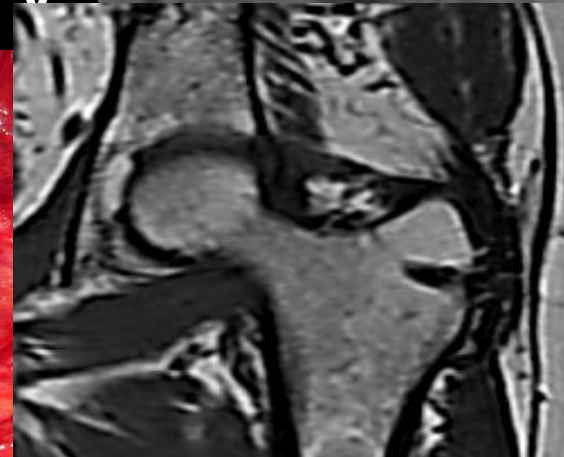
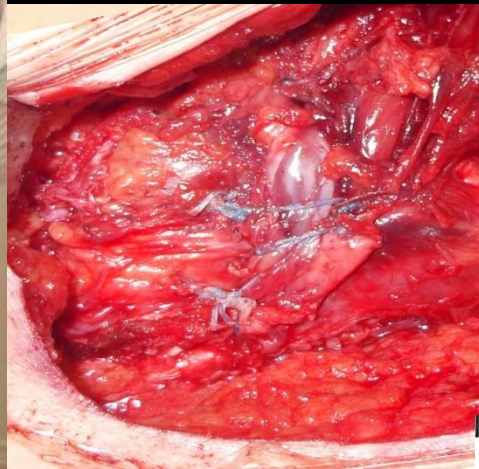
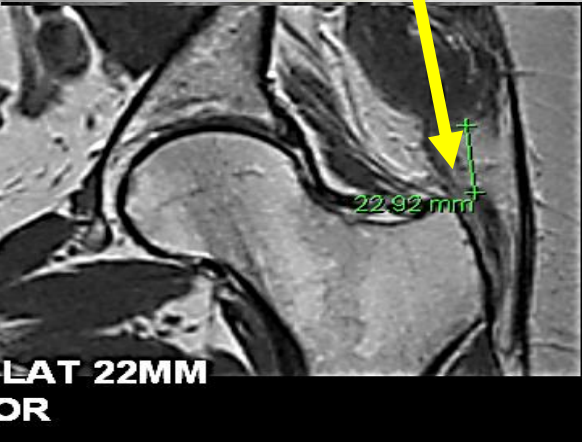
6 mesi postop

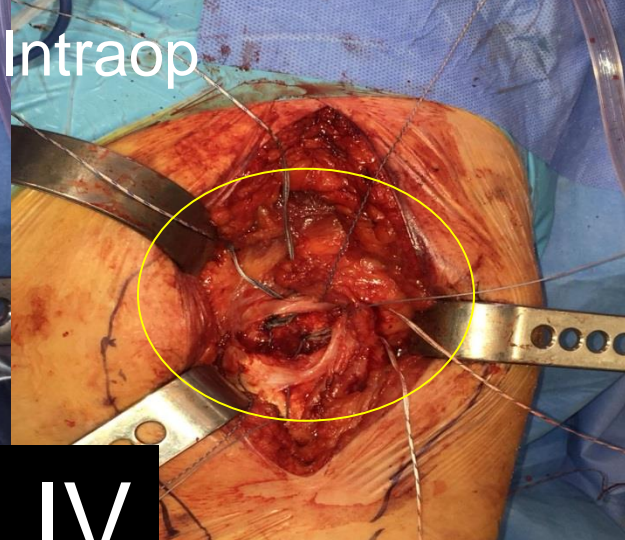
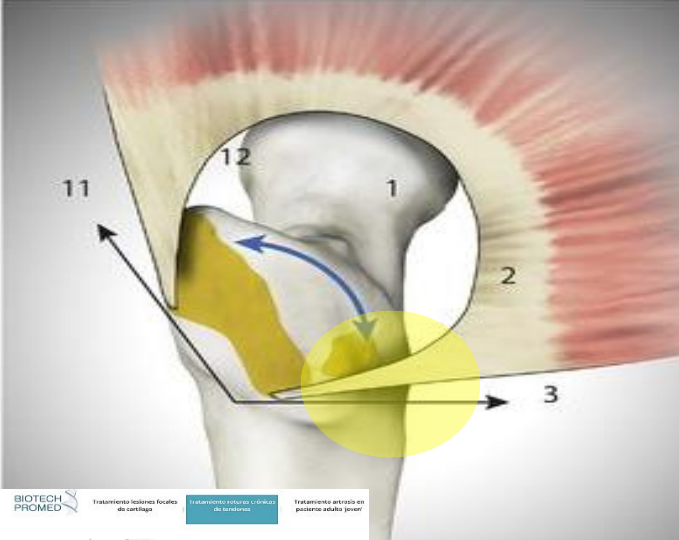


Rottura gluteo medio - Thomas III



Milwaukee IV





Visione Intraop

Milwaukee IV

BIOTECH PROMED

Tratamiento lesiones focales de cartilago Tratamiento lesiones extensas de cartilago Tratamiento artrosis en paciente adulto joven

