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Case Reports



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Case Reports – Content

- Terminology of Bone and Joint Infections
- Case Reports
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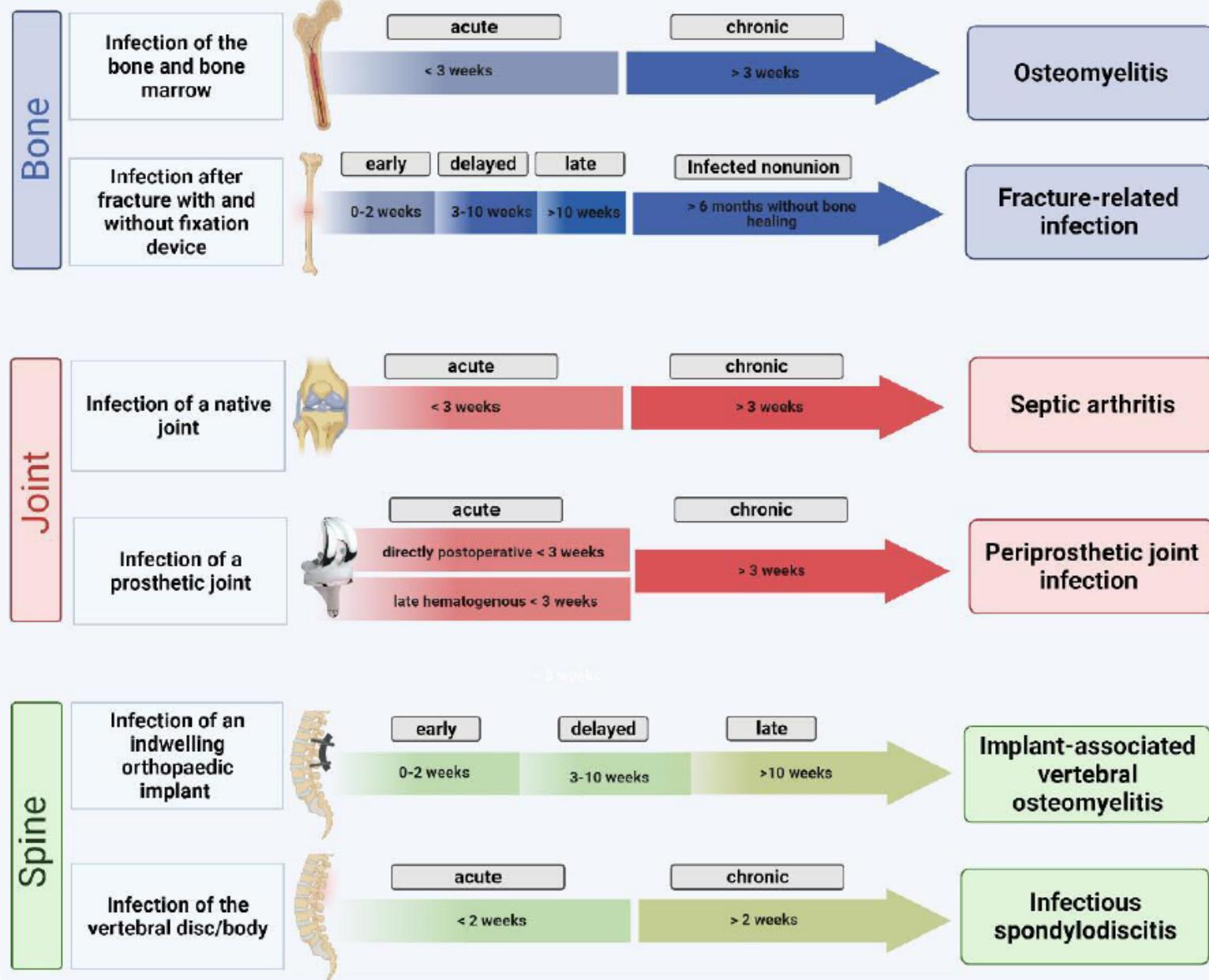
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Terminology of Bone and Joint Infections



Terminology of Bone and Joint Infections



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Case Reports



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Case Report I.1



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Case report

A simple management of massive bone defect after en-bloc resection of osteofibrous dysplasia of tibial shaft: A case report

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Case Report I.1

A B S T R A C T

Introduction: Osteofibrous dysplasia is a relatively rare disease, exclusively found in children, affecting the tibial diaphysis. Various management approaches are already available, but an internationally approved management guideline is not yet established. There is a major concern in the current management of wide excision technique as it frequently results in massive bone defect.

Case presentation: Here we present a case of osteofibrous dysplasia on a 10-year-old girl in Cipto Mangunkusumo Hospital with chief complaint of mild persistent pain of her lower leg since two years before with slight bowing deformity. The radiograph and histopathological examination support the diagnosis of osteofibrous dysplasia. She was managed with en-bloc resection (wide excision) of the tumor, followed with reconstruction using biomaterials substitute; combination between demineralized bone matrix (Bonegener®) and bone substitute “hydroxyapatite and calcium sulphate” and internal fixation using plate and screw.

Results: Clinical and radiological evaluation showed successful improvement and outcome. The patient showed progressive functional outcomes and achieved functional score of 100% LEFS at 3 years follow-up. The plate and screw was removed at 48 weeks after adequate callus formation and radiological union was achieved.

Conclusion: Simple reconstruction using biomaterial bone substitute not only created new bone formation with good stability, but also enabled patient to have an improved quality of life. This method is recommended to overcome the massive bone defect after tumor resection in osteofibrous dysplasia patient.

