Deep infection following femoral neck fracture osteosynthesis

Infections dans les fractures du col du fémur

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Résumé. On a noté pendant les dix dernières années une chute du nombre d’infections postopératoires dans les ostéosynthèses des fractures du col fémoral, ce qui nous a amené à revoir tous les cas infectés de ces fractures. Lors d’une série rétrospective de 1 894 fractures du col fémoral, dont la majeure partie était dans d’autres études prospectives limitées, on a diagnostiqué un total de 15 infections profondes (0,8 %). Le staphylocoque doré était la bactérie la plus souvent en cause ; le diagnostic était établi plus de 4 mois après l'intervention chez 9 des patients. 658 patients sur les 1 894, auxquels il avait été administré des tétracyclines per-opératoires pour mesurer le renouvellement osseux, ont présenté deux infections profondes (0,3 %). Parmi les 1 236 patients restants, sans antibio prophylaxie, on a comptabilisé 13 infections profondes (1,0 %). Cette différence incite à recommander la prophylaxie antibiotique dans l’ostéosynthèse de la fracture du col du fémur. Huit des infections ont conduit à une arthroplastie totale de la hanche, habituellement en deux étapes ; il n’y eut pas de récidive d’infection, et la fonction de la hanche fut rétablie chez ces patients. Les 7 patients restants ayant subi une résection de type Girdlestone, n’eurent aucune récidive d’infection, mais leur résultat fonctionnel fut moins bon.

Mots-clés : Hanche — Fracture — Ostéosynthèse — Infection — Staphylocoques

Summary. During the last decade a decrease in postoperative infections in femoral neck fracture osteosynthesis was noted which led us to review all femoral neck fractures for infection. In a retrospective series of 1894 femoral neck fractures, the majority of which were included in other limited prospective studies, a total of 15 deep infections were diagnosed (0.8%). Staph. aureus was the most common bacterium cultured, and the diagnosis was established more than 4 months postoperatively in 9 of the patients. A total of 658 of the 1894 patients, who had pre- or peroperative tetracycline administration for measuring bone turnover, had two deep infections (0.3%). Among the remaining 1236 patients without antibiotic prophylaxis, 13 deep infections were diagnosed (1.0%). This difference suggests considering antibiotic prophylaxis in femoral neck fracture osteosynthesis. Eight of the infections led to THR, usually two-stage ; no signs of recurrent infection ensued, and the hip function of these patients was restored. The remaining 7 patients had Girdlestone procedures, also without recurrent infection, but with inferior functional outcome.

Key words : Hip — Fracture — Osteosynthesis — Infection — Staphylococci

In hip joint replacement antibiotics in combination with other anti- and a-septic preventive measures can reduce the infection rate to 0.2% [3, 8]. It has been demonstrated in randomized studies that prophylactic antibiotics reduce the infection rate following osteosynthesis of trochanteric hip fractures [1, 6].

In the surgical treatment of femoral neck fractures the trauma is less with minimal osteosynthesis. The patient population has, however, a mean age approaching 80 years and is often burdened by concomitant disease. Furthermore, as all hip surgery, it is performed in close vicinity to the perineum. In primary osteosynthesis for femoral neck fracture the infection rate is generally reported to be 1-2% [4, 7, 10].
experimental series with tetracycline marking of bone turnover a decreased infection rate was noted [12]. The aim of this study was, in an extended retrospective series, to analyze the frequency of postoperative infections in two groups, with and without tetracycline.

Patients

At the Department of Orthopedics in Lund femoral neck fractures have consistently been treated by primary osteosynthesis. In the years 1977 through 1980 they were treated with a four-flanged nail [10], 1981-1982 every second patient had a four-flanged nail and every second two hook-pins in a prospective randomized trial [13]. From 1982 through 1989 all patients had osteosynthesis with two hook pins. During the years 1981 through 1985 all patients were part of prospectively planned series and were followed for a minimum of two years [14]. In the preceding and subsequent periods the study was performed retrospectively. However, infections have been registered continuously for many years at our department and at the Department of Infectious Diseases.

