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AN ALTERNATIVE METHOD FOR EXCHANGE OPERATION OF INFECTED ARTHROPLASTY

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The use of bone cement balls in chains loaded with gentamycin (gentamycin-PMMA-ketten) as part of a two-stage exchange operation has proven to be a good method of treatment for infected arthroplasty. The procedure is illustrated by three case reports.

Key words: exchange operation; gentamycin cement; hip surgery; infected arthroplasty; knee surgery

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Infected joint arthroplasties are a considerable problem to the orthopaedic surgeon. Exchange operation with gentamycin-loaded bone cement, described by Buchholz & Gartman (1972), is an accepted method of treatment. More than four fifths of the 79 exchange operations at the Orthopaedic Departments in Gävle, Lund and Malmö have been successful (Carlsson et al. 1978).

However, our experience in Gävle is that in certain cases immediate exchange is not suitable. In these cases we have first taken out the infected arthroplasty and inserted balls of bone cement loaded with gentamycin (EMD 33040 Merck, Darmstadt), for a period of 3 weeks, before the final exchange operation. This method has been described earlier, particularly in connection with chronic bone infection (Klemm 1976, Jenny et al. 1977).

Since 1976 several patients with infected arthroplasties have been operated upon at the Orthopaedic Department in Gävle according to this two-stage procedure with gentamycin-loaded cement balls. Three of the cases are described here.

CASE REPORTS

Case 1. A 67-year-old woman with coxarthrosis was treated with hip arthroplasty in 1970. In 1975, because of infection, an exchange operation with gentamycin-loaded bone cement was performed. Bacteriological culture yielded *Staphylococcus aureus.*

Due to persisting infection, in 1976 the latter prosthesis was extracted and replaced with 60 bone cement balls containing gentamycin. Culture again gave *S. aureus.*

The patient was then kept in traction for 3 weeks after which the final operation with a Christiansen prosthesis and with gentamycin-loaded cement (1.5 g gentamycin sulphate/40 g bone cement) was performed.

The patient is now quite free of symptoms with a normal X-ray and sedimentation rate 18 months after the last surgical procedure.

Case 2. A 65-year-old woman was operated on in 1970 and fitted with a Moore prosthesis because of a dislocated fracture of the femoral neck.

In 1976 there were signs of deep infection. X-ray showed protrusion of the prosthesis with infection (Figure 1). The patient was operated upon and the prosthesis removed. During the operation the femur fractured. Because of this and

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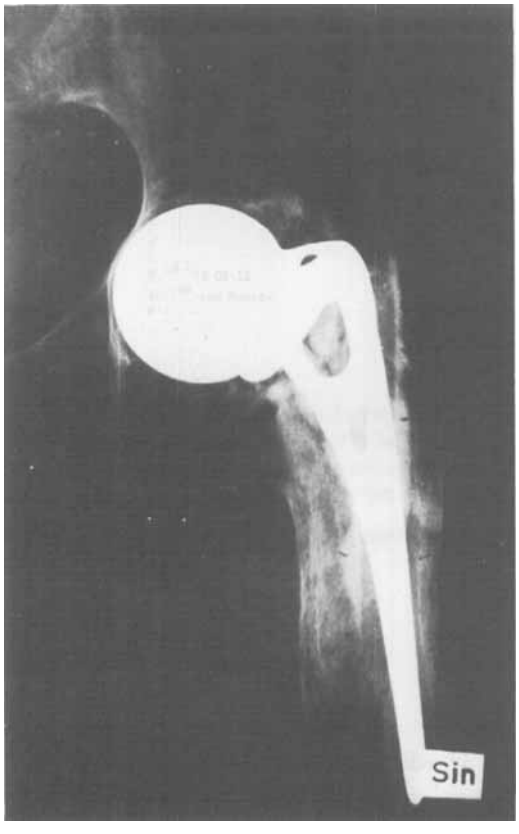

Figure 1. (Case 2) Infected Moore prosthesis 6 years after primary operation.

Figure 2. (Case 2) Prosthesis extracted. Gentamycin balls placed in the wound cavity. The femur was fractured during the operation.

the evident signs of infection no direct exchange was performed. Instead 90 balls of bone cement loaded with gentamycin were inserted into the femur and acetabulum. The patient was put into traction (Figure 2).

Culture yielded *Staphylococcus epidermidis* together with anaerobic bacilli sensitive only to ampicillin and gentamycin.

Three weeks later the balls were taken out, the fracture stabilized with metallic bands and an arthroplasty using bone cement with gentamycin (0.5 g gentamycin/40 g cement) was performed (Figure 3).

The patient remains free of symptoms after more than 1½ years. X-ray and sedimentation rate are normal.

Case 3. A woman aged 59 years, with rheumatoid arthritis was treated for several years with steroids. In March 1977 both condyles in the right knee were replaced with demi-prostheses. Six months postoperatively there were signs of septic arthritis. Culture showed *S. aureus.*

At the end of September the prosthesis was taken out together with as much infected tissue as possible. Thirty gentamycin-loaded balls were inserted. Primary closure of the wound was made. Four weeks later, when the sedimentation rate had fallen from 80 mm to 4 mm, the patient was operated on and fitted with a bicondylar prosthesis. The bone cement was loaded with 1.5 g gentamycin/40 g cement.

At the last examination of the patient made 6 months postoperatively there were still no signs of infection in the knee.

Figure 3. (Case 2) Total hip arthroplasty with a Christiansen prosthesis. The fracture of the femur has been stabilized with two metallic bands.

DISCUSSION

Infected arthroplasty usually means further operative procedures. Long-term treatment with antibiotics may alleviate the symptoms without resolving the infection (Lidgren et al. 1977).

Since Buchholz & Gartman published their results on exchange operations using gentamycin-loaded bone cement (Buchholz & Gartman 1972) this method has been used at the Orthopaedic Departments in Gävle, Lund and Malmö with to date good results (Carlsson et al. 1978).

Exchange operative procedures are often more complicated than primary arthroplasties. Amongst the technical problems encountered are peroperative fracture, perforation of the femoral shaft and difficulty in removing all the bone cement. Sometimes the infection is so severe that the surgeon is reluctant to make an immediate exchange.

When these circumstances prevail we are convinced that a two-stage operation is preferable. At the first intervention the prosthesis, all infected tissue and all bone cement are taken out. Adequate bacteriological cultures are made. Chains with gentamycin-loaded cement balls are inserted into the cavity left by the prosthesis. During the period in traction before the final arthroplasty, an X-ray is made to confirm that all bone cement is removed; this is important (Buchholz et al. 1977, Clegg 1977). The most suitable prosthesis is prepared beforehand and if appropriate, depending on the bacteriological culture, the bone cement may be loaded with antibiotics other than gentamycin (Buchholz et al. 1977).

The short period without a prosthesis as in our three cases was a great advantage. A longer period may cause technical problems (Carlsson et al. 1978).

The final arthroplasty should probably be performed after a period of 3 weeks with the cement balls, after which time most of gentamycin has been released (Sattel & Nabert-Bock 1973).

Summary

We have described an alternative method for exchange operation of infected arthroplasty. In certain cases this two-step procedure with gentamycin loaded cement balls offers several advantages.

1. Severe deep infection can be brought under control before the final prosthesis is inserted.

2. Adequate bacteriological culture during stage one makes it possible to add the appropriate antibiotic to the cement.

3. X-ray makes it possible to confirm that all bone cement is removed.

4. Technical complications, for example femoral fracture, can be handled later when

the correct model of prosthesis has been ordered.

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