

Short communication

Management of diabetic foot in a Jordanian hospital

A.D. Al-Ebous,¹ B. Hiasat,¹ M. Sarayrah,¹ M. Al-Jahmi¹ and A.N. Al-Zuriqat¹

التدبير العلاجي للقدم السكرية في مستشفى أردني

علي العبوس، باهي حياصات، ماجد سرايرة، محمد الجهمي، أحمد الزريقات

الخلاصة: تم تقصي تأثير مضادات حيوية مختلفة على نتيجة الرعاية الجراحية في إطار التدبير العلاجي للقدم السكرية. فقد قام الباحثون بتوزيع 100 مريض بالقدم السكرية توزيعاً عشوائياً على أربع مجموعات. وتم تصنيف العدوى لدى كل مريض وفقاً لتصنيف واغنر Wagner. وتلقى جميع المرضى نفس الرعاية الجراحية، ولكن أُعطي لكل مجموعة مضاد حيوي مختلف. وتفاوتت مدة البقاء في المستشفى من 7 أيام إلى 14 يوماً. ولوحظ تعرّض خمسة مرضى لمضاعفات من الإلتان الدموي؛ وأجري بتر لخمسة عشر مريضاً؛ وأصيب خمسة مرضى باختلال مؤقت في الكلى. ويوصي الباحثون بضرورة المراعاة الدقيقة لنوع المضاد الحيوي المستخدم.

ABSTRACT The effect of different antibiotics on the outcome of surgical care in the management of diabetic foot was investigated. We randomly allocated 100 patients with diabetic foot into one of four groups. Each patient's infection was graded (Wagner classification). All patients were offered the same surgical care but each group was assigned a different antibiotic. Hospital stay for the four groups ranged from 7 to 14 days. Five patients experienced complications from septicaemia; 15 patients underwent amputation; and five patients experienced temporary renal impairment. Careful consideration to the type of antibiotic used is essential.

Prise en charge du pied diabétique dans un hôpital jordanien

RÉSUMÉ Nous avons examiné l'effet de différents antibiotiques sur l'issue des soins chirurgicaux dans la prise en charge du pied diabétique. Nous avons réparti de manière aléatoire 100 patients ayant un pied diabétique dans quatre groupes. L'infection de chaque patient a été évaluée (classification de Wagner). Tous les patients ont reçu les mêmes soins chirurgicaux mais chaque groupe s'est vu attribué un antibiotique différent. La durée du séjour hospitalier pour les quatre groupes était comprise entre 7 et 14 jours. Cinq patients ont connu les complications d'une septicémie ; 15 patients ont subi une amputation et cinq patients ont eu une insuffisance rénale passagère. Il est donc essentiel de choisir soigneusement le type d'antibiotique utilisé.

¹Royal Medical Services, Amman, Jordan (Correspondence to A.D. Al-Ebous: aalebous@hotmail.com).
Received: 23/05/01; accepted: 24/03/02

Introduction

The skin and mucous membrane are the first line of defence against invading micro-organisms, and therefore, the integrity of the skin is of paramount importance in protecting against infection. Diabetes mellitus is a common systemic disease associated with a high incidence of infection, especially in the foot. The reasons for this are multifactorial with the most important factor being neuropathy. Angiopathy and poor host defence mechanisms also play a vital role [1,2].

The initial lesions of diabetic foot are usually superficial and caused by a single pathogen such as *Staphylococcus aureus* or *Streptococcus* species [3], although an increasing number of patients have been encountered for whom the infecting agent has been *Enterococcus* species and *Pseudomonas aeruginosa* [4,5]. We aimed to study treatment outcomes in patients with diabetic foot, including the effect of different antibiotics on the outcome of surgical care.

Methods

The study was conducted at the Prince Hashem Hospital, Jordan between August 1999 and August 2001. All patients admitted to the surgical ward diagnosed with diabetic foot were included in the study ($n = 100$). The 100 patients were randomly allocated to one of 4 groups (A, B, C or D). Treatment consisted of surgical care for all with the type and extent of the surgical intervention for the individual patient determined by the grade of infection according to the Wagner classification [6]. Surgical procedures ranged from simple debridement to above the knee amputation if conservative treatment failed. Table 1 shows the distribution among the groups of infec-

Table 1 Number of diabetic foot patients by Wagner grade of infection

Grade	Group A	Group B	Group C	Group D
Grade 0	1	0	1	0
Grade 1	4	3	5	2
Grade 2	10	11	9	12
Grade 3	2	3	3	2
Grade 4	3	2	3	2
Grade 5	5	6	4	7
Total	25	25	25	25

tion as determined by the Wagner classification. In addition to surgical procedures, each group had its own antibiotic regime to compare the effectiveness of different antibiotic treatments on patient outcome. These antibiotics used were the available broad-spectrum antibiotics. Group A received piperacillin sodium/tazobactam sodium (4.5 g 3 times daily; group B received ceftazidime (1 g 3 times daily)/metronidazole (500 mg 3 times daily); group C received lincomycin hydrochloride (600 mg 2 times daily)/amikacin (500 mg 2 times daily and group D received imipenem. Therapy commenced prior to isolation of the etiologic agent due to the need for urgent treatment of infections requiring immediate intervention.