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Case Report I.1



Pre-op: A mass on the anteromedial side of the tibia with bowing deformity. Radiographs showed bubbled appearance of the shaft tibia. MRI revealed hyperintense lesion of the shaft tibia.

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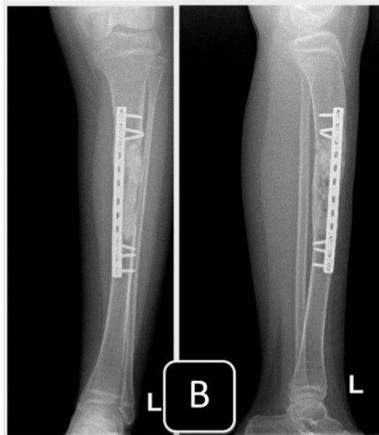
Case Report I.1



- A. The tumor exposed.
- B. En bloc resection with 10 cm bone loss, periosteum was preserved.
- C. Internal fixation using plate and screw to maintain the alignment.
- D. Application of combination of Bonegener and PerOssal.
- E. Suture of periosteum and final construct reconstruction.
- F. Macroscopic gross pathology of the tumor.

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Case Report I.1



- A. Radiographs post-operative.
- B. Follow-up at 20 weeks, callus formation seen.
- C. Follow-up at 48 weeks, hard callus formed with optimal stability of tibia.



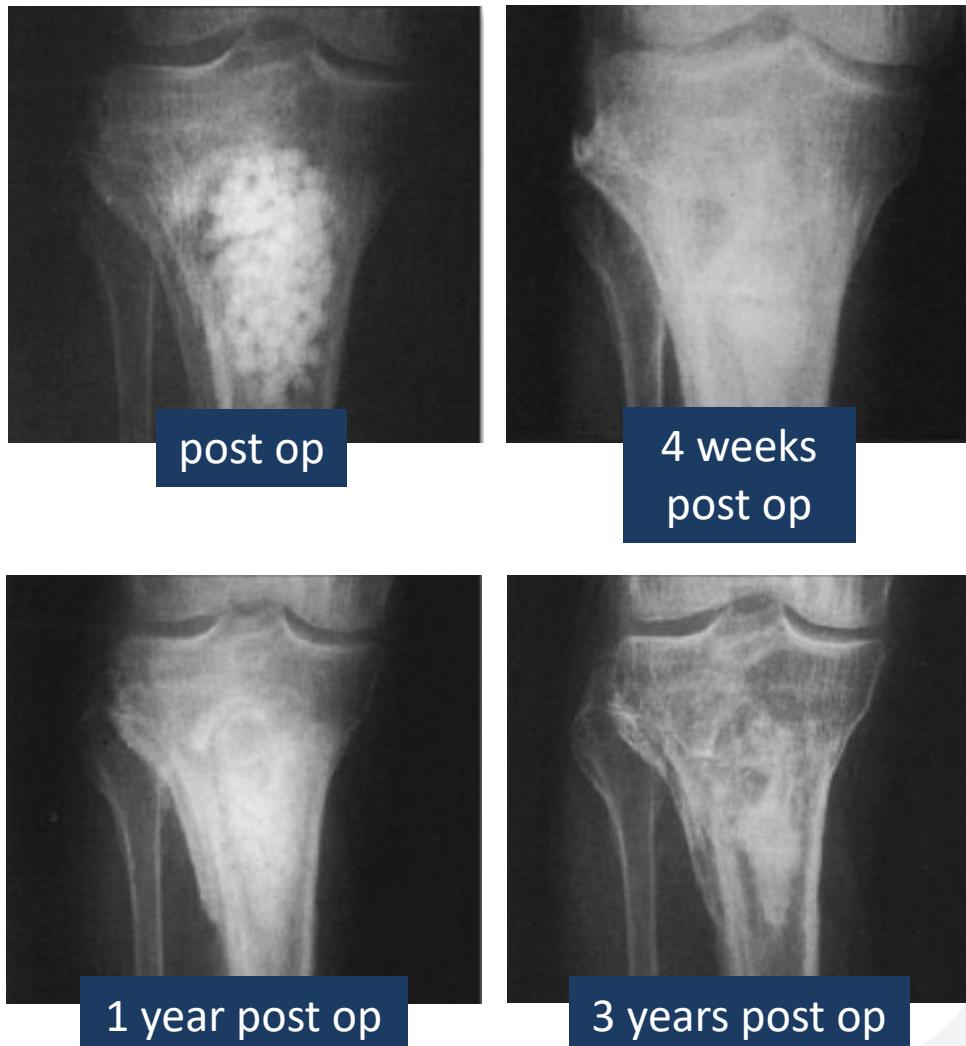
Clinical condition at 3 years after surgery. The patient could perform high intensity exercise; full weight bearing and squatting, scoring 100% of LEFS.