Contenido



Videos Técnicas quirúrgicas - Reconstrucción Cápsula Superior y Técnica de Reparación Glúteo medio- Epiflex biotechpromed.com

<https://biotechpromed.com/tecnicas-de-aumentacion-de-tendones-y-reconstruccion-capsular/reconstruccion-capsula-superior-y-tecnica-de-reparacion-gluteo-medio-epiflex/>

<https://biotechpromed.com>



Hospital Universitari Dexeus

Grupo Quirónsalud



Esempio a medio - lungo termine

T1

Preop

6,5 anni postop



Rottura gluteo medio - Thomas III

Hospital Universitari **Dexeus**
Grupo **quironsalud**

Esempio a medio - lungo termine

T2

Preop

6,5 anni postop

Rodriguez Mendez, Maria Aurea
48A 5H.Mujer.00309996
Cr:8
Pos.:1,30 mm
N.º cuenta: DEX148014
Cor:
Ec:1
Paciente Pos: FFS
Estudio Desc: RESONANCIA MAG CADERA
Serie Desc: COR OBL SE T1 FS CAD AFECTA
< 8 - 8 >

R
660.00/0.00/11.00
Et:1 TA:90.00
512x512
Enc: ^
1Siguiente



OSP DEXEUS
Ribas Fernandez, Manu
Previo 1
15/07/2009 18:17:54
234% Plus
DFOV 14,3 x 11,4 cm
EC 4,00 min

2 cm

C 598
A 1198

Rodriguez Mendez, Maria Aurea
57A 6H.Mujer.00309996
Cr:9
Pos.:27,09 mm
N.º cuenta: DEXC1810809000
Cor:
Ec:1
Paciente Pos: FFS
Estudio Desc: RESONANCIA M. CADERA
Serie Desc: Cor T2 FS DRET
< 4 - 9 >

R
4164.00/71.28
Et:16 TA:90.00
512x512
Enc: ^
4Siguiente



HOSP DEXEUS RM3
Ribas Fernandez, Manu
Actua
[16/10/2018 18:20:09
219% Fix
DFOV 15,2 x 12,2 cm
EC 3,00 min

2 cm

C 598
A 1198

Rottura gluteo medio - Thomas III

Esempio a medio - lungo termine

T2

Preop



6,5 anni postop



Rottura gluteo medio - Thomas III

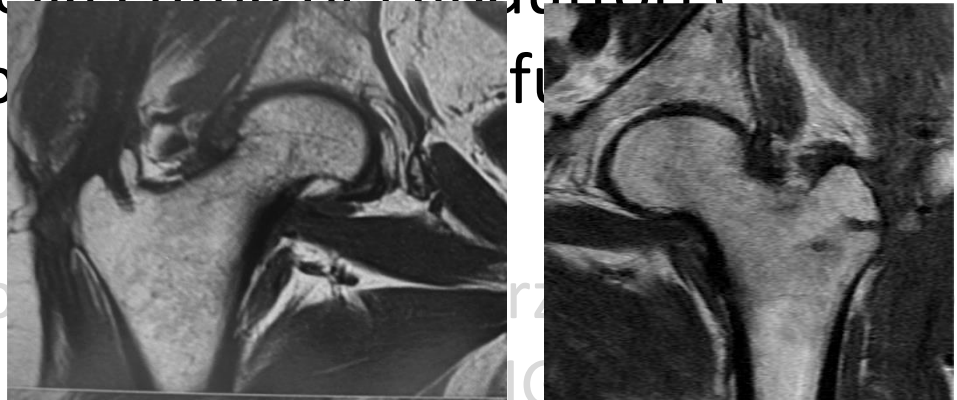
Hospital Universitari **Dexeus**
Grupo **quironsalud**

Conclusioni

1. Le rotture di gluteo isolate non possono essere sottovalutate. È possibile prevedere il rischio di estensione della lesione o persino il deterioramento grasso.
2. Il trattamento chirurgico della cuffia dei abductori è efficace in termini di miglioramento clinico-funzionale.
3. I risultati del reinserimento delle rotture parziali (II G) sono leggermente superiori alle più estese (\geq III G).

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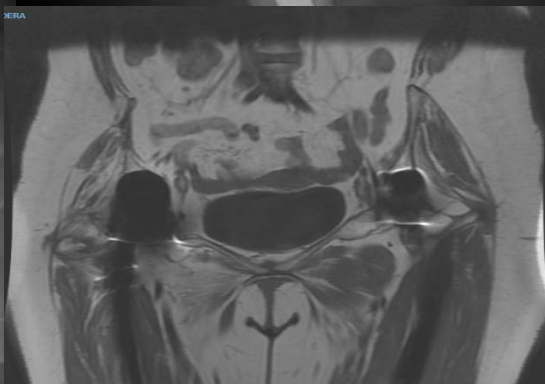
O.U. Dexeus: il nostro algoritmo ...

