

# Local antibiotics and bone substitutes for treating osteomyelitis

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**CLINICAL TIPS AND TRICKS IN LIMB RECONSTRUCTION**

*A Masterclass Symposium in treatment strategies, techniques and decision-making*

Kuala Lumpur, 26-27 September 2022

# Outline

- Rationale for local antibiotics
- Antibiotic beads (antibiotic-coated PMMA)
- Bone substitute antibiotic carrier (Calcium sulphate or phosphate)

# INTRODUCTION

Delivering a high dose of antibiotics in a poorly vascularised area

Via a carrier that gradually releases the antibiotic

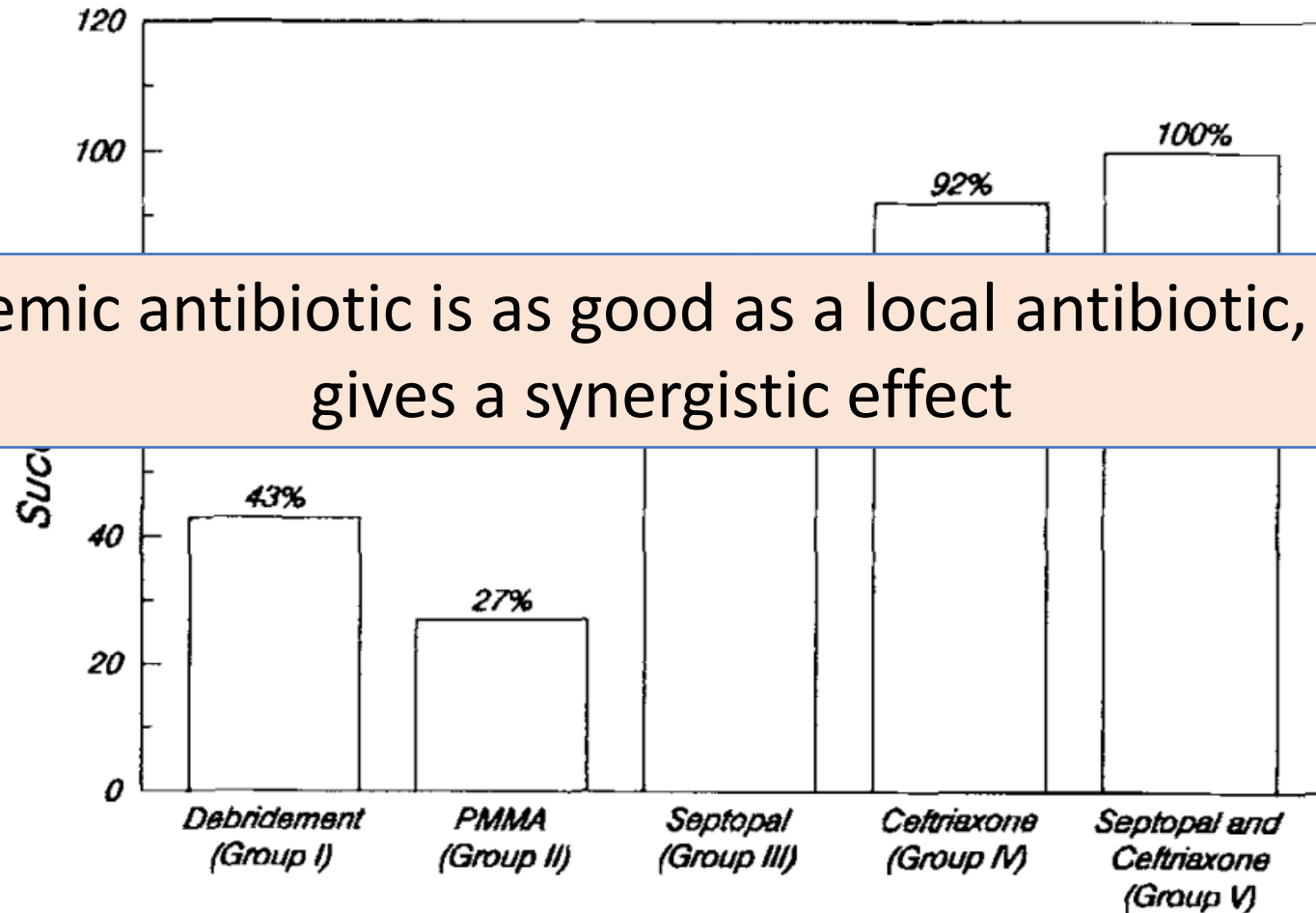
High efficacy less side effects

# Antibiotic carrier



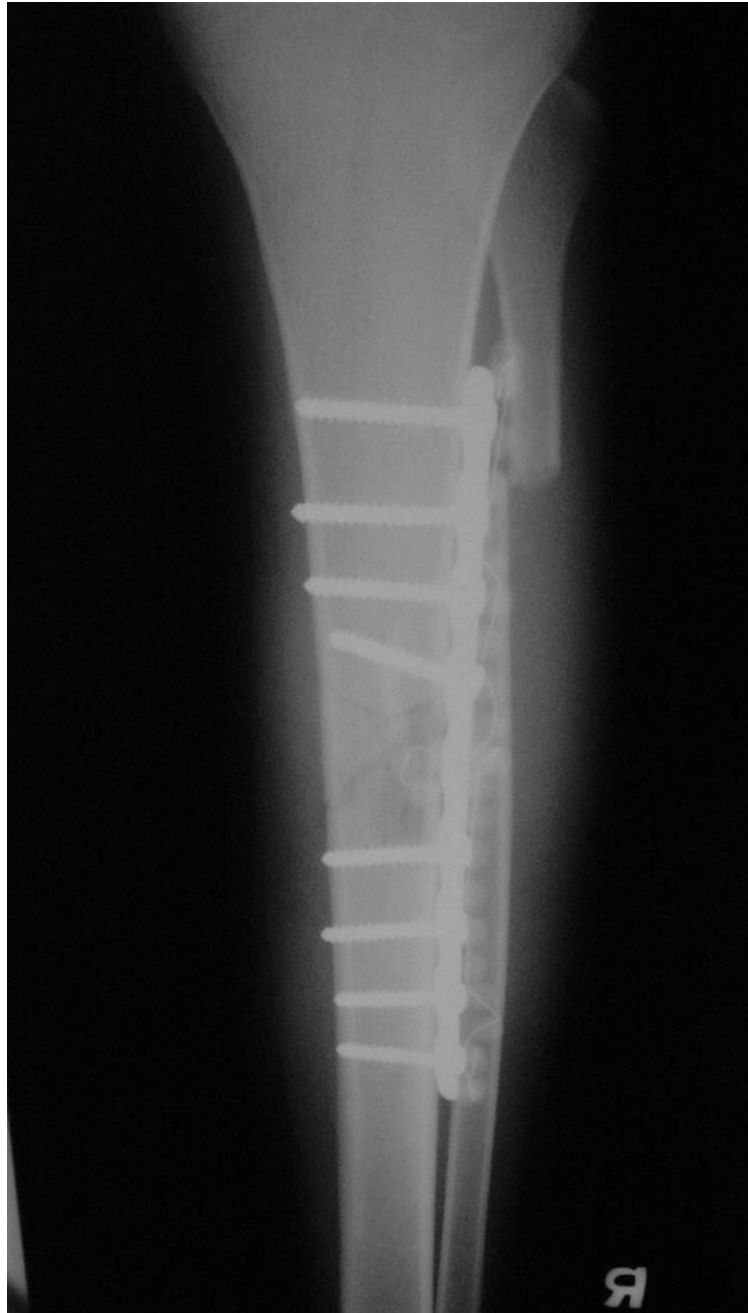
# Gentamicin-PMMA beads compared with systemic antibiotic therapy in the treatment of osteomyelitis.

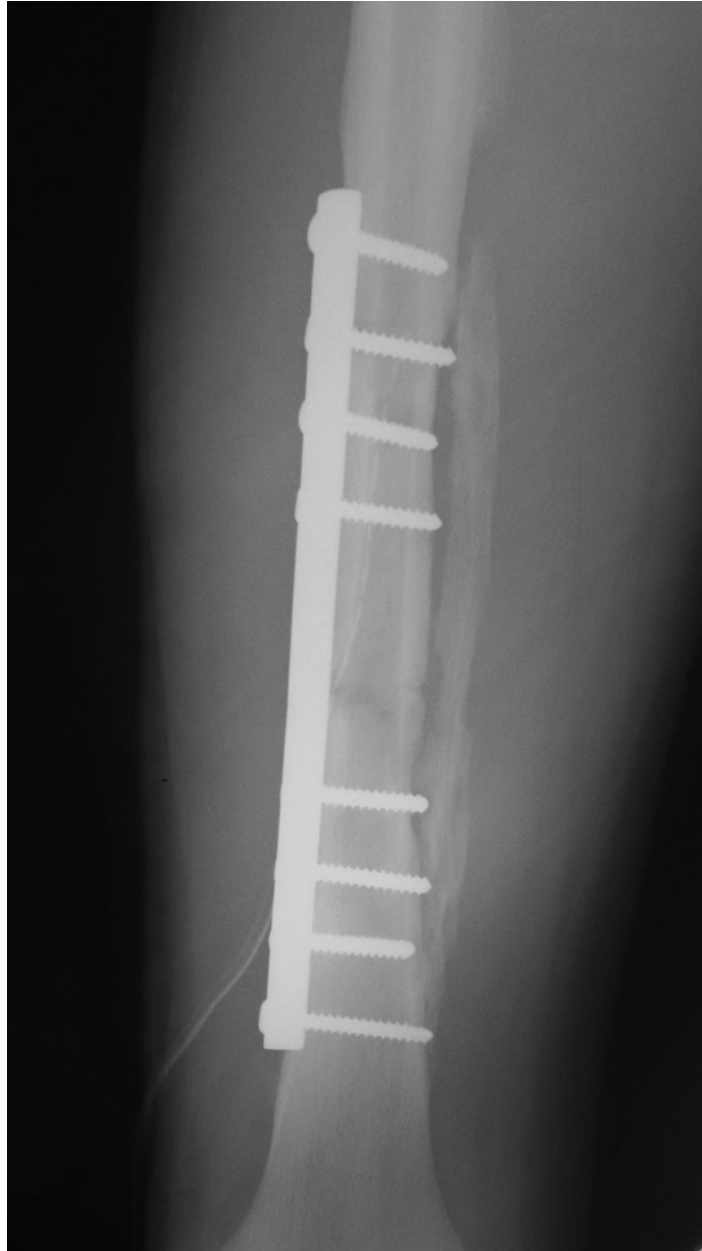
Evans RP, Nelson CL . Clin Orthop. 1993 295: 37-42