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Case Report I.2

42-year-old patient with fistulous osteomyelitis of the proximal tibia
3 years after plate osteosynthesis

1. Implantation of 2 x 50 PerOssal® pellets loaded with 1 g vancomycin after repeated debridement (*Staphylococcus aureus*)
2. 40% resorption of the PerOssal® pellets after the first 4 weeks
3. 90% resorption of the PerOssal® pellets after 1 year
4. 100% resorption of the PerOssal® pellets and completely new bone formation after 3 years; patient remained free of infection during the entire time

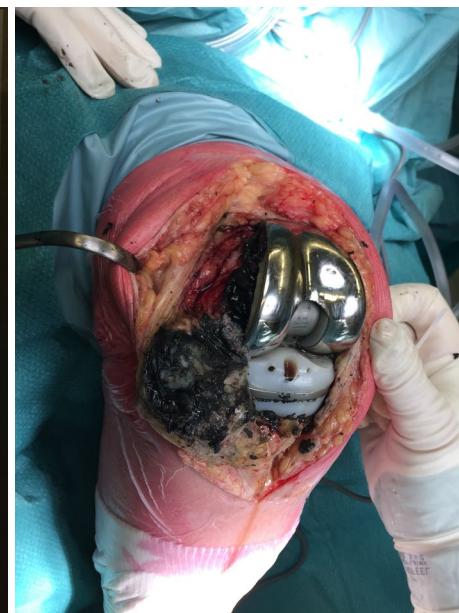
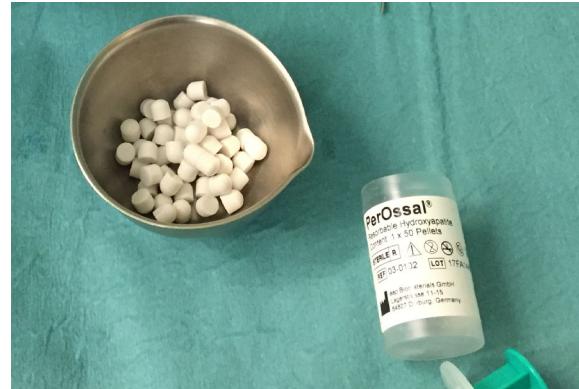


PerOssal®

Case Report I.3

60-year-old patient with revision prosthesis, with diffuse metallosis and suspected infection

1. 12.5 cm³ of PerOssal® perfused with Vancomycin and 12.5 cm³ with Gentamicin.
2. After extracting the tapus from the tibia and the femur and after a thorough debridement of bone and soft tissue, PerOssal® pellets were inserted into the medullary canal of the femur and tibia.
3. Subsequently an antibiotic spacer was applied with Vancomycin.

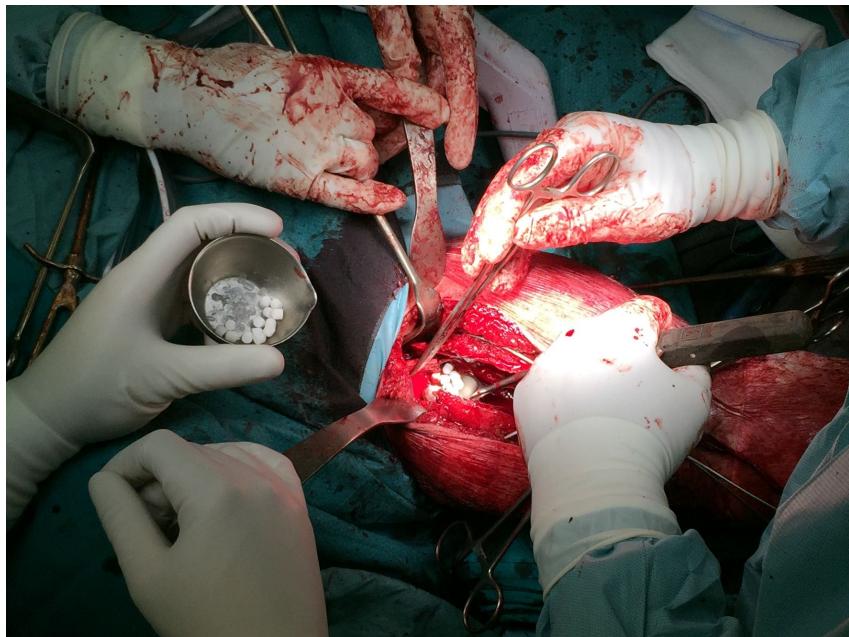


PerOssal®

Case Report I.3

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Case Report I.4

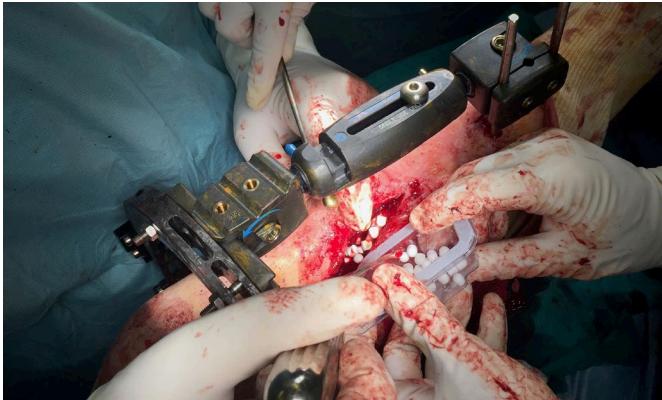
57-year-old patient with automotive trauma with exposed fracture, previously treated

1. After some months, infection and a delay in consolidation appeared.
2. The external fixator is positioned, then the infection is cleaned and curettage.
3. 12.5 cm³ of PerOssal® perfused with Vancomycin and 12.5 cm³ with Gentamicin.
4. To avoid direct contact with the skin it is placed on top of PerOssal® pellets of Tabotamp (Absorbable hemostatic, sterile in oxidized and regenerated cellulose).
5. The patient's skin is rebuilt with a Rematrix porcine matrix membrane.



