

# Exchange Arthroplasty for the Infected Knee Replacement Case Report of Modified Two Stage Method

P. Iqbal, R. Taylor, M. Haroon, Asad N. Khan  
Stoke Mandeville Hospital, Aylesbury, Bucks, England

**W**e report a case of modified two stage exchange arthroplasty for the infected knee prosthesis. The method proved successful in controlling infection and restoring function. In two stage exchange, the interval between the stages was managed by using custom made gentamycin bone cement block as a spacer to provide high local concentration of antibiotic.

Postoperative infection is the saddest of all complications<sup>1</sup>. Deep infection after knee arthroplasty has potentially disastrous consequences for the patient<sup>2</sup>. As more total knee arthroplasties are performed, the number of deep infections can be expected to increase even though the infection rates are declining. Its reported incidence varies from 0% to 23% with overall rate of 5%<sup>3</sup>. Many factors such as the infecting agent, duration of infection, a previous prosthesis, and general health of patient may affect the treatment plan as well as the overall result. Early infection may be treated by aggressive local debridement and antibiotic therapy, but if this is delayed for more than two weeks, it has little chance of success<sup>4,5</sup>. Treatment by continuous irrigation followed by long-term antibiotic therapy may suppress an infection<sup>1</sup> but is unlikely to eradicate it completely<sup>2</sup>.

Management by exchange arthroplasty requires meticulous surgical debridement, with removal of prosthesis, cement, infected soft tissues and any non-viable bone. Antibiotic therapy is then started and a new prosthesis is implanted either at the same procedure as - a one-stage exchange, or after an interval of several weeks or months - a two-stage exchange. Both methods have been reported to be successful in eliminating infection and restoring function<sup>1</sup>. The two stage exchange has the potential advantage of allowing confirmation that infection has been cured before inserting the new prosthesis. Biopsy can be taken for culture before the second-stage operation. This is of particular value in cases with virulent or resistant organism, or when there is

uncertainty about the thoroughness of the debridement<sup>2</sup>.

Arthrodesis is an alternative to exchange arthroplasty, but requires an initial debridement<sup>6</sup> and may be technically difficult, particularly after removal of prosthesis with long intramedullary stems or after wide resection of infected bone. In a study of ten knees that have been treated by arthrodesis after an infected knee arthroplasty, non-union occurred in three and fusion was achieved in other seven after two to twelve months of immobilization<sup>8</sup>. In addition, even a successful arthrodesis seldom produces a result that is satisfactory to the patient<sup>3</sup>. A simple excision arthroplasty may be an acceptable salvage procedure<sup>9</sup> and may provide a pain free pseudarthrosis. Orthotic support is usually required and walking ability is frequently limited.

## CASE REPORT

A seventy year old female, resident of Longwich, Buckinghamshire, had rheumatoid arthritis involving most of the joints of body since 1966, with no remission. She was crippled due to severe involvement of left hip and right knee. She was a widow, lived alone and was unable to manage her daily chores by herself. Her left total hip was replaced at Stoke Mandeville Hospital in 1982 and it worked well. She developed a rheumatoid ulcer on left shin in 1988. It was 4cm x 0.5 cm in size. It persisted in spite of regular dressings. Repeated culture and sensitivities grew *Staph. aureus*. It ultimately healed in 1991. Her sister had rheumatoid arthritis and died of septic arthritis. She was allergic to penicillin. She received gold salt and prednisolon between 1979 and 1990. In 1992, she was taking Methotrexate 7.5mg/week, Prednisolone 2.5mg/day and Diclofenac Retard 100mg/day. Her white blood cell count was regularly monitored and it remained within normal limits.

Her right total knee replacement (PCA Non-cemented) was performed on Oct. 25, 1991. She developed signs of infection one month after surgery. The discharge from wound was sent for culture and sensitivity and it grew *Staphylococcus aureus*. The blood and urine culture at this time revealed no growth. Intravenous antibiotics were started. She was admitted, wound debridement, washout and partial closure of wound was performed on December 04, 1991. Wound gradually got better, the closure was performed on Feb. 21, 1992. The wound healed and she was discharged. She presented with effusion of right knee on March 31, 1992. She was admitted for instillation of suction drainage. Culture and sensitivity at this time again revealed *Staph. aureus*. The infection was not controlled. Gentamycin beads were installed in right knee on June 24, 1992 (Figs. 1-2). The discharge persisted and infection was not controlled.

