

Study on Diabetic Foot Ulcer Management in a Tertiary Care Teaching Hospital.

K. Arunraj, Sowmya Srinivasan, R. Shyam Sundar, A. Jonathan Arland,
M. Mohammed Fardan, V. P. Maheshkumar, N. Juniorsundresh¹

Department of Pharmacy and ¹Surgery,
Rajah Muthiah Medical College, Annamalai University, Chidambaram, Tamil Nadu, India

Abstract

Introduction: Diabetic foot is a common complication of diabetes world over. Diabetic foot problems such as ulcerations, infections and gangrene, are the most common cause of hospitalization among diabetic patients; the staging of diabetic foot wounds is based on the depth of soft tissue and osseous involvement.

Aim & Objective: We conducted this study to determine commonly prescribed drugs in DFI at a tertiary care hospital & their management.

Methodology: This is a prospective study and carried out in diabetic foot ulcer patients admitted in department of surgery, 50 postsurgical patients were selected in based on inclusion and exclusion criteria. Patients were treated with anti-microbial agents the comparison of mono, dual & triple therapy is studied.

Conclusion: The results highlight the challenges of disseminating evidence based protocols systematically into routine clinical practice.

Key words: Diabetic Foot, Meggitt Wagner, Prescription Pattern

Aim of the Study

A clinico pharmacological study on diabetic foot ulcer management in a tertiary care Hospital.

Introduction

A Diabetic Foot ulcer is an open sore or wound occurs in approximately 15% of patients with diabetes and is commonly located on the bottom of the foot, Diabetic foot problems such as ulcerations, infections and gangrene, are the most common cause of hospitalization among diabetic patients, the staging of diabetic foot wounds is based on the depth of soft tissue and osseous involvement. A complete blood cell count should be done along with assessment of serum glucose, glycohemoglobin and creatinine levels.

Methodology

Study Site

The study has conducted in department of surgery, Rajah

Muthiah Medical College and Hospital, Annamalai University, a 1200 bedded multispecialty tertiary care teaching hospital.

Study Design

This is a prospective study and carried out in diabetic foot ulcer patients admitted in department of surgery.

Study Period

A prospective observational study carried out over a period of 3 months (Jan 2019 - April 2019). A total of 50 Post-Surgical patients were included in this study and patients were selected based on inclusion and exclusion criteria.

Inclusion Criteria

1. The patient who are suffering from diabetic foot ulcer in department of surgery in RMMCH.
2. Patient who are above the age of 19.

Exclusion Criteria

1. Patient who are not willing to participate.
2. Patient who discontinued the treatment

Tools Required for Data Collection

Data were collected on a pretested case record form, which included information on patient characteristics,

Address for correspondence

Dr. K. Arunraj, Department of Pharmacy, Rajah Muthiah Medical College, Annamalai University, Chidambaram - 608002, Tamil Nadu, India
E-Mail : ar16089@gmail.com

Received: 05.06.19

Accepted: 10.10.19

surgical department under which admitted, type of operation, antimicrobial agents and analgesics are prescribed as well as their route of administration and timing of administration prior to surgery. Follow up data included additionally administered doses of antimicrobial agents and analgesics, the total duration of diabetic foot ulcer management as well as signs and symptoms of surgical site infections. If more than one drug was prescribed for a single procedure, all parameters for each drug were evaluated separately. The investigators did not intervene in patients' care in any way. Appropriateness of preoperative diabetic foot ulcer management was assessed as per guidelines of international consensus and practical guidelines on the management and

the prevention of the diabetic foot. These guidelines provide evidence based recommendations to the practitioners for the management and the prevention of the diabetic foot

Result

A total of 50, 43 were males and 07 were females patients were included in the study. Mean age of patients was 39.56 ± 15.44 years (Range 26-78 years). The great majority (80%) of patients had an elective procedure while 20% were operated on an emergency basis. The rate of higher incidence of Atherosclerosis was found to be more in male 12 (70.5%) than the female 05 (29.5%).

