

Calcium Phosphate And Silver Coated Implants In Recurrent Hip Arthroplasty Septic Failures: a single center early experience

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INTRODUCTION

Periprosthetic joint infection (PJI) is one of the most threatful complication following arthroplasty procedures and several authors in literature have advocated to provide to the implants antibacterial coatings.

The higher costs of these complications and the complexity of patients invoked the use of:

- Fixed Coatings (metallic bacteriostatic/bactericidal coating: zinc, copper, **silver**)
- Absorbable Coatings (Hydrogel, HA/CaS, antibiotic carriers..)
- ... and furthermore, developing technologies...
- Biological Coatings (phages?)

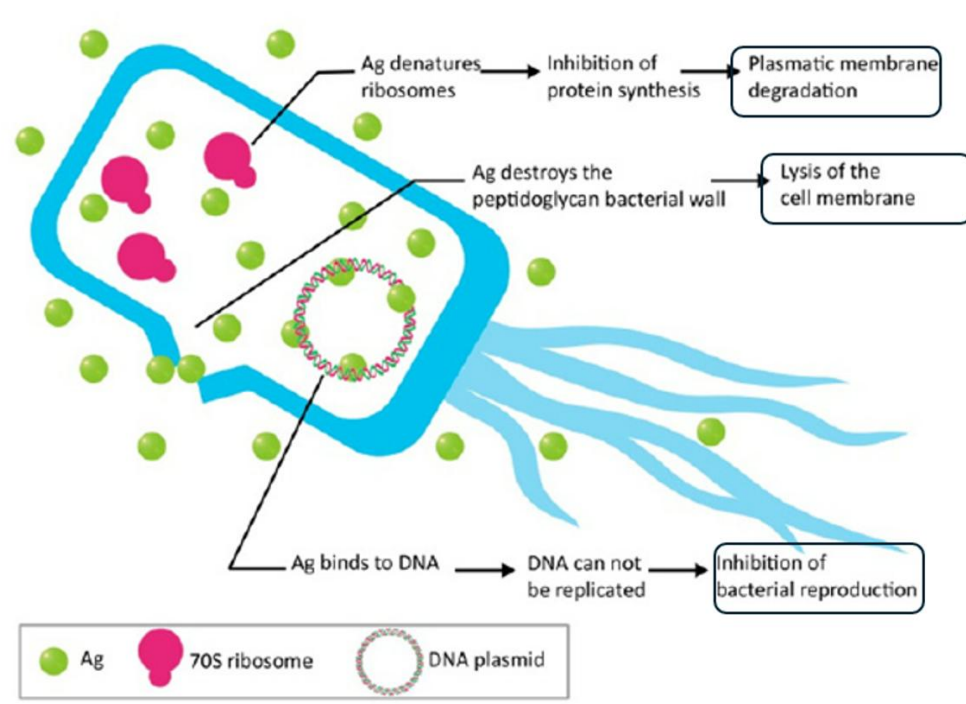
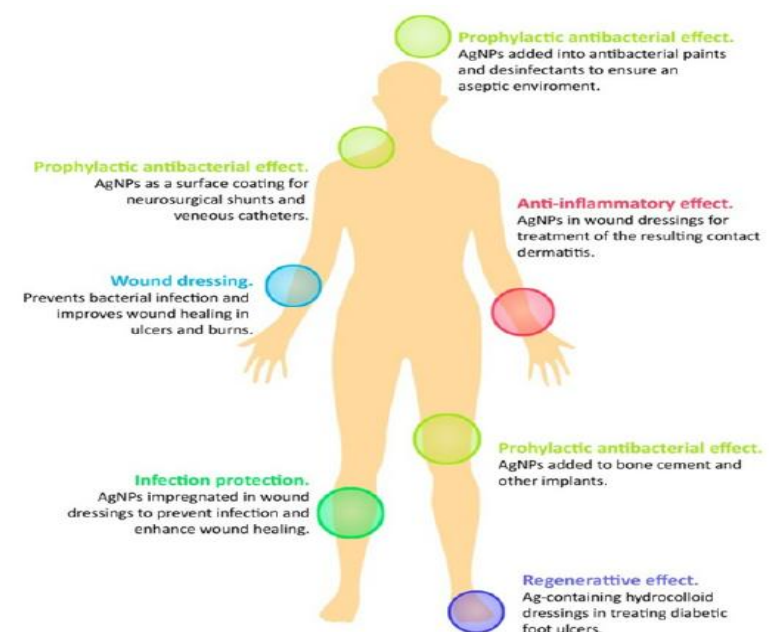
BACKGROUND

Likewise, **silver has been a promising coating** for metallic surfaces since several decades, and several types of silver-coated arthroplasty implants are in clinical use.

The antibacterial effect of silver has been used in a variety of commercially available products and medical devices for many years, either in its metallic or salt form.

Ag + ions and Ag-based compounds are toxic to microorganisms, possess strong biocidal effects on at least 12 species of bacteria including:

- Multiresistant Bacteria (Methicillin-resistant Staph. Aureus)
- Multidrug-resistant Microorganisms (Pseudomonas Aeruginosa)
- Ampicillin-resistant Bacteria (Escherichia Coli O157: H7)
- Erythromycin-resistant Bacteria (Streptococcus Pyogenes)



Domènech, Berta & Muñoz, M. & Muraviev, Dmitri & Macanías, Jorge. (2013). Polymer-Silver Nanocomposites as Antibacterial materials

OBJECTIVE

Nowadays new implants with Calcium phosphate (CaP) coatings associated to silver nanoparticles offer an antimicrobial solution for orthopedic implants, combining the bone-growth-promoting properties of CaP with the broad-spectrum antibacterial effects of silver.

