

ISOELASTIC CEMENTLESS TOTAL HIP REPLACEMENT PRELIMINARY RESULTS OF 24 REPLACEMENTS

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ABSTRACT

Twenty-six (26) isoelastic cementless total hip replacement in 20 patients with a follow-up period of 2 months to 2 years are presented. The indications for hip replacement were avascular necrosis and osteoarthritis secondary to rheumatoid arthritis, ankylosing spondylitis, degenerative arthritis and chronic renal failure except in two patients, one with fracture neck of femur and another with a loose cemented total arthroplasty.

The duration of surgery ranged from 80 to 140 minutes and the average hospital stay 14 days. They were four intra-operative complications, one each with fracture of the greater trochanter and subtrochanteric femoral fracture and two perforations of the femoral shaft. All were managed conservatively with good results. Three patients had posterior hip dislocation in which in one it was associated with separation of the head from the endoprosthesis. The first two were managed by closed reduction and the last one by open reduction with satisfactory results. There was a marked improvement in the Harris score post-operatively. All patients were satisfied with the outcome of surgery with some bedridden patients returning to active independent life.

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INTRODUCTION

The problem of permanent fixation of implant to bone in prosthetic hip replacement has not been completely solved. When in 1958 Charnley introduced the widespread use of acrylic bone cement, it was then thought permanent fixation was possible⁴. However, despite numerous good results, it was soon realised that painful loosening was the most important long term complication of cemented prosthesis⁶. It has been estimated that up to 57% of patients will show features of loosening of at least one of the components after 4 to 9 years^{3,10}. Most of these patients, the majority being young and active, will eventually require revision surgery which is technically more demanding and has inferior results^{1,5}.

Thus in order to decrease the incidence of loosening, biological fixation of total hip prosthesis by bony ingrowth rather than cement has evolved^{9,10}. This is because regardless of the microfixation at implantation, the cement becomes altered after some years, leading to weakening of the bone-cement interphase. On the other end the interphase between implant and ingrowing bone can remodel and maintain stability with time^{7,15}.

The concept of "isoelastic" is an implant whose elasticity and other physical properties are similar to those of surrounding bone¹³. According to Morscher^{13,14}, the forces which can lead to loosening are eliminated or diminished in the isoelastic pro-

sthesis by the following factors:

- i By low friction achieved by a small diameter femoral head
- ii By transmission of forces in a physiologic manner, accomplished by the right design.
- iii By intimate contact and direct anchoring of the implant to bone tissue. This is achieved by as large area of contact as possible and elimination of cement.
- iv By adjustment of the physical characteristics of the foreign material to that of bone.

In 1985 we started using isoelastic cementless prosthetic replacement following encouraging results from various centres. This is a presentation of our early experience and preliminary results of 26 replacements in 20 patients.

MATERIALS AND METHODS

From July 1985 to July 1987, 20 patients (12 females and 8 males) were treated with 26 isoelastic cementless total hip prosthesis. The average follow-up duration is 13 months with a range of 2 to 24 months. The age range shown in Fig. 1 is 24 to 68 years with an average of 48.4 years and the indications for arthroplasty as shown in Table 1.

Table 1.
INDICATIONS FOR ARTHROPLASTY

Avascular Necrosis	13
Osteoarthritis	11
Subcapital Fracture of neck of Femur	1
Revision Arthroplasty	1
Total	26

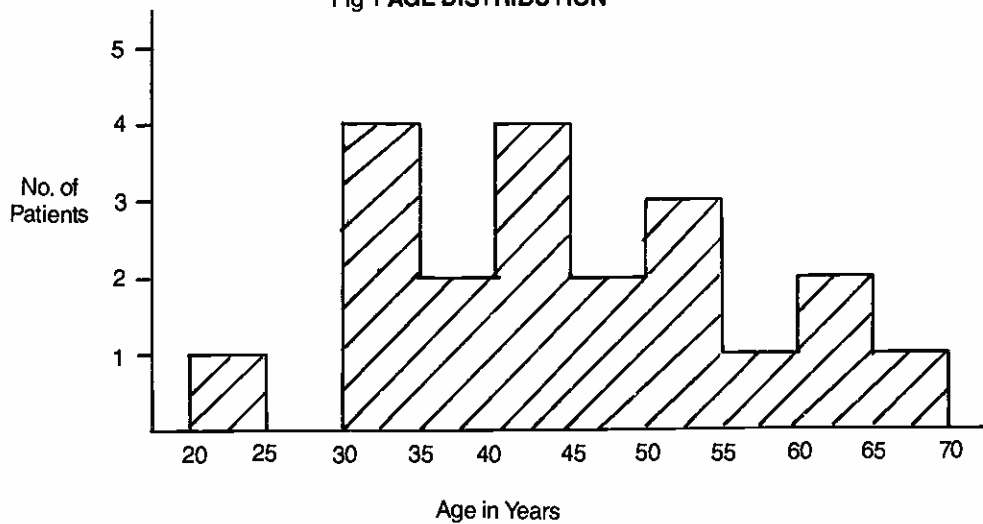
Antibiotics were administered 24 hours pre-operative, intra-operative and 48 hours post-operatively, ampicillin and cloxacillin combination being the commonest used. A posterolateral approach was used in all patients, the average operation time being 115 minutes with a range of 80 to 150 minutes.

