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Nephrotoxicity by dicloxacillin and gentamicin in 163 patients with intertrochanteric hip fractures

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Abstract Of 163 patients with intertrochanteric hip fractures 87 received 2 g dicloxacillin and 240 mg of gentamicin preoperatively, and 76 patients had no antibiotic prophylaxis. Preoperative antibiotic prophylaxis was not shown to have any significant effect on wound infections. However, 16 reversible and 1 irreversible cases of kidney toxicity were found among patients receiving antibiotic prophylaxis, whereas there were only four cases of reversible kidney damage among the patients not receiving antibiotics.

Résumé Parmi 163 patients avec des fractures intertrochantériennes, 87 patients avaient reçu en préopératoire 2 g Dicloxacilline et 240 mg Gentamicine. 76 patients n'avaient reçu aucune prophylaxie antibiotique. La prophylaxie préopératoire contre les infections n'a montré aucun effet significatif. Cependant dans le groupe avec prophylaxie, 17 affections rénales ont été observées, dont 16 réversibles et 1 irréversible. Parmi les patients n'ayant reçu aucune prophylaxie antibiotique 4 affections rénales réversibles ont été observées.

Introduction

The use of antibiotic prophylaxis in patients with trochanteric fractures is controversial and few randomized studies have been published. It was the aim of this retrospective study to evaluate the nephrotoxicity after preoperative prophylaxis with dicloxacillin and gentamicin in patients with trochanteric hip fractures.

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Material and methods

Until 1994 no antibiotic prophylaxis was used at our department. From 1994 gentamicin and dicloxacillin was used for osteosynthesis of trochanteric hip fractures with the AO-ASIF Dynamic Hip Screw. We have retrospectively sampled data from 203 consecutive patients from 1992 to 1995.

There were 47 males, and 156 females and median age was 82 (31–101) years. Eighty-six patients had no antibiotic prophylaxis, 93 received 2 g dicloxacillin and 240 mg gentamicin intravenously and 24 patients received other forms of antibiotic prophylaxis.

Patients who died within 2 weeks postoperatively; patients with a preoperative serum creatinine greater than 121 mmol/L and patients who received antibiotics other than dicloxacillin and gentamicin were excluded. A total of 40 patients were excluded as a result of these restrictions.

Included in the study were 163 patients. In group I: 87 patients who received a preoperative dose of 2 g dicloxacillin and 240 mg of gentamicin intravenously and in group II: 76 patients who received no antibiotic prophylaxis (Table 1).

We defined a reversible nephrotoxicity as a rise of the serum creatinine above the upper standard 95% limit, and irreversible kidney damage as increasing uremia leading to death.

The following parameters were registered: age, dependence on drugs/alcohol, preoperative chronic disease/kidney disease, preoperative blood loss, preoperative serum creatinine/carbamide/hemoglobin values, method of anesthesia, preoperative diuretics and dosage, operating time, blood pressure dropping below 80 mmHg for more than 5 min per- or postoperatively, fracture type, and postoperative hematoma.

A logistic regression analysis was performed to study the comparability between the two groups. The non-parametric Wilcoxon-Pratt test was used to compare serum creatinine values pre- and postoperatively. The level chosen for statistical significance was P=0.05 (two-tailed).

Results

The logistic regression analysis showed no differences between the two groups concerning the background variables. In group 1, 16 reversible and one irreversible cases of kidney toxicity were observed, and in group 2 four reversible cases of kidney damage (Table 1).

In group 1, we found a statistically significant increase in serum creatinine on the third and fourth postoperative days compared to the preoperative level

Table 1 Patient characteristics. Median values with range or percent in parentheses

	Group I	Group II
Male/female	21/66	16/60
Age (years)	82 (31–98)	81 (31–101)
Preoperative kidney disease	4 (2%)	4 (2%)
Duration of operation (min)	55 (25–220)	50 (30–120)
Peroperative blood loss (mL)	200 (0–2000)	200 (0–1500)
Toxicity (reversible/irreversible)	16/1	4/0
Reoperation	3 (2%)	5 (3%)
Infection (deep and superficial)	7 (4%)	7 (4%)