Results

The mean healing time in the different groups is shown in Table 2 together with the number who experienced septicaemia, amputation and renal impairment. The healing time was measured from the start of treatment until the wound was clean and healthy looking with no evidence of dis-

Table 2 Antibiotic regime, healing time and number of patients with septicaemia, amputation and/or renal impairment

Variable	Group A	Group B	Group C	Group D
Antibiotic regime	Piperacillin sodium/tazobactam sodium	Ceftazidime/metronidazole	Lincomycin hydrochloride/amikacin	Imipenem
Mean healing time (days)	7	10	14	14
Septicaemia (No.)	0	2	1	2
Amputation (No.)	3	5	2	5
Renal impairment (No.)	4	0	1	0

charge. The mean healing time was 7 days for group A; 10 days for group B; and 14 days for groups C and D. There were 2 patients who experienced complications from septicaemia in each of groups B and D, one in group C, and none in group A. Amputation was performed on 3 patients in group A, 5 patients in groups B and D each, and 2 patients in group C. Renal impairment was observed in 4 patients in group A and 1 patient in group C (Table 2).

Discussion

Clinical illness of patients with skin and soft tissue infections should be evaluated to determine whether hospital admission is required. In this study, the extent of infection, the presence of devitalized tissue, the state of the vascular supply and the patient's general condition were assessed.

The option of timely surgical intervention was considered for patients with deep infection, especially grades 3, 4 and 5 according to the Wagner classification. Successful treatment of these grades was highly dependent upon early debridement or, when appropriate, amputation. Such action resulted in rapid resolution of the prob-

lem and a consequent reduction in hospital stay. Control of blood glucose levels did not present any problems as long as the infection was kept under control.

Our results suggest that antibiotics contributed little to the outcome of patients with these deep tissue infections. However, the results demonstrated the importance of antimicrobial therapy in the treatment of skin and soft tissue infection [7,8] during the management of grade 1 and 2 infections. A comparison between types of antimicrobial agents found that patients using piperacillin sodium/tazobactam sodium (group A) had a shorter hospital stay and a lower incidence of septicaemia.

Routine testing of patients' liver and renal functions helped in the detection of early deterioration in renal function in 5 patients, 4 of whom were in group A. Fortunately, for each of these patients renal impairment was reversible with renal function parameters returning to normal following discontinuation of antibiotic therapy.

Conclusion

Management of diabetic foot requires a team approach. Grade of infection deter-

mines treatment modality, whether surgical or medical, the former being of paramount importance in deep infection. Antimicrobial therapy was effective in mild infection.

Careful consideration of the type of antimicrobial therapy is required for optimal management of diabetic foot.

References

1. Levin ME, O'Neal LW, eds. *Diabetic foot*, 3rd ed. St Louis, Mosby, 1982.
2. Wheat LJ. Infection and diabetes mellitus. *Diabetes care*, 1980, 3:187–97.
3. Lipsky BA, Pecoraro RE, Wheat LJ. The diabetic foot. Soft tissue and bone infection. *Infectious disease clinics of North America*, 1990, 4:409–32.
4. Tan JS, File TM, Salstrom SJ. Timentin versus moxalactam in the treatment of skin and soft tissue infections. *American journal of medicine*, 1985, 79:130–3.
5. File TM Jr, Tan JS. Ticarcillin–clavulanate therapy for bacterial skin and soft tissue infections. *Reviews of infectious diseases*, 1991, 13(suppl. 9):S733–6.
6. Wagner FW Jr. The dysvascular foot: a system for diagnosis and treatment. *Foot & ankle*, 1981, 2:64–122.
7. File TM Jr, Tan JS. Treatment of bacterial skin and soft tissue infections. *Surgery, gynecology & obstetrics*, 1991, 172(suppl.):17–24.
8. Sexton DJ et al. Twice daily intramuscular imipenem/cilastatin in the treatment of skin and soft tissue infections. *Chemotherapy*, 1991, 37(suppl. 2):26–30.