

DIAGNOSIS AND TREATMENT OF JOINT INFECTIONS IN ELDERLY PATIENTS

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Clinical, laboratory and radiological data of 35 patients (> 60 years) with septic arthritis were retrospectively analyzed in 2 groups submitted to different treatment protocols based on the radiological stage of destruction. Group I: intraarticular gentamicin-PMMA beads (8 cases), group II: resection-arthroplasty with gentamicin-cement spacer (27 cases). The average diagnostic delay was 4.8 months. Diagnostic errors were: osteoarthritis in 9 cases, periarthrititis of the shoulder in 5, femoral head necrosis in 4 cases, sciatic pain in 3, osteoporosis in 1, and thrombosis in 1 case. The re-operation rate in group I was 1.4 (range 1-2 operations) and in group II 1.2 (range 0-3 operations). Fifteen patients were left with a resection-arthroplasty. The restriction of motion remained moderate in 6 and severe in 9 cases. Three patients had sepsis and died. The final results were poor after both treatment protocols. Early diagnosis seems to be the most determining factor concerning the final outcome of septic arthritis.

Keywords: joint infection; coxarthrosis; elderly patients; two-step procedure.

Mots-clés: infection; arthrite septique; coxarthrose.

INTRODUCTION

Russels and Amsell demonstrated that 25-30% of joint infections appeared in patients over 60 years old (21). In elderly patients, the blood supply of the tissue is reduced (10). The mechanisms of immune defence and self repair are also decreased (16). Joint infections in elderly patients are characterized by a high mortality and loss of joint function (3, 18). The aim of the present study was to analyze the influence of the delay in diagnosis and the outcome following two treatment protocols.

PATIENTS AND METHODS

During the observation period (1980 to 1994), 35 elderly patients (16 women, 19 men) with septic arthritis were treated at the Orthopedic Department of the University of Münster (Fig. 1). At the time of diagnosis all patients were over 60 years old with an average age of 69.4 years (60-82). We only analyzed the "patient related risk factors" and excluded all cases with perforating wounds, postinjection arthritis or infected total endoprosthesis. Four other cases with septic arthritis were not included in the study. They were treated before 1980 by a less aggressive protocol with debridement in combination with a postoperative open irrigation drainage.

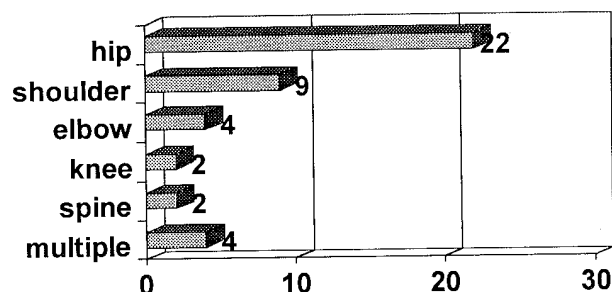


Fig. 1. — Distribution of septic arthritis in elderly patients.

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At first presentation all clinical, microbiological and radiological data were analyzed. Documentation was done for local infection signs, duration and type of pain. Biochemistry analysis was done for the erythrocyte sedimentation rate, white blood cell count and body temperature. All infections were confirmed by positive cultures intraoperatively or by histological results. The radiological stage of joint destruction was classified according to the criteria of Larsen (1977) (15).

The final outcome was analyzed in two treatment groups that were related to the radiological stage of joint destruction at first presentation. Group I was classified grade 1-3 with some loss of the width of the joint space and periarticular osteopenia. Group II were classified grade 4-5 with severe erosions and joint destruction (15) (Fig. 2). The restriction of the total



Fig. 2. — 68-year old woman with rheumatoid arthritis and hip joint infection (*S. aureus*). The delay of diagnosis was four months. After resection-arthroplasty and implantation of a bone cement spacer with gentamycin beads the infection was controlled. She had moderate pain and could walk with two crutches.

joint movement was classified after treatment at the latest follow-up : hip : mild ($120-180^\circ$), moderate ($60-120^\circ$) and severe ($< 60^\circ$) ; shoulder : mild ($120-240^\circ$), moderate ($60-120^\circ$), severe ($< 60^\circ$), knee : mild ($60-90^\circ$), moderate ($30-60^\circ$), severe ($0-30^\circ$) ; elbow : mild ($60-90^\circ$), moderate ($0-60^\circ$), severe ($0-30^\circ$). The clinical function was evaluated by a standardized question are according to Enneking for large musculo-skeletal defects at the upper and lower extremities (8). This score was chosen because the joint defects in our patients were extensive and comparable to tumor resections and the score could be used independent from joint specific evaluation problems. The system based on numerical values (0-5) for each of six categories : emotional acceptance, pain, function, supports, walking distance and gait in the lower extremity and hand positioning, dexterity and lifting ability in the upper extremity (8). The total score summarize all six criteria and is expressed in percentage rating. Twenty-six patients could be completely evaluated, three patients died and 6 patients were lost to follow-up.

