Treatment of displaced femoral neck fractures

A randomized minimum 5-year follow-up study of screws and bipolar hemiprostheses in 100 patients

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ABSTRACT – In a randomized study of 100 patients having displaced femoral neck fractures (Garden types 3–4), we compared internal fixation using 2 von Bahr screws (n = 53) with a bipolar Variokopf prosthesis (n = 47) . The duration of surgery was shorter and the blood loss was less in the group with screws. Dislocation of the prosthesis occurred in 7/47 patients, all within 4 months. After a minimum follow-up of 5 years, 34 of 53 patients had been reoperated on in the screw group and 3/47 patients in the prosthesis group. No differences in patient mortality were noted between the groups after 2 or 5 years.

The bipolar prosthesis seems to be a suitable alternative for primary treatment of displaced femoral neck fractures.

The treatment of displaced femoral neck fractures is still under debate. Despite the magnitude of the problem, only a few prospective randomized studies have compared osteosynthesis and hemiarthroplasty to a unipolar hemiprosthesis (Söreide et al. 1979, Sikorski and Barrington 1981, Skinner et al. 1989). Prosthetic implantation is commonly used as a primary treatment in central Europe, whereas internal fixation has long been the preferred treatment in Scandinavia. In a randomized series, we compared the clinical outcome of the bipolar prosthesis with screw osteosynthesis in non senile patients of 70 years of age or more, who had displaced hip fractures (Garden 3-4) but were not senile.

Patients and methods

The study includes 100 patients having displaced femoral neck fractures; they were randomly allocated to treatment with 2 screws (von Bahr et al. 1974) or a bipolar prosthesis (Variokopf - 28 mm head) (Table). The study was consecutive and prospective and was performed in Sundsvall's county hospital. It started in February 1992 and ended in September 1994. During this period, 223 patients were admitted with cervical hip fractures. The criteria for inclusion were: age over 70 years, no previous hip disease, no senility—i.e, the patient remembered his day of birth and home address—and could walk before the fracture. The criteria for exclusion of 123 patients were: age below 70 years (34), medical findings (31), senility (20), inability to walk (18), technical (10), fracture more than 12 hours previously (3), refusal to participate (4), irreducible fracture (1) and non-residence (2).

The surgical procedure was selected from sealed envelopes in the operating room. 12 experienced senior surgeons performed the operations within 24 hours of admission. Spinal anesthesia was used in all cases. The patients were given thromboembolic prophylaxis with low molecular heparin for one week (Klexane)—i.e., 40 mg subcutaneously once daily starting on the night before the operation. 53 patients were given von Bahr screws. All 47 patients with a bipolar prosthesis received prophylaxis for an infection with cloxacillin/diclocil for 4 days.

Using fluoroscopy, the fractures were reduced in the operating room and 2 parallel screws with

Patient material. Median (range)

	Screws	Prosthesis
Number	53	47
Women/Men	37/16	34/13
Mean age	81 (70–96)	81 (70–96)
Duration of surgery (min) [a]	18 (4–45)	58 (30–85)
Blood loss (mL) [b]	24 (0–300)	510 (250–1000)
Blood transfusion (units) [c]	0.3 (0–3)	1.2 (0–6)
Hospitalization days	15 (2–49)	15 (3–51)
Return to original residence	45	37

Statistically significant differences in [a], [b] and [c] ($p < 0.001$, respectively)

the peak close to the cortex of the femoral head were inserted percutaneously with the patient lying supine. The insertion of the bipolar prosthesis was done via a posterior Moore incision with the patient lying in a lateral position. The stem was fixed with gentamicin cement after insertion of a distal plug in the femoral canal.

The patients were followed for 5–6 years with a clinical examination at 4 months, 1 and 2 years and a telephone interview by an experienced senior nurse at 5–6 years. The study was accepted by the Ethics Committee of Umeå University and informed consent was obtained from all patients.

Non-parametric tests and the chi-2 test with Yates correction were used for the statistical analysis.

Results

In the screw group, the duration of surgery was shorter (40 minutes) and the blood loss less (median about 0.5 L) than in the prosthesis group (Table).

Complications in the screw group (53 patients)

Within 2 weeks, 9 patients developed displacement of the fracture. All of them were reoperated on with a prosthesis (4 total hip, 5 bipolar). The screws migrated in 8 patients, 3 required a prosthesis, 3 had their screws extracted and 2 were left without further treatment because they had no pain.