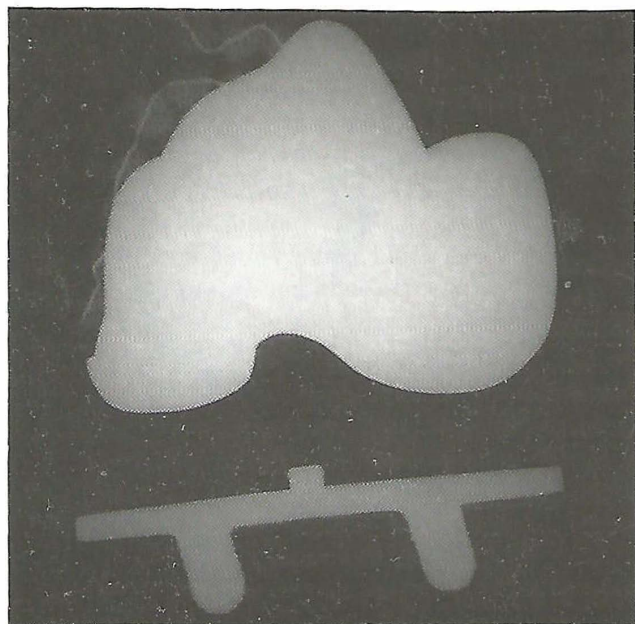


Fig. 1: X-rays after antibiotic beads AP view.

She was admitted for the removal of infected knee arthroplasty. Examination revealed extensive rheumatoid arthritis involving small joints of hands, wrists, elbows, shoulders and knees. She had atrophic and paper thin skin. The range of movements at cervical spine was moderately restricted. She had stiffness of both shoulders, and abduction was limited to 90 degrees. There was ulnar deviation of metacarpophalangeal and proximal interphalangeal joints of both hands. There

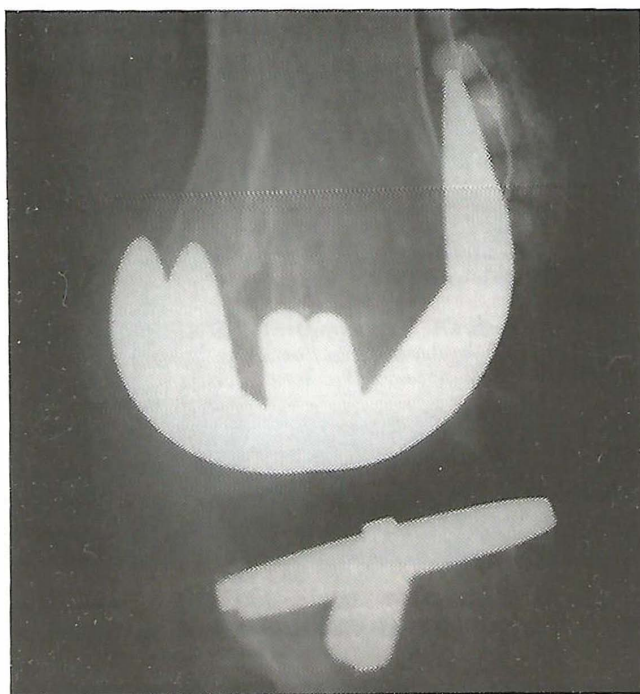


Fig. 2: X-rays after antibiotic beads latera view.

were scar marks of previous surgery and discharging sinuses in front of right knee. The range of movements was 15 to 75 degrees.

Removal of infected knee arthroplasty and insertion of Gentamycin Bone Cement Spacer was performed on August 13, 1992 (Figs. 3-4). Biopsy of the tissue was sent for culture. It revealed Anaerobes, sensitive to metronidazole. She was given Metronidazole for three weeks. The Infection was controlled clinically.