The systemic antibiotic is as good as a local antibiotic, combine gives a synergistic effect

Poor  
debridement  
cannot be  
compensated  
by local  
antibiotic





A 15-year-old boy complained of painful swelling 3 months after surgery. An I&D he was started on IV vancomycin after culture grew MRSA

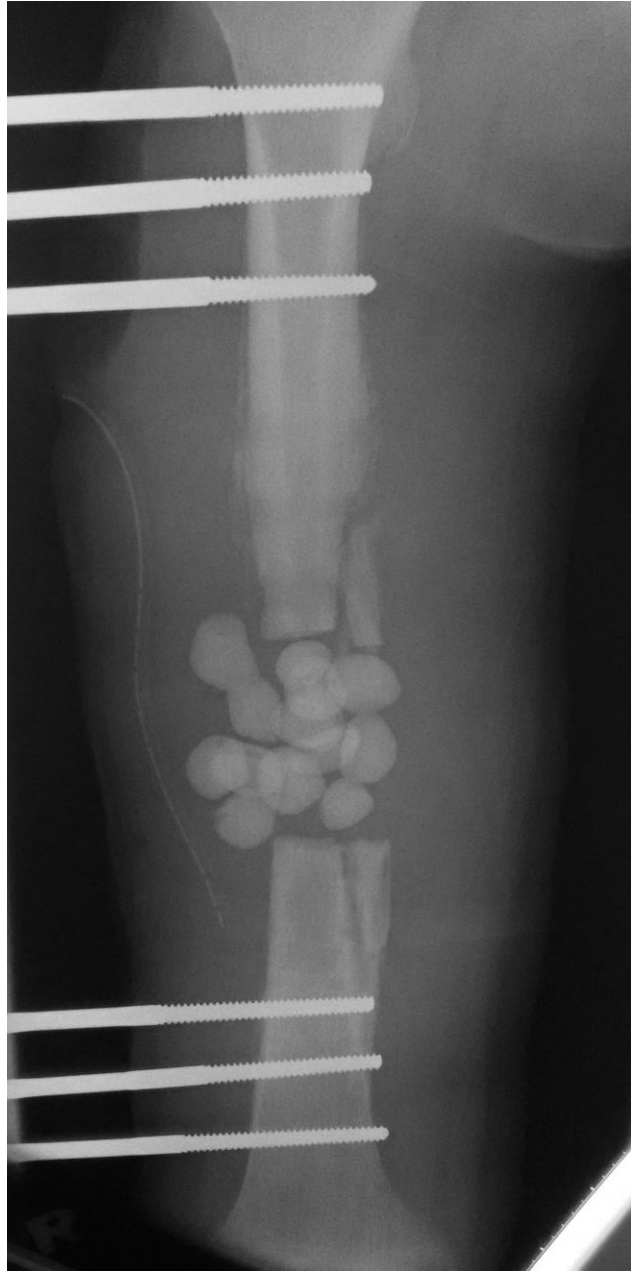
Infection was not controlled.

Then the plate was removed and stabilised by an external fixator.





Repeated  
resection and  
insertion of  
vancomycin  
beads achieved  
control of  
infection



To eradicate infection ...