Group I (n = 8)

The treatment included arthrotomy, extensive debridement, synovectomy, and implantation of gentamicin beads into the joint (Septopal®, Merck, Darmstadt, Germany) — avoiding cartilage contact. This group received intravenous cephalosporins for 4-6 weeks. After infection control the gentamycin PMMA-beads were removed. Mobilization started after the 6th day. Partial weight bearing was imposed for 4-6 weeks.

Group II (n = 27)

The patients were treated by an aggressive debridement combined with a resection arthroplasty (6). Then a gentamycin-polymethylmethacrylate (PMMA) spacer was implanted with gentamycin-PMMA beads for 3-6 weeks and simultaneous intravenous therapy with cephalosporins. The implantation of a prosthesis was intended as a second stage procedure after infection control.

RESULTS

Clinical diagnosis

The clinical diagnosis of septic arthritis is difficult. Thirty three patients complained of unspecific pain, while two patients referred no pain.

Local infection signs (swelling, heat) were noted in eight of 35 patients only. An elevated body temperature ($> 37.5^{\circ}$) was found in eight of 35 patients. The average delay from the initial symptoms to the definitive diagnosis was 4.8 months (range 0.5-13 months). Diagnostic problems were noted in 25 of 35 patients. The most frequent negative diagnoses were osteoarthritis in 9 cases, peri-arthritis of the shoulder in five, femoral head necrosis in four, sciatica in three, osteoporosis in one, thrombosis in one, and abdominal pain in one case.

Biochemistry

The erythrocyte sedimentation rate (ESR, 1 hour) was increased moderately (> 50 mm/h) in 16 and markedly (> 100 mm/h) in 19 patients. The white blood cell count amounted to $> 10.0 \times 10^3$ /ml in seven patients and was within a normal range in 25 and below 5.0×10^3 /ml in three patients.

Bacteriology

Staphylococcus aureus was found in 13 cases and gram negative organisms as follows: *Proteus* in five cases, *E. coli* in four and *Pseudomonas* in one case. Other organisms found were *Enterococcus* in three, *Staphylococcus epidermidis* in three, *Salmonella* in two cases and in one case *Mycobacterium tuberculosis*. Mixed cultures were found in 8 cases. In 5 cases the organisms were not identified but positive histological results were obtained.

Final outcome

Group I (n = 8)

The delay in diagnosis was on average 3.8 months (range 1-8 months). The re-operation rate was on average 1.4 (range 1-2 operations). In 3 patients, infection control was possible with a moderate restriction in joint mobility. In 5 patients the width of the joint space was reduced. All patients suffered a severe loss of joint movement. One patient died of pericarditis and the other

patient died of toxic shock following sepsis due to *S. aureus*. The final Enneking score (n = 6) was on average 23.3% (range 16-68%).

Group II (n = 27)

The time delay for correct diagnosis was on average 5.9 months (range 2-13 months). The re-operation rate was on average 1.2 (range 0-3 operations). In 14 cases, the infection was controlled. In 12 patients the conditions of the femur and the gluteal muscles allowed for the implantation of an endoprosthesis. In this group the restriction of joint motion was mild in 4, moderate in 6 and severe in 2 cases. In 15 patients the defects were too extensive and a resection arthroplasty was done. In this group the restriction of motion remained moderate in 6 and severe in 9 cases. Two patients died of sepsis by gram-negative organisms. The final Enneking score (n = 20) was on average 20.3% (range 8-58%).

DISCUSSION

Dubost *et al.* (7) found that the knee joint is the joint most often affected by septic arthritis followed by the elbow, shoulder and hip joint. In our study the hip predominated, because we excluded all patients with infections after intra-articular injections, which is the most common reason for septic arthritis in the knee and shoulder joint.

