Bone cements are ideal as carriers for the local delivery of antibiotics

Use in infection prophylaxis
For use in primary procedures, a bone cement is used that contains a broad spectrum antibiotic in a low dose (0.5–1 g per 40 g bone cement) for antibiotic prophylaxis. Gentamicin, an aminoglycoside that has bactericidal action and can kill both Gram-positive and Gram-negative bacteria due to its broad spectrum of activity, has established itself for this purpose. The function of this antibiotic is to kill bacteria before they can colonise the implant and form a biofilm.

Support in the eradication of an infection
Bone cement that contains a high dose of antibiotics (≥ 2 g per 40 g bone cement powder) are used to support the treatment of an existing infection in order to specifically target the pathogens. The bone cement should contain two antibiotics in the case of a severe infection because combination antibiotic therapy is superior in fighting infection.

Spacers made of bone cement in revision
In the two-stage exchange operation, spacers are used as a temporary placeholder for the subsequent revision prosthesis to minimise contracture of the soft tissue apparatus, create stability and enable limited mobility of the patient. Such bone cement spacers are often impregnated with antibiotics to prevent recolonisation of the implant and adjacent tissue. The release of the active substances follows the laws of diffusion. The higher the water absorption capacity of the bone cement and the larger the bone cement surface, the better the release.

However, not all antibiotics are suitable for use in bone cement. The following prerequisites for an active substance must be present:

- It must be water soluble and heat stable
- It must be available in powdered form
- It must be chemically stable and capable of being sterilised and stored
- It must not interact with the chemical reaction of the bone cement setting and should affect the mechanical properties of the bone cement as little as possible

⚠ **WARNING: Bone cements are not approved for manual addition of antibiotics!**

Note that manual addition of antibiotics to bone cement leads to off-label use of the medical device. Product liability then passes to the surgeon.
If no industrially manufactured products are available which target the pathogens according to the antibiogram, manual admixture of antibiotics to bone cement has become clinical practice, in order to customize a special antibiotic-cement mixture.
In this case it must be ensured that the antibiotic is evenly and fractionally added to the bone cement powder. If necessary, the active substance may therefore have to be ground beforehand. In all cases the antibiotic must be added in the powdered state and should not exceed a total quantity of maximum 10% of the total quantity of the bone cement. Deviations from these requirements may have negative effects on the stability of the bone cement.

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