

Advice for healthcare professionals

The science behind CERAMENT®

CERAMENT is an injectable bone graft substitute that consists of hydroxyapatite (HA) particles, calcium sulfate (CaS) crystals and a liquid component¹.

By combining CaS and HA a balance is achieved between implant resorption and bone ingrowth rate²⁻⁴. After CERAMENT has been injected into a bone void resorption of the CaS component begins, leaving behind a HA scaffold for colonization by osteoblasts and formation of new bone⁵⁻⁸.

Why does white wound drainage occur?

In deep bone voids, CaS is resorbed from the site of implantation by the cancellous bone vascular network and surrounding soft tissue.

In some cases where the void is not in contact with cancellous bone, for example if there is sclerotic bone present, the void is not contained, or if CERAMENT is in close proximity to the skin, there is a risk that dissolved CaS can lead to a seroma or serous wound exudate⁸.

This exudate is white in color because of the CaS and is known to occur with bone graft substitutes containing CaS¹⁰⁻¹⁴. It is sterile and in most cases resolves within 2-3 weeks without further therapy^{8,9}, but in some instances this can take longer.

Key facts

- Seroma/wound ooze is sterile
- Wound exudate generally resolves on its own without further therapy within 2-3 weeks
- Wound healing is not affected

Possible causes

- CERAMENT is in contact with poor quality bone
- Very heavy bleeding at the site of implantation
- Volume of bone graft substitute implanted >20mls
- Bone with thin subcutaneous covering

What should I do if my patient experiences white wound drainage?

The white color of the wound exudate can resemble infection, so there may be an impulse to schedule immediate revision surgery, but white wound drainage is not generally linked to infection and is reported to resolve without treatment⁸.

1. Always contact the surgeon or a member of the team that implanted CERAMENT, so they can decide whether revision surgery is required.

2. Carry out diagnostic tests before deciding to perform revision surgery:

- Clinical observations: temperature, heart rate and blood pressure.
- CRP and white blood cell count.
- If a seroma is present, aspiration of the fluid and determination of the white blood cell count & microbiology.

Negative test results

If all or most of the above parameters are negative, an infection is very unlikely and conservative treatment with standard wound care¹⁰ should be considered. The patient should be followed up closely and the above tests may be repeated. In most cases the wound exudate should resolve within two-three weeks.

Positive test results

If the above parameters indicate an infection (raised temperature, tachycardia, elevated white blood cell count and CRP, a high number of white blood cells in the aspirate or positive culture result) revision surgery should be considered.

Tips and tricks for decreasing the risk of white wound drainage

- **Ensure CERAMENT is in contact with cancellous bone.** If CERAMENT is not in contact with cancellous bone, e.g. if there is sclerotic bone present, or if CERAMENT is in close proximity to the skin, there is a risk that dissolved CaS can lead to a seroma or serous wound exudate⁸.
- **Control bleeding during surgery.** Extensive bleeding might result in intermixing of blood with the CERAMENT paste. Consider using a tourniquet if applicable.
- **Wait until three or four minutes after mixing, according to the instructions for use, before injecting CERAMENT.**
- **Close soft tissue and skin in layers.**

References and further reading

1. Nilsson et al. 'The composite of hydroxyapatite and calcium sulphate: a review of preclinical evaluation and clinical applications.' *Expert Rev Med Devices*. 2013;10(5):675-684.
2. CERAMENT BONE VOID FILLER Instructions for Use.
3. CERAMENT G Instructions for Use.
4. CERAMENT V Instructions for Use.
5. Hettwer et al. 'Establishment and effects of allograft and synthetic bone graft substitute treatment of a critical size metaphyseal bone defect model in the sheep femur'. *APMIS* 2019;127:53-63.
6. Hofmann et al. 'Autologous iliac bone graft compared with biphasic hydroxyapatite and calcium sulfate cement for the treatment of bone defects in tibial plateau fractures – A prospective, randomized, open-label, multicenter study'. *J Bone Joint Surg Am*. 2020;102:179-93.
7. Ferguson et al. 'Radiographic and histological analysis of a synthetic bone graft substitute eluting gentamicin in the treatment of chronic osteomyelitis'. *J Bone Joint Infect*. 2019;4:76-84.
8. McNally et al. 'Single-stage treatment of chronic osteomyelitis with a new absorbable, gentamicin-loaded, calcium sulphate/hydroxyapatite biocomposite – A prospective series of 100 cases'. *Bone Joint J*. 2016;98-B:1289-96.
9. Horstmann et al. 'Early clinical and radiological experience with a ceramic bone graft substitute in the treatment of benign and borderline bone lesions'. *Sci Rep*. 2018;8:15384.
10. Ferguson et al. 'The use of a biodegradable antibiotic-loaded calcium sulphate carrier containing tobramycin for the treatment of chronic osteomyelitis: a series of 195 cases'. *Bone Joint J*. 2014;96-B:829-36.
11. Beuerlein & McKee. 'Calcium sulfates: what is the evidence?' *J Orthop Trauma*. 2010;24 Suppl. 1:S46-51.
12. Kelly et al. 'The use of a surgical grade calcium sulphate as a bone graft substitute. Results of a multicenter trial.' *Clin Orthop Relat Res*. 2001;382:42-50.
13. Borrelli et al. 'Treatment of nonunions and osseous defects with bone graft and calcium sulphate.' *Clin Orthop Relat Res*. 2003;411: 245–254.
14. McKee et al. 'The use of an antibiotic impregnated, osteoconductive, bioabsorbable bone substitute in the treatment of infected long bone defects: early results of a prospective trial.' *J Orthop Trauma*. 2002;16(9):622–627.



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