SAPIENZA
UNIVERSITÀ DI ROMA

Pietro PERSIANI

Infezioni osteoarticolari in età pediatrica

URGENZA DIAGNOSTICA E TERAPEUTICA

EPIDEMIOLOGIA

INFEZIONI ETÀ PEDIATRICA:

- Respiratorie
- Urinarie
- Digestive
- OSTEOARTICOLARI

1965 → 2004

INCIDENZA STABILE

0,07/0,16 $\%_0$

Incidence and Characteristics of Arthritis in Norwegian Children: A Population-Based Study

Øystein Rolandsen Riise, MD, MPH[a,b], Kai Samson Handeland, MD[a], Milada Cvancarova, MSc[c], Karl-Olaf Wathne, MD, PhD[d], Britt Nakstad, MD, PhD[d,e], Tore Gunnar Abrahamsen, MD, PhD[f], Eva Kirkhus, MD[g], Berit Flatø, MD, PhD[a]

Downloaded from www.pediatrics.org by on November 20, 2008

J. Paediatr. Child Health (2005) 41, 59–62

Acute osteomyelitis and septic arthritis in children

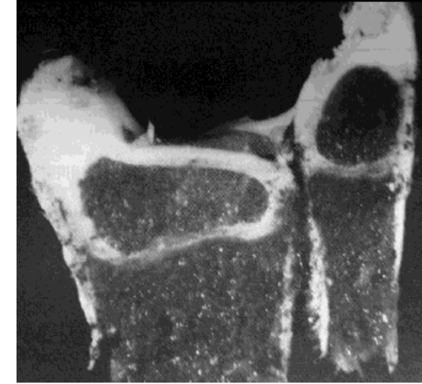
ED Goergens,[1] A McEvoy,[1] M Watson[2] and IR Barrett[1]

Epidemiology and physiopathology of osteoarticular infections in children (newborns except)

E. Grimprel[1,2*], R. Cohen[1,3]

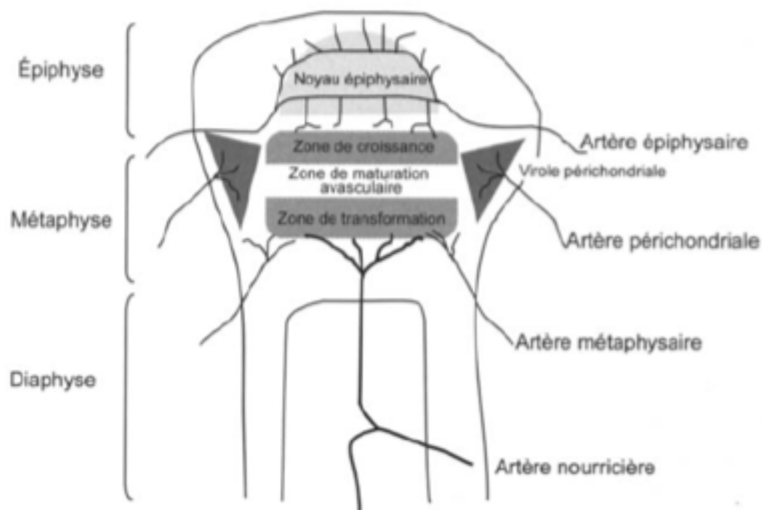
Archives de pédiatrie 14 (2007) S81-S85

CLASSIFICAZIONE



LOCALIZZAZIONE PRIMITIVA:

- Artriti settiche
- Osteomieliti



Epidemiology and physiopathology of osteoarticular infections in children (newborns except)

E. Grimprel[1,2*], R. Cohen[1,3]

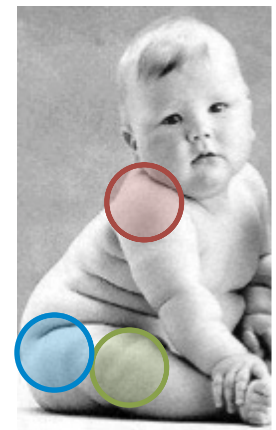
Archives de pédiatrie 14 (2007) S81-S85

METAFISI INTRA-ARTICOLARE:

Spalla

Anca

Ginocchio



Trueta J. The three types of acute haematogenous osteomyelitis. A clinical and vascular study. J Bone Joint Surg (Br) 1959 ; 41 : 671-80.

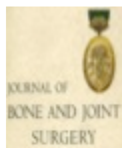
ARTRITE SETTICA

OSTEOARTRITE DEL NEONATO

UNICA ENTITA' NOSOLOGICA

OSTEOMIELITE SUB-ACUTA

OSTEOMIELITE



ACUTE HAEMATOGENOUS OSTEOMYELITIS AND SEPTIC ARTHRITIS—A SINGLE DISEASE

AN HYPOTHESIS BASED UPON THE PRESENCE OF TRANSPHYSEAL BLOOD VESSELS

MARK ALDERSON, DAVID SPEERS, KERRY EMSLIE, SYDNEY NADE

From the University of Western Australia

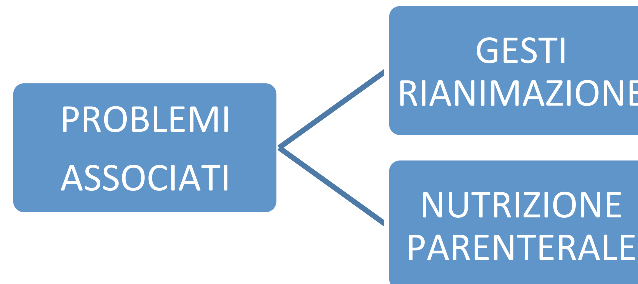
J Pediatr Orthop. 2000 Jan-Feb;20(1):40-3.

The incidence of joint involvement with adjacent osteomyelitis in pediatric patients.

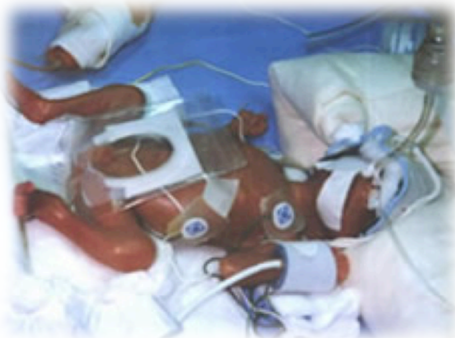
OSTEOARTRITE DEL NEONATO

EZIOLOGIA / 1

ESTENSIONE RAPIDA DELL' INFEZIONE VERSO L' EPIFISI E L' ARTICOLAZIONE



- Prelievi femorali
- Puntura tallone
- Catetere d' infusione



J Bone Joint Surg Am. 1971 Apr;53(3):538-44.

Suppurative arthritis of the hip joint in infancy. A persistent diagnostic problem and possible complication of femoral venipuncture.

EZIOLOGIA /2

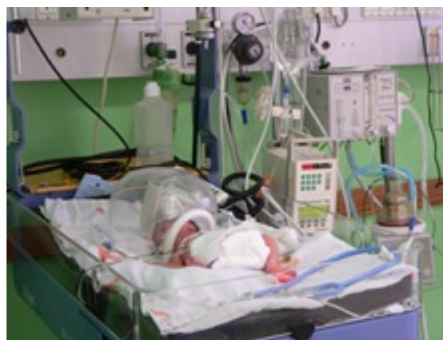
GERMI

- S. Aureus
- Streptococco
- Enterobacteri
  - Klebsiella
  - Proteus
  - E. Coli
- H. Influenzea
- Pneumococco