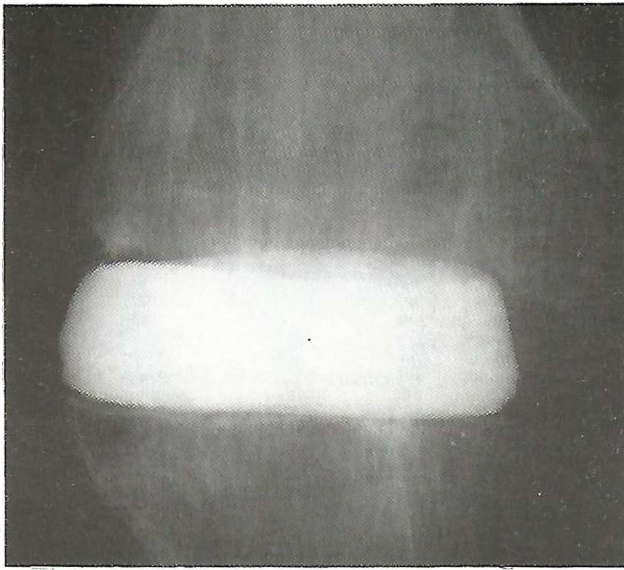
Removal of bone cement block and PCA revision total knee arthroplasty was performed on December 02, 1992 (Figs. 5-6). Biopsy of tissue was again sent for culture. It revealed moderate growth of *Bacillus* species, sensitive to Erythromycin, Trimethoprim, Amoxycillin, and Gentamycin. She received Trimethoprim for two weeks.

Follow-up on Jan. 08, 1993 revealed healed wound and no sign of infection. Range of movement at right knee was from zero to sixty degrees. In April 1993, She was satisfied with surgery, she was able to bear weight on her right leg and do most of house hold work.

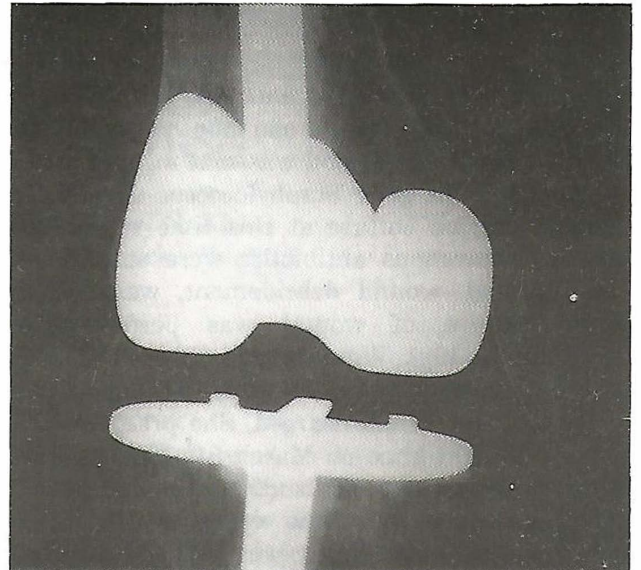
## DISCUSSION

In the presence of an infected knee arthroplasty, there are several alternative methods of

