CLINICAL OUTCOME AFTER LOCAL INJECTION OF ANTIBIOTICS IN DIABETIC FOOT

By
Abd El-Fatah Saleh Abd El-Fatah Abo Zeid
Department of General Surgery, Al-Minia University

ABSTRACT:
Objective: To assess outcome of local injection of antibiotic in diabetic foot when systemic antibiotics are not effective.
Patients and methods: Diabetic patients in whom conventional treatment with systemic antibiotic failed with the presence of vascular disease and diabetic foot infections including cellulitis, superficial ulcer, or abscess were included. Areas of cellulitis less than 7.5 cm in diameter usually were injected at one or two sites with 1 ml of antibiotic solution (Gentamycin, 80 mg in 2 ml solution). Larger areas were injected at 2-5 sites with a total of 2 ml of antibiotic solution.
Results: The study included 25 patients, 14 (56%) males and 11 (44%) females, with mean age of 58 ± 7.9 years. The overall number of treated legs was 30. The types of the 30 lesions were: cellulitis in 11 patients (36.7%), abscess in 4 patients (13.3%) and ulcer in 15 patients (50%).
Pain was lessened or relieved in all lesions within a few days of the local injection of antibiotics. The mean follow-up period was 17 ± 3 months. Wound healing was evident and amputation was avoided in 21 of 30 legs (70%) and was not performed after the first 6 months. Three legs (10%) needed amputation. Conversion to another antibiotic after culture done in 6 legs (20%).
Conclusion: When there is a risk of toxicity with systemic antibiotics, the use of local injection of gentamycin in treatment of superficial diabetic ulcer, abscess or cellulitis is safe and effective.

KEYWORDS:
Diabetic foot Infection Ulcer
Local antibiotic Genatmycin

INTRODUCTION:

Foot complications are common in diabetic patients[1]. Diabetic foot disease is a major health problem, which concerns 15% of the 200 million patients with diabetes worldwide[2]. It is the most important cause of non-traumatic foot amputations[3,4].

Gram-positive bacteria, such as Staphylococcus aureus and beta-hemolytic streptococci, are the most common pathogens in previously untreated mild and moderate infection[5].

Clinically, three distinct stages of diabetic foot infection may be recognized: localized infection, spreading infection and severe infection. Localized infections with limited cellulitis can generally be treated with oral antibiotics on an outpatient basis. Spreading infection should be treated with systemic antibiotics[6]. Topical therapy may be used for some mild superficial infections[7].

The literature on local antibiotic injection in diabetic foot

infections is scant [8,9]. Therefore, in the present study, antibiotics were injected into infected tissue of diabetic foot disease to ensure effective local antibiotic concentrations.

PATIENTS AND METHODS:

The study was conducted at department of general surgery at Minia university hospital from January 2009 to January 2011. Diabetic patients in whom conventional treatment with systemic antibiotic failed with the presence of vascular disease and diabetic foot infections including cellulitis, superficial ulcer, or abscess were included. Foot ulcers that were long standing (>4 weeks), large (>2 cm), and deep (>3 mm) or were associated with a substantially elevated erythrocyte-sedimentation rate (>70 mm/h) were excluded from the study.

Infection was diagnosed clinically, by the presence of systemic signs (e.g., fever, chills, and leukocytosis), purulent secretions (pus), or by local classical signs or symptoms of inflammation (warmth, redness, pain or tenderness, and induration). An ulcer was defined as a break through the full thickness of the dermis[10].

Gentamycin was supplied in vials containing 80 mg of antibiotic in 2 ml solution. Areas of cellulitis less than 7.5 cm in diameter usually were injected at one or two sites with 1 ml of antibiotic solution. Larger areas were injected at 2-5 sites with a total of 2 ml of antibiotic solution. Wound healing was defined as intact skin that remains intact for at least six months or is intact at the time of death[10].

RESULTS:

The study included 25 patients with mean age of 58 ± 7.9 years. Characteristics of the studied 25 patients with diabetic foot are shown in (Table 1). Of the studied patients, 14 (56%) were males and 11 (44%) were females. Lesions involved one limb in 20 patients (80%) and two limbs in 5 patients (20%), thus the overall number of treated legs was 30. Most of the diabetic patients were on insulin therapy (23; 92%). Associated previous medical conditions included: blood pressure > 160/90 despite medication in 8 patients (32%), angina of previous myocardial infarction in 6 patients (24%), congestive heart failure in 5 patients (20%), cerebrovascular disease (stroke or TIA) in 4 patients (16%) and chronic renal failure in 2 patients (8%). The types of the 30 lesions in the studied 25 patients (Table 2) were: cellulitis in 11 patients (36.7%), abscess in 4 patients (13.3%) and ulcer in 15 patients (50%).

Pain was lessened or relieved in all lesions within a few days of the local injection of antibiotics. The mean follow-up period was 17 ± 3 months. Wound healing was evident and amputation was avoided in 21 of 30 legs (70%) and was not performed after the first 6 months. Three legs (10%) needed amputation. Culture was indicated and conversion to another antibiotic rather than gentamycin was done in 6 legs (20%) during the follow-up period (Table 3).

Table 1: Characteristics of 25 patients with diabetic foot.