INFEZIONI FUNGINEA

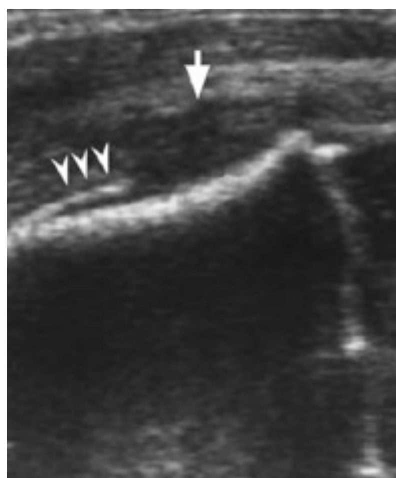
S. AUREUS METICILLINO RESISTENTE

DIAGNOSI



MANIFESTAZIONI SETTICEMICHE

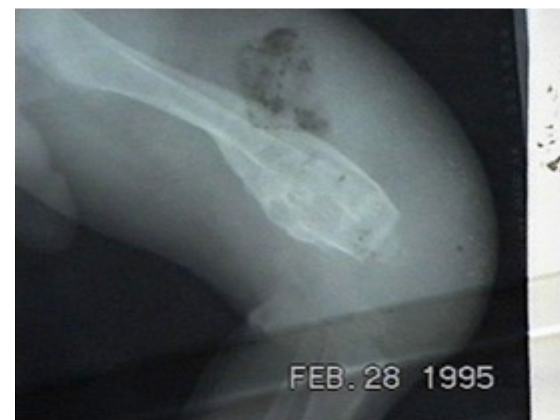
LOCALIZZAZIONE ARTICOLARE MISCONOSCIUTE



ECOGRAFIA

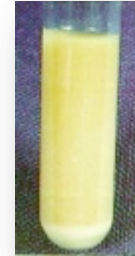
RADIOGRAFIA TARDIVA

- Lussazione patologica
- RIMODELLAMENTO E REAZIONE PERIOSTALE



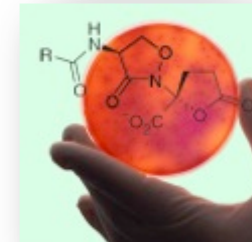
TRATTAMENTO

1. PUNTURA ARTICOLARE
   - Decompressione
   - Prelievo



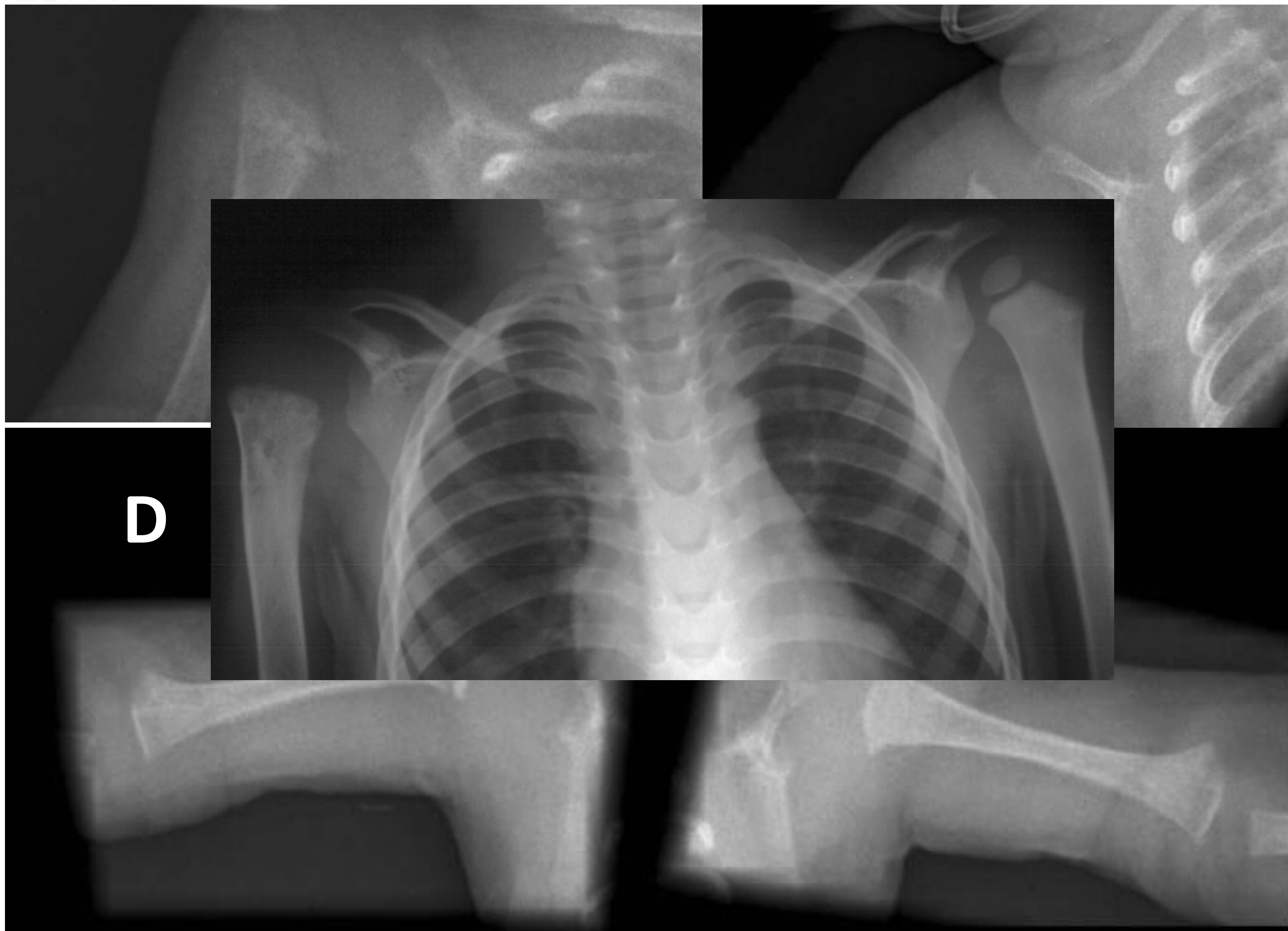
2. ANTIBIOTICO EMPIRICO
   - Oxacillina
   - Cefalosporina di 3° generazione
   - Vancomicina (se MRSA)

3. ANTIBIOTICO MIRATO



4. DECOMPRESSIONE ARTICOLARE
   - Artrotomia

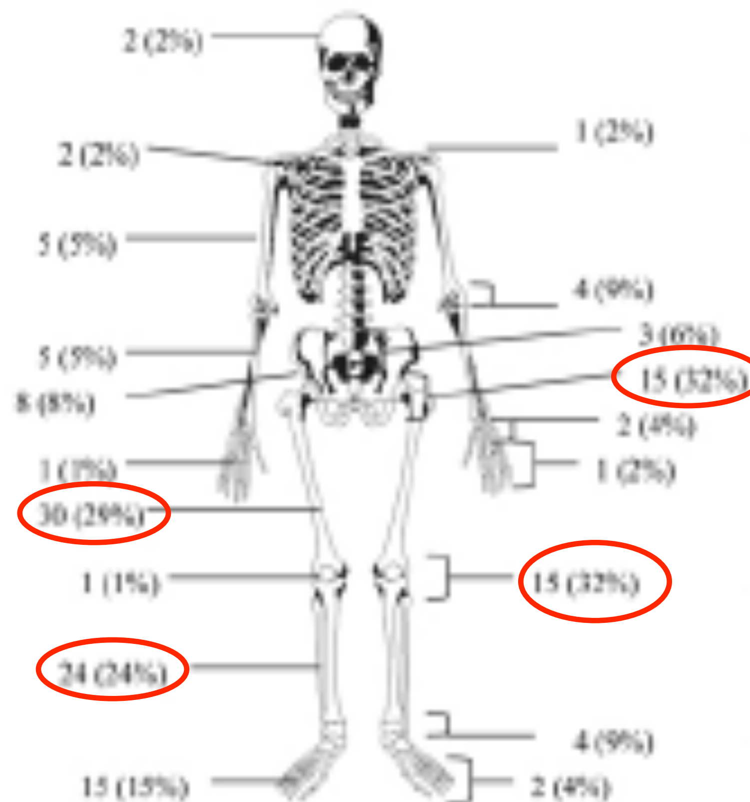
ESITI



OSTEOMIELITE ED ARTRITE SETTICA

OAE = ACUTA EMATOGENA

- 1/5000 età sotto 13aa
  - 50% sotto 5aa
  - 30% sotto 2aa
- Età media 6-9aa
- Ossa arti inferiori



Essaddam H, Hammou A. Ostéomyélites. Encycl Med Chir (Elsevier, Paris), Radiodiagnostic, Neuroradiologie, Appareil locomoteur, 31-218-B-10, 1998 : 18 p.

PATOGENESI/1

BATTEREMIA

- POSTPRANDIALE
- GERMI INCAPSULATI
  - H.Influenzae
  - Pneumococco
  - Meningococco

STAFILOCOCCO AUREUS

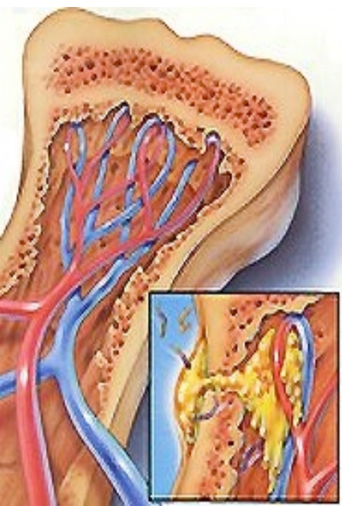
PATOGENESI/2

RUOLO DELL' ANATOMIA VASCOLARE

Al livello dei sinusoidi venosi metafisari si riduce il flusso → Si riduce la capacità delle cellule endoteliali di fagocitare → Trombizzazione dei vasi ↓

Fase cellulitica → Formazione pus → sollevamento periosrtio ↓

Aumento della pressione → Riduzione della vascolarizzazione → Necrosi SEQUESTRO



Damsin JP, Djenadi K, Josset P, et al. Cartilage de croissance et croissance en orthopédie. Encycl Méd Chir (Elsevier, Paris), Appareil locomoteur, 14-009-A-10, 1996. 13p.

PATOGENESI/3

RUOLO TRAUMA INIZIALE

- È dibattuto
- Nel 40% dei casi si evidenzia all' anamnesi

RALLENTAMENTO FLUSSO DEI SINUSOIDI VENOSI

MICROEMATOMI

FLOGOSI

Ruzic JC, Rombouts-Godin V, Drouart A,Rombouts JJ. Infections articulaires et traumatismes fermés. In : Les infections ostéo-articulaires à germes banals. Paris : Masson ; 1998. p. 257-61.

ScienceDirect

Épidémiologie et physiopathologie des infections ostéoarticulaires chez l'enfant (nouveau-né exclu)

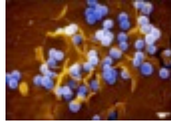
Epidemiology and physiopathology of osteoarticular infections in children (newborns except)

E. Grimprel, R. Cohen

PATOGENESI/4

RUOLO della VIRULENZA BATTERICA

S. Aureus



PROTEINE ADESIVE

MATRICE EXTRA CELLULARE
FIBRINOGENO
FIBRONECTINA
COLLAGENE
VITRONECTINA
ELASTINA

PATOGENESI/5

RUOLO DELLO S.AUREUS

- CAPACITA' DI ELUDERE LE DIFESE
  - Proteina A
  - Endotossine
  - Polisaccaride capsulare

- CAPACITA' DI PENETRAZIONE INTRATISSUTALE
  - Esotossine
  - Idrolasi

THE NEW ENGLAND JOURNAL of MEDICINE

Lew DP, Waldvogel FA. Osteomyelitis. N Engl J Med 1997;336:999-1007.