Thomas I	Conservativo	Infiltrazioni ecoguidate di PRP s (LE I @ 2 a + RHB)
Thomas II Milwaukee I	conservativo vs chirurgico	preferibilmente ancore di HA cercare impronta – AC / miniopen
Thomas II Milwaukee II	conservativo vs chirurgico	AC / miniopen
Thomas III Milwaukee III	chirurgico	Miniopen vs aperto in base alle caratteristiche del paziente
Thomas III Milwaukee IV	chirurgico	Miniopen vs aperto in base alle caratteristiche del paziente
Riparazione diretta non riuscita	chirurgico	Lembo gluteo : Tecnica di Whiteside

Doppia revisione della cuffia abductoria:

Destra : osteoplastica del GT con lembo di Whiteside

Sinistra: ricostruzione acetabolare + doppia mobilità + osteotomia discesa GT



Doppia revisione della cuffia abductoria:

Destra : osteoplastica del GT con lembo di Whiteside

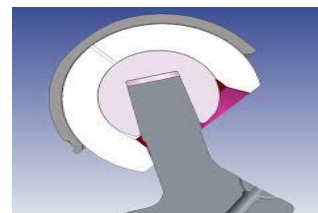
Sinistra: ricostruzione acetabolare + doppia mobilità + osteotomia discesa GT



Lembo di Whiteside - indicazioni

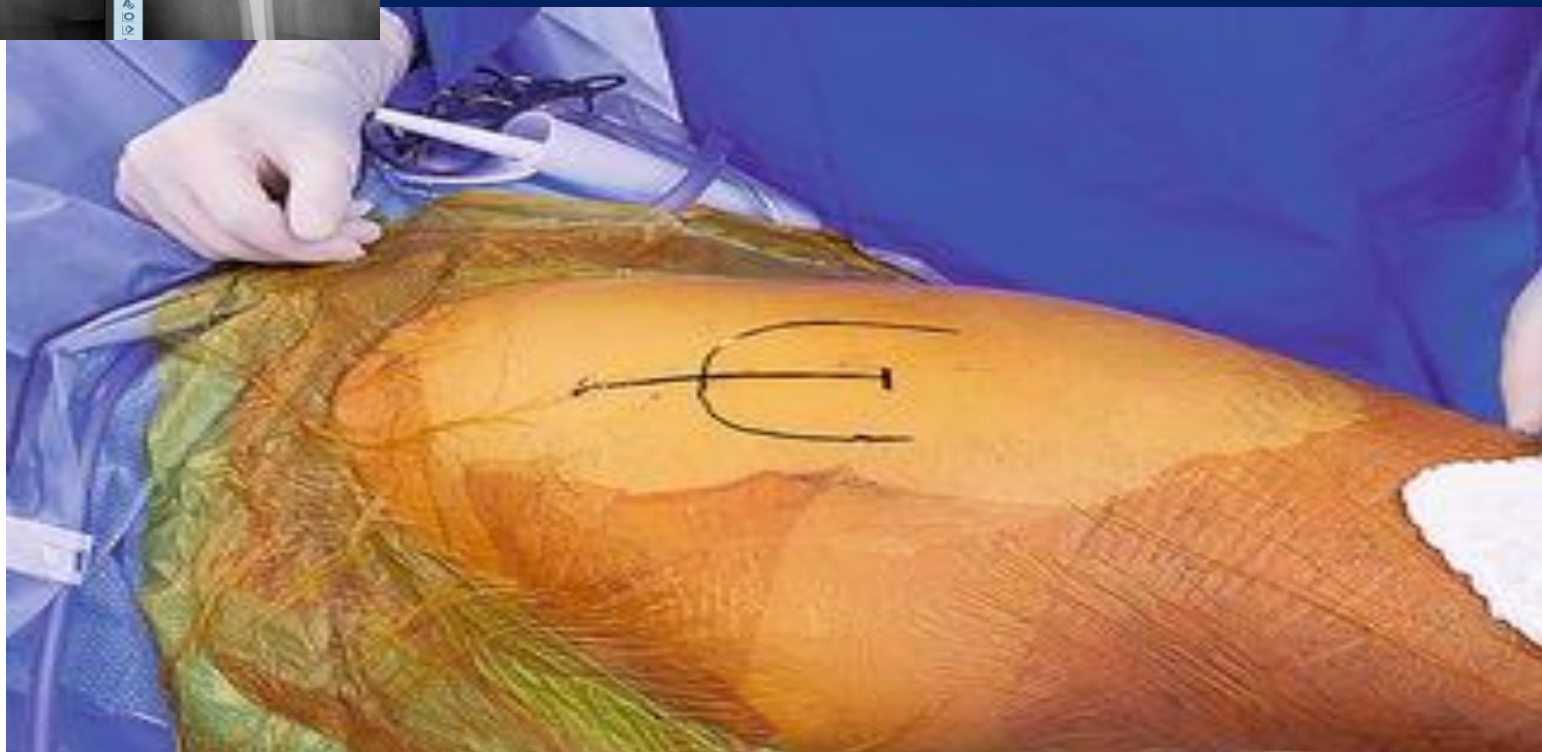
University Hospital Dexeus - Indicazioni

- Riparazione diretta non riuscita
- Chirurgia di revisione con afettazione glúteo medio –minore
- Degenerazione grassa della cuffia abduktoria
- Sequele neuromuscolari
- Tumori
- Disfunzione dopo accesso anterolaterale