- Ti6Al4V alloy** (90% Ti, 6% Al, 4% Vanadium)
- Electrochemically depose **CaP-layer** for stimulate osteointegration
- Silver nano-particle** ranging between 10 nm to 40 nm randomly dispersed on the implant surface.

Aim of the the study was to **present short term results in silver-CaP coated hip revisions implants in polipathological patients following multiple septic failures** to assess any complication and result at a short follow-up.

STUDY DESIGN

A **retrospective analysis** of a select cohort with **16 patients** who underwent to a second stage hip revision following multiple failures for PJI in a single hospital between 2023 and 2025 were included in the study.

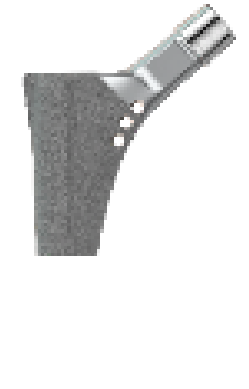
Criteria of inclusion were:

- polipathological patients (**at least 2 comorbidities**)
- age **younger than 80**
- proved **PJI** with at least already 2 **previous failed surgical treatments**

MATERIALS

In all the patients the same hip revision silver-CaP coated system was used implanting a revision stem in 15 patient and a primary stem in 1 case associated in all the cases with a double mobility cup.

- Modular Ti-alloy Stem
- Ca-P layer
- BACT version (AgNPs)**
- Proximal Body 4 heights x 2 ø
- Distal Stem 3 Lenghts x 5 ø



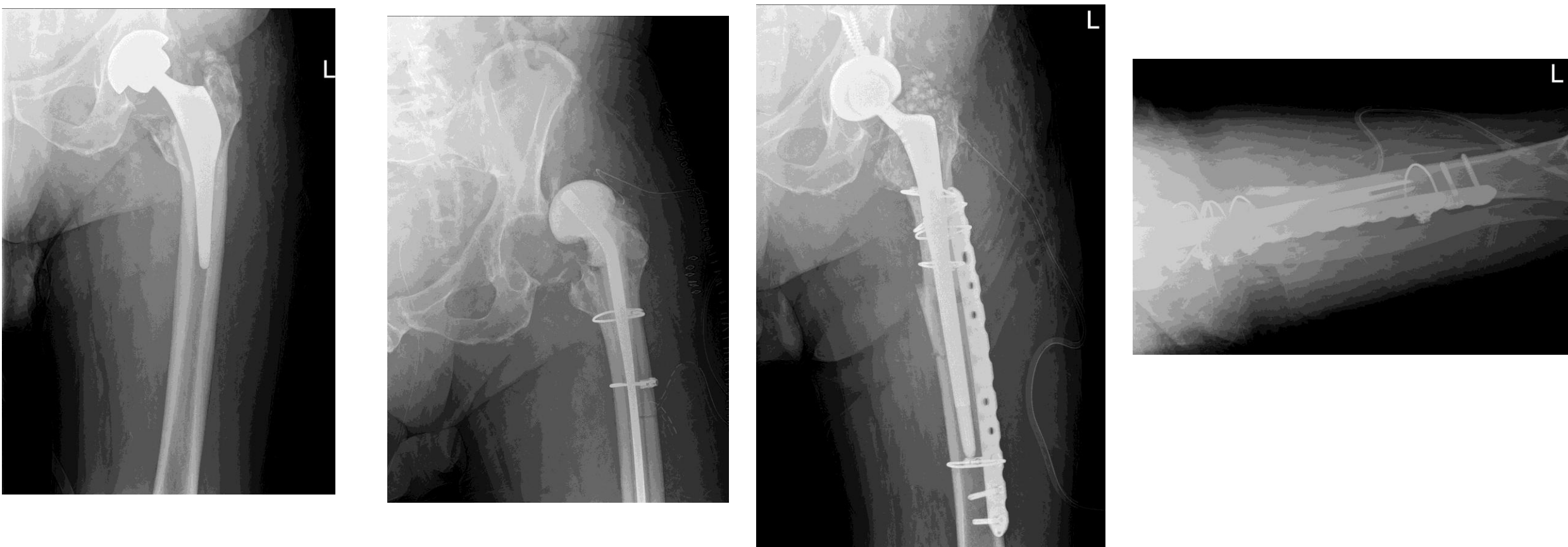
RESULTS

At a mean follow-up of 13 months:

- no mechanical failure among all the implants
- no signs of early loosening
- all the patients recover to full weightbearing
- All the patients were extremely satisfied.
- No signs of argyria was observed

Complications:

7 case of associated ORIF: (4 plates, 3 tension band)
6 intraoperative osteotomy (ETO)
1 fracture occurred one week before reimplantation
2 early DAIR procedure for persistent drainage (all negative intra-operative culture)
1 septic local recurrence (patient underwent to hardware removal of tension band + stem body and double mobility exchange)



CONCLUSIONS

- PJI recurrency in polipathological patient is one of major challenge in joint arthroplasty surgery and new coatings could represent a promising technology for these selected patients.
- In our experience **at a short follow-up no patient underwent to a failure** requiring a new revision because any failure reason.

Longer and larger follow-up are required even considering any advantages/disadvantage in term of cost.