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Wagner surface replacement of the hip

Three to six year follow-up

Forty-two Wagner surface replacements were followed prospectively for 4 (3–6) years. Fifteen hips required rearthroplasty, in 11 cases owing to loosening and in 2 cases because of fracture of the femoral neck.

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Introduction

The purpose of this paper is to report our results with Wagner surface replacement in 42 hips after 3 to 6 years.

Patients and methods

Patients. From 1978 to 1982, 42 Wagner hip arthroplasties were performed on 38 patients of whom 23 were males. The average age at the time of surgery was 52 (33–63) years. Twenty-three patients had involvement of the right hip and 4 bilateral involvement. Thirty-two hips were diagnosed as having primary osteoarthrosis, 2 ankylosing spondylitis, and 8, secondary osteoarthrosis. Indications for surgery were severe pain and functional disability in younger patients with good bone stock.

Operative technique and postoperative care. The operations were performed by the senior surgeon (S.-A. A.), as originally described and taught by Wagner. In all the cases, the anterior Smith-Petersen approach was used. Both components were fastened with polymethylmethacrylate cement containing gentamicin (Figure 1). Systemic prophylaxis against infection and thrombosis was given. To avoid dislocation of the hip, the patients were postoperatively immediately placed in bed with both legs in abduction and in neutral rotation. Mobilization started the day after surgery under supervision of a physiotherapist. Partial weight bearing was allowed from the fifth postoperative week, and full weight bearing, from the seventh week. The patients were discharged approximately 2 weeks after surgery.

Follow-up. Clinical and radiographic examinations were performed preoperatively and postoperatively after 6 weeks, 3 and 6 months, and then yearly. Fifteen hips had a rearthroplasty and 1 patient died 5 years postoperatively that was unrelated to the previous hip surgery. Consequently, at the latest follow-up, 25 patients with 26 operated hips were examined. The patients were followed on an average of 4 (3–6) years. The clinical evaluation of pain, walking ability, and range of motion was based on the system of d'Aubigné & Postel (1954).

Radiographic examination. All the examinations were performed in AP and lateral positions. Radiographs 6 weeks postoperatively were analyzed to judge the position of the prosthetic parts. The ratio of the diam-

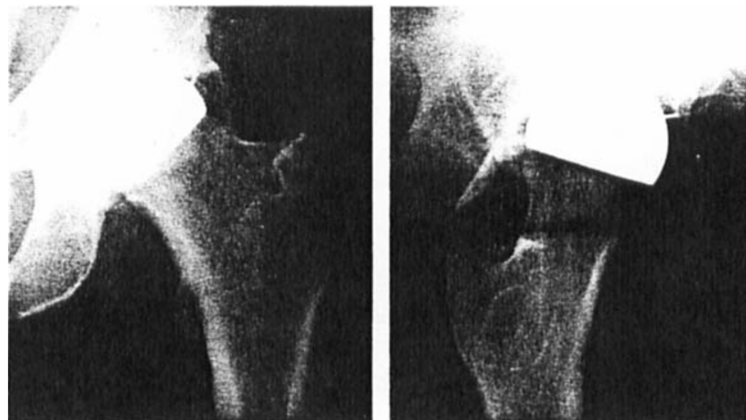

Figure 1. Wagner surface replacement 6 weeks postoperatively in an ideal position.

eter of the femoral component to the transverse diameter of the femoral neck was measured and calculated according to Capello et al. (1984). The AP position of the femoral cup was determined by measuring and comparing the preoperative neck-shaft angle with the postoperative cup-shaft angle (Amstutz et al. 1981, Jolly et al. 1982). Percentage of bone coverage (Amstutz et al. 1981, Capello et al. 1984) and the lateral opening, inclination angle of the acetabular component (Salvati et al. 1976, Amstutz et al. 1981) was measured on the postoperative radiographs.

On the latest radiographs, radiolucent zones (DeLee & Charnley 1976) and heterotopic bone (Jowsey et al. 1977) were recorded.

Results

The hospital stay averaged 14 (9–25) days. The average length of surgery was 2.2±0.5 hours. Estimated blood loss during surgery was 750±340 ml.

The ESR was normal in all the cases. Deep vein thrombosis or pulmonary embolism was not observed. In only 1 case was bacterial growth (*Acinobacter* and *Enterobacter cloace*) found in a sample taken at revision surgery; no clinical signs of infection were observed in that case. One hip dislocated 30 minutes postoperatively and was immediately reduced without further dislocation. Reduced sensibility in the area of the nervus cutaneous femoris lateralis occurred in 12 cases. Leg shortening of 2–3 cm occurred in 2 cases. Severely impaired hip motion due to ectopic bone formation required operations in 2 cases.

The average ratings for pain were preoperatively 2.8 and at the latest follow-up 5.2. The figures for walking ability were 3.7 and 5.3, and hip motion (flexion) 5.2 and 5.5. These results did not differ from ratings obtained at earlier follow-ups of these patients.

Radiographic. All the radiographs except four were available for evaluation. Four cups were placed in slight varus. The cup/neck ratio was 1.29 (1.09–1.60). The neck/shaft angle was 130 (114–160)°. The cup/shaft angle was 142 (121–160)°, and the inclination angle was 45 (31–62)°. Bone coverage of the acetabular cup was 96 per cent (Table 1). There was no significant difference between values for hips that later failed and those that did not fail.