Characteristics	No. of patients (n=25)	Percentage
Number of treated limbs:		
One limb	20	80%
Two limbs	5	20%
Sex:		
Male	14	56%
Female	11	44%
Treatment of diabetes:		
Insulin	23	92%
Sulfonylurea	2	8%
Smoking habits:		
Active	9	36%
Previous	12	48%
Nonsmokers	4	16%
Associated previous conditions:		
Blood pressure > 160/90 despite medication	8	32%
Angina of previous myocardial infarction	6	24%
Congestive heart failure	5	20%
Cerebrovascular disease (stroke or TIA)	4	16%
Chronic renal failure	2	8%

Table 2: Type of lesions in 30 legs with diabetic foot.

Type of lesion	No. of patients	Percentage
Ulcer	15	50%
Cellulitis	11	36.7%
Abscess	4	13.3%

Table 3: Outcome after treatment of lesions in 30 legs with diabetic foot.

Months from presentation	No. of patients	Percentage
Wound healing	21	70%
Conversion to another treatment	6	20%
Amputation	3	10%

DISCUSSION:

In the present study 70% of diabetic patients, mostly with diabetic foot ulcers (50%) showed complete wound healing after local injection of gentamycin and only 10% of them required amputation within follow-up period 17 ± 3 months.

Foot infections in diabetic patients usually begin in a skin ulceration[11]. Although most infections remain superficial, 25% will spread contiguously from the skin to deeper subcutaneous tissues and/or bone. About 10%–30% of diabetic patients with a foot ulcer will eventually progress to an amputation, which may be minor (i.e., foot sparing) or major[12].

The studied patients had associated vascular conditions. The administration of local antibiotics appears to be especially advantageous in diabetic patients in whom vascular disease and renal failure are commonly found, making nephrotoxic drugs less effective and more dangerous. In the study by Dillon and associates[8], local therapy was the initial form of therapy for five legs in which standard therapy appeared likely to fail. Infection was controlled in all patients with the use of local antibiotics and compression boot therapy. Early leg amputation was avoided in all but one patient. Late leg amputation occurred in two patients who were lost to follow-up care. Also, little or no gentamycin was found in the serum after the injection of 80 mg in divided doses in various areas of the foot.

The use of gentamycin locally in the management of diabetic foot infections showed an excellent results in treatment of chronic bone and soft tissue infections due to its broad spectrum of action, its bactericidal properties, low rate of primarily resistant pathogens, and good thermostability[13,14].

The steps to achieving a healthy healing wound include a correct diagnosis, ensuring a good local blood supply, debriding the wound to reveal a clean base, correcting the biomechanical abnormality, and nurturing the wound until it shows signs of healing[15].

In conclusion, the use of local antibiotic injection is safe and effective for treatment and prevention of diabetic foot infections in patients with high risk for the use of systemic antibiotic and had infections rather than oestomylitis. Its advantages over systemic therapy include lower cost, lower risk of toxicity, and tremendously higher concentrations of antibiotics at the desired sites.

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النتائج الإكلينيكية لحقن المضادات الحيوية موضعياً في حالات القدم السكري

عبد الفتاح صالح عبد الفتاح

الهدف :

تهدف هذه الدراسة إلى تقييم نتائج حقن المضادات الحيوية موضعياً في حالات القدم السكرية عند وجود موانع لاستخدام المضادات الحيوية وريديا.

المرضى والأدوات :

قد أجريت الدراسة في قسم الجراحة العامة بمستشفى المنيا الجامعي بين شهري يناير 2009 و يناير 2011، و قد شملت الحالات وجود التهاب خلوي أو تقرحات أو خراج بالقدم، و تم استخدام عقار (جينتاميسين - 80 مجم).

النتائج :

شملت الدراسة 25 مريضا بداء السكري، 14 (56%) رجلا و 11 (44%) امرأة، كان متوسط أعمارهم 58 عاما. و قد شملت الإصابات طرف سفلي واحد في 20 مريضا و شملت كلا الطرفين في 5 مرضى ليكون مجموع الأطراف التي تم علاجها هو 30 طرفا. فيما يتعلق بأنواع الإصابات فقد تم علاج 15 مريضا بتقرحات القدم و 11 مريضا بالالتهاب الخلوي و 4 مرضى بالخراج. و قد لوحظ انخفاض الألم أو اختفاؤه في جميع الحالات بعد أيام قليلة من حقن المضاد الحيوي. خلال فترة متابعة الحالات التي كان متوسطها 17 شهراً تم التئام الجروح و تفادي عمليات البتر في 21 طرفاً (70%)، إلا أن عمليات البتر أجريت في ثلاثة أطراف (10%)، و كانت هناك حاجة لاستخدام مضاد حيوي آخر بعد إجراء مزرعة بكتيرية في 6 أطراف (20%).

الخلاصة :

هذه الدراسة تستنتج أن حقن المضاد الحيوي (جينتاميسن) موضعيا آمن و فعال في حالات القدم السكرية التي تشمل الالتهاب الخلوي و القرحة السطحية و الخراج، خاصة عند وجود مخاطر صحية أو احتمال نقص الفاعلية عند استخدام المضادات الحيوية بالحقن الوريدي.