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Fig 1 AGE DISTRIBUTION



Average hospital stay was 14 days and patients were mobilised on 2nd or 3rd day post-operative with full weight bearing started after an average of 3 months.

RESULTS

18 out of 20 patients with 24 replacements in situ were reviewed. All the patients reviewed had no problems with the prosthesis and none developed post-operative infection.

There were four intra-operative complications; fracture of the greater trochanter, subtrochanteric spiral fracture and two perforations of the femoral shaft. The only post-operative complication was 3 posterior hip dislocation in which in one was associated with separation of the head from the endoprosthesis.

Table 2.
COMPLICATIONS IN 24 HIPS

Fracture of the greater trochanter	1
Subtrochanteric spiral fracture	1
Perforation of the femoral shaft	2
Posterior hip dislocation	3
Total	7

The outcome of prosthetic replacement was classified according to the Harris score⁹. Whereas all 18 patients had poor pre-operative score, following surgery 6 had excellent results, 10 good results and 2 fair results with no poor results.

Table 3.
PRE-OPERATIVE AND POST-OPERATIVE HARRIS SCORE

Score in Points	Pre-operative	Post-operative
Excellent	—	6
Good	—	10
Fair	—	2
Poor	18	—

DISCUSSION

It is still early for a definitive assessment of the overall performance of non-cemented prosthesis due to the short duration

of follow-up. However, the present clinical results are encouraging. In one series, 88% of 59 patients had excellent and good score without signs of loosening. This compares favourably with our patients in whom over 80% have excellent and good results on the Harris Score (Table 3). All the patients reviewed were satisfied with the outcome of surgery, mainly because of the marked relief of pain which had made the majority bedridden or limited in the house. They were now painfree and led independent economically useful lives.

Since perfect adaptation and stability of the prosthesis to the bone is mandatory in cementless prosthesis, the surgical technique at least on the femoral side is precise and demanding. Excessive reaming in order to apply the biggest possible stem to get a press fit has resulted in high incidence of intra-operative complications. In 215 patients 45 (21%) had longitudinal or segmental violations of the femoral neck 2 (0.9%) femoral shaft fractures and 9 (2.4%) fractures of the greater trochanter². Two of our patients had femoral shaft perforations, one of whom had revision arthroplasty for a loose cemented prosthesis (Fig 2). The other two each had fracture of the greater trochanter and subtrochanteric spiral fracture of the femur (Fig 3).



Fig 2 X-ray showing perforation of the mid shaft.



Fig 3 Subtrochanteric spiral fracture of the femur.



Fig 4 Well united subtrochanteric fracture in figure II after conservative treatment by traction.



Fig 5a Posterior dislocation after 4 weeks of surgery



Fig 5b Spontaneous Posterior dislocation 3 weeks after surgery



Fig 5c Posterior dislocation with separation of the head from the endoprosthesis.

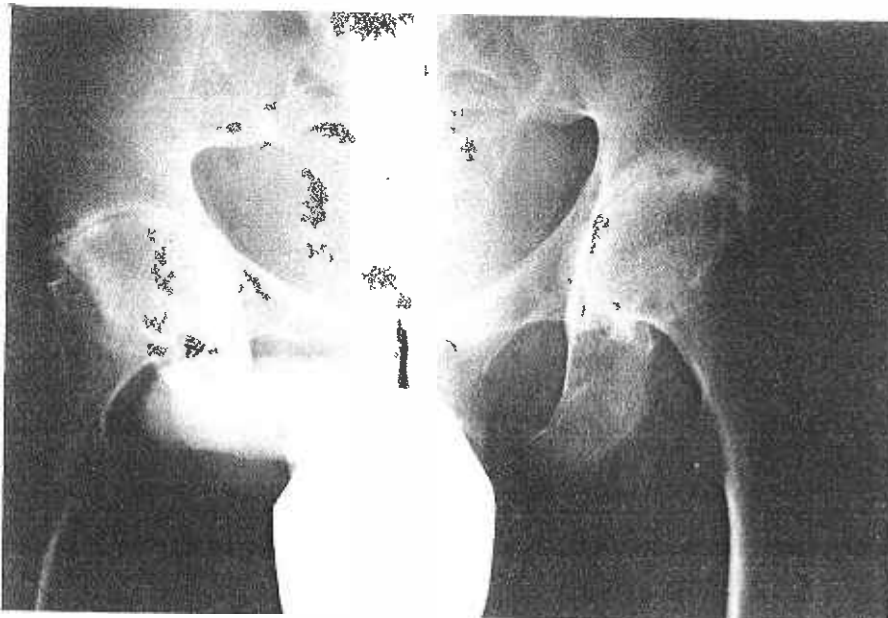


Fig 6a X-ray of a patient with ankylosing spondylitis with bilateral arthritic changes