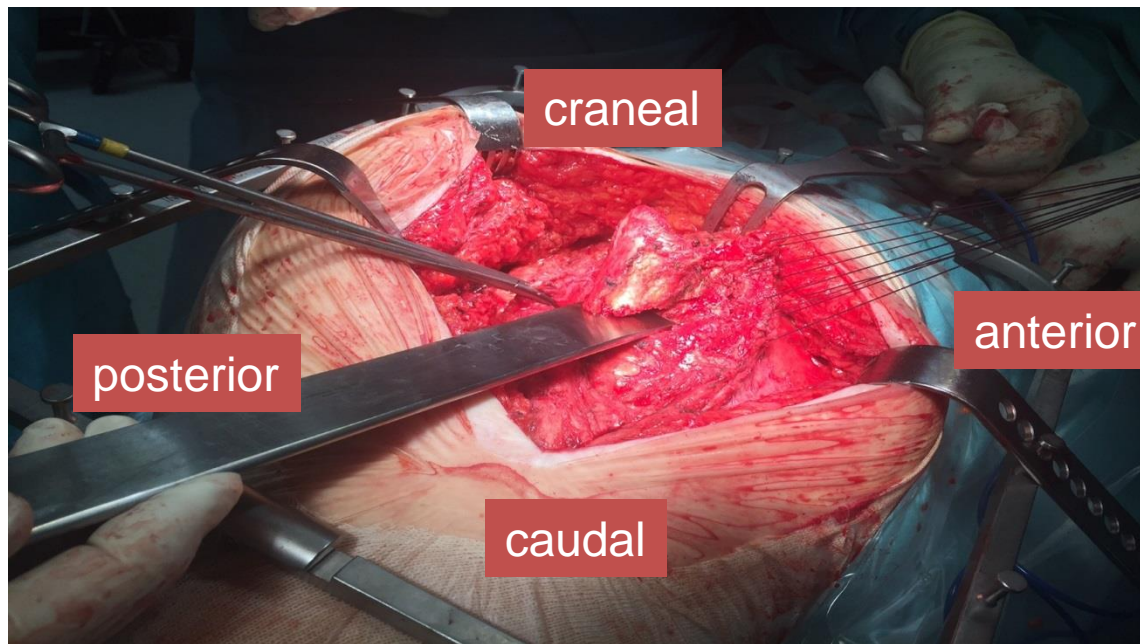
*Sempre avere una
doppia mobilità in
mano*

Tecnica

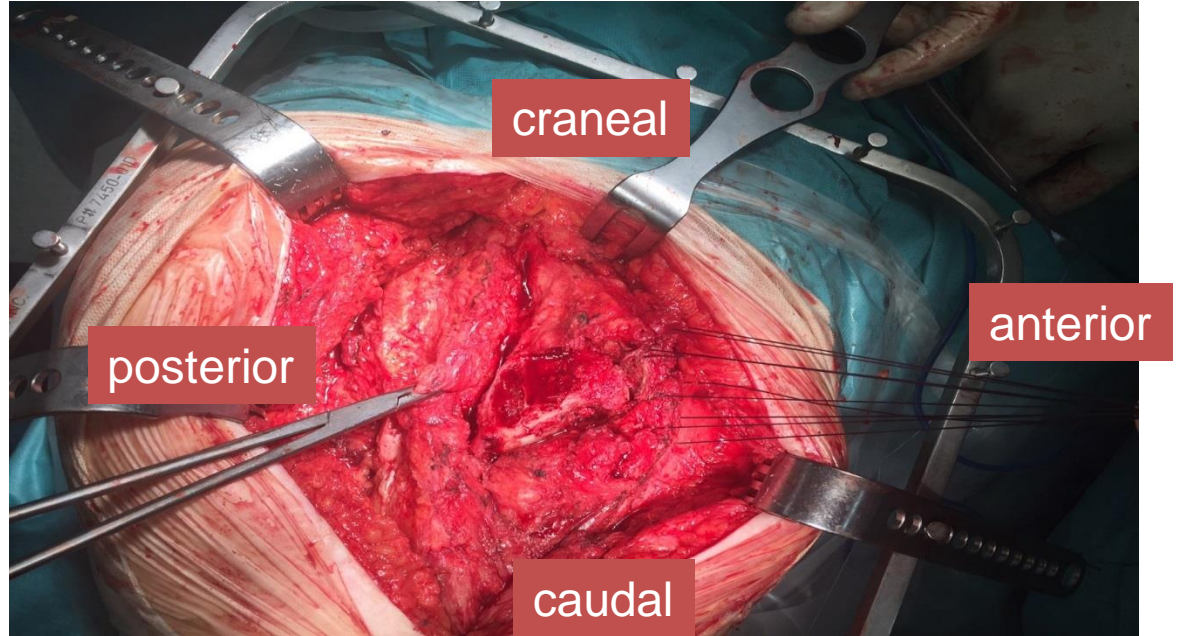
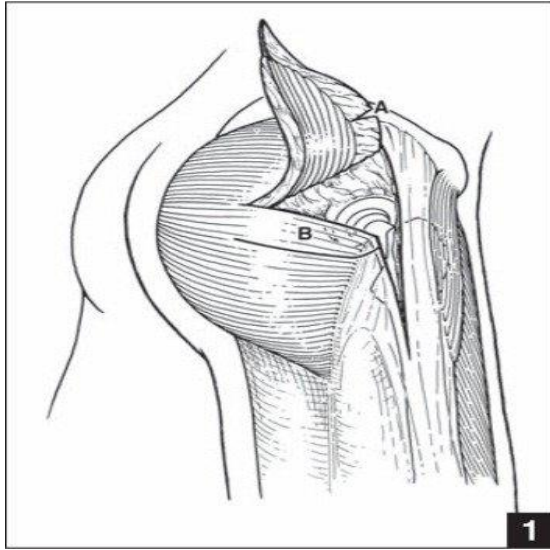