PerOssal®

Case Report I.4



Courtesy of Dr. Memminger, Head of Orthopedic Surgery, Hospital of Montebelluna, Italy

PerOssal®

Case Report I.5

27-year-old male patient with a tibia plate removed due to an infection

1. Thorough surgical debridement of the bone and soft tissues
2. 12.5 cm³ PerOssal® pellets are loaded with Gentamicin and 12.5 cm³ PerOssal® pellets with Vancomycin
3. All of bones cavities filled with PerOssal® were covered by a collagen membrane to protect soft tissue



PerOssal®

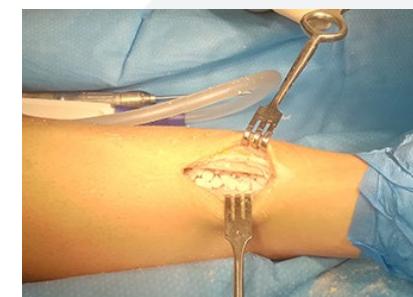
Case Report I.5



PerOssal®

Case Report I.6

1. Bone infection has led to the formation of a high percentage of sclerotic tissue in the intramedullary canal of the tibia.
2. The removal of this tissue during the debridement phase is fundamental for the success of the surgery and required a long and precise work from the surgeon.
3. In this case they used 12.5 cm³ of PerOssal® loaded with Vancomycin.
4. The surgeon, after filling the cavity with PerOssal®, covered the access with a collagen fleece to avoid contact between soft tissues and pellets and facilitate the reconstruction of the neoperiosteum.



PerOssal®

Case Report I.7

12 years old, female, with pathologic diaphyseal fracture of the left femur due to chronic osteomyelitis

1. SMRI reveals signs of chronic infection of lower two thirds of the femur from above the fracture site to the level of the distal growth plate of the femur.
2. This severe osteomyelitis needs radical resection of all the necrotic and dead tissue, fixation with external device, and filling the cavity after debridement with bone graft which could be loaded with antibiotics PerOssal®.



PerOssal®

Case Report I.8

29 years old, male, multi-level and multi-fracture fractures with displacement of the distal parts of the tibia and fibula after motorcycle accident

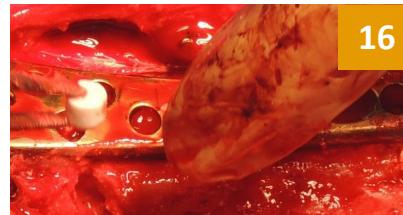
1. Primary anastomosis test using an external fixator (photo 2). Minimal for this type and degree of injury, damage to the skin integuments, no visible features occurring quite typical in such cases of open fractures, significantly increasing the risk of direct infection.
2. Second surgery due to the lack of fusion of bones and suspected infection. Decision was made to remove the stabilizer – 2 weeks after it was inserted. The next step was debridement of the injury site and implantation of the locking plate, tibia into the distal epiphysis and straight locking plate into the fibula (photo 3).
3. The first symptoms of an infectious complication, drainage in the areas of both operated ankles, from the side of the fibula, ankle joint and the tibia (photo 4).
4. The condition of the limb after 8 days of wound drainage. Multiple-point, bilateral purulent spills, also from the places of introduction into healthy bones of the external stabilizer screw tips (photos 5 and 6).
5. Limb condition 6 weeks after the second treatment. Visible fistulas on both sides, confirming infection in the lateral and medial area of the ankle joint and the distal epiphyses of both damaged bones (photos 7, 8, 9 and 10).
6. Almost 6 months after the accident (injury) and the first surgery: Limb condition without any visible improvement, lack of union of both bones, two screws in the tibial fracture slot, visible active purulent fistula, on the medial side, just above the ankle joint (photos 11 and 12).



PerOssal®

Case Report I.8

7. Six months after the first surgery, the patient was operated on again. The main assumptions of the surgery were: very precise debridement around the established anastomoses, removal of incorrectly inserted screws and application of antibiotic carriers and bone substitute to infected areas and areas of non-union and to the tibial canal. Due to the complete instability of the fractures, it was not possible to remove the existing anastomoses, which evidently, due to the bacterial biofilm, reduced the chances of successful surgery, i.e. curing the infection and final osseointegration of both bones.
8. PerOssal® 1 x 50 pellets were used, 25 pellets loaded with gentamicin and 25 pellets loaded with vancomycin
9. SEPTOPAL – polymethylmethacrylate beads with gentamicin was also used.
10. Removal of screws from the fracture gap, thorough debridement (removal of necrotic tissues and scarring, i.e. pathological, fibrous connections between tissues). Aggressive cleaning of the fracture gaps (photos 13, 14).
11. SEPTOPAL beads prepared for implantation, later arranged in parallel on both sides of the distal epiphysis of the tibia (photo 17).



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Case Report I.8

12. X-ray image after administration of PerOssal® pellets and SEPTOPAL beads. Visible areas filled with the PerOssal® in the fracture gaps (photo 18).
13. Follow-up two weeks after the surgery. Dry postoperative wounds, no visible signs of infection, not even superficial ones, removal of sutures. The patient used the EXOGEN ultrasound bone healing system throughout the postoperative period (photos 19 and 20).
14. Follow-up 6 weeks after surgery, current X-ray images in the frontal and lateral planes. Visible rapid reconstruction of the spongy bone and progressive fusion of the cortical bone, especially within both fractures. Dry postoperative wounds, with no signs of infectious complications.
15. There are no signs of the infection returning, comparatively there is a slowly progressive bone fusion and reconstruction of cavities (photos 21 and 22). In September 2021 (15 months after the first surgery) the patient was able to resume walking without crutches.
16. In optimistic forecasts, the patient should reach full fitness in spring / summer 2022.