BIOFILM

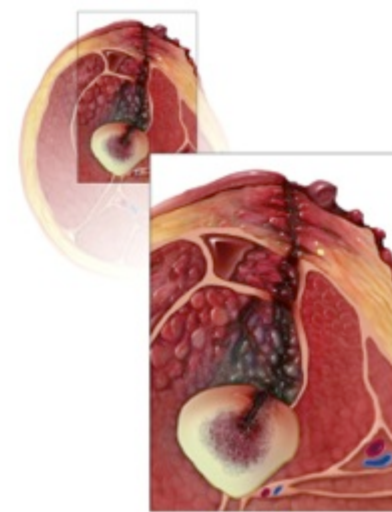
"QUORUM SENSING"

COMUNICAZIONE INTRACELLULARE

THE LANCET

Lew DP LANCET 2004 Vol.364

PRESENTAZIONE

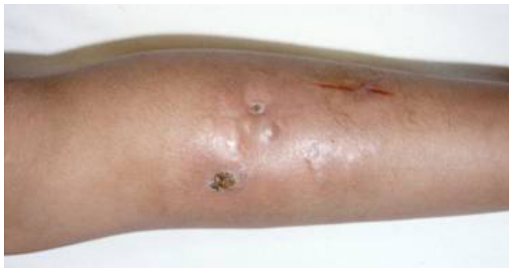


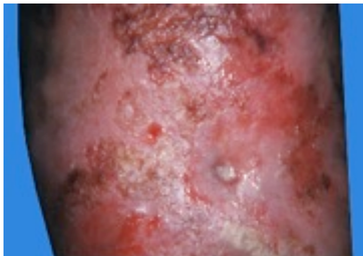
MALESSERE

LIEVE RIALZO FEBBRILE

SINTOMI E SEGNI

FEBBRE ELEVATA





- Concomitante infezione
- Dolore
- Eritema
- Calore
- Tumefazione
- Impotenza funzionale

DD ZOPPIA NEL BAMBINO

Table 2: An Algorithm for Predicting the Probability of Septic Arthritis Based on History of Fever, Non-Weight Bearing, ESR, and WBC

History of fever	Non-weight bearing	ESR >40 mm/h	Serum WBC >12,000 cells per mm³	Predicted probability of septic arthritis (%)
Yes	Yes	Yes	Yes	99.8
Yes	Yes	Yes	No	97.3
Yes	Yes	No	Yes	95.2
Yes	Yes	No	No	57.8
Yes	No	Yes	Yes	95.5
Yes	No	Yes	No	62.2
Yes	No	No	Yes	44.8
Yes	No	No	No	5.3
No	Yes	Yes	Yes	93.0
No	Yes	Yes	No	48.0
No	Yes	No	Yes	33.8
No	Yes	No	No	3.4
No	No	Yes	Yes	35.3
No	No	Yes	No	3.7
No	No	No	Yes	2.1
No	No	No	No	0.1

Adapted from: Kocher MS, Zurakowski D, Kasser JR. Differentiating between septic arthritis and transient synovitis of the hip in children: an evidence-based clinical prediction algorithm. *J Bone Joint Surg Am*. 1999;81:1662-1670.)

99,8%

97,3%

57,8%

48%

3,4%

THE JOURNAL OF BONE & JOINT SURGERY
JB&JS
This is an enhanced PDF from The Journal of Bone and Joint Surgery
The PDF of the article you requested follows this cover page.

Factors Distinguishing Septic Arthritis from Transient Synovitis of the Hip in Children. A Prospective Study

Michelle S. Caird, John M. Flynn, Y. Leo Leung, Jennifer E. Millman, Joann G. D'Italia and John P. Dormans
J Bone Joint Surg Am. 2006;88:1251-1257. doi:10.2106/JBJS.E.00216

Livello evidenza 1

THE JOURNAL OF BONE & JOINT SURGERY
JB&JS
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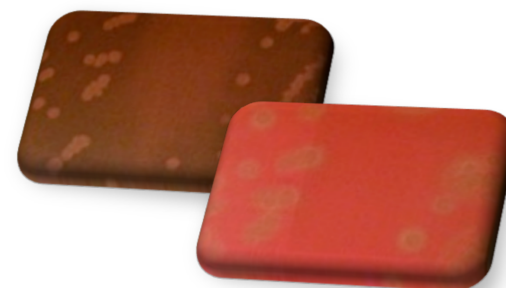
The PDF of the article you requested follows this cover page.

Validation of a Clinical Prediction Rule for the Differentiation Between Septic Arthritis and Transient Synovitis of the Hip in Children

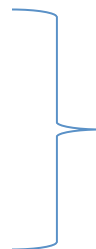
Mininder S. Kocher, Rahul Mandiga, David Zurakowski, Carol Barnewolt and James R. Kasser
J Bone Joint Surg Am. 2004;86:1629-1635.

LABORATORIO

- **Leucociti (neutrofili)**
- **VES**
- **dove e se possibile PCR**



Neonato
Bambino CCS
Drepanocitosi

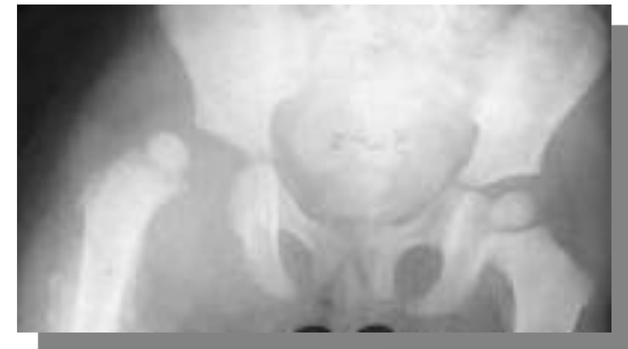


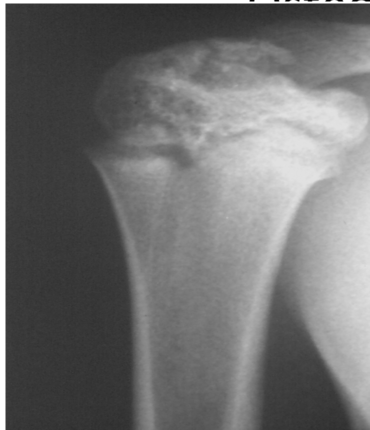
VES Bassa

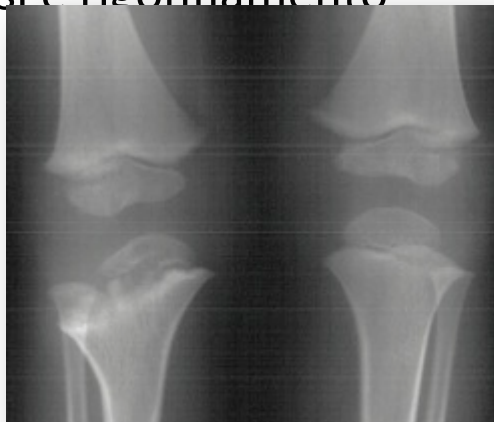
DIAGNOSTICA PER IMMAGINI/ RDX

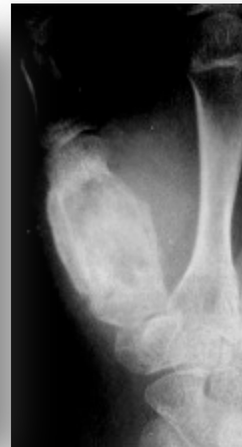
LA RADIOGRAFIA E' SEMPRE IN RITARDO SULLA CLINICA

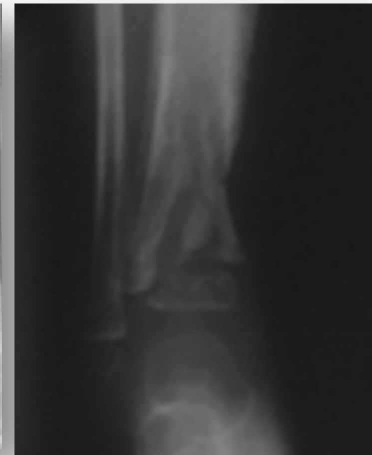
- RIGONFIAMENTO TESSUTI MOLLI (1° segno)
- SCOLLAMENTO PERIOSTALE (3gg)
- LESIONE OSSEA (2 settimane)
  - Lesione a carta geografica
  - Apposizione ossea
  - Sequestro
  - Osteolisi e rigonfiamento

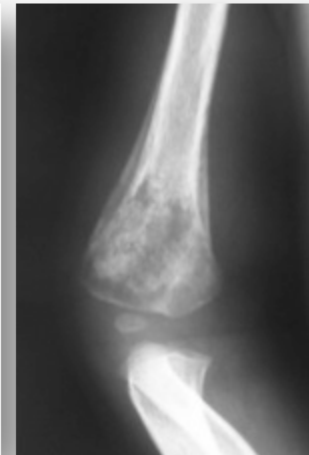






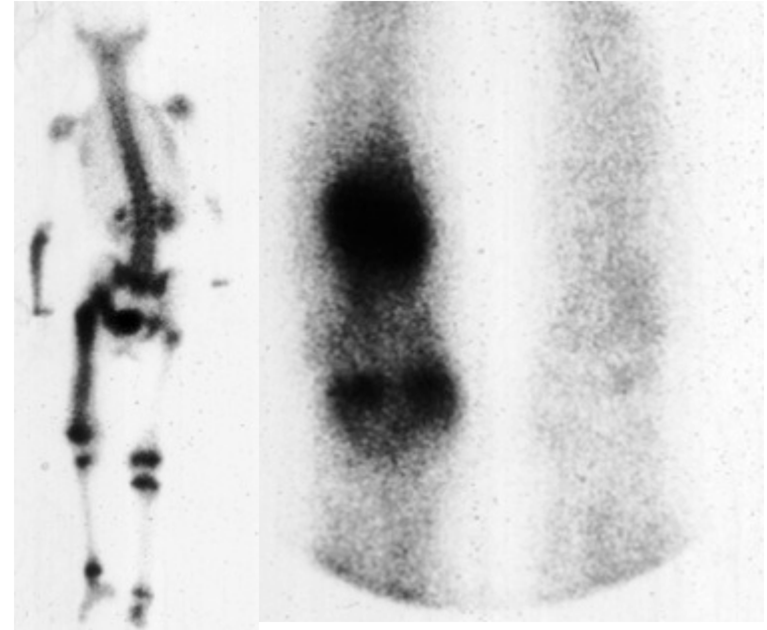


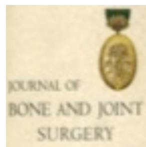




DIAGNOSTICA PER IMMAGINI/ SCINTIGRAFIA

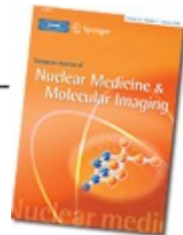
- RUOLO DISCUSSO
- SENSIBILITA' 80%





ISOTOPE BONE SCANNING FOR ACUTE OSTEOMYELITIS AND SEPTIC ARTHRITIS IN CHILDREN

C. E. TUSON, E. B. HOFFMAN, M. D. MANN



Acute Hematogenous Osteomyelitis of Children: Assessment of Skeletal Scintigraphy–Based Diagnosis in the Era of MRI

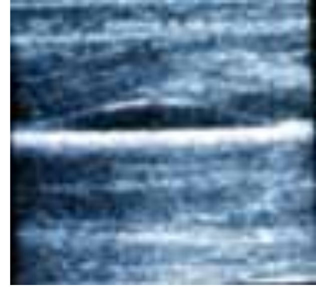
Leonard P. Connolly, MD; Susan A. Connolly, MD; Laura A. Drubach, MD; Diego Jaramillo, MD; and S. Ted Treves, MD

Department of Radiology, Children's Hospital, Boston, Massachusetts

Forme fredde Segno di gravita'

RISCHIO DI RITARDARE LA DIAGNOSI CON ESAME NON INDISPENSABILE

DIAGNOSTICA PER IMMAGINI/ ECOGRAFIA



ASCESSI SUBPERIOSTALI

Protocollo di Tunisi: Ecografia giornaliera per almeno 1 setti a

Essaddam H, Hammou A. Ostéomyélites. Encycl Med Chir (Elsevier, Paris), Radiodiagnostic, Neuroradiologie, Appareil locomoteur 31-218-B-10, 1998 : 18 p.