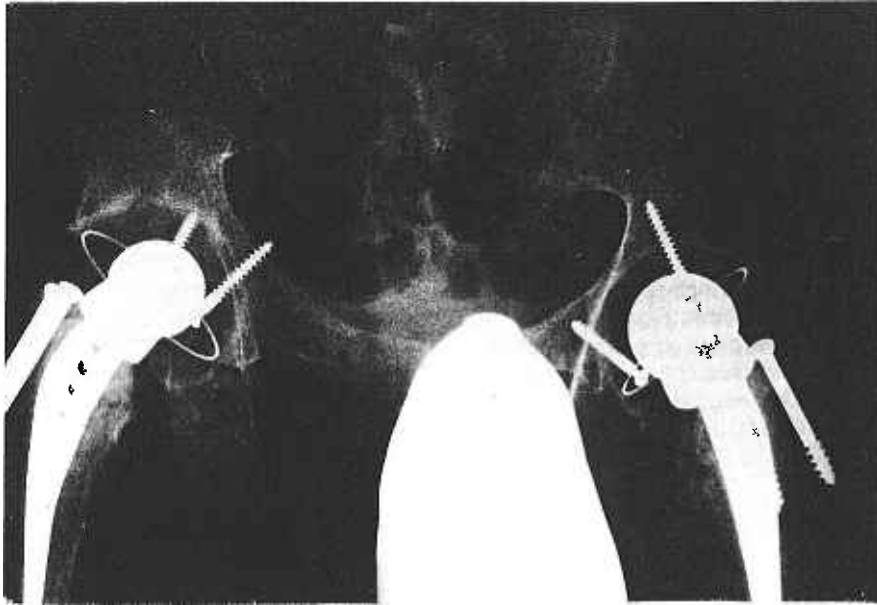


Fig 6b Patient in (Va) a few months after bilateral isoelectric hip replacement



Fig 6c Same patient in Va two years after replacement showing good adaptability

Of the two patients with femoral shaft perforation, one was detected during reaming of the shaft. The endoprosthesis was thus placed correctly. In the second, it was detected in the post-operative radiographs. She was re-operated, the endoprosthesis was placed correctly and the perforation grafted. Both were managed by prolonged non-weight bearing. The subtrochanteric fracture on the other end was managed by Russell's balanced traction. In other series fractures of the shaft have been treated with cerclage wires, greater trochanter with figure-of-eight wire reattached and neck fractures with cancellous bone graft². Fortunately these complications have not been found to affect long term results. Similarly these four patients have done equally well when compared to other in the series. All the fractures healed well and the Harris Score was comparable to others (Fig 4).

Posterior dislocation has been reported to have an incidence of 0.5 to 4.1%^{1,2}. Three patients had spontaneous posterior dislocation within a month of replacement. In one the head separated from the endoprosthesis (Fig 5a, b, c).

The two uncomplicated dislocations were reduced under I.V. medication followed by four weeks of traction. The other was treated by open reduction followed by traction. None have recurred and the progress is similar to others. Other series have shown good results with conservative treatment¹¹. However revision arthroplasty with realignment of the cup and a change to a longer neck has been done for a patient with recurrent dislocation¹. As a prophylaxis against posterior dislocation Bombelli discourages the use of the postero-lateral approach. He advocates the Muller modification of the Watson-Jones approach which also gives a complete view of the acetabulum, an important factor in dysplasia.

So far loosening has not been major problem in isoelastic cementless prosthesis. In 215 patients with an average follow-up of 17 months, Bombelli² found no evidence of component loosening. Similarly Morscher¹² followed 627 patients for a period of 1 to 5½ years and found no evidence of loosening. The radiological assessment of our patients show no evidence of loosening. In fact they show adaptation of the prosthesis to the host bone (Fig 4 and 6 a, b, c).

CONCLUSION

The physiological basis on which isoelastic cementless hip prosthesis is based makes it an attractive choice. The early results so far are encouraging. The intra-operative complications do not appear to affect long term results. So far component loosening has not been a major problem. It appears this could be the answer in young active patients in who cemented prosthesis has generally not fared well. However long term evaluation is still needed to judge its effectiveness. Meanwhile strict patient selection must be practised for as Sir John Charnley said "Neither surgeons nor engineers will ever make an artificial hip joint which will last 30 years and at some time during this period enable the patient to play football."

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