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Case Report I.9

Dr. Gregor Reiter,
BG Klinik Ludwigshafen

59 years old, male, Osteomyelitis of the distal tibia after open fracture 2011 and course of infection 2015, now: unstable pretibial scar, fistula, pain

1. Debridement, antibiotic containing cement, two stage defect filling with bone substitute containing antibiotics
2. Combination with autologous cancellous bone from the iliac crest
3. After 6 months: free of pain, no re-infection



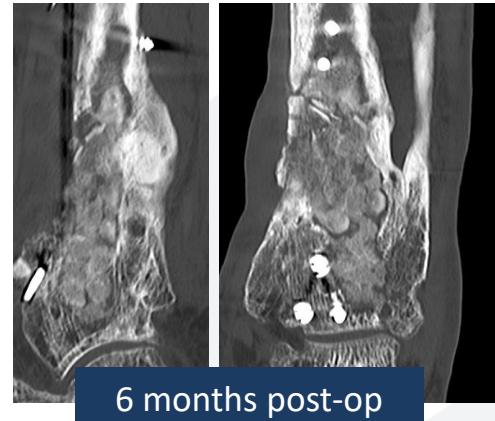
before



1st operation



2nd operation
after 6 weeks



6 months post-op

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Case Report I.10

17-year-old female with a chronic osteomyelitis of shoulder and femur

1. Thorough debridement of bone and soft tissue and 3 times lavage
2. 12.5 cm³ PerOssal® pellets are loaded with Gentamicin and 12.5 cm³ PerOssal® pellets with Vancomycin



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Case Report I.10



PerOssal®

Case Report I.10



PerOssal®

Case Report I.11

43 years old, male, low diagonal fracture of the right tibia, initially treated with locking tibia nail, 8 months ago, visible fistula indicating an infection

1. After removing the nail, an intraoperative x-ray showed malunion and lack of bone tissue.
2. The nail canal was reamed and thoroughly debrided with antibiotic solution. Swab samples taken for analysis.
3. PerOssal® 1x50 pellets were applied loaded with Gentamicin and Vancomycin. After assessing the filling in fracture, 2 additional sets of PerOssal® (1x6 pellets each) were added, with the same types of antibiotics. The back wall of tibia proved to be stable enough and with adequate rigidness of fibula.

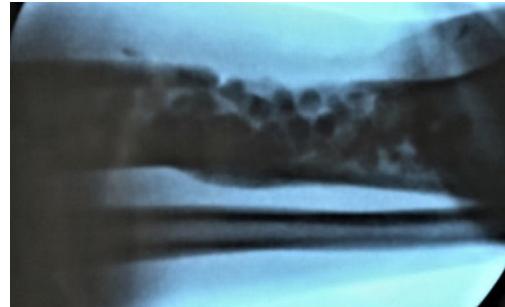


PerOssal®

Case Report I.11

43 years old, male, low diagonal fracture of the right tibia, initially treated with locking tibia nail, 8 months ago, visible fistula indicating an infection

4. Final intraoperative x-ray showed a good filling of the canal with PerOssal®.
After closing, the limb covered in plaster casing and V.A.C.® set for negative-pressure wound therapy.



Dr. Jaromir Ognik and Dr. Andrzej Hałajko, Orthopedic and Trauma Department
of the hospital in Radzyń Podlaski

PerOssal®

Case Report I.12

25 years old, male, chronic tibia osteomyelitis, several attempts of conservative and surgical treatments, continuous fistulous discharge resulting in progressive skin defect exposing the bone

1. X-ray revealed: exposed bone is long bone sequester of the medial half of almost whole tibial diaphysis. In the wound swab Methicillin resistant Staphylococcus aureus (MRSA) was found.
2. Excision of the sequester and debridement and curettage of the remained bone. Defect was filled with 100 pellets of PerOssal® soaked in 8 ml solution of 2 g of Vancomycin (250 mg/ml). Skin defect was covered with local soft tissue flap. Remnant bone continuity was secured with unilateral external fixator. Parenteral Vancomycin treatment was administrated in the following month.
3. Results: No wound leakage. Two weeks after surgery no signs of infection. Sutures were removed. No signs of pin track infection.



PerOssal®

Case Report I.12

25 years old, male, chronic tibia osteomyelitis, several attempts of conservative and surgical treatments, continuous fistulous discharge resulting in progressive skin defect exposing the bone

4. Three months post-op: scarce bony bridge and clusters of PerOssal® pellets in the bone defect, discrete varus collapse of the bone in spite external fixation
5. Six months post-op: bony bridge doubled in width, pellets completely absorbed, external fixation removed, PTB orthosis was used for gradually increased weight bearing
6. Eleven months post-op: width of tibia diaphysis and compensatory hypertrophy of fibula were strong enough to permit unprotected full weight bearing



PerOssal®

Case Report I.13

18 years old, male, closed fracture of the middle third of the lower leg with a multi-fragmentary spiral fracture of the tibial shaft, fibula fracture and soft tissue injury

1. Intramedullary nail osteosynthesis of the tibia. Post-op the patient developed a compartment syndrome, whereupon a bilateral fasciotomy was performed and a secondary suture was placed.
2. 12 weeks post-op: Wound dehiscence and strong secretion of the lateral wound. Revision: Wedge fracture was avital and infected. Implant removal and segment resection. Resulting bony defect was filled with a PMMA cement plug. Debridement of the medullary cavity, attaching of external fixator. *Staphylococcus epidermidis* and *Finegoldia magna* were found intraoperative.