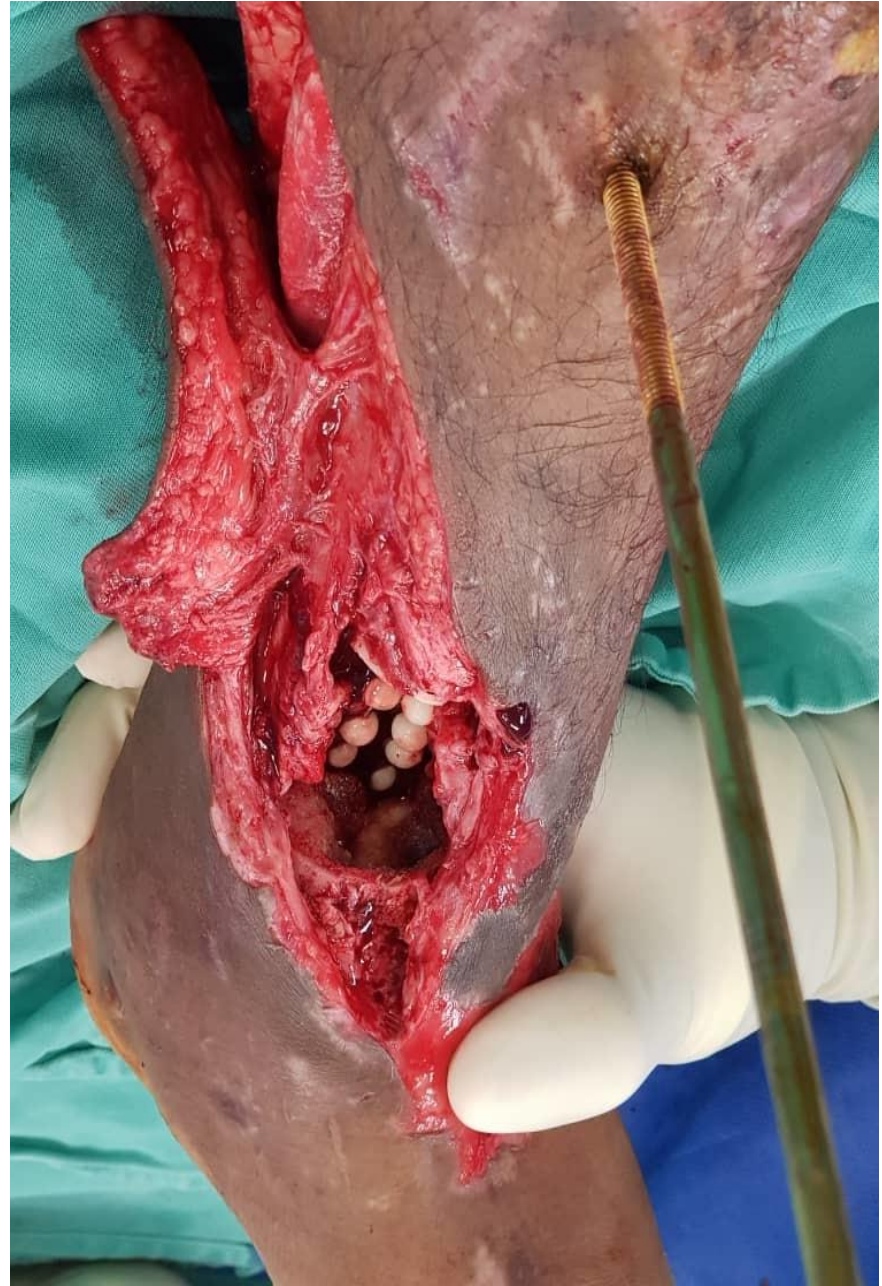
Adequate debridement

Bacteria is sensitive to the antibiotic

Dead space management to improve the antibiotic delivery



Too many beads lead to problems with wound closure



Good soft tissue coverage



# Flaps

Improve antibiotic delivery

Prevent hospitals bacteria colonisation



# Masquelet Technique

Sex: F

R



5, Age: 57y  
78

LATEROMEDIAL VIEW

R

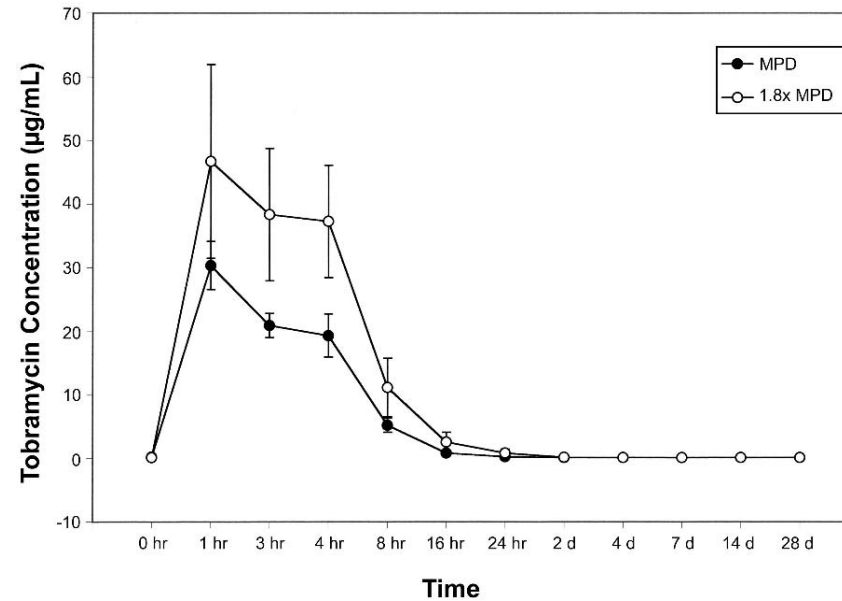
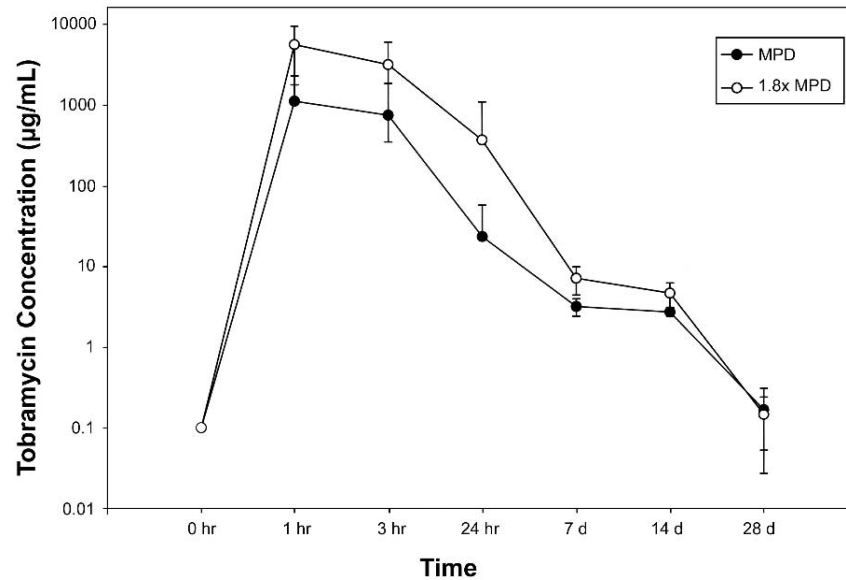






