Loosening of the Lubinus hip

202 cases followed for 3–6 years

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Survivorship methods were applied to a consecutive series of 202 primary Lubinus total hip arthroplasties followed for 3 to 6 years. After 5 years, the revision rate was 3 percent, and the radiographic loosening rate was 13 percent for the socket and 10 percent for the stem.

The Lubinus total hip prosthesis has been widely used in Sweden since the late 1970s (Ahnfelt 1986). Surprisingly, we found no published report on the long-term outcome of the Lubinus hip when we initiated this study in 1986.

We report the 5-year clinical and radiographic results of the Lubinus hip using actuarial methods.

Patients and method

From January 1980 through 1982, 202 primary Lubinus (W. Link, Hamburg) total hip arthroplasties were implanted in 187 patients at the Department of Orthopedics at Jönköping Hospital (Sweden). The median age of the patients was 68 (29–94) years and the weight 71 (45–108) kilograms. Of the 202 hips, 97 were in men and 105 in women. The majority had arthrosis; and 13, 8, and 5 percent, respectively, had a failed hip fracture, rheumatoid arthritis, and a congenital dislocation.

The Lubinus femoral component is made of a chrome-cobalt-molybdenum alloy. The 13–17-cm-long curved stem has a collar and a 32-mm-diameter head. The socket is made of ultra-high-density polyethylene; it has a snap-fit design, and the inner sphere is eccentrically positioned in relation to the outer sphere.

All the operations were performed via a posterior approach in an ultra-clean air enclosure. Cement-containing gentamicin (Palacos cum Gentamycin, Essex) was used in all the cases. Irrigation, brushing, and modern cementing techniques were not used at that time, i.e., the bone cement was introduced with the finger and no special preparation of the bone bed nor any femoral-canal plugging and cement pressurization were performed.

Totally 138 patients with 151 Lubinus arthroplasties were reexamined clinically 3–6 years postoperatively, pain and walking ability being assessed according to Charnley (1979), i.e., the lowest score was 2 and the highest 12. In 22 patients with 24 operated on hips not reexamined by the investigators, scores were not calculated. Twenty-seven patients with 27 operated on hips had died. In all 150 patients with 164 arthroplasties were examined radiographically 3–6 years postoperatively. All the investigations included AP and oblique views of the hip. Serial radiographs were scrutinized by both authors simultaneously with the attention focused on the bone-cement demarcation, component migration or other change of position using methods described by Gruen (1979), Harris et al. (1982), and Carlsson and Gentz (1984). Radiographic failure was defined as the migration of one or both components by 2 mm or more; corrections for radiographic magnification effects were made.

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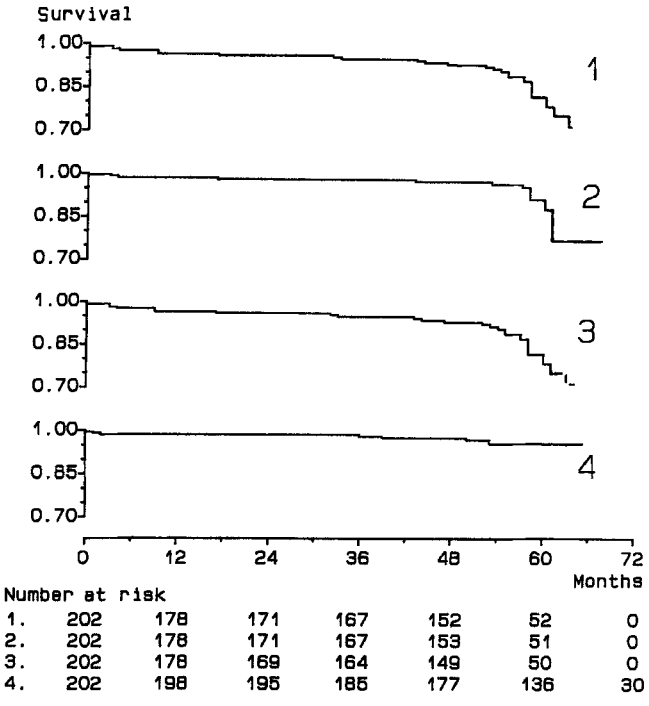

Figure 1. Kaplan-Meier curve depicting radiographic and clinical survivorships.
1. Radiographic survival of the acetabular component.
2. Radiographic survival of the femoral component.
3. Radiographic survival of both components.
4. Clinical survival of both components.

The figures at bottom give the number of patients or hips still remaining at risk for revision or radiographic failure, respectively.