Post-op



Implantation of cement plug
and attaching of external fixator



e

Intraoperative situation of
soft tissue after 12 weeks

PerOssal®

Case Report I.13

18 years old, male, closed fracture of the middle third of the lower leg with a multi-fragmentary spiral fracture of the tibial shaft, fibula fracture and soft tissue injury

3. After that, the patient received a 12-week antibiogram-appropriate, anti-infective therapy with clindamycin.
4. Dead space management of bony segmental defect with allogeneic and autologous spongiosa. Additionally, Vancomycin-loaded PerOssal® pellets were used.
5. 6 months post-op: The former defect is largely consolidated into bone, the bone graft substitute shows complete resorption and remodeling.



Application of PerOssal®



6 months post-op

PerOssal®

Case Report II.1

Material & Methods:

- During 2004 to 2008
- 46 patients (38 females and 8 males)
- Mean age 65.3 years (range 32 to 84)
- All patients
 - ▶ Periprosthetic infection of their TKRs
 - ▶ Revision using a two-stage revision protocol.
- **Group A**
 - ▶ 31 patients (25 females and 6 males)
 - ▶ Conventional articulating spacer impregnated with Tobramycin was used
- **Group B**
 - ▶ 15 patients (13 females, 2 males)
 - ▶ A **combination** of an articulating spacer and **PerOssal®** applied intramedullary as antibiotic carrier was used
 - ▶ Antibiotics used in PerOssal® pellets: Vancomycin, Amikacin, Rifampicin

Combination of calcium hydroxyapatite antibiotic carrier with spacers in periprosthetic knee infections

A. Drakou, V.I. Sakellariou, G.I. Karaliotas,
G.C. Babis, P.J. Papagelopoulos

From the 1st Orthopaedic Department, University of Athens,
ATTIKON University General Hospital, Chaidari, Greece.

PerOssal®

Case Report II.1 a)

Infected TKR, 72 years old, female, 2-stage revision

1. Implant removal – cement spacer
2. PerOssal® (contained fashion) in I.M canal sealed by spacer
3. Primary wound healing
4. Revision 2nd stage at 6 months
5. FU 24 months FOD



Removal of 1st implant



Spacer



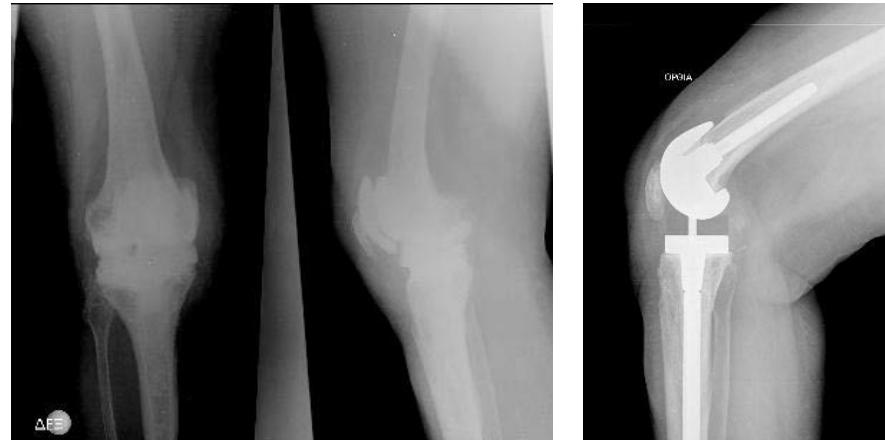
Revision prosthesis

PerOssal®

Case Report II.1 b)

Infected TKR, 65 years old, female,
2-stage revision

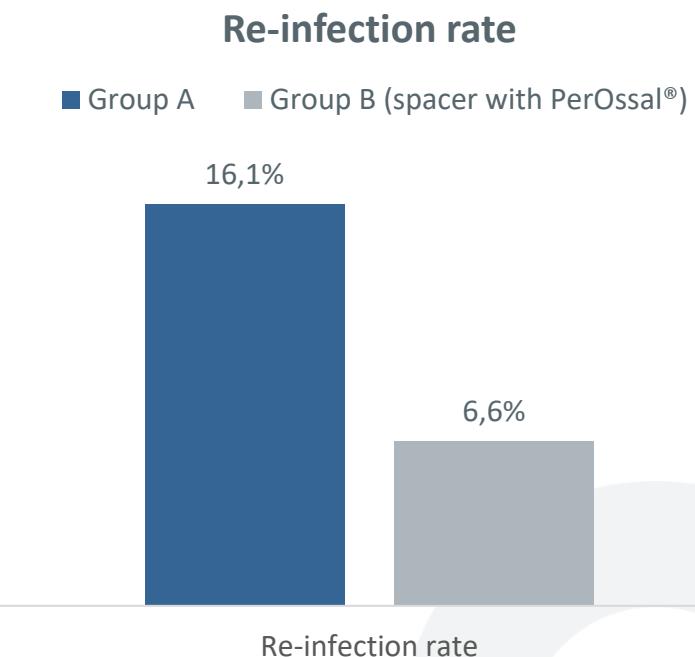
1. Implant removal – cement spacer
2. PerOssal® (contained fashion) in I.M canal sealed by spacer
3. Primary wound healing
4. Revision 2nd stage at 6 months
5. FU 18 months FOD