Radiolucency between bone and cement was observed in all three zones in 34 hips and in zones II and III in three hips. Two of these latter hips were future failures. The maximum width of radiolucency was on an average 2.8 (0.5–10) mm, and radiolucency exceeding 2 mm was found in 14/25 in the nonfailure group and 7/12 in the failure group.

Table 1. Results of radiographic examination. Figures from other reports (Salvati 1976, Amstutz et al. 1981, Jolly et al. 1982, Capello et al. 1984) represent best clinical/ideal results which are compared with ours

	Literature	Our results
Cup/neck ratio	1.32(1.12–1.59)	1.29(1.09–1.60)
Neck/shaft angle	137±8°	130(114–160)°
Cup/shaft angle	139±8°	142(121–160)°
Inclination	44±10°	45(31–62)°
Bone coverage (mean)	95%	96%

At the latest follow-up, ectopic bone Grade I was found in 17 hips, Grade II in 13 hips, and Grade III in no hips. Two Grade I hips were classified as Grade III before treatment.

Revisions. Fifteen hips required revision with conventional total hips, CAD. The interval from surgery to diagnosis of failure averaged 39 (8–67) months (Table 2). The reasons for failure included two femoral neck fractures (Figure 2) and two femoral, three acetabular, and' six combined loosenings (Figure 3). Two hips were revised owing to persistent pain; macroscopically, at surgery, there were no signs of component loosening in these 2 cases.

At rearthroplasty the femoral head and the subcapital part of the neck were collapsed and resorbed in six hips with femoral loosening. Localized necrosis in the superior portion of the femoral head was observed in two cases.

Discussion

The reported rate of failure after surface replacement arthroplasties differs widely; Wagner (1978) reported 1.5 per cent and Head (1981) 34 per cent as compared with our 35 per cent. The majority of our failures occurred more than 3 years postoperatively (Table 2), emphasizing the importance of an adequate follow-up time.

Table 2. Years to failure in 13 reoperated on hips. Two patients with no macroscopic sign of loosening at reoperation were excluded

	Years to failure				
	–1	–2	–3	–4	–5
No of hips	1	1	1	8	2

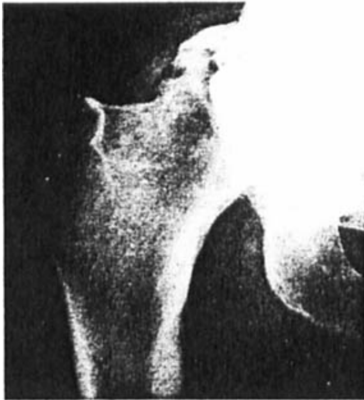

Figure 2

Figure 3

Figure 2. Fracture of the femoral neck.

Figure 3. Malposition of the acetabular and femoral components due to component loosening.

Many reasons for failure have been ventilated (Gerard 1978, Wagner 1978, Shybut et al. 1980, Amstutz et al. 1981, Trentani & Vaccarino 1981). Necrosis of the femoral head may contribute to failure, but different opinions have been forthcoming (Capello et al. 1980, Lapp & Schatzker 1981, Whiteside et al. 1983, Capello et al. 1984). In our series, seven failures with femoral-component loosening had signs of femoral head and neck resorption or collapse of the femoral head. In one hip with fracture of the femoral neck, there was resorption of the superior surface of the head. These findings could be effects of necrosis due to the surgical preparation of the head; trochanteric osteotomy was never performed and the anterior approach was always used.

Capello et al. (1984) found a higher incidence of failure in hips with a greater implant/femoral neck ratio. They proposed usage of a femoral component with a cup/neck ratio less than 1.2. In our series the ratio was on an average 1.29 without difference for hips that later failed and those that did not. Valgus angulation of the femoral component is of great importance (Freeman 1978, Wagner 1978, Amstutz et al. 1981, Trentani & Vaccarino 1981, Jolly et al. 1982, Capello et al. 1984), and Jolly et al. (1982) proposed an ideal cup-shaft angle of more than 135 degrees. Four femoral cups in our series were placed in slight varus compared with the preoperative shaft-neck angle, and five hips had a cup-shaft angle less than 135 degrees. However there were no differences between failed and nonfailed hips.

The significance of radiolucency between bone and cement has been discussed by several authors (De Lee & Charnley 1976, Salvati et al. 1976, Amstutz et al. 1977, Beckenbaugh & Ilstrup 1978, Chandler et al. 1981, Pellici et al. 1985). Progressive radiolucency or radiolucent zones exceeding 2 mm have been considered to be of importance. Almost all the hips in this series had some radiolucency in all three zones, and there was no difference in the amount or distribution of radiolucency between nonfailures and failures.

Rearthroplasty of failed conventional total hips is a great problem, with an increased risk of complication (Amstutz et al. 1982, Pellici et al. 1985, Kavanagh et al. 1985). An advantage of surface replacement is the ease of revision surgery (Capello et al. 1982, Thomas & Amstutz 1982, Steele et al. 1985), which was also our impression.

The concept of surface arthroplasty is interesting, but to date the Wagner artroplasty has resulted in too many failures.

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