Remove?

# Calcium sulphate antibiotic carrier



Serum tobramycin was elevated for less than one day while local levels remained elevated for at least 14 days, and in some animals, 28 days

# ANIMAL MODEL

Rabbits treated with 10% tobramycin pellets significantly eradicate more infection than rabbits treated with IM tobramycin and placebo pellets

*Nelson CL et al . The treatment of experimental osteomyelitis by surgical debridement and the implantation of calcium sulfate tobramycin pellets. J Orthop Res. 2002;20: 643-7*

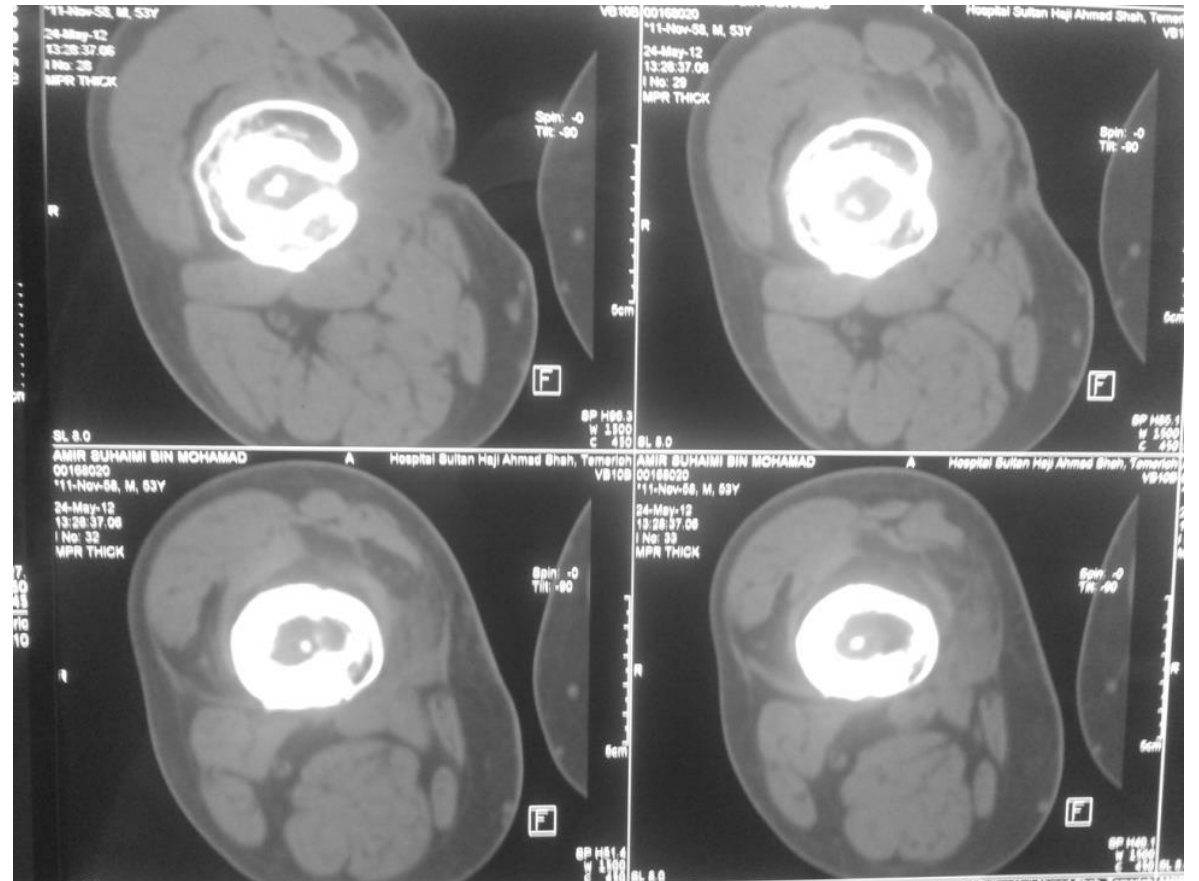
**Pellets impaired efficacy of IM tobramycin**