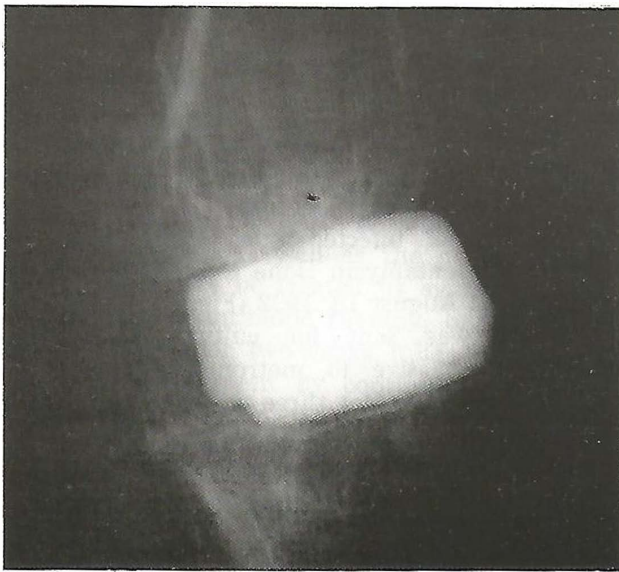




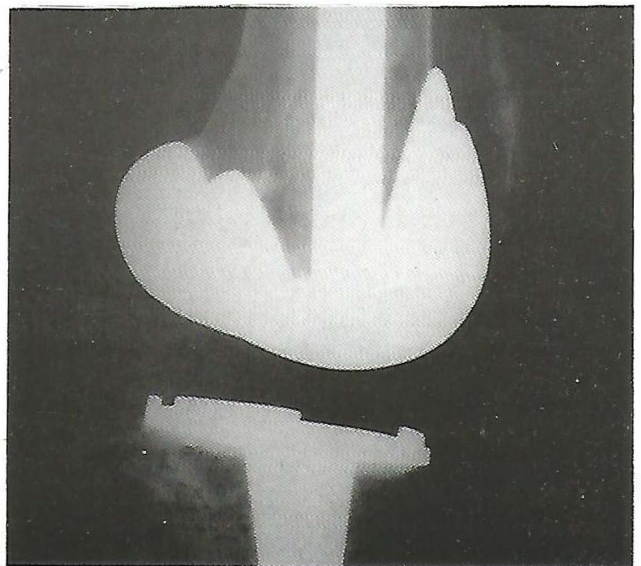
**Fig. 3:** X-rays of knee AP view after bone cement block.



**Fig. 5:** X-rays of knee AP view after removal of bone cement block and revision total knee arthroplasty.



**Fig. 7:** X-rays of knee lateral view after bone cement block.



**Fig. 6:** X-rays of knee lateral view after removal of bone cement block and revision total knee arthroplasty.

treatment: (1) antibiotic therapy alone; (2) incision drainage, and debridement, leaving the prosthetic components in situ, followed by long term antibiotic suppression; (3) removal of prosthesis, arthrodesis, and antibiotic therapy; (4) reimplantation, one or two stage. Historically, component removal and arthrodesis were the methods of choice for this problem<sup>10</sup>. The aims of infected knee arthroplasty are to eradicate infection and to restore knee function. Both Insall<sup>3</sup> and Freeman<sup>3</sup> have reported

careful attention to technique and appropriate bacteriological guidance to achieve good results with exchange arthroplasty.

Multiple attempts to cure infection without removal of prosthesis in this patient ended up in failure. The infection was eradicated by removing the prosthesis and performing a meticulous surgical debridement, and then to use antibiotic-loaded acrylic bone cement block to obtain high local

concentration of the appropriate antibiotic. This bone cement block also acted as a spacer.

The instability at the knee during interval between stages may be managed in several ways: by skeletal traction, external fixation, a plaster cast, a cement block interposition<sup>11</sup> and use of prosthesis as a temporary spacer<sup>2</sup>.

The antibiotic bone cement block is cost effective and provides good space for arthroplasty during control of infection.

The two stage procedure makes it possible to confirm that infection has been cleared before the final prosthesis is inserted.

The results of reimplantation are not as good as after a primary operation, but, still, most of the patients are satisfied with the results, including those having, a some what painful knee, since the infection has been controlled and they have attained a fair status of mobility.

We agree with Scott et al<sup>2</sup> that two stage exchange arthroplasty can eradicate local infection, restore knee function and independent mobility. It appears to be the optimum treatment for patients with infected knee arthroplasty who are fit for the procedure. In unfit patients, incision drainage with appropriate antibiotics to suppress infection may be the only feasible option<sup>12</sup>.

The use of bone cement block as a spacer in the management of infected knee arthroplasty have been mentioned<sup>2,11</sup> but our search of literature using CD-ROM Med Line have not revealed a study with a larger experience. As we get more cases, we hope to publish it in future.

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## The Authors:

P. Iqbal,  
Senior Registrar Orthopaedics,  
Shaikh Zayed Hospital Lahore - 54600  
**Pakistan.**

R. Taylor,  
Consultant,  
Department of Orthopaedics and Accident Surgery,  
Stoke Mandeville Hospital,  
Aylesbury, Bucks,  
**England.**

M. Haroon,  
Registrar,  
Department of Orthopaedics and Accident Surgery,  
Stoke Mandeville Hospital,  
Aylesbury, Bucks,  
**England.**

Asad N. Khan  
S.H.O.  
Department of Orthopaedics and Accident Surgery,  
Stoke Mandeville Hospital,  
Aylesbury, Bucks,  
**England.**

## Address for Correspondence:

Pervaiz Iqbal  
Senior Registrar Orthopaedics,  
Shaikh Zayed Hospital Lahore - 54600  
**Pakistan.**