PerOssal®

Case Report II.1 a) & II.1 b) – Results

- Re-infection rate was 16.1% in **group A** and 6.6% in **group B** ($p=0.192$), all cases showing the same microorganism as of the initial surgery
- No adverse effects were shown on the group B where PerOssal® was used
- No evidence of PerOssal® induced osseointegration or osseo-integration was found at reimplantation (2nd stage)
- No bone loss noted at PerOssal® removal

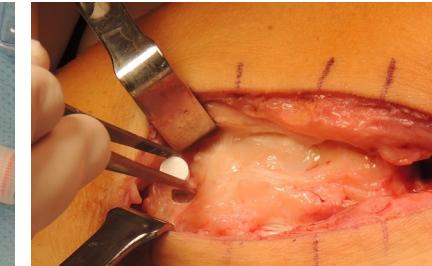


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Case Report II.2

55 years old, male, 7 months after implanting an innovative shock absorber on the knee – Calypso Knee System. Infection around all fixation screws. Swollen knee joint. On the medial side, the skin red and hot.

1. All screws have been removed. Debridement, lavage with physiological salt with antibiotics (Genta/Vanco). Two tubes 1x6 and one box 2x6 PerOssal® implantation (0.5 ml of the appropriate antibiotic was added to each of them, alternate, Gentamicin pellet and Vancomycin pellet). Wound closure.
2. After 1 week from the treatment there are no symptoms of complications. The patient was included in the follow-up program.
3. Follow-up visits after surgery – two weeks, one month, three months, one year. After 18/24 months and negative infection tests, good bone reconstruction, reimplantation the Calypso system.



PerOssal®

Case Report III.1

60-year-old patient with diabetic big toe osteomyelitis

1. Thorough debridement of bone and soft tissue and intensive lavage
2. 12.5 cm³ PerOssal® pellets are loaded with Gentamicin and 12.5 cm³ PerOssal® pellets with Vancomycin



PerOssal®

Case Report III.2

Infected metatarsal fracture

Open treatment,
implantation of
Vancomycin-loaded PerOssal®,
mixed with autologous bone



PerOssal®

Case Report III.2

1st attempt: Treatment with Septopal®



failed

PerOssal®

Case Report III.2

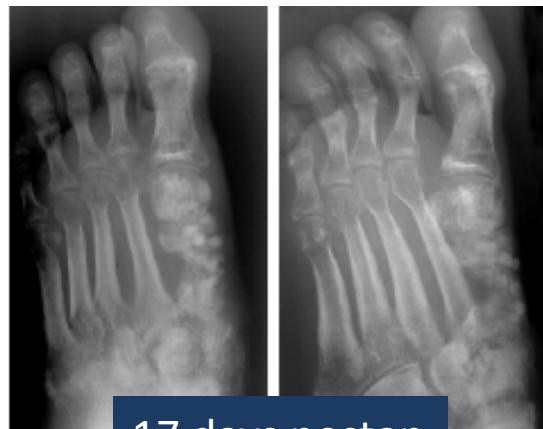
2nd attempt: 50 beads PerOssal®
+ 400 mg Vancomycin



PerOssal®

Case Report III.2

Osteomyelitis – Treatment with PerOssal® and Vancomycin



17 days postop



4 weeks postop



1 year later

4 weeks postop:

- ongoing healing
- no seroma
- new bone formation
- no reinfection!

Courtesy of Priv. Doz Dr HGK Schmidt,
BG-Unfallkrankenhaus Hamburg

PerOssal®

Case Report III.3

60-year-old patient

Osteomyelitis calcaneus left with skin fistula

1. 1x50 PerOssal® pellets were loaded with 400 mg Vancomycin and used in this case report.



PerOssal®

Case Report III.4

81 years old, female, arthrodesis (stiffening) of the ankle with a Herbert screw

1. Inflammation around the anastomosis and fistula visible
2. Subtalar screw was removed and debridement managed accordingly
3. Local application of bone substitute PerOssal® used as antibiotic carrier – 2 packages of 1x6 pellets
4. PerOssal® was preloaded in vancomycin and gentamicin
5. VivanoTec® device applied



Post-op comments: PerOssal® pellets did not change their structure after antibiotic preloading, a substitute could be compacted.

Single product of 6 pellets before administration for the test stay in vancomycin solution – no change of the consistency and hardness.

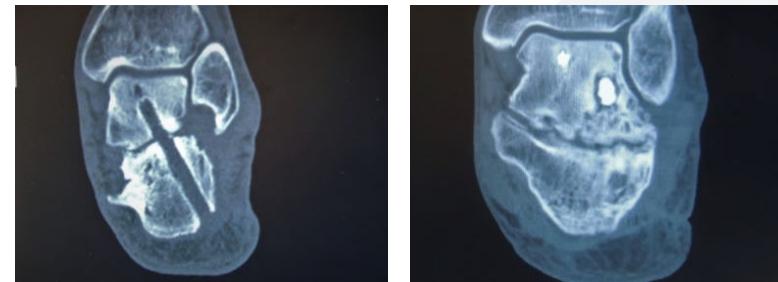
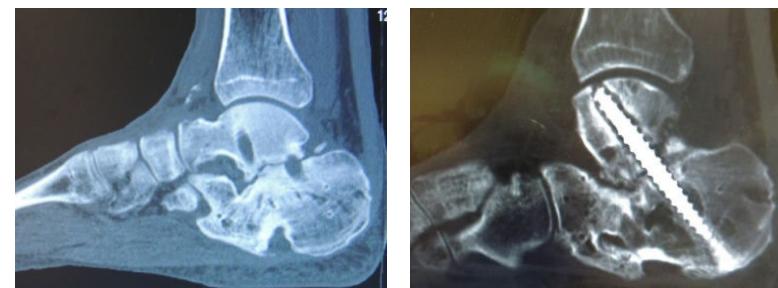
Dr. Urszula Zdanowicz, Carolina Medical Center,
Warsaw, Poland

