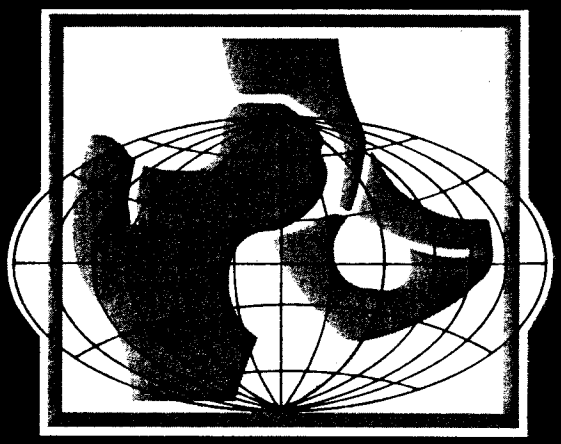

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Long-term evaluation of hip arthroplasty (Mid-thigh pain, limp, loosening and failures)

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ABSTRACT: Two hundred and fifty arthroplasties performed from February 1982 to June 1990 at the 3rd Orthopedic Department of the University of Milan, were evaluated in the long term after operation. All patients were rated by a personal scoring system based on the analysis of hip motion. Twenty-one patients who had received cementless arthroplasties were examined by bony scintigraphy to check the time course of prosthetic fixation on the basis of bone metabolic state.
The excellent clinical results strongly support the correctness of the concept of arthroplasty, but various aspects of surgical technique must be studied and further improvements made in components. (HIP International 1991; 1:102-7)

KEY WORDS: Hip arthroplasty, Cementless hip arthroplasty, Complications in hip arthroplasty

INTRODUCTION

Prosthetic joint replacement still draws researchers' attention. Twenty years ago the long-term wear of prosthetic joint was the main problem and ten years ago it was prosthetic loosening. Now investigations are directed to the development of better methods of implant fixation and the use of more biocompatible prosthetic components. This study illustrates the rapid progress in the field of prosthetic joint replacement.

MATERIALS AND METHODS

From February 1982 to June 1990, 250 arthroplasties were performed at the San Paolo Hospital. All were done by the same team of surgeons according to the Watson-Jones antero-lateral hip approach.

Table I shows the arthroplasties and Table II the prosthetic patterns. There were 166 females and 84 males, average age 56.04 years (range 24-80). All patients aged over 80 years at surgery were excluded (Tab. III). The preoperative diagnosis included osteoarthritis (27.2%), congenital hip dysplasia (5.4%), avascular necrosis of femoral head (2.7%), fractures of femoral neck (59.4%), loosening (1.6%), deep sepsis (3.7%).

TABLE I - ARTHROPLASTIES PERFORMED

Arthroprosthesis	120
Endoprosthesis D.H.	71
Endoprosthesis	52
Reimplantation	7
Total	250

TABLE II - PROSTHETIC PATTERNS

1) ACETABULAR COMPONENTS	
Parhofer-Monch screwed	73
S.P. 1* autoscrewed	47
2) FEMORAL COMPONENTS	
Parhofer-Monch	99
S.P. 2*	87
Furlong	43
Anaform/Proplast	15
Others	6