Debridement and surgical wound closure of diabetic foot

Table 1 : Gender vs No. of Patients

Gender	Total no. of patient's %	No. patients with Atherosclerosis %
Male	43(86.0)	12 (70.5)
Female	07(14.0)	05 (29.5)
Total	50(100)	17 (100)

Table 2: Meggitt-Wagner Classification of Foot Ulcer

Grade	Description of ulcer	No. of patients
0	Pre- (or) post ulcerative completely epithelized	24
1	Superficial, full-thickness ulcer limited dermis, not extending to the sub cutis	17
2	Ulcer extending through the sub cutis	8
3	Deep ulcer – absence farms	1
4	Localized gangrene	0
5	Foot with extended gangrene	0

Table-3: Operative Procedure vs No. of Patients

Operative Procedure	No. of patients with%
Debridement	13(26.0)
Revisional surgery	07(14.0)
Vascular reconstruction	06(12.0)
Tissue-cultured skin	02(04.0)
Surgical wound closure	16(32.0)
Xenograft	04(08.0)
Skin grafts	02(04.0)
Total	50(100)

Table - 4 : Commonly Prescribed Single Antimicrobial Agents (Monotherapy) for Diabetic Foot

n=09	
Antimicrobial agent	No. of cases with %
Metronidazole	02 (44.40)
Cefixime	04 (22.22)
Ceftriaxone	01 (22.22)
Ciprofloxacin	02 (11.11)
Total	09 (100)

Table - 5 : Commonly Prescribed Dual Combination Antimicrobial Agents (Dual Therapy) for Diabetic Foot

n=21	
Antimicrobial Agents	No. of cases with %
Metronidazole + Cefixime	08 (38.9)
Metronidazole + Ceftriaxone	09 (42.85)
Metronidazole + Amoxicillin	02 (9.52)
Metronidazole + Ofloxacin	02 (9.52)
Total	21 (100)

Table-6 : Commonly Prescribed Triple Combination Antimicrobial Agents (Triple Therapy) for Diabetic Foot

n=21	
Antimicrobial Agents	No. of cases with %
Metronidazole + Ceftriaxone + Ofloxacin	09 (45.0)
Cefixime + Metronidazole + Cefotaxime	08 (40.0)
Cefotaxime + Cefixime + Ofloxacin	03 (15.0)
Total	20 (100)

was the most frequent surgical procedure performed (26.0 % + 32.0 %). All the patients undergoing Debridement and vascular reconstruction were prescribed postoperative antibiotics, most commonly cefixime and metronidazole. Similarly, all patients undergoing Revisional surgery (14 % of total cases) received preoperative antibiotics. Cefixime with metronidazole was the most commonly prescribed combination in this group followed by ciprofloxacin alone.

A total number of 101 antibiotics were prescribed in our study. The most frequently prescribed classes of antibiotics were cephalosporins (44 %) followed by metronidazole anti protozoal agent (44 %). 07 different combinations of antimicrobial drugs were used. 18 % of patients (09 cases) received a single drug for diabetic foot while 21 patients (42.0 %) received two drugs. 20 patients (40 %) received three drugs for diabetic foot.

Among the antibiotic combinations, commonly used regimens included cefixime and metronidazole (22 patients).

The study patients received post-operative antibiotics for a mean duration of 5 days during their stay in hospital plus 6 days following discharge from ward/unit. Few patients (13 %) complained of purulent discharge at incision site and surgical site infection was reported in 11 % of cases. The use of antimicrobials in the cases was

empirical based on operating surgeon's clinical experience. No other adverse drug reaction was reported in the study.

Discussion

The effectiveness of preoperative antibiotic for diabetic foot is well established. Despite this, surveys have shown that optimal practice is not achieved in many hospitals. The majority (86 %) of patients received antibiotic for diabetic foot to surgery. Among the study participants 82 % received antimicrobial combinations. Combinations of antibiotics for diabetic foot were used in all the surgical departments and 40 % patients received three drugs together.

In our study, third generation cephalosporins anti-protozoal agents were prescribed to almost half of all the patients who received preoperative antibiotics for diabetic foot, which was inappropriate as per international consensus and practical guidelines. 22 % of study participants received cefixime + metronidazole and 16 % received cefotaxime prior to their surgery for diabetic foot. For diabetic foot it is important to select an antibiotic with narrowest antibacterial spectrum to reduce the emergence of resistance and also because broad spectrum antibiotics may be required later if patient develops serious sepsis. Therefore, it is recommended that the use of third generation cephalosporins such as ceftriaxone and cefotaxime be avoided in surgical prophylaxis.

According to National consensus and practical guidelines on the management and prevention of the diabetic foot, all antibiotic administration must be completed at time of surgical incision and no more than 30 minutes prior. In our study antibiotics were administered at least 1 ½ hours prior to surgery. Only 16 % of patients received antibiotics just before incision.