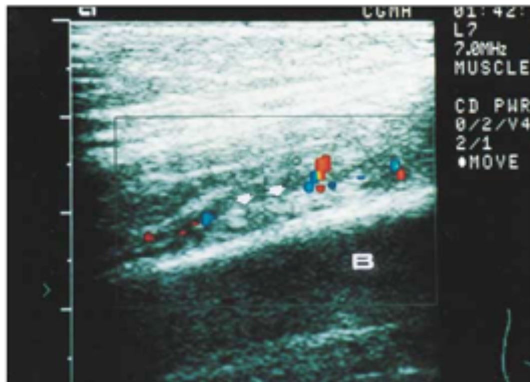


Figure 1 Initial CDUS image (case 6) demonstrates color Doppler vascular flow within and around the periosteum *(arrows)*. Patients with this CDUS feature usually have symptoms for more than 4 days. B, Bone.

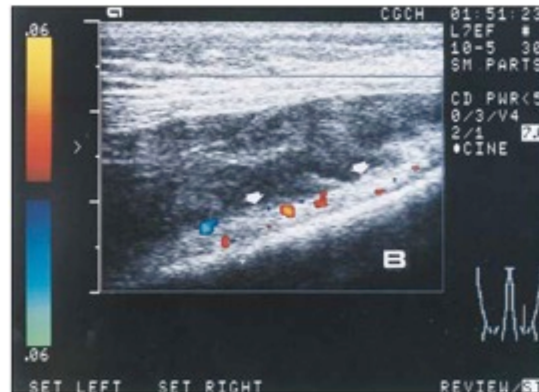


Figure 2 Initial CDUS image (case 10) demonstrates thickened periosteum *(arrows)* with high duplex ultrasonographic vascularity and correlates with high serum CRP levels. This CDUS feature indicates advanced osteomyelitis. B, Bone.

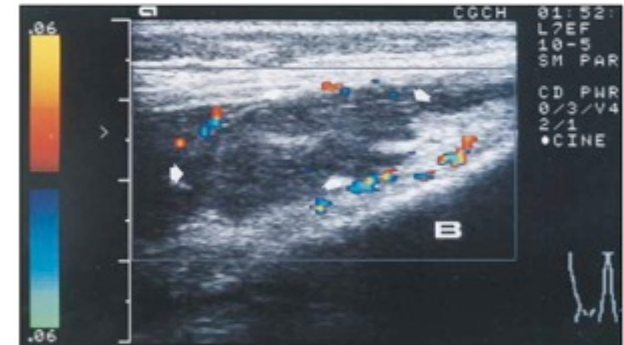


Figure 3 Follow-up CDUS image (case 10) demonstrates increased color Doppler vascular flows in the affected periosteum and periosteal low echogenic mass *(arrows)*, which is suggestive of periosteal abscess and correlates with elevation of serum CRP levels, indicating the progression of osteomyelitis. The patient underwent surgical excision and drainage of pus. B, Bone.

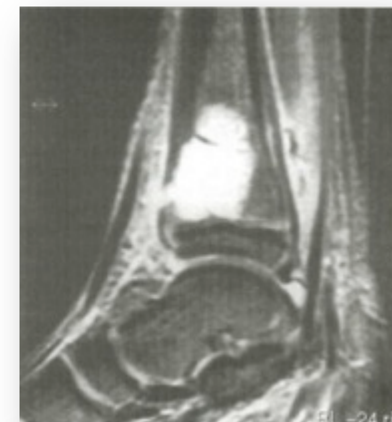
DIAGNOSTICA PER IMMAGINI/ RMN

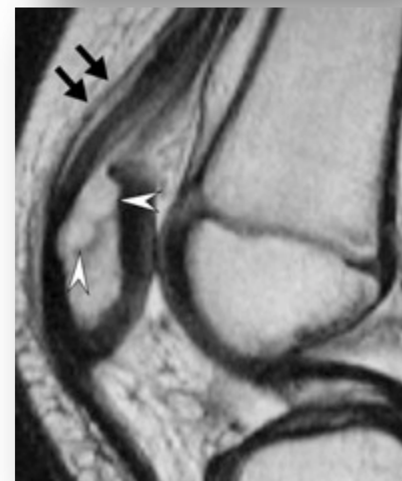
LIMITI

- Accesibilità
- Costi
- Sedazione
- Sensibile ma poco specifico

CIO NONOSTANTE

- Ascesso metafisario (con m.d.c)
- dd con lesione tumorale
- Precocità
  - Edema t.molle
  - Edema midollare





TRATTAMENTO D’URGENZA

- Prelievo
- Antibiotico empirico
  - S.Aureus
  - Scelta dell’antibiotico

[TABEL]LA 1 | Terapia antibiotica empirica iniziale per l'osteomielite

Tipo di pazienti	Probabile microrganismo	Antibiotico iniziale
Neonato*	Streptococchi di gruppo B, *S. aureus*, o bacilli Gram-negativi	Oxacillina 150 mg/kg/24 h in dosi suddivise ogni 8 ore + gentamicina 7,5 mg/kg/24 h in dosi suddivise ogni 8 ore; oppure oxacillina + cefotaxime 150 mg/kg/24 h in dosi suddivise ogni 8 ore
Bambini piccoli o più grandicelli	*S. aureus*, *S. pneumoniae*, streptococchi di gruppo A	Oxacillina 150 mg/kg/24 h in dosi suddivise ogni 6 ore
Se allergici alla penicillina		Cefazolina 100 mg/kg/24 h in dosi suddivise ogni 6 ore
Se allergici alla penicillina e alle cefalosporine		Clindamicina 35-40 mg/kg/24 h in dosi suddivise ogni 6 ore; oppure vancomicina 40 mg/kg/24 h in dosi suddivise ogni 6 ore
Pazienti con anemia drepanocitica	*S. aureus* o *Salmonella* spp.	Oxacillina e cefotaxime

Durata dibattuta

3 settimane per via parenterale seguite da 3 settimane per OS

Riduzione della febbre

Riduzione della PCR dopo 24h – 48h

JOURNAL OF PEDIATRIC ORTHOPAEDICS

J Pediatr Orthop. 1999 Mar-Apr;19(2):141-2

Bugs, drugs, and bones: a pediatric infectious disease specialist reflects on management of musculoskeletal infections.

The Pediatric Infectious Disease Journal

Pediatr Infect Dis J. 1997 AOSita’ del germeug;16(8):735-46; quiz 746-7.

Clinical applications of C-reactive protein in pediatrics.

IMMOBILIZZAZIONE

APPARECCHIO GESSATO O DYNACAST SOFT(45 GIORNI)
RUOLO ANTALGICO, PREVENZIONE DI ATTEGGIAMENTI VIZIOSI

CONTROLLI

REGOLARI CLINICI, LABORATORIO, RADIOGRAFICI
G10, G30, G45, G90

BILANCIO DEL DECIMO GIORNO

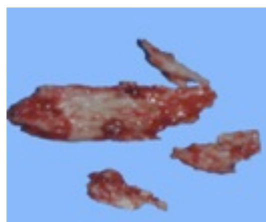
INTERVENTO

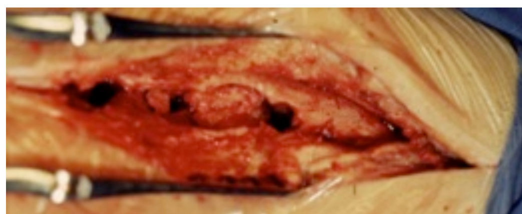
DIAGNOSI PRECOCE …
MENO INDICAZIONI CHIRURGICHE!

