The use of ofloxacin in the treatment of diabetic foot infections: preliminary findings

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Abstract

In a pilot study, the efficacy of oral ofloxacin was compared to a regimen of intravenous followed by oral ampicillin and cloxacillin in the treatment of diabetic foot infections. There were 10 patients in the ofloxacin group and 11 patients in the ampicillin and cloxacillin group. The results were comparable at six weeks of treatment, with no serious side-effects in either group. Ofloxacin is a useful alternative for the treatment of diabetic foot infections and obviates the need for parentenal antibiotics.

Keywords: Diabetes; Foot

Introduction

Diabetic foot infections are a difficult problem because of poor vascularity and sensibility of the tissues, which severely impair wound healing.[1]

In a randomized prospective study, the efficacy of ofloxacin was compared with intravenous ampicillin and cloxacillin in the treatment of diabetic foot infections. Ampicillin and cloxacillin were chosen as a regime for comparison because of their extensive use to treat or prevent wound infections.

Patients and methods

Only patients with infections limited to one toe, isolated ulcers and localized skin abscesses were included in the study. More extensive foot infections and generalized conditions which may adversely affect the outcome were excluded. Thus, gangrene of two or more toes, uncontrolled diabetes mellitus, patients with hepatic or renal failure, or concomitant severe peripheral vascular disease were excluded.

Group I. Ten patients, six males and four females with diabetic foot infections were treated with ofloxacin 200 mg orally for six weeks. The mean age was 62.6 years (range 45–72 years). The onset of symptoms to the time of treatment ranged from two to ten weeks. Four patients had an infected toe with gangrene, while two had no gangrene. One patient had a foot ulcer. Two patients had localized skin abscesses around the ankle and one had foot cellulitis.

Group II. Eleven patients with similar sex and age distribution as in Group I were studied. There were seven males and four females. Mean age was 68.7 years (range 50–76 years). Six patients each had an infected toe with gangrene, two had no gangrene. Two patients had skin abscesses and one had foot cellulitis.

Upon admission to Queen Mary Hospital, and if emergency operation was planned, the patient was given oral ofloxacin 400 mg as a stat dose before fasting for surgery in Group I or intravenous ampicillin (500 mg) and cloxacillin (500 mg) in Group II. Surgery was performed in the form of debridement, incision and drainage or amputation of the toe.[2] The wound was laid open and antibiotics were given postoperatively. In Group I, oral ofloxacin was continued for a total of six weeks at a dosage of 200 mg thrice daily. In Group II, intravenous ampicillin and cloxacillin were given for one week only, then oral drugs 500 mg each four times daily were continued for another five weeks. Wound swabs for bacterial culture and sensitivity tests were done before, during and after surgical procedures.[3] No other drugs were used except those for control of diabetes.

The authors conducted weekly follow-up with their patients in order to assess the response to treatment.

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Oral drugs were also prescribed during each follow-up to ensure compliance but no attempt was made to blind the authors who were assessing the response to treatment.

Results

The following parameters were used to assess the clinical response—pain, tenderness, swelling, redness, area of involvement, the presence of granulation tissue and discharges. The results are shown in Table 1. Excellent results mean the absence of clinical symptoms and signs of inflammation at six weeks. Good results mean significant improvement observed but residual mild symptoms and signs present at six weeks. Poor results mean no change in clinical parameters after the completion of the course of drug or when there was a deterioration of clinical status. Discontinuation of the drugs was considered when there were severe side-effects, culture revealing resistance to the drug, clinical deterioration for one week after the start of the drug and when proximal amputation became necessary.[4]

Table 1. Clinical results in each group.

	Group I	Group II
Excellent	7	7
Good	1	2
Poor	2	2
Total	10 patients	11 patients

In the ofloxacin group, two patients had poor results. One of them required discontinuation of the drug because of spreading infection which necessitated ray amputation of the fifth metatarsal.[5] The other one showed no improvement after six weeks.

In the ampicillin-cloxacillin group, two patients had poor results and both of them required discontinuation of the drugs and proximal amputation because of extension of infections.

No side-effects were noted in patients receiving ofloxacin but there were two patients complaining of mild gastro-intestinal upset having oral ampicillin and cloxacillin, although it was not severe enough to necessitate the discontinuation of the drugs.

Discussion

The most common organisms in diabetic foot infection in this study correlates well with other series. As shown in Table 2, *Staphylococcus* was the most common organism but none was methicillin resistant. Methicillin-resistant *Staphylococcus aureus* (MRSA) was not encountered in our series probably because most of the infections were not hospital acquired.

Table 2. Causative organisms in diabetic foot infections.

Staphylococcus aureus	8
Pseudomonas aeruginosa	3
Escherichia coli	2
Bacteroides fragilis	3
Streptococcus pyogenes	2
Streptococcus agalactiae	1
Streptococcus haemolytic group B	1
Proteus mirabilis	1
Proteus vulgaris	1
Enterobacter group	1

Pre-therapy cultures yielded 23 bacterial pathogenic isolates in 21 out of 27 patients. All bacterial isolates were susceptible to both study drugs. Table 2 provides the distribution of the pathogens over both treatment groups, and Table 1 shows the outcome after treatment.

In our opinion, ofloxacin has the advantage of covering both Gram-positive pathogens, very common in wound infections, and Gram-negative micro-organisms which may be the cause of infections of soft tissues, particularly in diabetic patients. In addition, ofloxacin seems to be one of the first highly effective orally administered anti-pseudomonas agents. Moreover, the costs of the two treatment regimes are comparable (Table 3).

Table 3. Comparative costs and convenience of the two treatment regimes.

Regime I	
Oral ofloxacin 100 mg costs $3.02	
Oral ofloxacin	
400 mg stat	$12.10
200 mg × 3 daily for six weeks	$761.00
Total	$773.10
Regime II	
Ampicillin 500 mg costs $2.27 (IV) and $0.40 (oral)	
Cloxacillin 500 mg costs $4.89 (IV) and $0.53 (oral)	
IV ampicillin + cloxacillin	
500 mg each Q6H for one week	$141.81*
Oral ampicillin + cloxacillin	
500 mg each × 4 daily for five weeks	$130.19
Total	$272.00

* IV administration (syringes, cannulae, etc.) entails additional costs.

In our study, ofloxacin administered orally at a dose of 200 mg thrice daily proved to be a highly effective and well-tolerated antimicrobial agent in appropriately selected patients with diabetic foot infections. However, more patients are needed and a longer follow-up is preferred to study related drug resistance in any relapses.

References

1. Delbridge L, Appleberg M, Reeve TS, Factors associated with development of foot lesions in the diabetic. Surgery 1983; 93: 78–9.
2. Roekaerts F, Deleess L. Effectiveness of ofloxacin in the treatment of wound Infections. Proceedings of the 14th International Congress of Chemotherapy. Kyoto, 1985: 87–91.
3. Wongwanich S, Ramsiri H, Tanaka H, et al. Comparative in vitro activity of ofloxacin and other antimicrobial agents against enteric and miscellaneous bacteria. Proceedings of the 14th International Congress of Chemotherapy. Kyoto, 1985: 1761–2.
4. Peyramond D, Biron F, Tigaud S, et al. Treatment of bacterial osteomyelitis with ofloxacin. Rev Infect Dis 1989; 11: 230–1.
5. Ketterl R, Beckurts T, Machka K, et al. Ofloxacin for prevention of and therapy for bone and joint infections. Rev Infect Dis 1989; 11: 228–9.