Conclusion

The results highlight the challenges of disseminating evidence based protocols systematically into routine clinical practice. Various measures are needed to improve appropriateness of prescriptions and adherence include development of evidence based guidelines in collaboration with surgeons, increased outcome based research to document benefits of appropriate antibiotic use for diabetic foot, continuing education to disseminate information to practitioners, surveys of antibiotic use for diabetic foot and reassessment of prescribing practices over time and providing regular feedback and organizing group education and consensus meetings is necessary.

Conflict of interest:	All authors declare no COI
Ethics:	There is no ethical violation as it is based on voluntary anonymous interviews
Funding:	No external funding
Guarantor:	Dr. K. Arunraj will act as guarantor of this article on behalf of all co-authors.

Bibliography

- Abbott CA, Carrington AL, Ashe H, North-West Diabetes Foot Care Study, et al. The North-West Diabetes Foot Care Study: incidence of, and risk factors for, new diabetic foot ulceration in a community-based patient cohort. *Diabet Med.* 2002;19:377–84.
- Centres for Disease Control and Prevention. Lower extremity disease among persons aged C40 years with and without diabetes—United States, 1999–2002. *MMWR Morb Mortal Wkly Rep.* 2005;54:1158–60.
- Lauterbach S, Kostev K, Kohlmann T. Prevalence of diabetic foot syndrome and its risk factors in the UK. *J Wound Care.* 2010;19:333–7.
- Katsilambros N, Dounis E, Makrilakis K, Tentolouris N, Tsapogas P. Atlas of the diabetic foot. 2nd ed. Oxford: Wiley-Blackwell; 2010.
- Moxey PW, Gogalniceanu P, Hinchliffe RJ, et al. Lower extremity amputations—a review of global variability in incidence. *Diabet Med.* 2011;28:1144–53.
- Diabetes Ther* (2012) 3:4 Page 11 of 15.
- Lavery LA, Armstrong DG, Vela SA, Quebedeaux TL, Fleischli JG. Practical criteria for screening patients at high risk for diabetic foot ulceration. *Arch Intern Med.* 1998;158:157–62.
- Malgrange D, Richard JL, Leymarie F, French Working Group On The Diabetic Foot. Screening diabetic patients at risk for foot ulceration. A multi- centre hospital - based study in France. *Diabetes Metab.* 2003;29:261–8.
- Prompers L, Huijberts M, Schaper N, et al. Resource utilisation and costs associated with the treatment of diabetic foot ulcers. Prospective data from the Eurodiale Study. *Diabetologia.* 2008;51:1826–34.
- Kumar S, Ashe HA, Parnell LN, et al. The prevalence of foot ulceration and its correlates in type 2 diabetic patients: a population-based study. *Diabet Med.* 1994;11:480–4.
- Tesfaye S, Stevens LK, Stephenson JM, et al. Prevalence of diabetic peripheral neuropathy and its relation to glycaemic control and potential risk factors: the EURODIAB IDDM Complications Study. *Diabetologia.* 1996;39:1377–84.
- Brem H, Sheehan P, Boulton AJ. Protocol for treatment of diabetic foot ulcers. *Am J Surg.* 2004;187:1S–10S.
- Bowering CK. Diabetic foot ulcers. Pathophysiology, assessment, and therapy. *Can Fam Physician.* 2001;47:1007–16.
- Management of peripheral arterial disease (PAD). TransAtlantic Inter-Society Consensus (TASC). *Eur J Vasc Endovasc Surg.* 2000;19 (Suppl. A):S1–250.
- Prompers L, Huijberts M, Apelqvist J, et al. High prevalence of ischaemia, infection and serious comorbidity in patients with diabetic foot disease in Europe. Baseline results from the Eurodiale study. *Diabetologia.* 2007;50:18–25.
- Boulton AJ. The diabetic foot - An update. *Foot Ankle Surg.* 2008;14:120–4.
- Benotmane A, Mohammedi F, Ayad F, Kadi K, Azzouz A. Diabetic foot lesions: etiologic and prognostic factors. *Diabetes Metab.* 2000;26:113–7.
- Hoffman AF. Evaluation of arterial blood flow in the lower extremity. *Clin Podiatr Med Surg.* 1992;9:19–56.
- Puttemans T, Nemery C. Diabetes: the use of color Doppler sonography for the assessment of vascular complications. *Eur J Ultrasound.* 1998;7:15–22.