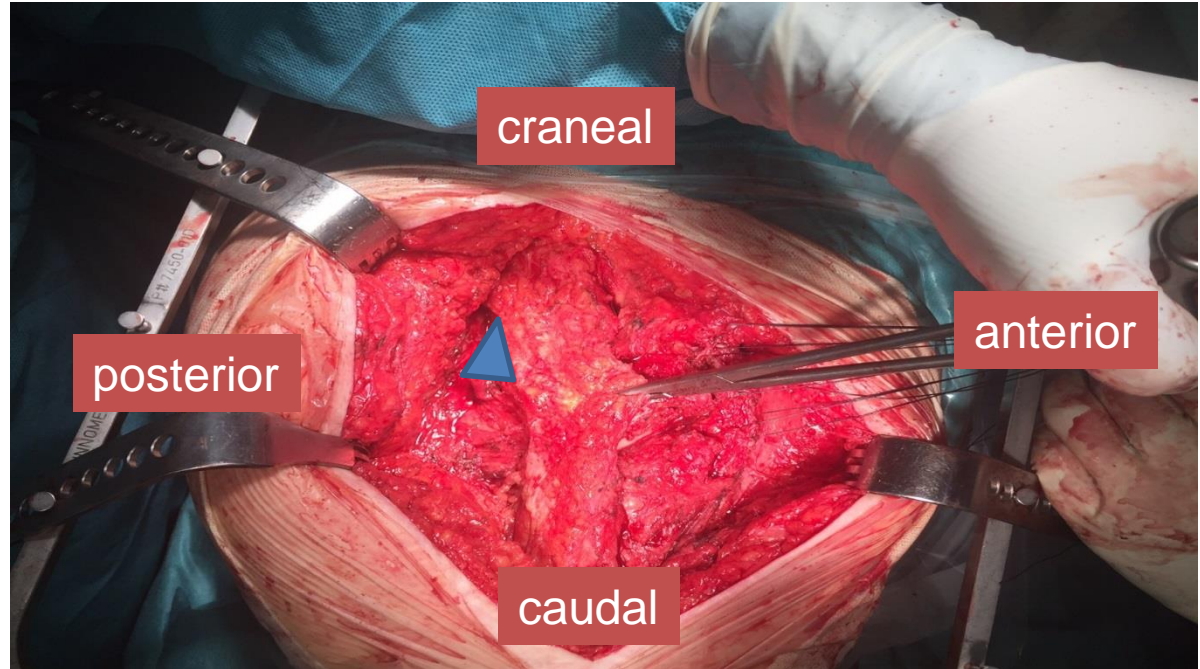
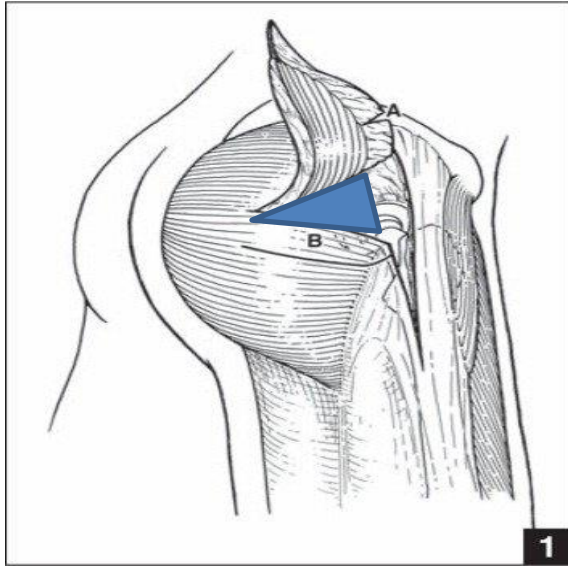
Tecnica