- Retrospective study of 15 cases of osteomyelitis
- There were 14 males and 1 female with a mean age of 31.5 years old (range 13-70).
- Eleven cases involving the tibias, 3 femurs and 1 medial malleolus.



# CIERNY MADER CLASSIFICATION

- 10 stage IVA
- 1 stage IVB (HIV and Hep B)
- 3 stage IIIA
- 1 stage IA



# WOUND MANAGEMENT

- 3 gastrocnemius flap
- 1 gastrocnemius myocutaneous flap
- 3 fasciocutaneous flap
- 2 sural flaps
- 5 primary closures



# RESULTS

- 12 patients (80%) achieved control of infection.
- 3 patients (20%) undergone repeated debridement because of persistent serous discharge



# FAILURES

- All stage IVA CM
- Tibial lesion
- MRSA 2
- No growth 1





# INFECTION CONTROLLED AFTER REPEATED DEBRIDEMENT + VANCOMYCIN MIX WITH BONE CEMENT



# DISCUSSIONS

- Chang et al reported healing rate of 80% compare with 60% debridement alone  
*Acta Orthop Belg. 2007 Apr;73(2):238-43*
- McKee et al reported healing rate of 86% compare with 86% with PMMA  
*J Orthop Trauma. 2010 ;24(8):483-90*