TABLE III - AGE OF PATIENTS AT SURGERY

Under 60 years	80
From 60 to 70 years	63
Over 70 years	107

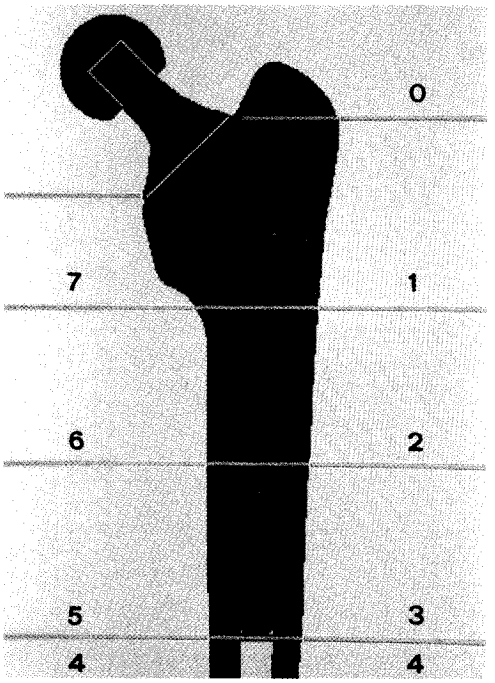

Fig. 1 - *X-rays of seven areas of prosthetic stem.*

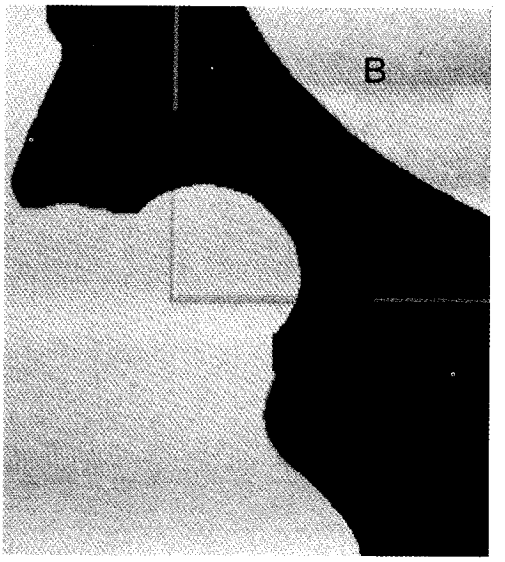

Fig. 2 - *X-rays of three areas of prosthetic socket.*

Fig. 3 - *Scintigraphy.*

Follow-up was done at 6, 9, 12, 18, 24 months then at yearly intervals to a maximum of eight years. A historical, clinical and radiographic evaluation was made using the Merle D'Aubigne (1) rating system as modified by Charnley (2) (3). Another clinical assessment was made using a personal rating system based on the detached analysis of hip motion. Calcifications were assessed radiographically according to Kruger (Figs. 1, 2, Tab. IV).

Bone scintigraphy (4) was done in 21 patients who received cementless arthroplasties and changes in prosthetic fixation were assessed by study of the metabolic bone state (Fig. 3). Normally in cementless arthroplasties, bone scintigraphy shows early hyper-uptake of radioactive tracer that disappears in 12-15 months from the implant. If the hyper-uptake persists prosthetic loosening is likely to have begun.

RESULTS

The incidence of painful cases with or without limp was 4.4%. Another 4.4%, at least six months from implant, complained of mid-thigh pain under load (MTP). Commonly MTP is subacute, initially mild but increasing, disappearing at

TABLE IV - RADIOGRAPHIC EVALUATION

Acetabulum	A	B	C
4 unchanged			
3 dem. < 2 mm			
2 dem. > 2 mm			
1 dem. > 4 mm			
0 dem. > 7 mm			
total			

Femur interface 6 sites	1	2	3	5	6	7
4 unchanged						
3 demarcation < 2 mm						
2 demarcation > 2 mm						
1 demarcation > 4 mm						
0 demarcation > 7 mm						
total						

Femur cortex 6 sites	1	2	3	5	6	7
4 thckness + miner.						
3 hypertrophy						
2 loss of cort. def.						
1 thinning						
0 cavitation						
total						

Femur site 4
4 unchanged
3 tiny plug
2 big plug
1 halo
0 cavitation
total

Calcar vertical reduction
4 unchanged
3 reduction 1-5 mm
2 reduction 6-10 mm
0 reduction > 10 mm
total

Calcification	
grade 0	score 10
grade 1	" 8
grade 2	" 6
grade 3	" 4
grade 4	" 2

Femur final score
interface 6 sites
cortex
site 4
calcar
total

Final score
acetabulum
femur
calcifications
total

TABLE V - CLINICAL EVALUATION

Pain	
acute - spontaneous	0
acute under load	2
sub - acute	3
poor after load	4
no pain	

Walking	
poor self gov. + clubs	0
poor self gov. – clubs	2
restricted + 1 club	
standing position possible	3
possible with 1 club	
restricted without clubs	3
normal	5