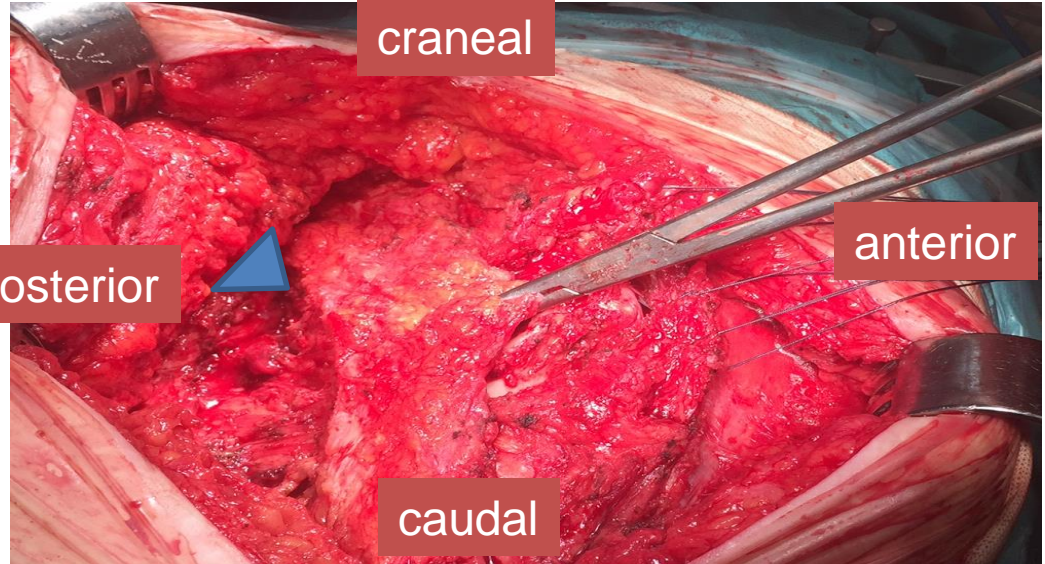
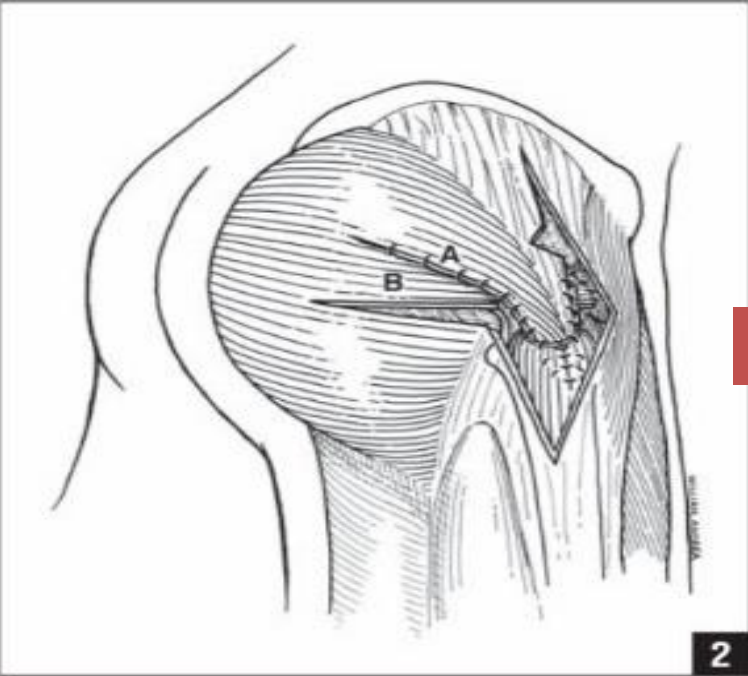
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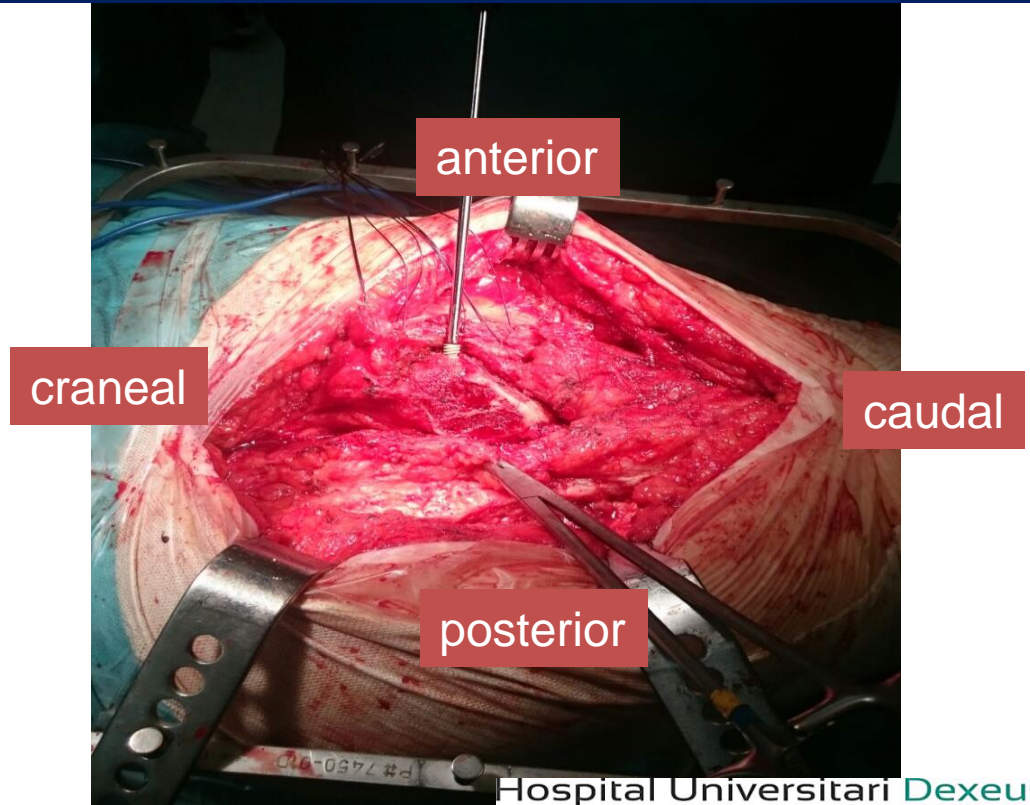