Infection control is dependent on early diagnosis, aggressive debridement and systemic antibiotic therapy (1, 9). Lane *et al.* analyzed the time dependent destruction of cartilage in septic arthritis (14). Pannus overgrowth appeared on the 11th day, erosion of the joint capsule on the 17th day and fibrous joint ankylosis after 5 weeks (20). Our study demonstrates that a long delay in diagnosis is detrimental to the outcome of the disease (14). In young patients the results were better, because the diagnosis is usually made within 3-4 days (1). Härtle and Evanchick *et al.* pointed out that already after 7 days the results will deteriorate (9, 12). In elderly patients the delay can be several weeks or months (10, 11, 23). The clinical signs of infection are often unspecific because of the

deep situation of the hip or shoulder joint (2, 17, 22). The diagnostic delay can also be related to the unspecific biochemistry results. The diagnostic value of the erythrocyte sedimentation rate (ESR) or body temperature is low, especially in rheumatoid arthritis (12, 13, 24). Joint aspiration is the most reliable diagnostic method with a sensitivity of 93% and specificity of 92% (25). Leukocyte count over 35.000/mm³ are suspicious and call for further culture (12). This method was not used during the study but is now routinely done in our department. Probably it might improve the results for elderly patients.

In our study the delay in diagnosis but not the operative treatment was the most important factor influencing the final outcome, as was also shown in other studies. Good results were obtained when treatment was started in the first four days. This was described for arthroscopy, arthrocentesis or multiple needling therapy (4, 5, 9). When treatment started after several months the revision rate increased. Persistent osteomyelitis and sepsis occurred more frequently in elderly than in younger patients treated by the same protocol (6). Our high mortality could be related to gram-negative microorganisms. Newmann's studies also revealed that especially gram-negative microorganisms are associated with a fair functional outcome and require close attention (19).

CONCLUSION

Our study shows that septic arthritis in the elderly is a very dangerous disease. Therefore one should consider a potential joint infection in all destructive joint conditions. We advise to do an immediate joint aspiration in elderly patients with unspecific joint complaints or radiological narrowing of the joint space distance.

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SAMENVATTING

D. BETTIN, B. SCHUL, L. SCHWERING. Resultaat na behandeling van septische arthritis bij bejaarden.

De klinische, radiologische en biochemische gegevens van 35 patiënten met een septische arthritis werden nagekeken ; twee behandelingsprotocollen werden onderscheiden afhankelijk van de radiologische destructie : 8 × met intra-articulaire gentamycine-PMMA-parels en 27 × resectie-arthroplastie met gentamycine-cement spacer. De gemiddelde vertraging in de diagnose bedroeg 4,8 maanden. Diagnostische fouten waren : osteoarthrose (9), peri-arthritis van de schouder (4), ischias (3), osteoporose en trombose (elks 1). De re-operaties in groep I was 1,4, in groep II was dit 1,2. Vijftien patiënten behielden de resectie-arthroplastie. De bewegingsbeperking was matig in 6 en ernstig in 9 gevallen ; drie patiënten overleden door sepsis. Het uiteindelijke resultaat was pover onafhankelijk van het gevolgde protocol. De snelle diagnose is een belangrijkste determinerende parameter.

RÉSUMÉ

D. BETTIN, B. SCHUL, L. SCHWERING. Diagnostic et traitement des infections articulaires chez les sujets âgés.

Les auteurs ont étudié rétrospectivement les données cliniques, biologiques et radiologiques de 35 patients âgés de plus de 60 ans qui présentaient une arthrite septique, au niveau de la hanche dans 22 cas. Le diagnostic a été posé avec un retard moyen de 4,8 mois. Des erreurs de diagnostic ont été relevées : arthrose dans 9 cas, nécrose de la tête fémorale dans 4 cas, sciatalgie dans 3 cas, ostéoporose dans 1 cas et thrombose dans 1 cas ; au niveau de l'épaule, périarthrite dans 5 cas. Les patients se répartissaient en deux groupes : dans le groupe I, le traitement associait arthrotomie, débridement, synovectomie, et implantation de billes de ciment à la gentamycine, associés à une antibiothérapie intraveineuse. Dans le groupe II, le traitement comportait une résection-arthroplastie avec un spacer en ciment à la gentamycine et, dans 12 cas, implantation secondaire d'une prothèse, les autres étant laissés en résection. Les patients du groupe I ont subi en moyenne, 1,4 réopérations et ceux du groupe II 1,2. Trois patients sont décédés de complications infectieuses, 1 dans le groupe I et 2 dans le groupe II. Tous les patients du groupe I ont conservé une importante raideur articulaire ; dans le groupe II, l'enraidissement restait modéré dans 6 cas et important dans 9 autres. Le résultat final a été médiocre avec les deux protocoles de traitement. Un diagnostic précoce semble être le facteur déterminant du résultat final.