Femoral head necrosis was diagnosed in 10 patients, of whom 7 had a prosthesis; only 2 had the screws extracted since they were too sick for prosthetic surgery. 1 was left without treatment because of senility. Nonunion was diagnosed in 7 patients, of whom 5 required a prosthesis; in 1 patient, 1 screw was extracted and 1 patient had no symptoms. Infection occurred in 3 patients. 2 superficial infections healed uneventfully after antibiotic treatment. 1 had a deep infection diagnosed at the 1-year follow-up examination and subsequently underwent a Girdlestone procedure.

Complications in the prosthesis group (43 patients)

4 patients developed a cerebrovascular lesion immediately after surgery. Pulmonary embolism with clinical symptoms was diagnosed by scintigraphy in 1 patient.

Dislocation of the prosthesis occurred in 7 patients, 4 of them within 2 weeks—1 patient suffered a dislocation during sleep, 1 because of an epileptic seizure and 2 while in a confused state of mind postoperatively. The 3 later dislocations occurred within 4 months; 1 in a patient who showed postoperative mental deterioration and 1 who fell beside his chair when sitting down. The dislocation in the 3rd hip was detected on a routine examination; the hip was loose radiographically, but the patient had only slight hip pain. The dislocation was reduced. 6 dislocations were treated by closed reductions in 4 cases and open reductions in 2 because of an intraprosthetic dislocation when the surgeon tried to perform a closed reduction. The 7th patient had recurrent dislocations and was revised with a total hip replacement. Because of a postoperative deep infection, she later underwent a Girdlestone procedure. 5 patients showed radiographic signs of heterotopic bone formation. None of them complained of hip pain.

Thus, in all, 34 reoperations were performed in the screw group and 7 in the bipolar group ($p < 0.001$). The rates of overall mortality were similar in both groups: 7 patients in the screw and 4 in the prosthesis group after 2 years, and 28 patients and 20, respectively, after 5–6 years.

Functional capacity

At the first follow-up after 4 months, 31/44 patients with a prosthesis and 17/40 with screws could walk as well as before surgery ($p = 0.02$). The difference between the groups was also obvious from the consumption of analgesics, 21/44 in the screw group and 6/44 in the prosthesis group ($p < 0.001$).

At the 5-year follow-up, no differences were found between the groups.

Discussion

Primary osteosynthesis with screws (von Bahr et al. 1974) or hook-pins (Strömqvist et al. 1984) is often followed by complications after surgery, especially in dislocated fractures (Zetterberg et al. 1985), which frequently require a secondary hip replacement (Nilsson et al. 1989). Half of the patients in the latter study were confined to a wheel chair before being reoperated on, and the postoperative dislocation rate was 11%.

All our patients were offered a clinical examination and radiographic follow-up after 5–6 years. However, when contacted by telephone for an appointment, all patients in the bipolar group, most of whom lived far from the hospital, refused to attend because they were asymptomatic.

We used a bipolar prosthesis instead of a total prosthesis because the surgical procedure is simpler, and easier to perform under emergency conditions than a total hip replacement. It has also been reported to give good results in 65–90% of cases after 2 and 4 years (Bochner et al. 1988, Rae et al. 1989, Wetherell and Hinves 1990).

Dislocations of bipolar prostheses in large groups of patients have been noted in 3% (Wetherell and Hinves 1990), which is about the same as can be expected in ordinary, elective, total hip arthroplasties (Hedlundh et al. 1995). In our study, the frequency of dislocations was high in the early, postoperative period, which is somewhat disturbing. Patients showing signs of senility were not included—although 1 patient was accepted—and 3 of them developed postoperative confusion, which was probably the reason for the dislocations. A knee splint in the early postoperative period may prevent dislocation of the prosthesis, especially in restless patients. Thus, poor postoperative cooperation must be considered an increased risk of dislocation.

The difference in the number of reoperations was striking. Apart from the operations occasioned by a prosthesis dislocation, only 1 major operation was performed in the prosthesis group at the last follow-up as compared to 24 major operations in the screw group.

To conclude, the greater effort required to perform a primary hip replacement in dislocated femoral neck fractures seems to be worthwhile in the long run.

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