PerOssal®

Case Report III.5

62 years old, male, high-impact fracture of heel bones, with dislocation, due to a fall from a scaffolding during work

1. Both heels were fixated with cannulated screws and surgical plates
2. Despite a lack of a proper repositioning of both fractures, the right heel has mended, the left heel, after a 1.5 years, showed signs of malunion
3. Revision surgery was performed with 2 titanium cannulated screws of higher diameter

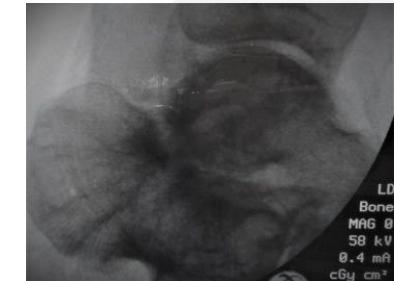


PerOssal®

Case Report III.5

62 years old, male, high-impact fracture of heel bones, with dislocation, due to a fall from a scaffolding during work

4. Removal of the screws was followed by a thorough debridement of the canals with antibiotic loaded PerOssal® 1x50 pellets, soaked in equal proportions with Gentamicin and Vancomycin
5. An intraoperative x-ray showed both canals to be properly filled



PerOssal®

Case Report IV.1

19 years old, male, big bone tumor on right elbow

1. Bone tumor was removed and cleaned with NaCl 0.9%
2. The autologous bone was mixed with 2x50 PerOssal® pellets loaded with 4 x 2 ml Gentamicin (80 mg per ampoule)
3. Post-op: good first outcome after surgery
4. Follow-up: 6 months later the patient will come for check-up



Pre-op



Post-op

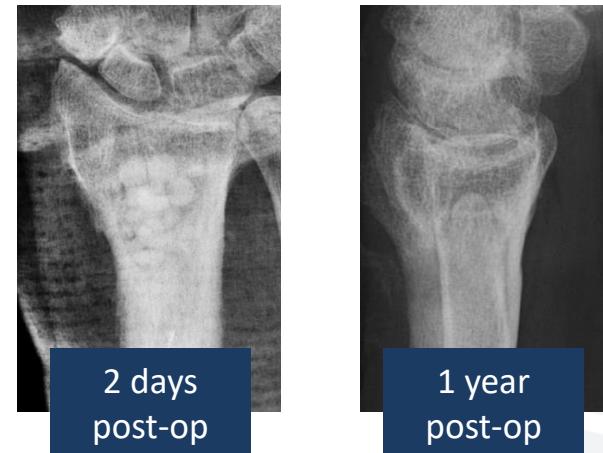


PerOssal®

Case Report IV.2

**58 years old, male, open distal radius fracture
1986, initial conservative therapy, recurrent
redness, swelling, pain and fistula formation
for 3 years**

1. One stage debridement and filling with bone substitute containing antibiotics
2. 1 year post-op: Free of pain, no re-infection



PerOssal®

Case Report V.1



Obelisc

Fig. 1. Obelisc® Vertebral body replacement for bridging substance defects (Ulrich, Spinal implants, Ulm, Germany).

Distraction is achieved with a bevel gear drive unit, and is subsequently locked with a screw. Antibiotic carrier was added in all cases (Fig. 3).

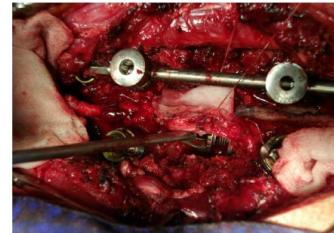


Fig. 2. A. Placing the Obelisc and Perossal pellets B. Intraoperative image with Obelisc vertebral replacement and posterior fixation with transpedicular screws



Fig. 3. Intraoperative image with Perossal pellets placed between the transverse apophysis

*Key Engineering Materials Vol 614 (2014) pp 173-177
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Online: 2014-06-06

Circumferential decompression with posterior instrumentation and fusion by lateral extracavitary approach – effective solution aiding the treatment of infectious spondylodiscitis

Iulian Popa^{1a*}, Dan Negoescu^{2b}, Dan Poenaru^{1c}, Manuel Oprea^{1d}

¹2nd Orthopaedics Department, University of Medicine and Pharmacy Victor Babes Timisoara, Romania; ²Polytrauma Clinic, University of Medicine and Pharmacy Victor Babes Timisoara, Romania

Results.

The average operative time was 263 minutes (range 231- 421 minutes). The average blood loss was 650 ml (range 330-1080 ml) which increased with the operative time. The average postoperative stay was ten days (range 7-14 days).



Fig. 4. X-ray image showing the correct placement of the implants



OSARTIS®

Legal manufacturer
of PerOssal®

OSARTIS GmbH

Auf der Beune 101, 64839 Münster

बहुत धन्यवाद

Puno hvala

وڈیون مہربانیون

Tack så mycket

お疲れ様です

Merci beaucoup

dziękuję bardzo

Muchas gracias

Vielen Dank für Ihre Aufmerksamkeit.

Thank you for your attention.

огромное спасибо

Muito obrigado

hartelijk dank

grazie mille

多谢