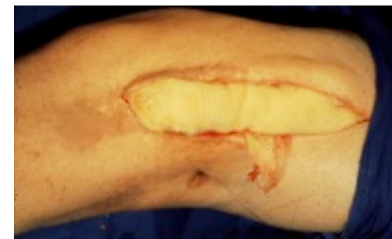
ANTIBIOTICI → Riduzione della mortalità

CHIRURGIA → Riduzione della morbosità

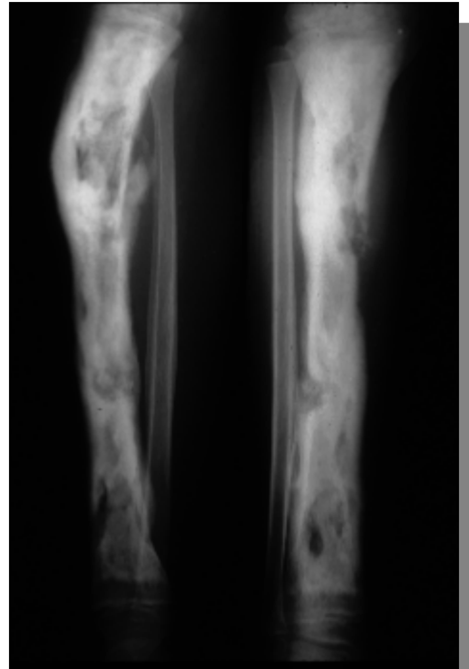
DRENAGGIO ASCESSO SUB-PERIOSTSTALE
SEQUESTRO, NECROSI
PUS NEL CANALE MIDOLLARE

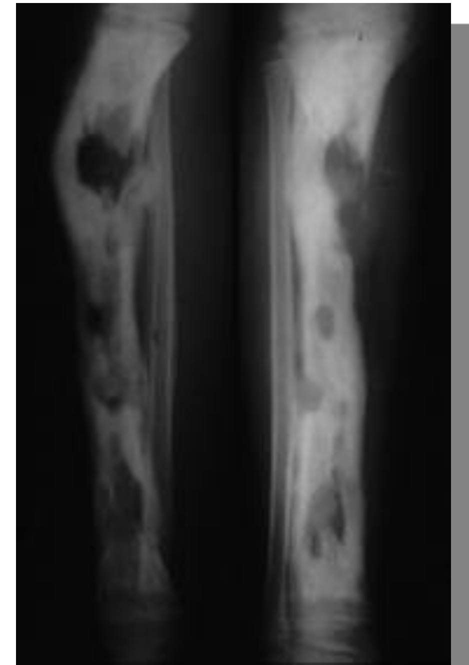




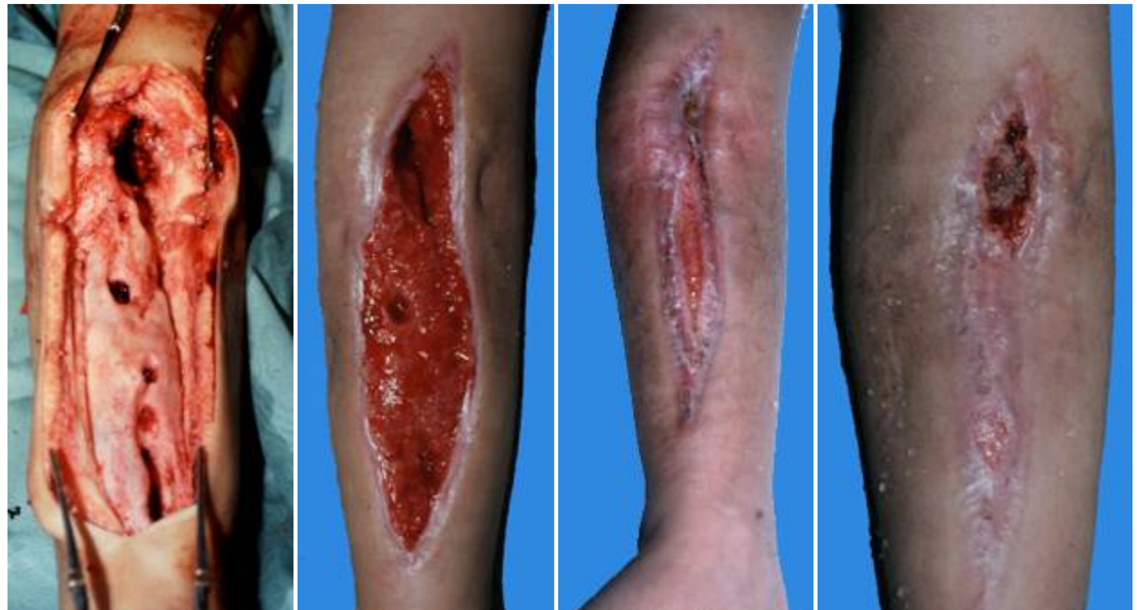


INTERVENTO
Pandiafisite di tibia
Sequestro + necrosi





CURRETAGE



GUARIGIONE SPONTANEA
Cicatrizzazione per seconda intenzione

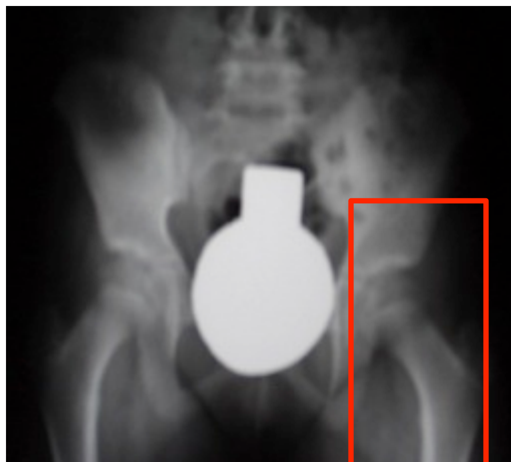
CASO CLINICO 1

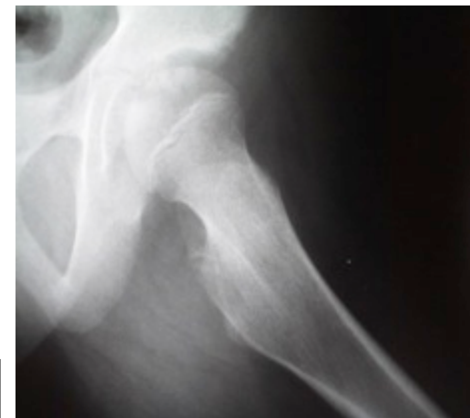
g + 10gg

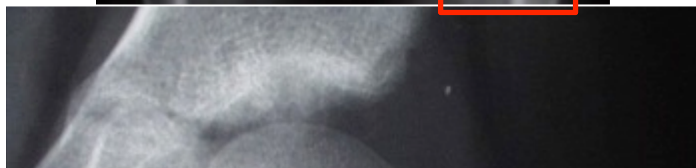
Dolore

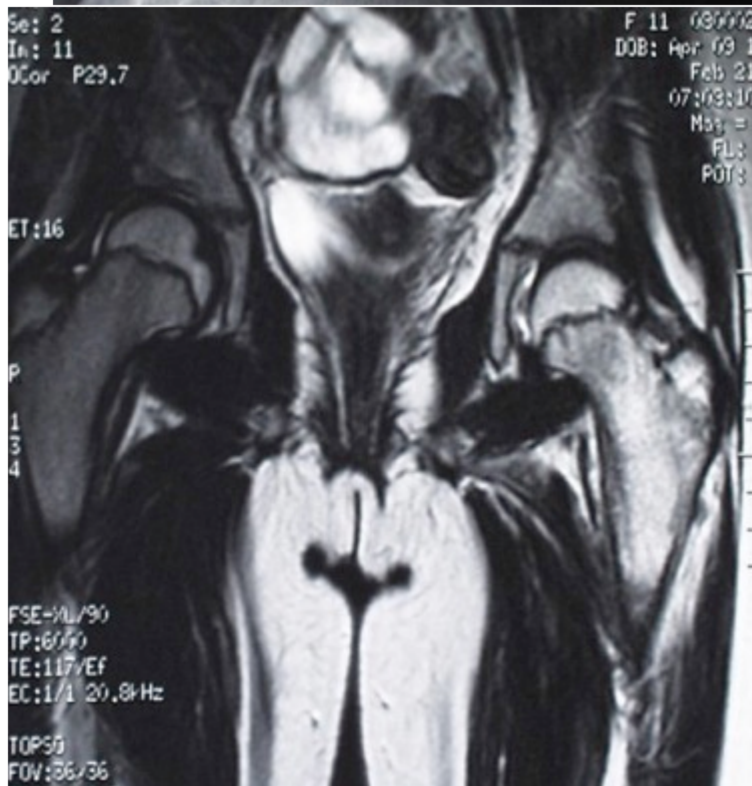
Febbre

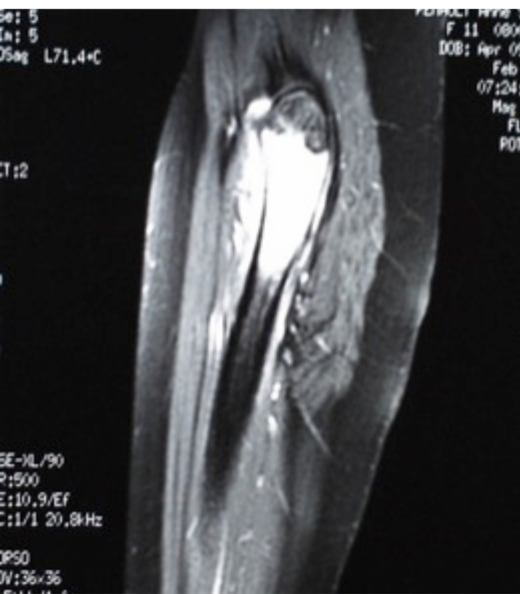
VES , LEUCOCITOSI

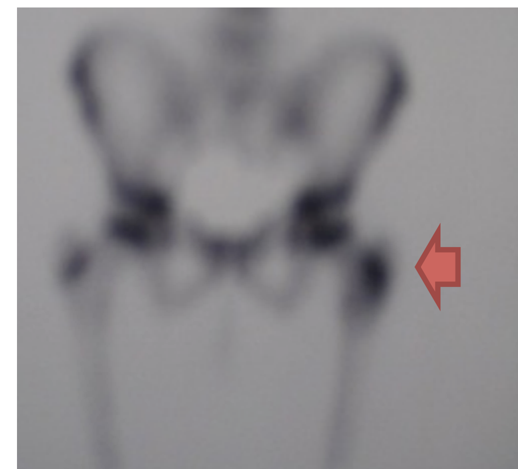








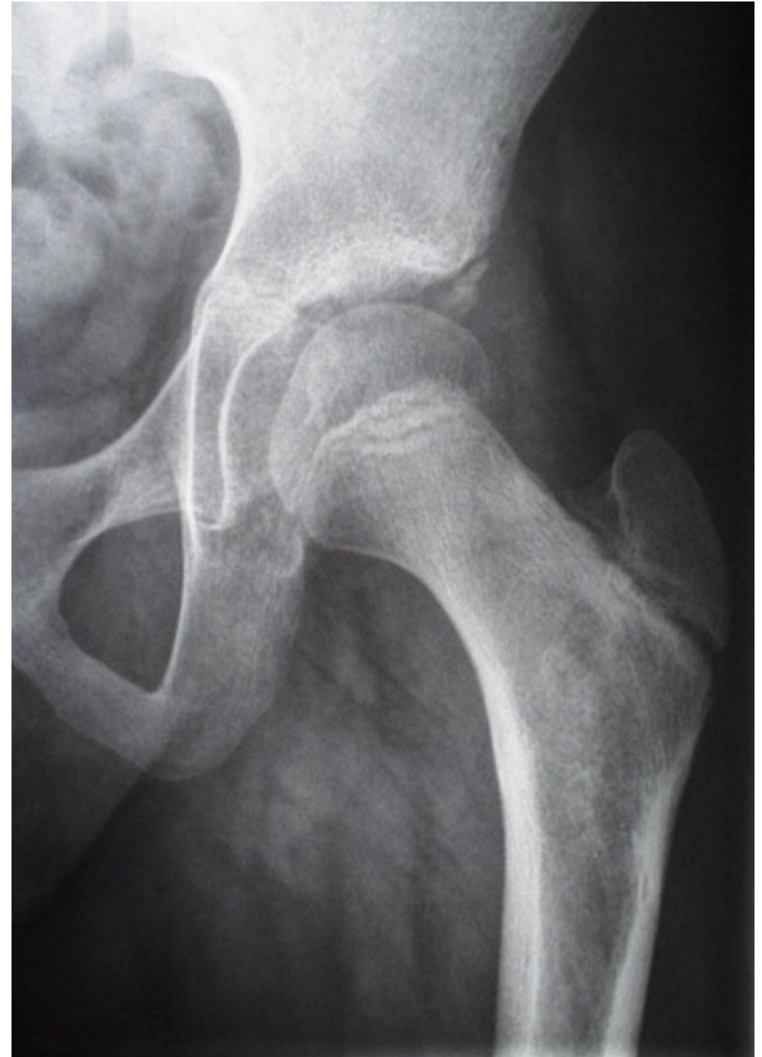




CASO CLINICO 1

- **Biopsia e prelievo**
- **Immobilizzazione**
- **Antibiotico empirico sufficiente (SA)**