* results:	very good 78-62	fair 46-31	bad 15-0
	good 62-46	sufficient 31-15	

Joint motion	
0- 60°	0
60°	2
120°	3
160°	4
260°	

Final score
pain
joint motion
walking
total

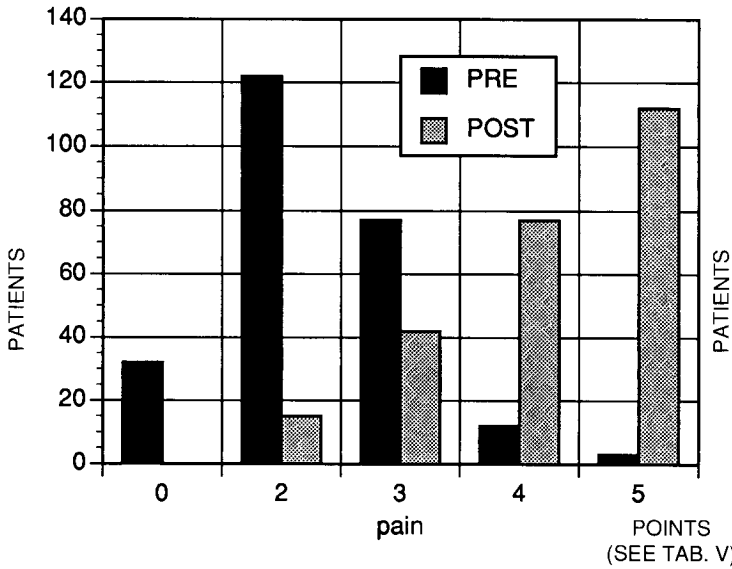

Fig. 4 - *Preoperative and postoperative pain.*

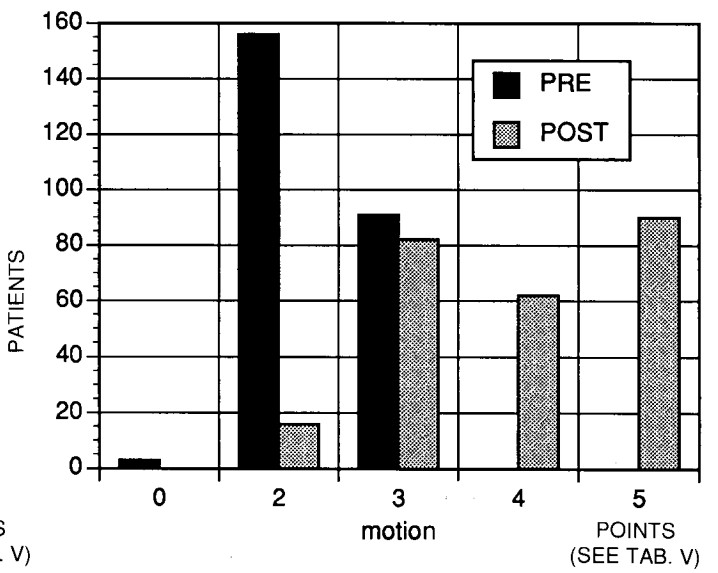

Fig. 5 - *Preoperative and postoperative total range of hip movements.*

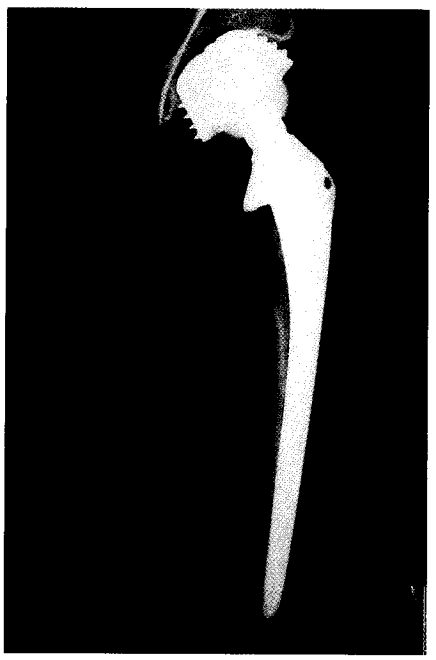

Fig. 6 - *Demarcation at the stem < 2 mm.*

Fig. 7 - *Demarcation at the stem > 2 mm.*

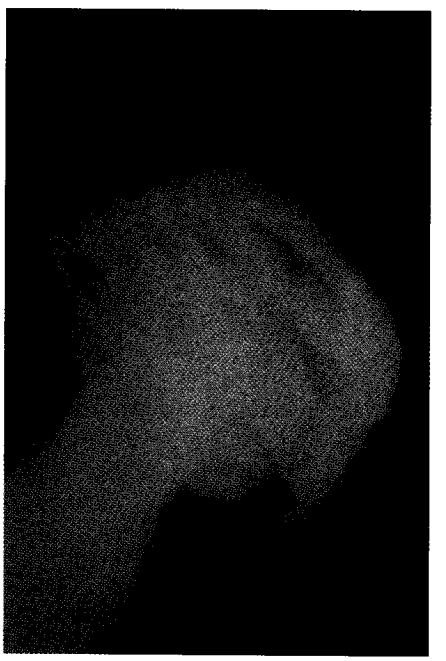

Fig. 8 - *Demarcation at the socket < 2 mm.*

rest and not exacerbated by hip motion. In 17 of these cases calcitonin with or without vitamin D and hormones, and lessening of joint load resulted in MTP relief. Instead, in 4 cases the inefficacy of therapy made surgical revision necessary; no prosthesis bio-fixation and fibrous layer around the stem were found. No bone reaction was shown and mechanical capacity was limited. The prosthesis had to be reimplanted with cement.

A comparison of preoperative and postoperative pain is shown in Figure. 4. The patients without pain before surgery were those with hip ankylosis. The preoperative and postoperative total range of movements is shown in Figure. 5.

Radiographic evaluation showed that in 161 cases the bone/cement or bone/prosthesis bond had remained