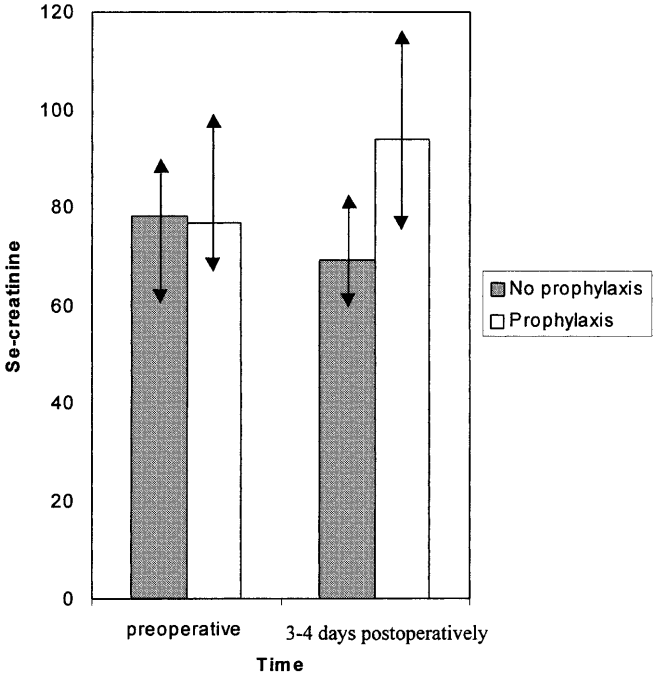

Fig. 1 Serum creatinine values preoperatively and after 3–4 days in the group without prophylaxis (n=35) and the group with prophylaxis (n=57). *Arrows* show 25 and 75 quartiles

(P=0.01). The median serum creatinine level rose 17.2 mmol/L (Fig. 1). In group 2, no differences between the preoperative and the third and fourth day values (P=0.317) were seen. There were no differences between the preoperative and seventh day levels in either of the two groups (Fig. 2).

Postoperative wound infection was seen in 14 patients, 7 in each group. Twelve were treated with antibiotics and in group 2, two patients were reoperated. Eight patients were reoperated.

Discussion

Two studies [1,2] have shown partial effect of cephalosporines given as prophylaxis. A recent investigation [5] has shown a 35% frequency of methicillin resistance among blood cultures in Danish university hospitals. Based on their similarity in molecular structure to penicillins, it is known that cephalosporins are ineffective against methicillin-resistant microorganisms (mostly coagulase-negative staphylococci). In our orthopaedic department, gentamicin and dicloxacillin were therefore chosen because of the presumed efficiency towards methicillin-resistant bacterial strains.

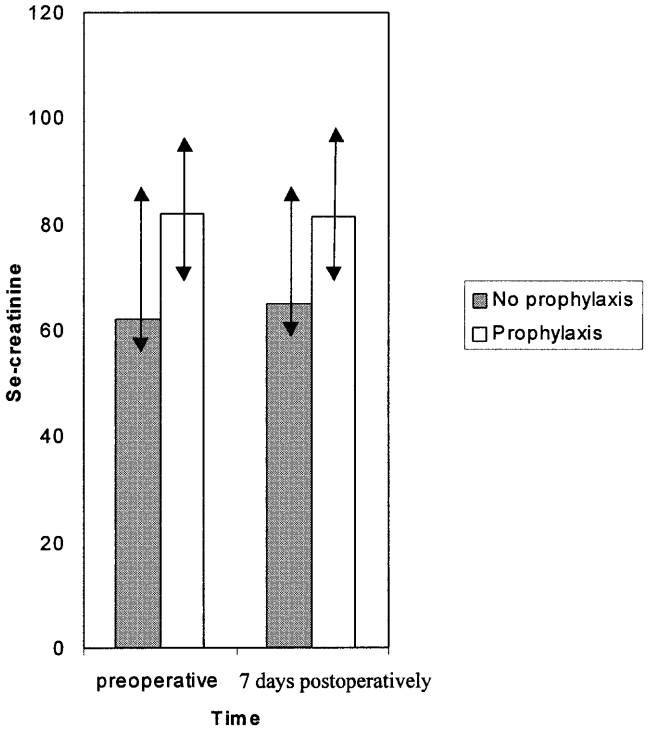

Fig. 2 Serum creatinine values preoperatively and after 7 days in the group without prophylaxis (n=27) and the group with prophylaxis (n=38). *Arrows* show 25 and 75 quartiles

We found no significant effect of antibiotic prophylaxis in hip fracture patients and we are in agreement with several randomized [3,7,9,10,11] studies. It is doubtful whether antibiotic prophylaxis should be given to hip fracture patients.

Gentamicin and dicloxacillin produced a transient reduction of the renal function in the hip fracture patients with a preoperative normal serum creatinine level. It has previously been stated [6] that the onset of decreasing renal function caused by aminoglycosides usually occurs after 1 week's treatment and seems to be reversible. As previous documentation suggests a toxicity of dicloxacillin [4,8], a synergistic toxic effect of our antibiotic prophylaxis might be presumed.

The clinical significance of the shown toxicity of gentamicin and dicloxacillin in a one-dose form is uncertain. The results are, however worrying. We recommend the planning and execution of a (multicenter) prospective investigation in hip fracture patients testing the need for antibiotic prophylaxis and the possible side effects of the antibiotics used.

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Statement on Conflict of Interest No benefits in any form have been received or will be received from a commercial party related directly or indirectly to the subject of this article.

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