Information as to whether the patients were alive on December 31, 1986, or patients operated on in 1982, were alive on June 30, 1987, was obtained from national records. The clinical survival of each hip was assessed until the date of a revision procedure, until the date of death for deceased patients, or until the date of the end of the study. Thus, all 202 hips were included in the clinical survivorship analysis.

The radiographic survivorship calculations were based on the date when evident migration of either component was first observed; the date of the last radiographic examination was recorded for the radiographically intact cases. The survivorship analyses were performed according to the Kaplan-Meier method (BMDP Statistical Software Inc. 1964), which accounts for the fact that the lengths of follow-up time, death, or drop-outs do not influence the failure quotient. The Mann-Whitney test was used to compare clinical scores of intact and loose hips. The Cox proportional hazard stepwise method (BMDP Statistical Software Inc. 1964) was applied to determine factors influencing the radiographic outcome with respect to sex, age, diagnosis, and body weight.

Results

CDH was the only diagnosis with a significantly ($P < 0.01$) worse radiographic outcome. Therefore, the various diagnosis groups have been pooled. None of the other presumed determinants influenced on the radiographic outcome (Cox proportional hazard stepwise method).

No case of deep infection was recorded. Seven of 202 hips (3 percent) were reoperated on owing to aseptic loosening; there were three isolated sockets, two isolated stems, and two combined exchanges. The radiographic analysis revealed 31 hips with migrated components: 18 hips with an isolated socket migration, 10 with isolated stem migration, including one stem fracture, and 3 cases with migration of both components. According to the Kaplan-Meier survivorship analysis the revision rate was 3 percent. Thirteen percent of the sockets and 10 percent of the stems were radiographically loose after 5 years (Figure 1).

The mean functional score did not distinguish between radiographically intact hips; it was 10 and 9.7, respectively.

Discussion

In a survey of the literature of various total hip arthroplasties followed for 5 years and using similar cementing techniques, femoral component loosening ranged from 5 to 38 percent. The wide discrepancy of results might at least have a threefold explanation: (1) differences in the definition of stem loosening (Brand et al. 1985); (2) differences in the statistical handling of the failure figures; (3) different stem designs.

In three series of Charnley hips, the loosening rates ranged from 5 to 36 percent (Carlsson 1981, Johnston and Crowninshield 1983, Weijkner 1988). The Brunswik stems were radiographically loose in 38 percent (Lindberg and Carlsson 1983) and the CAD stems in 7 percent of the cases (Olsson 1987). In the light of this, our observations regarding the Lubinus stem do not seem to imply any greater risk of stem loosening than with other designs.

For two other large-head prostheses, the Brunswik with a diameter of 35-mm and the CAD with a diameter of 32-mm diameter, the radiographic socket loosening rates were 12 and 9 percent, respectively (Olsson 1987, Carlsson et al. 1988). In comparison, for the Charnley hip with a 22-mm-head diameter, the reported figures for loosening range from 2 to 4 percent (Johnston and Crowninshield 1983, Carlsson et al. 1988, Weijkner 1988). Our observations of the radiographic socket loosening accord with previously reported series with a large head. The frictional torque generated in the ball-socket articulation is proportional to the head diameter, as is the resulting shear force at the acetabular bone-cement interface (Clark 1982). The snap-fit design reduces the range of motion, and thus increases the risk of impingement, which is detrimental to the socket stability (Wroblewski 1985, Herrlin et al. 1988). In addition, the eccentric socket of the Lubinus prosthesis introduces additional disadvantageous torques acting on the socket bed (Ramadier 1980).

Earlier it has been observed that hip dysplasia is associated with a higher than average failure rate of total hip replacement (Röttger and Elson 1986); in our series, this was the only substantial determinant of radiographic loosening.

Ahnfelt et al. (1990) found an increased revision rate among men with arthrosis compared with women of all age groups. Men between 55 and 64 years of age were revised even more often than men under aged 55 years. In a study of Lubinus revisions, Johnsson (1987) found a preponderance of failure in men and younger individuals. Both authors had low failure rates. Both studies revealed men under 65 years of age with arthrosis as being at greater risk for revision than all other arthrotic patients.

Studies based only on revision rates are of a limited value—loose hips will eventually cause symptoms if the patient survives and procedures with a high rate of radiographic loosening should be abandoned.

The Lubinus total hip seems to have a serviceable stem design, but the socket loosening rate is discouraging. The shape of the radiographic survivorship curve indicates clinical worsening as time goes by.

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