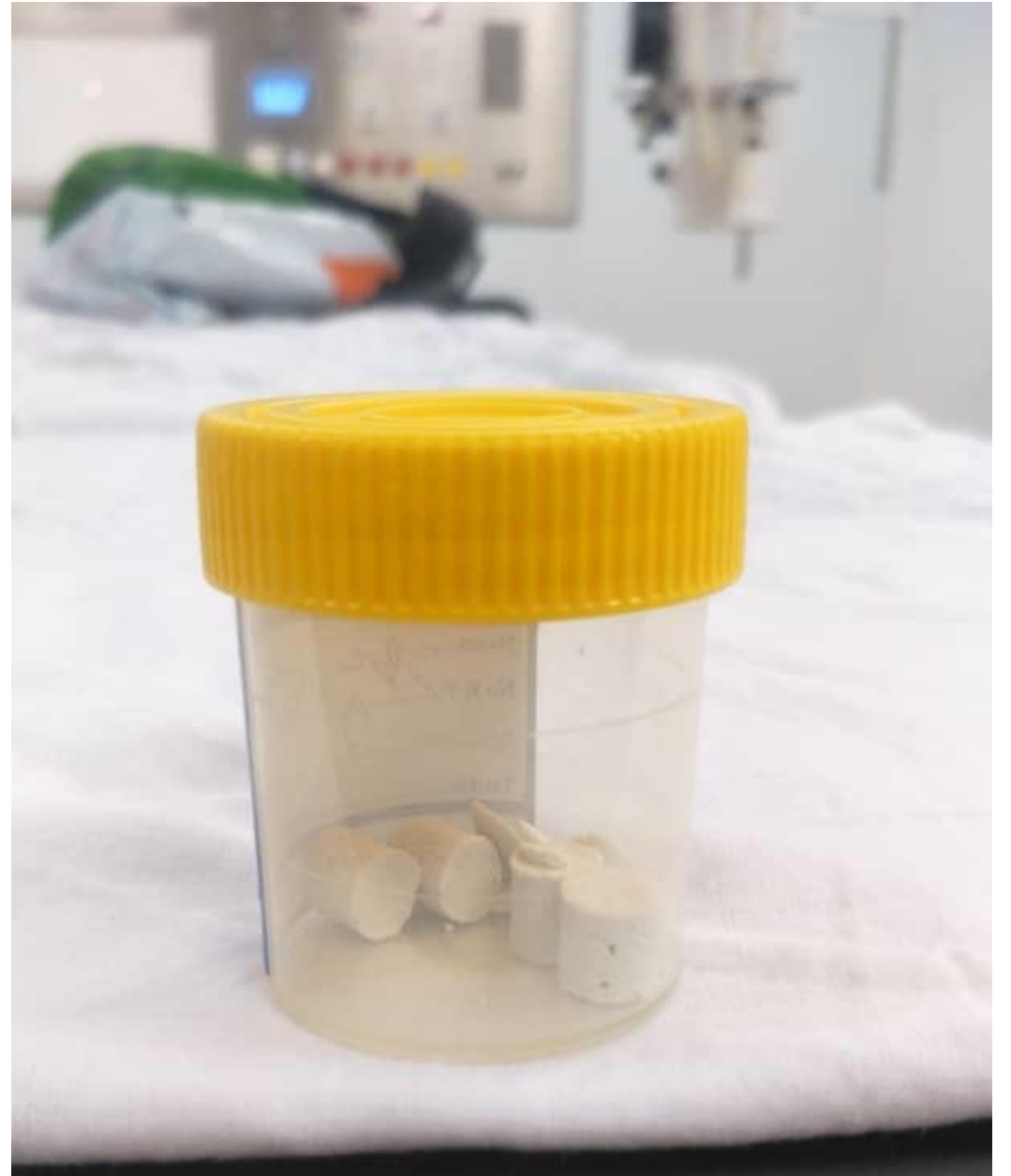
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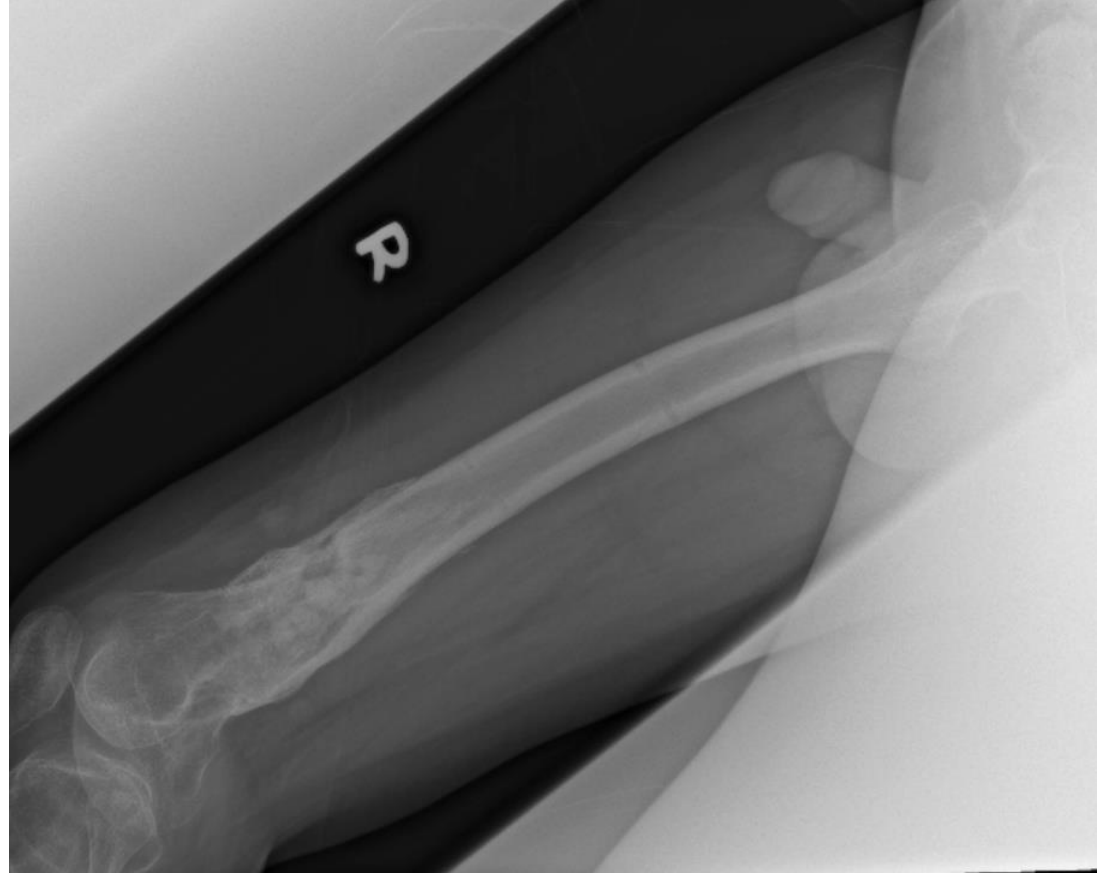


# Absorbable antibiotic carrier











After 6 months



# Problems

- Setting time
- Washed out by blood
- Exudates
- Resorbption rate

# Conclusion

Get a reliable microbiology sample and antibiotic sensitivity results

Good antibiotic delivery with adequate dose and duration

The local antibiotic is a supplement after good surgical debridement





IN CONJUNCTION WITH



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CLINICAL TIPS AND TRICKS IN LIMB RECONSTRUCTION :  
**A MASTERCLASS SYMPOSIUM ON TREATMENT  
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CONTENTS OF SYMPOSIUM :

- LECTURES
- CASE DISCUSSIONS
- PRACTICAL SESSIONS / WORKSHOPS

FEE :

- CONSULTANTS / SURGEONS : RM 500
- TRAINEES / MEDICAL OFFICERS : RM 250



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## **CLINICAL TIPS AND TRICKS IN LIMB RECONSTRUCTION**

*A Masterclass Symposium in treatment strategies, techniques and decision-making*

Kuala Lumpur, 26-27 September 2022

### **DESCRIPTION**

This Masterclass symposium provides a quick overview of important clinical problems, a summary review of common treatment approaches, and details of individual expert surgeons' approaches with tips and tricks.