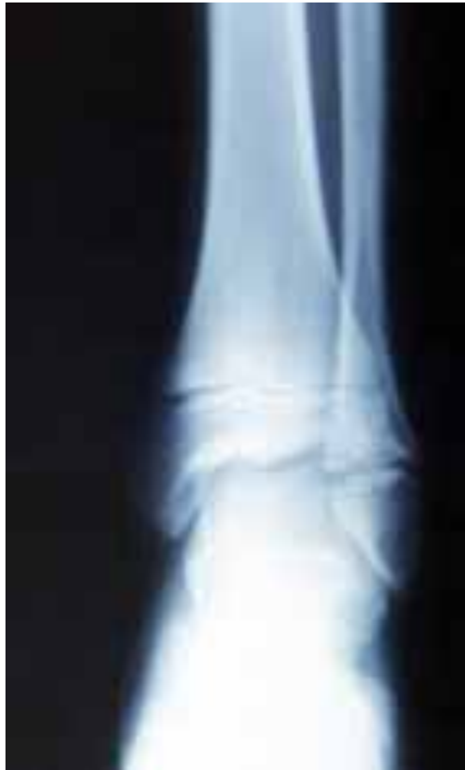
Evoluzione favorevole



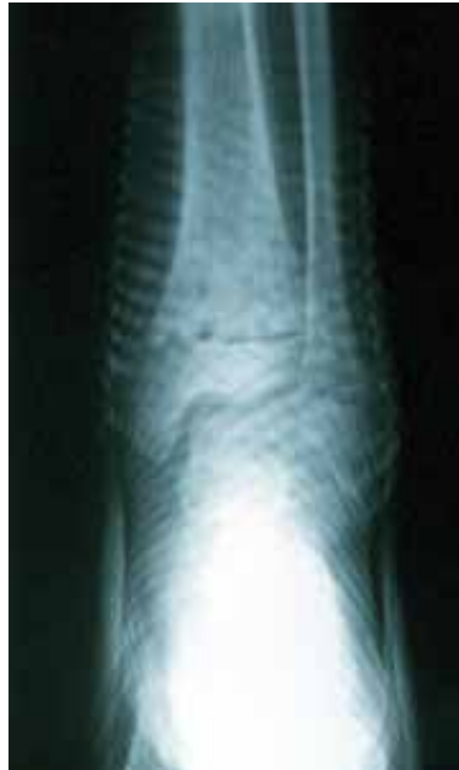
CASO CLINICO 2

Bambino di 11aa
distorsione di caviglia

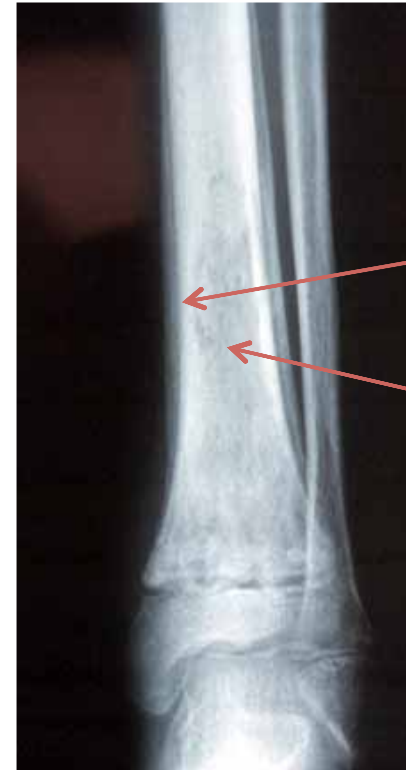
FEBBRE, LAB +



G + 15gg



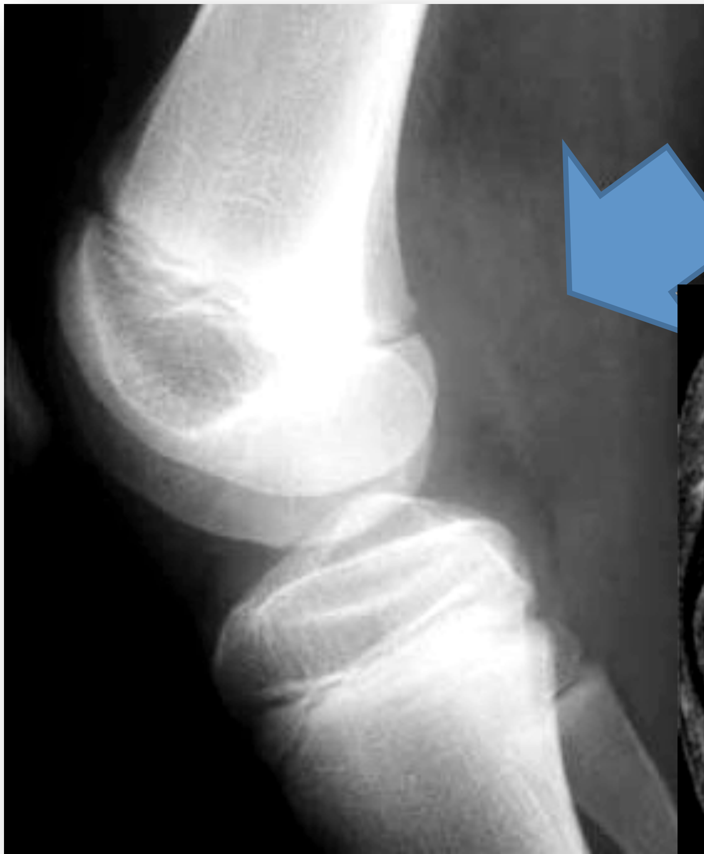
G + 21gg



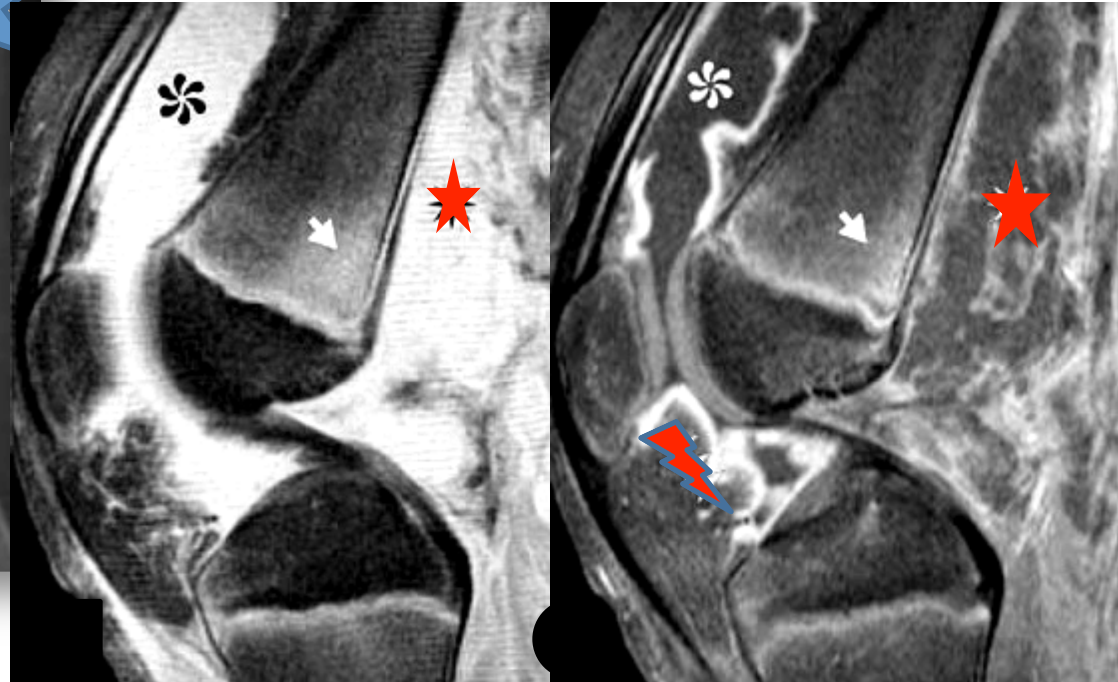
Apposizione periostale

Osteolisi midollare

CASO CLINICO 3



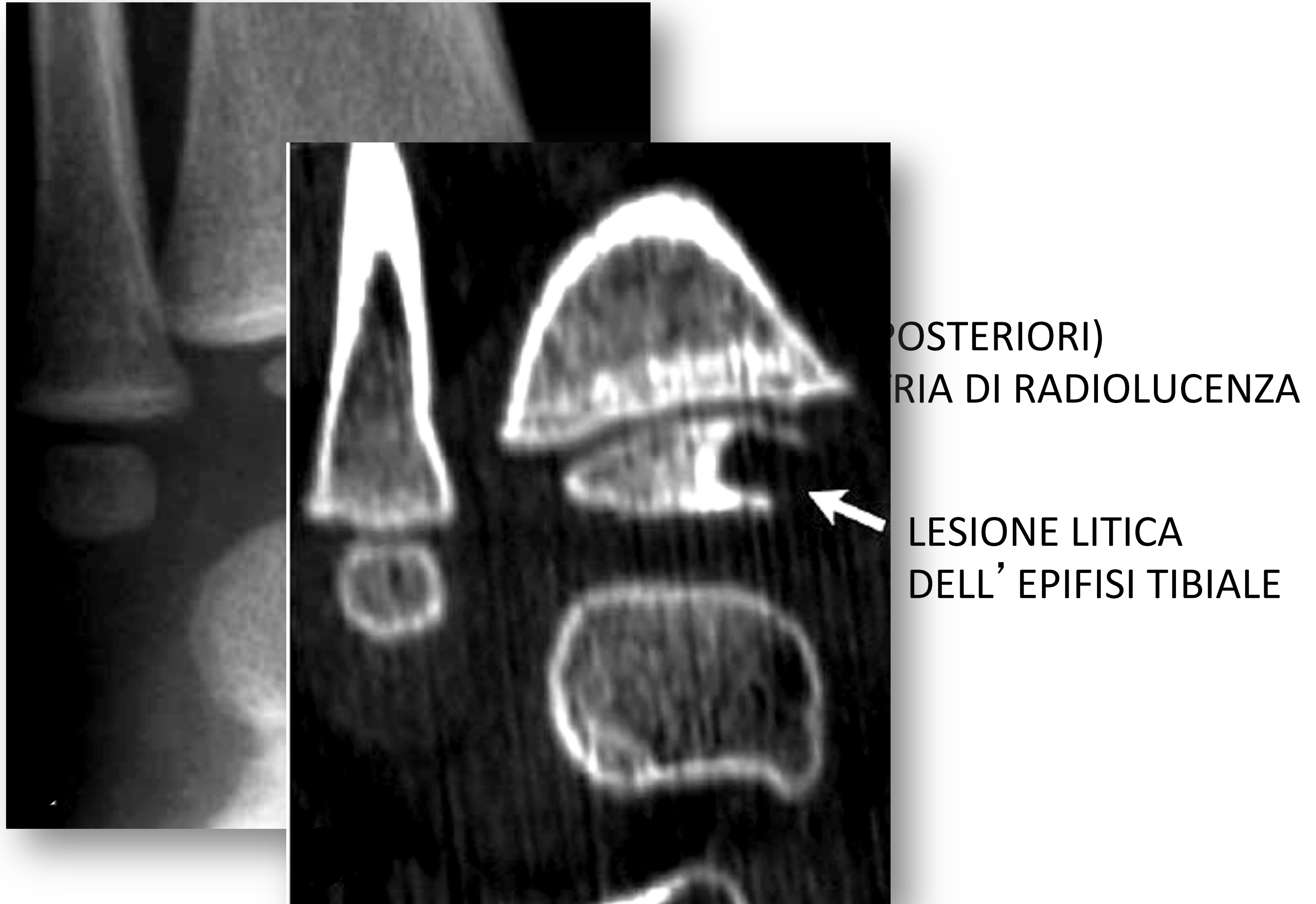
BAMBINO DI 10 AA - SPORTIVO
TONSILLITE FEBBRE, GONALGIA, VES e PCR
PRECOCITA' QUADRO RMN