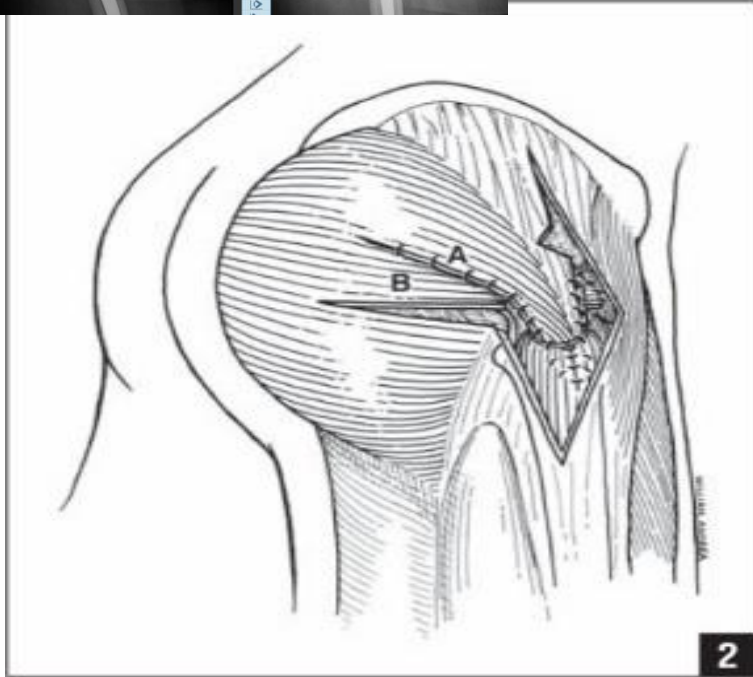
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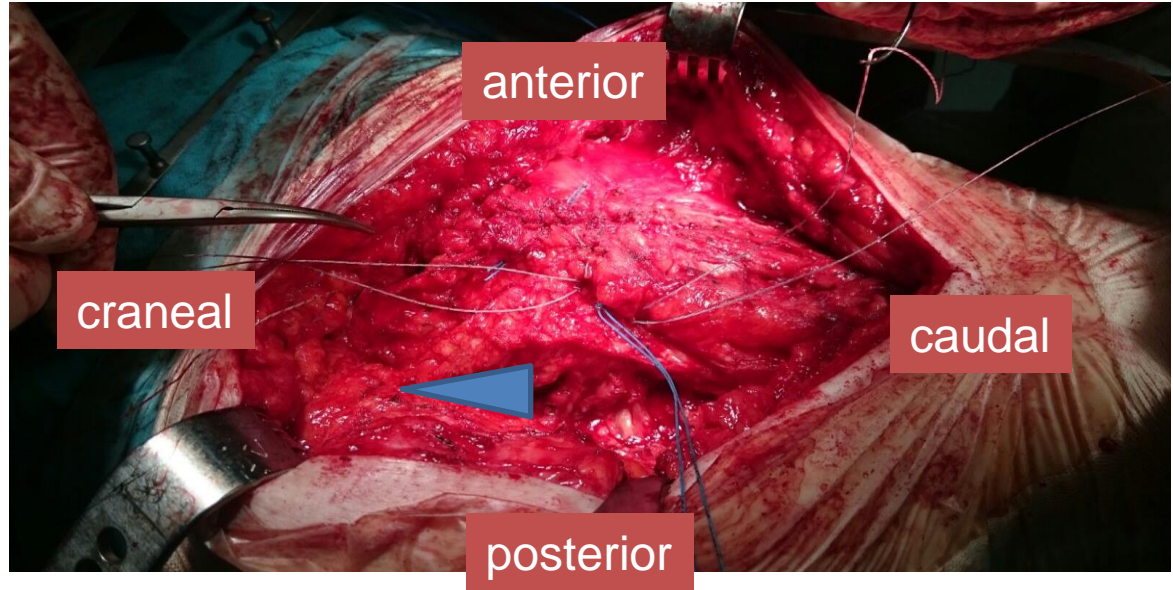
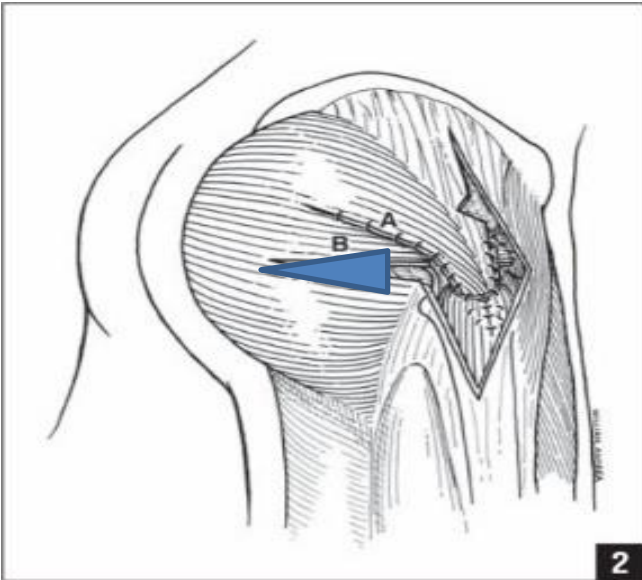
Tecnica