No prophylactic antibiotics were routinely administered to femoral neck fracture patients during the time period studied. However, as part of a femoral head vitality project, 658 patients received tetracycline or oxytetracycline intravenously or per os [12].

A total of 1894 patients were treated for femoral neck fracture from 1977 to 1989. Their mean age was 79 years and the female:male ratio 2.6 : 1. The follow-up period was a minimum of two years.

Methods

The protocols of the prospectively planned series were scrutinized. The register of infections was collected for all complications after femoral neck fracture. All charts of patients registered as infected were scrutinized. Deep infection was considered to be present if positive cultures were obtained from the hip joint and if the patient had a typical clinical course with a feeling of illness, increased temperature, increased sedimentation rate or radiographic signs of infection in the hip joint. The records were also checked for antibiotic treatment at the time of surgery and in the follow-up period.

Preoperative administration consisted of either 1000 mg of tetracycline or oxytetracycline per os in two equal doses with a 4 to 6-h interval or 500 mg of oxytetracycline in 500 cc of saline in a 4 to 6-h infusion. For peroperative administration 500 mg oxytetracycline or 200 mg of doxycycline in 20 cc of saline was infused intravenously on the operating table during 10 min.

Total hip replacement for deep infection was with one exception performed as a two stage procedure. In the first stage the femoral head was resected, synovectomy performed and the joint filled with gentamicin-containing PMMA beads [16]. Total hip replacement with gentamicin-containing bone cement was performed usually 2 to 8 weeks later. However, in some cases the second operation was performed several months later. Antibiotic coverage with cloxacillin, or other antibiotics according to cultures, was given.

The Girdlestone procedure was either nail extraction, nail extraction with temporary gentamicin PMMA beads or resection of the femoral head with synovectomy and gentamicin PMMA beads.

Results

Deep infection was diagnosed in 15 of the 1894 femoral neck fractures (0.8%). Two of these patients belonged to the group of 658 that had been marked with tetracycline (0.3%), and 13 deep infections were seen in 1236 patients without tetracycline administration yielding an infection rate of 1.0%.

Infection was usually caused by Staphylococcus Aureus (Table 1). Seven of the 15 infections occurred in patients with intercurrent diseases (Table 2).

The diagnosis of infection was established during the first three months after fracture in 6 cases, 4 to 12 months postoperatively in 6 cases, and 1 to 4 years postoperatively in the remaining 3. Decreased function and increased pain on weight-bearing were common denominators for the patients and preceded the diagnosis. Diagnosis and treatment were often delayed due to the advanced age and other concurrent diseases. In three cases destruction of the femoral head was initially believed to be caused by femoral head collapse.

In 8 patients prosthetic replacement was performed with no recurrence of infection. The age at total hip replacement was 60 to 85 years (mean 74 years). Three patients died within one year of the operation and one after 18 months, all from causes unrelated to infection. Four patients with an observation time of 4 to 14 years did well and were without signs of infection. All but one of these patients had the replacement performed in a two stage procedure. Successful treatment restored functional capacity to its former condition or nearly so.

The remaining 7 patients had a Girdlestone hip without signs of remaining infection. Their age was 74 to 90 years (mean 83 years). Two died within 1 year and another two within 2 years all from causes unrelated to infection. Three lived for more than 5 years and had limited mobility using crutches or walking frame.

Discussion

Infection is the most severe local complication after femoral neck fracture and puts a great burden on the patient as well as on hospital resources. Prophylactic antibiotics have been discussed but to our knowledge no randomized or comparative studies have demonstrated the benefits in a femoral neck fracture population. An effect has been demonstrated in trochanteric hip fractures [1, 2, 9, 15], but this is a more extensive operation with longer duration of surgery. Antibiotic prophylaxis