In vivo release of high dose vancomycin from loaded cement in patients with periprostheses infection effective bactericidal activity.

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After limb salvage, infection

• is a devastating complication that occurred in 8 to 20% of patients treated by en bloc resection and prosthetic reconstruction for bone sarcomas.

• Resulting often in secondary amputation
Antibiotic loaded cement spacers

• Have been widely used since 1972 to prevent and to treat prosthetic infection
• The delivery of a high concentration of antibiotics in a localized area is thought to be safer than systemic administration of intravenous antibiotics in such doses
the emergence of increased resistance of staphylococcus

• Explains recent less effectiveness of conventionnal antibiotic loaded cement (low dose of antibiotics)
• Plaes for higher doses of antibiotics
• and compells us to consider the antibiotic concentration in the operating field
systemic safety of high dose vancomycin

• The systemic safety of high dose vancomycin loaded spacer has been investigated* but rarely the elution of high vancomycin from cement in vivo.

The aims of the study

1°) To **confirm the systemic safety** of using high doses of vancomycin in cement

2°) To **evaluate the elution of vancomycin into the site** of the excision arthroplasty to see if effective bactericidal activity can be obtained
Patients and methods

- From 2006 to 2008, 16 consecutive patients were managed by prosthetic exchange 2 stages procedure using high dose vancomycin loaded cement spacer.
- Patients were males:7 females:9. Average of age at the time of surgery was 22 years.
Antibiotic-loaded methylmethacrylate cement

- Cement were prepared by adding 4 g of vancomycin powder to a 40 g pack of Palacos R cement in the operative room during the operation.
Antibiotic-loaded methylmethacrylate cement

• We generally used 2 to 4 batches of cement in one spacer depending of the size and length of resection.

• The average dose of implanted vancomycin was 7.5 G (4-14.5).
The spacer was composed of metallic rods covered with antibiotic loaded cement Gentamycine+ Vancomycine (4 gr/pack).
spacers for femur

- Distal femur
- Total femur
- Proximal femur
other spacers

Spacers used for proximal humerus or acetabular

![X-ray image of a hip replacement with a spacer]
Post operative cares

- The wounds were closed with absorbable mono-filaments sutures over one suction drain.
- Intravenous antibiotics excluding vancomycin were given for 6 to 24 weeks.
- Patients biological values and the concentrations of vancomycin in the blood and in the aliquots of suction drainage were checked daily until removal of drain (d10-d15).
Results for systemic safety

- The serum concentration of vancomycin remained under 2 µg/ml in all patients
- We observed no case of
  - allergy,
  - toxicity
  - or intolerance
Local concentration

- Local concentration of vancomycin depended on the dose of vancomycin used and decreased quickly during the first week.
- half life : 2.25 days.
For a dose of 10 G vancomycin, the average concentration from the drain was: d1: 725 µg/ml, d2: 510 µg/ml, d3: 346
Is it bactericidal?

- These results should be compared to the bactericidal concentration of vancomycin for staphylococcus aureus:
  - 10 to 20 µg/ml for usual organisms,
  - 20 to 40 µg/ml for resistant organisms.
Conclusion

• high dose vancomycin spacers result in very low serum concentration without risk of systemic toxicity.

• In the operative wound, very high concentration are obtained, 10 to 20 fold bactericidal concentration for staphylococcus aureus.

• Additional studies are needed, with longer follow-up to evaluate the clinical efficacy of this method.