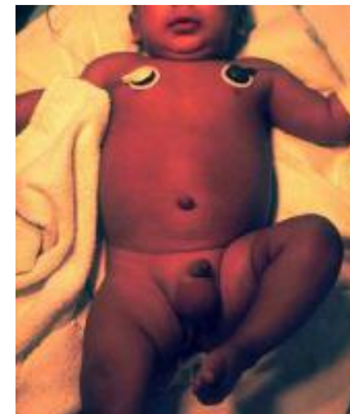
EDEMA ED IPERINTENSITA' DI SEGNALE METAFISI FEMORALE
ASCESSO ED IMPEGNO TESSUTI MOLLI
VERSAMENTO ARTICOLARE
IPERTROFIA SINOVIALE

CASO CLINICO 4

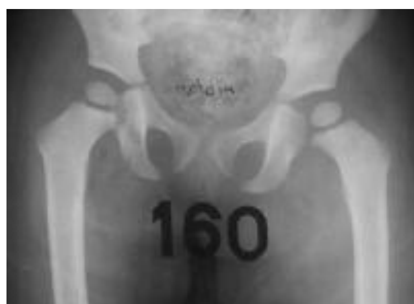
BAMBINA 21 MESI
TONSILLITE DOPO 7GG FEBBRE, TUMEFAZIONE CAVIGLIA E VES+LEUCOCITOSI

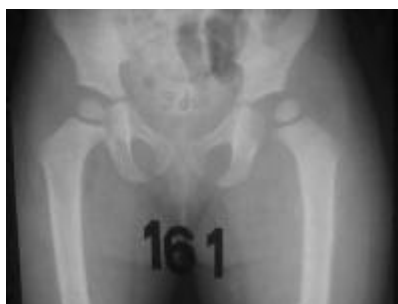


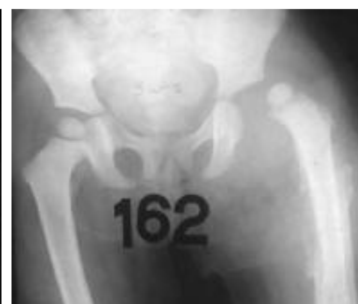
ESITI

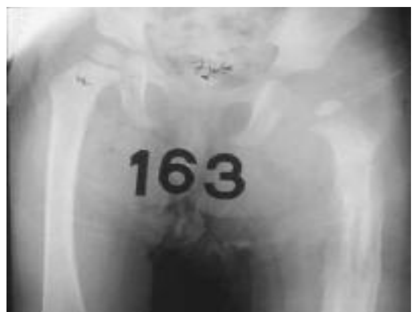


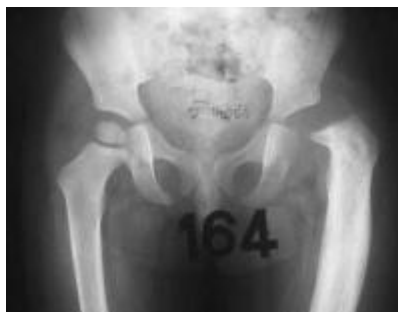
- Lesione della cartilagine epifisaria
- Turbe d' accrescimento

