Chlorhexidine and chondrolysis in the knee

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We have summarised the clinical and pathological changes in the knees of three patients in whom aqueous chlorhexidine 0.02\% had been used as the irrigation solution during arthroscopically-assisted reconstruction of the anterior cruciate ligament. Even very dilute solutions of chlorhexidine can cause marked chondrolysis of articular cartilage leading to severe permanent damage to the knee. Irrigation solutions should be checked carefully to ensure that their composition is appropriate to the procedure being carried out. Exposure of articular cartilage to chlorhexidine should be avoided.

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Chlorhexidine 0.02\% has been widely used as an irrigation solution during surgical procedures. It is bactericidal and has been shown to kill Staphylococcus aureus in contaminated wounds.\(^1\) It has always been considered safe and does not have any effect on rates of wound healing, as has been shown in animal experiments.\(^2\) Two previous reports,\(^3,4\) however, have shown that chlorhexidine has a deleterious effect on articular cartilage. Relatively concentrated solutions (0.5\% and 1\%, respectively) were implicated.

We describe the clinical and pathological changes in three knees after chlorhexidine, in the very low concentration of 0.2\%, had been used as the irrigation solution during three consecutive arthroscopically-assisted reconstructions of the anterior cruciate ligament (ACL).

Case reports

The patients were a 20-year-old woman, a 30-year-old man and a 62-year-old woman. All three had reconstruction of the ACL carried out under arthroscopic control without opening the knee. Dacron and carbon-fibre composite prostheses were used. The three operations had been undertaken consecutively by the same surgeon in 1989. All three patients had chronic insufficiency of the ACL.

The only difference in the technique in these three cases, compared with the rest of his series, was the use of chlorhexidine 0.02\% for irrigation throughout the procedure.

All had a good immediate postoperative recovery with no sign of infection, and none had preceding rheumatoid or other inflammatory joint disease, systemic disease or chronic use of medication.

They all developed pain, swelling, stiffness and loud crepitus between two and four months after the procedure and had radiological evidence of loss of joint space, especially in the medial compartment.

Arthroscopies of all three knees showed a large amount of loose chondral material, a ‘snowstorm’ appearance, which could be washed out (Fig. 1). Severe erosion of the articular cartilage and a mild synovitis were also demonstrated. The ligaments were all intact and culture of the synovial fluid was sterile.

Histopathological examination of the fragments of cartilage showed the presence of non-viable chondrocytes, which were seen as ghost outlines on Van Gieson staining, with the absence of acute inflammatory cells and very few chronic inflammatory cells. The synovial biopsy specimens showed evidence of fibrosis.

All three patients had severely damaged knees which required total knee replacement.

Discussion

The deleterious effect of chlorhexidine on articular cartilage has been reported previously.\(^3,4\) In all cases, relatively concentrated solutions were used.

Rombouts et al\(^3\) described chondrolysis in the knee of a 21-year-old man after an arthrotomy in which chlorhexidine 0.5\% had been used as the irrigation solution. An experimental study carried out by these authors confirmed the toxicity of concentrated chlorhexidine on the articular cartilage in dogs. No toxicity was detected with a 0.02\% solution.
Douw et al. described five patients in whom chlorhexidine 1% had been accidentally used for irrigation during arthroscopy of the knee. The clinical presentation and radiological features were similar to our cases.

Our observations show that chlorhexidine, even in the very low concentration of 0.02%, has a very damaging effect on the articular cartilage of the knee. It causes marked chondrolysis leading to severe permanent damage to the knee. This is especially true when it is used as an irrigation solution during arthroscopy or arthroscopically-assisted procedures.

Chlorhexidine 0.02% should not be used as the irrigation solution in surgical or traumatic wounds in which articular cartilage is exposed, or in arthroscopic procedures. Orthopaedic surgeons should always check carefully that the irrigation solution used is appropriate for the procedure being undertaken.

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References