Tecnica

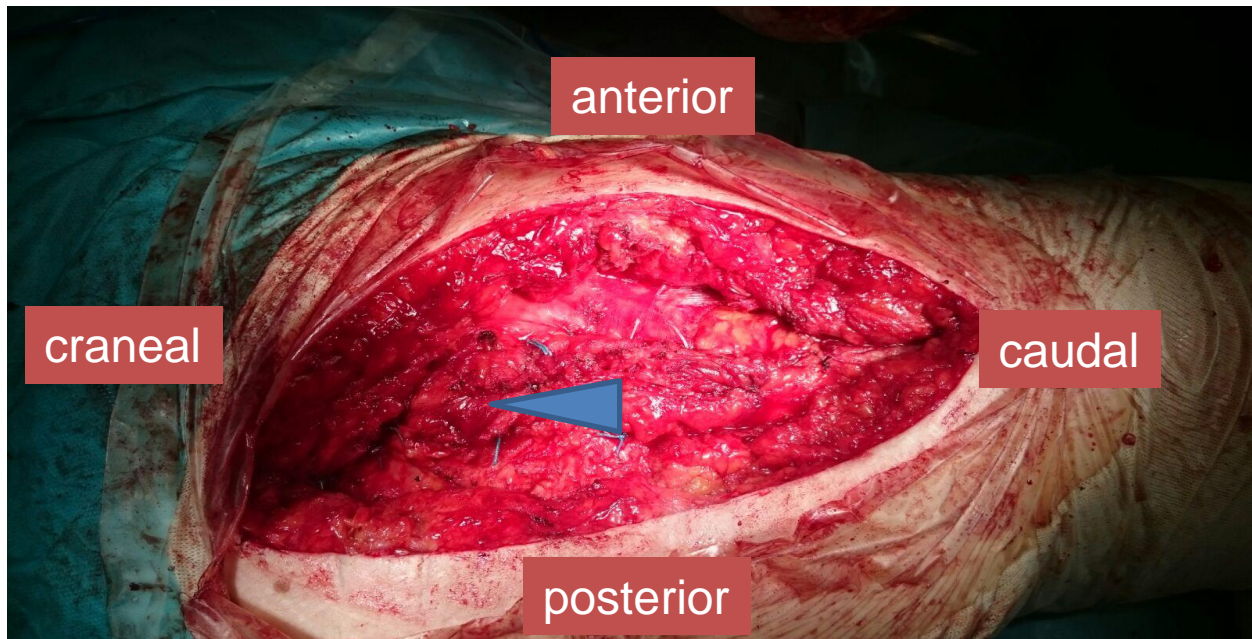
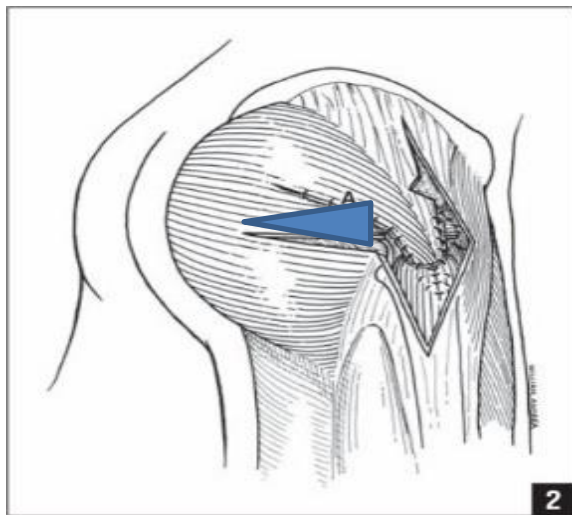


Tecnica





Tecnica



Lembo di Whiteside : 24 ore postop





**17 - 19 OCTOBER 2019
MADRID, SPAIN**

Host Chairs
Dr Oliver Marin-Pena & Dr Luis Perez Carro

Programme Chair
Professor Damian Griffin

www.ishaconference.com



Li aspettiamo il prossimo mese a Madrid

2^o

EUROPEAN HIP SPORT MEETING

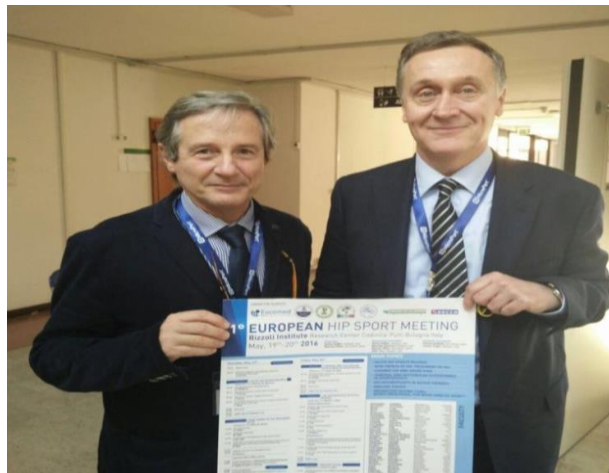
F.C.Barcelona
facilities

Barcelona, Spain

Auditorium 1899

Septembre 18-19th,

2020



... e li aspettiamo il prossimo anno a Barcellona





FC BARCELONA
MEETINGS & EVENTS

Auditorium 1899

18-19 settembre 2020





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Restiamo sempre a vostra completa disposizione



Hospital Universitari Dexeus
Grupo Quirónsalud



Grazie per la vostra attenzione