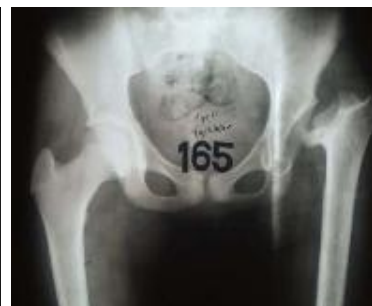






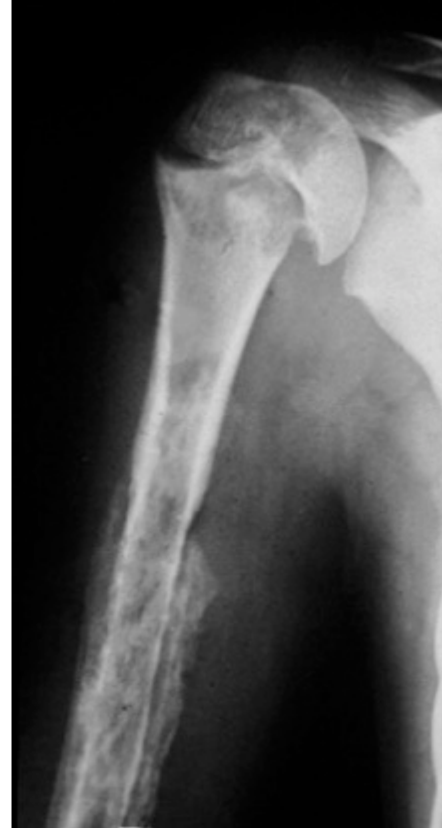


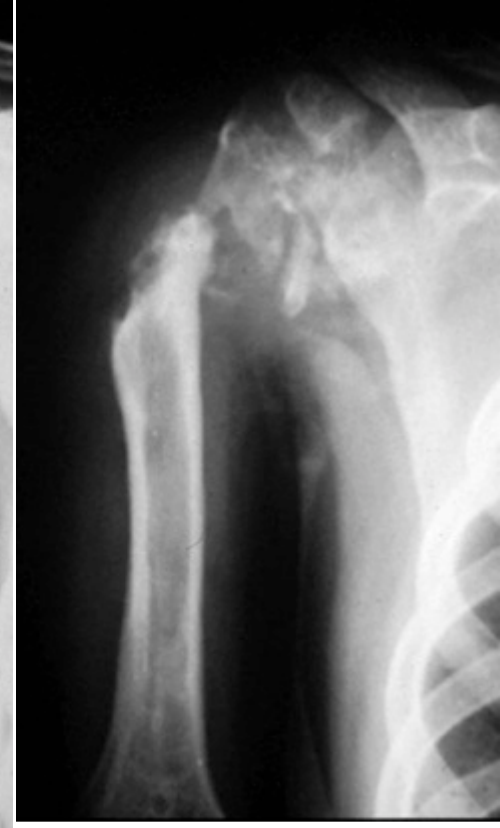


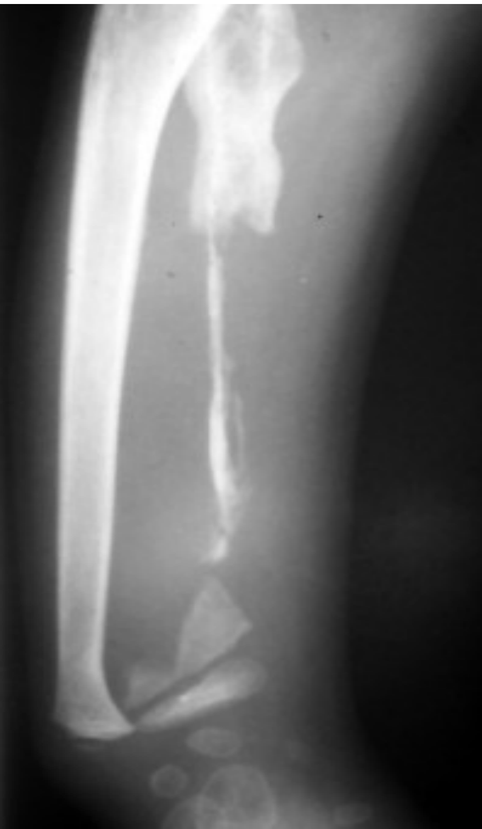


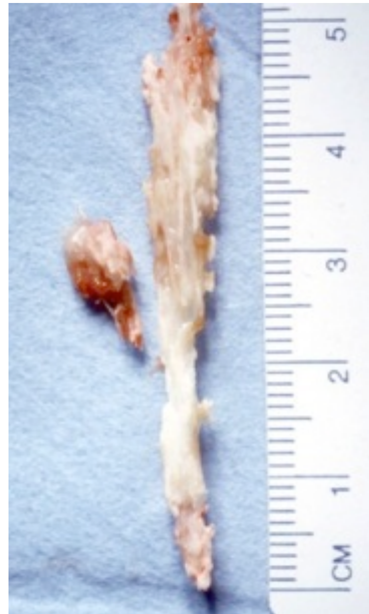
ESITI

PANDIAFISITE
ARTRITE



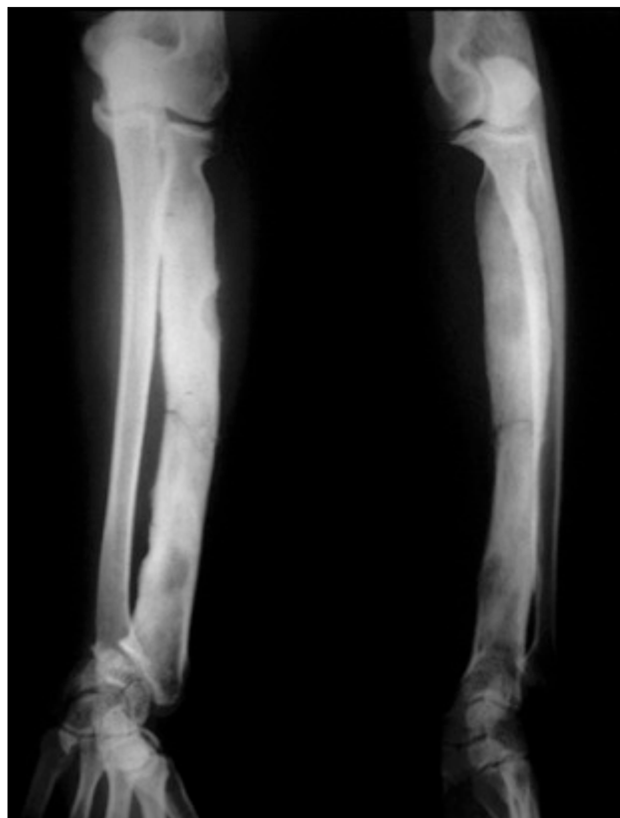






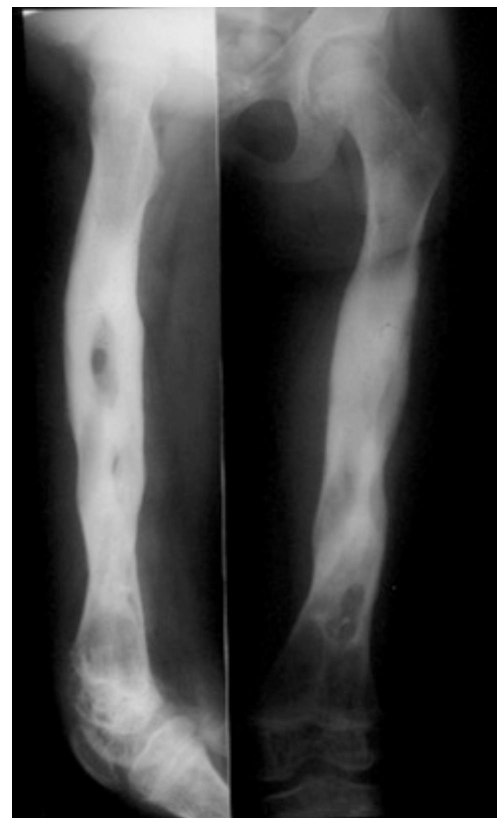
NECROSI

ESITI



PANDIAFISITE DEL RADIO

EPIFISIODESI AL POLSO



PANDIAFISITE DEL FEMORE

IPOMETRIA RESIDUA

OSTEOMIELITE SUB-ACUTA

- Entità ben definita
- Caratteristiche
  - Inizo insidioso
  - Assenza segni generali
  - Evoluzione benigna
- Localizzazione
  - Metafisi ed epifisi
  - No alterazioni dell'accrescimento

Postgrad. med. J. (1962), 38, 97

THE PROBLEMS OF ORTHOPAEDIC SURGERY IN NORTHERN NIGERIA

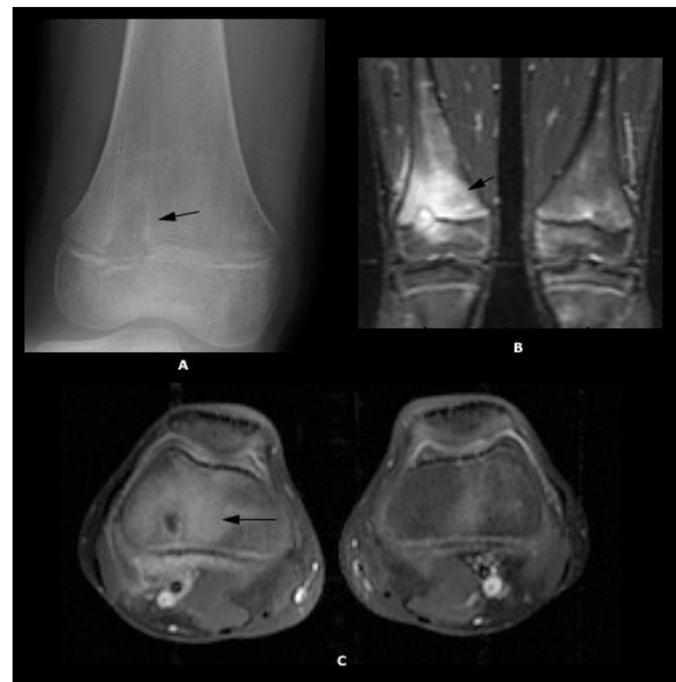
A. F. Bryson, F.R.C.S.

Senior Specialist, Orthopaedic Hospital, Kano, N. Nigeria

PRIMARY SUBACUTE PYOGENIC OSTEOMYELITIS

N. H. Harris, London, England, and
W. H. Kirkaldy-Willis,* Saskatoon, Canada

From the Royal National Orthopaedic Hospital and the Institute of Orthopaedics, London, and the Charles Camsell Hospital and Surgical-Medical Research Institute, Edmonton, Alberta

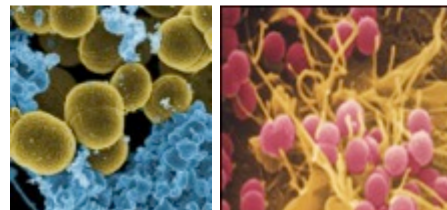


Subacute Osteomyelitis in Children. Gledhill, Robert B. M.D., F.R.CS.(C)
Clinical Orthopaedics & Related Research. 96:57-69, October 1973.

EZIOLOGIA

Infezione ematogena con poca virulenza e/o buona difesa

- S. Aureus
- Kingella Kingae

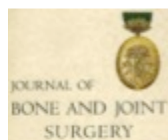


TERAPIA

- Antibiotico

OXACILLINA

- e.v per 48h
- Poi per os per 7 settimane



TREATMENT OF SUBACUTE OSTEOMYELITIS IN CHILDHOOD

E. R. S. ROSS, W. G. COLE

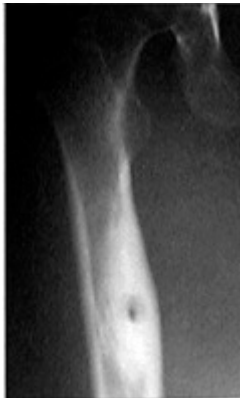
From The Royal Children's Hospital, Melbourne

DIAGNOSI DIFFERENZIALE

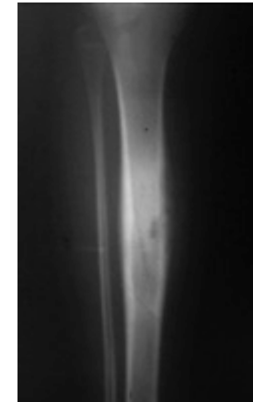
Per le caratteristiche

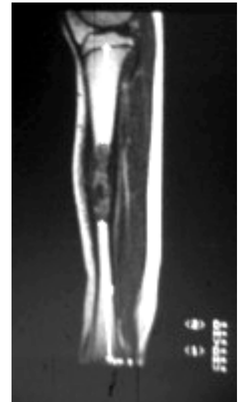
Per l'aspetto radiografico

- Granuloma eosinofilo
- Sarcoma osteogenetico
- Osteoma osteoide



OSTEOMIELITE PSEUDOTUMORALE





Ann Pediatr (Paris). 1984 Feb;31(2):148-53
Subacute pseudo-tumorous osteomyelitis of the long bones in children

Revue de Chirurgie Orthopédique et Réparatrice de l'Appareil Moteur Vol 86, N° 1 **- février 2000** p. 74
Ostéomyélite subaiguë pseudo-tumorale