Delegates will be able to:

- Discuss specific aspects of treatment with highly experienced international faculty
- Practice tips and tricks in hands-on workshops
- Improve their decision-making process through problem-based learning

### **CHAIRMEN**

**Nayagam Selvadurai**

**Nazri Mohd Yusof**

### **FACULTY**

**Fernandes James**

**Inan Muharrem**

**Solomin Leonid**

## Monday, 26<sup>th</sup> September 2022

- 8:00 Registration  
8:30 Welcome & Course Objectives *Course Chairmen*

### **SESSION 1: GENU VARUM - FROM THE SIMPLE TO THE COMPLEX**

*Moderators: M.Y. Nazri, J. Fernandes*

- 8:40 Simple genu varum and Blount's disease in children *M. Inan*  
8:55 Medial compartment osteoarthritis in adults: non-arthroplasty solutions *S. Nayagam*  
9:10 Discussion  
9:20 **Practical Session 1 – Group A** *L. Solomin*  
Genu Varum treated with a hexapod circular fixator *M. Inan*  
**Practical Session 2 – Group B** *S. Nayagam*  
Genu Varum treated with fixator-assisted plating *M. Y. Nazri*

10:45 **Break**

- 11:15 **Practical Session 1 – Group B** *L. Solomin*  
Genu Varum treated with a hexapod circular fixator *M. Inan*  
**Practical Session 2 – Group A** *S. Nayagam*  
Genu Varum treated with fixator-assisted plating *M. Y. Nazri*

12:45 **Lunch**

### **SESSION 2: BONE INFECTIONS**

*Moderators: M. Inan, L. Solomin*

- 13:45 Paediatric bone infections – how they should be managed differently from adults *J. Fernandes*  
14:00 Local antibiotics and bone substitutes for treating osteomyelitis *M. Y. Nazri*  
14:15 An approach for bone infection – investigation and surgery *S. Nayagam*  
14:30 **Practical Session 3 – Group A** *L. Solomin*  
Bone Transport with a hexapod circular fixator or LRS *M. Inan*  
**Clinical Case Discussion – Group B** *J. Fernandes*  
*S. Nayagam*

- M. Y. Nazri*
- 15:45 **Break**
- 16:15 **Practical Session 3 – Group B** *L. Solomin*  
**Bone Transport with a hexapod circular** *M. Inan*  
**fixator or LRS**
- Clinical Case Discussion – Group A** *J. Fernandes*  
*S. Nayagam*  
*M. Y. Nazri*
- 17:30 Take-Home Messages
- 17:40 Close of Day 1

## Tuesday, 27<sup>th</sup> September 2022

### **SESSION 3: COMPLEX DEFORMITIES AND METABOLIC BONE DISORDERS**

*Moderators: C. Inan, M. Y. Nazri*

- 8:30 Deformities from metabolic bone disorders – an approach to treatment *J. Fernandes*
- 8:45 Rotation abnormalities – unlocking the confusion and simplifying treatment *S. Nayagam*  
**Derotation over a nail – standard** *M. Inan*  
**nail and DeRoNa nail. Tips and**  
**Tricks**
- 9:00 Acute correction of multiapical and multilevel deformities – tips and tricks *L. Solomin*
- 9:15 Discussion
- 9:25 **Practical Session 4 – Group A** *J. Fernandes*  
**OI Telescopic Nail** *M. Inan*
- Practical Session 5 – Group B** *L. Solomin*  
**Multiapical deformity with** *S. Nayagam*  
**rotation treated** with a Hexapod  
Circular Fixator
- 10:45 **Break**
- 11:15 **Practical Session 4 – Group B** *J. Fernandes*  
**OI Telescopic Nail** *M. Inan*
- Practical Session 5 – Group A** *L. Solomin*  
*S. Nayagam*

Multiapical deformity with  
rotation treated with a Hexapod  
Circular Fixator

12:40 **Lunch**

**SESSION 4: PERI-ARTICULAR FRACTURES OF THE TIBIA & THEIR SEQUELAE**

*Moderators: M. Inan, M. Y. Nazri*

13:40 Pilon Fractures

*S. Nayagam*

13:55 Ankle distraction with correction  
of equinus for early osteoarthritis  
of the ankle

*L. Solomin AND J Fernandes*

14:10 Arthrodesis Techniques of the  
ankle

*M.Y. Nazri*

14:25 Case Discussion – *Delegates  
should bring their own cases*

15:30 Break

**SESSION 5: SUMMARY SESSION**

*All Faculty*

16:00 Take-Home Messages & Final Discussion

17:00 Close of the Course