

Management of the infected arthroplasty using antibiotic-loaded hydroxyapatite blocks combined with cement spacer.

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Introduction

The treatment of the infected arthroplasty is very difficult and its cost-effectiveness is relatively low. Although many methods have been reported to manage this intractable disease, for example, resection arthroplasty, continuous irrigation, the use of the cement beads and the cement spacer which contained antibiotics, and hydroxyapatite blocks which filled with antibiotics, each therapy has limitation or disadvantage for clinical application. The resection arthroplasty usually demands difficulty of the daily living and thought to be the final choice for the infection of the hip arthroplasty. Continuous irrigation needs long period of bed rest and hospital stay. Although some authors recently reported better results of the infection of the arthroplasty using cement beads and the cement spacer, it is not fully investigated if there will be sufficient concentration of the drug. Additionally, the loss of efficacy of the antibiotics by polymerization heat is problem when heat sensitive antibiotic is used with bone cement.

Hydroxyapatite blocks filled with antibiotics seemed to be one of the better choices, but it is difficult to place the blocks to desirable location and maintain it during treatment period. Additionally, it is also difficult to fill the space after the infected implants are removed by hydroxyapatite blocks alone. In the present study, we report the clinical results of the antibiotic-loaded hydroxyl-apatite blocks (HAB) combined with cement spacer. Our method provides the surgeon to avoid polymerization heat for antibiotics, to place HAB with cement spacer to where the surgeon anticipates the effect of an antibiotic, and also to fill the void space with preservation of the affected leg length.

Method

Technical details of the hydroxyapatite blocks combined with cement spacer

The Cement Spacer Molds® (Biomet Inc., Warsaw, IN, USA) and Boneceram P (Sumitomo Pharmaceuticals Co., Ltd., Osaka, Japan; 8mm cube) were used in combination. Multiple windows (8mm square) were made in a hip cement spacer mold (Fig.1), and HAB was inserted through the windows with its lid toward to outside (Fig.2). The bone cement which was mixed with selected antibiotics for each patient was injected into a mold. After hardening of the cement, a mold was removed, and then the HAB were filled with powder of the antibiotics and were covered with the lid (Fig.3). In the surgery, after all components were removed, vigorous débridement and washing using pulse washer was performed, then the HAB combined with cement spacer was inserted into the hip joint. For the total knee arthroplasty, same procedure was performed using knee spacer molds.

Clinical results

We performed this technique for eight patients. Summary of the clinical result is shown in table 1. We found regression of infection in 7 out of 8 cases.

Case 1

A 79-year-old woman was introduced to our hospital with continuous pain of the hip and thigh just one year after hemiarthroplasty. Because clear zone around the femoral component was observed, the joint fluid was analyzed. The result of culture of the joint fluid indicated the evidence of infection with *Meticillin Resistant Staphylococcus Epidermidis* (MRSE). We performed two-stage reconstruction using HAB combined with cement spacer. Nine months after the revision total hip arthroplasty, there is no evidence of recurrence of infection (Fig.4).

Discussion and Conclusion

The treatment and management of the infected hip arthroplasty is extremely difficult and intractable. Although there are many choices, no gold standard method exists. In the case of recurrent infection, Girdlestone operation is indicated. But the difficulty of daily living is quite high. Recently two-stage reconstruction using antibiotic-loaded cement beads or cement spacer was introduced and the reported clinical results are satisfactory.

In case of infection with MRSA, vancomycin often will be first choice, but the surgeons have to pay attention to handle it, since it is very delicate for heat. The choice of bone cement with low polymerization heat, or the another method using HAB as a carrier of the powder of the drugs should be needed.

We performed the two-stage reconstruction using antibiotic-loaded HAB combined with cement spacer which had the feature of both advantage. The advantages of our method are to avoid loss of efficacy of the antibiotic from polymerization heat of bone cement, to place HAB with cement spacer in a portion to anticipate the effect of an antibiotic, and to fill the void space.

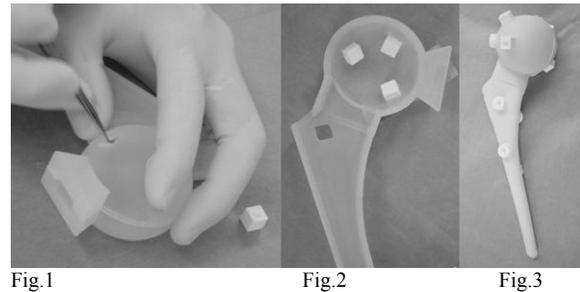


Fig.1

Fig.2

Fig.3



Fig.4 Left: Clear zone was visible near the calcar of the femoral neck. Center: HAB combined with cement spacer was inserted. Right: Nine months after the revision surgery, there is no evidence of infection.

Table 1

Case	Age	First operation	Culture	Follow up (months)	Status	Recurrence of infection
1	72y	THA	MRSA	20	Revision THA	-
2	73y	None (infected hip)	MRSA	11	Waiting	-
3	79y	Hip hemi-arthroplasty	MRSE	11	Revision THA	-
4	56y	Hip hemi-arthroplasty	Not detected	14	Revision THA	-
5	82y	Hip hemi-arthroplasty	MRSE	14	Waiting	-
6	39y	THA	Staphylococcus Coagulase Negative	29	Revision THA	-
7	64y	THA	Enterobacter cloacae	7	Waiting	-
8	60y	TKA	Enterococcus faecalis	7	Waiting	+

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