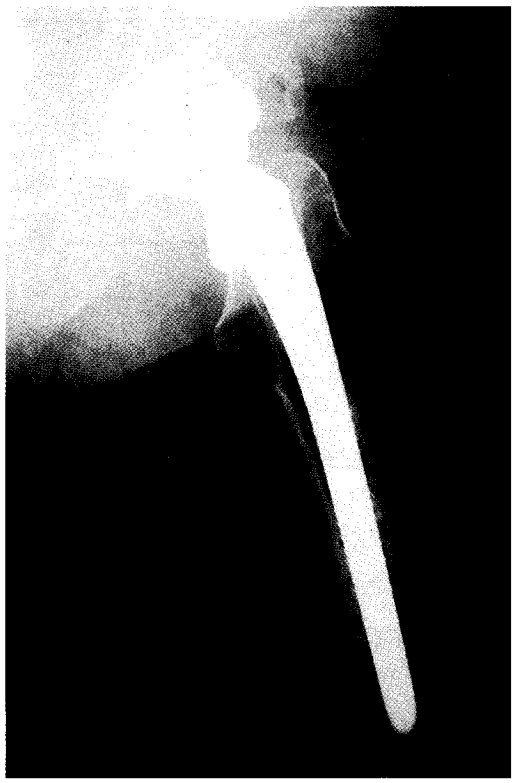

Fig. 9 - *Loss of femoral cortex.*

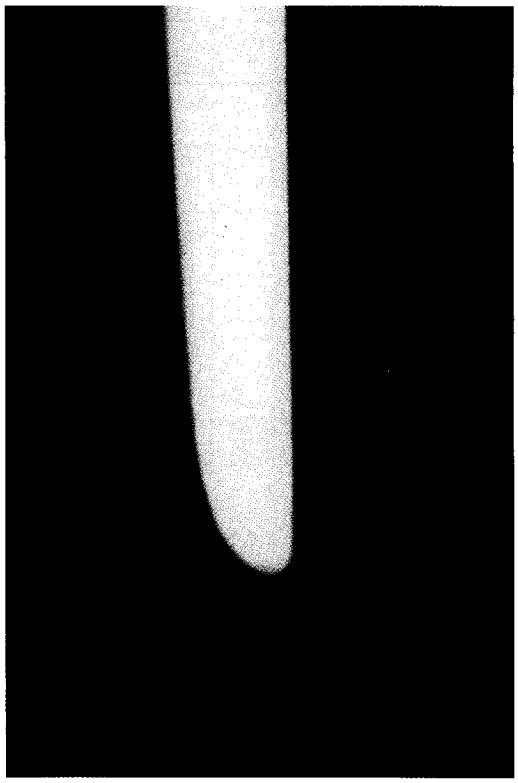

Fig. 11 - *Endosteal cavitation.*

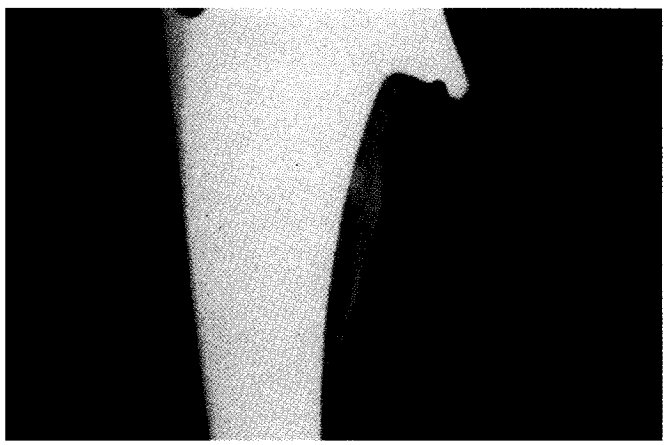

Fig. 10 - *Height of calcar.*

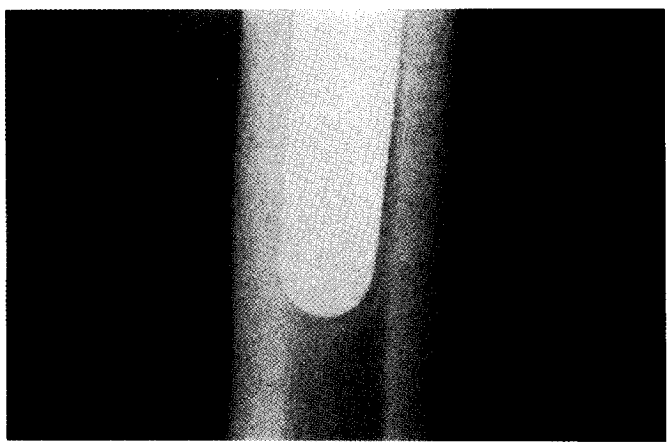

Fig. 12 - *Cortical hypertrophy at the tip.*

unchanged since surgery; in 67 cases there was no progressive demarcation of the stem (5) (6), i.e. less than 2 mm, and in 22 cases the demarcation was more than 2 mm (Figs. 6, 7). In 22 cases there was no progressive demarcation of one third of the socket or less than 2 mm (Fig. 8). Eight presented superficial infection and targetted antibiotic therapy was successful. None of these patients had deep infection. In 13 cases (5%) there was loss of cortical definition of the medial portion of the femoral cortex before surgery and it remained unaltered (Fig. 9). Loss of height of the medial femoral cortex was present in 25 cases (10%); in 13 cases (5%) from 1 to 5 mm and in 12 cases (4%) from 6 to 10 mm (Fig. 10). Endosteal cavitation of the femur was present in five cases (2%); in three it was present at the calcar, in two at the tip and in one

Fig. 13 - *Calcifications.*

at both sites (Fig. 11). Cortical thickening of the femoral shaft at the tip was present in four cases (1,8%) (Fig. 12). In three of these it was associated with more than 4 mm demarcation at the bone/cement or bone/prosthesis bond. The calcifications were present in 14 cases at three years (11.8%) (Fig. 13).

DISCUSSION

The findings of this study indicate that pain relief is maintained and the range of movement is good or excellent and does not decrease over the years. The constant improvement in prosthetic design and improved methods of implant have led to a very low incidence of revisions for loosening of the components and almost complete absence of severe bone loss particularly on the acetabular side (7, 8). Prosthetic fixation with or without cement does not suggest that the bone/cement or bone/prosthesis bond deteriorates with time.

The practical lesson learned from this long-term evaluation is than though the idea of arthroplasty has remained unaltered, various aspects of the surgical technique must be studied for further progress. With regard to stem design the need for biofixation has brought a new dimension to this kind of surgery, especially for the prosthetic external surface or its coating. In spite of the large number of implants being done, this kind of surgery must still be planned carefully to take advantage of recent developments and avoid complications.

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