

Original Research Article

Prognostic significance of non-enteric blood culture in diabetic foot disease

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Abstract

The diabetic foot is a group of syndromes in which ischemia, neuropathy and infection leads to tissue breakdown resulting in morbidity and possible lower extremity amputation. The diagnosis is based on clinical criteria investigations. It is imperative that such patients are managed by a team of Physician, Surgeon, Social care worker, Physiotherapist and a Podiatrist. In this study we included 100 diabetic foot patients in the age group of 30 to 80 years. The study was done for a period of one year. 47% of our patients had Meggit Wagner grade 3 and 10% had grade 5. 27% of the patients had renal failure and 30% had anemia. These patients were subjected to non-enteric culture of blood under sterile precautions. 80% of our patients showed positive culture. The organisms commonly isolated were *Staphylococcus aureus*, beta haemolytic *Streptococcus* and *Klebsiella pneumoniae*. Less commonly isolated were *Citrobacter* species, *Proteus mirabilis* and anaerobes. 40% of patients with positive culture went on to have lower extremity amputation. Thus we concluded that non enteric culture in diabetic foot disease has prognostic significance and the spectrum of infection in diabetic foot disease is polymicrobial in nature and at par with the literature.

Key words

Diabetic foot infection (DFI), Lower extremity amputation (LEA), Non enteric organism culture (NEC).

Introduction

The diabetic foot is a group of syndromes in which neuropathy, ischemia and infection leads to tissue breakdown resulting in morbidity and possible amputation [1]. Diagnosis of foot ulcer infection is based on clinical criteria and investigations [2]. An estimated 15% of diabetic patients will develop a lower extremity ulcer during the course of their disease [6]. The infection in diabetic foot is mostly poly microbial in nature [4]. Hence in this study we propose to study the prognostic significance of blood culture for non-enteric organisms in patients with diabetic foot.

Aim and objectives

- To study the prognostic significance of non-enteric blood culture in patients with diabetic foot.

Materials and methods

Place of study: Government Kanya Kumari Medical College Hospital.

Period of study: One year (January 2017 to January 2018)

Type of study: Observational study.

No of cases: 100

Inclusion criteria

- Patients with diabetic foot Meggitt-Wagner grade 3 and above
- Diabetic foot patients with signs and symptoms of sepsis like fever, tachycardia, delirium, shock, increased total counts
- Diabetic foot patients with co morbid conditions like anemia, hypertension, coronary artery disease, renal failure

Exclusion criteria

- Non diabetic foot ulcers are excluded from the study

Method

Blood samples were taken from the patients included in the study under sterile and aseptic precautions and inoculated into both aerobic and anaerobic culture media and results reviewed.

Results

- 80 patients showed positive culture.
- 60 patients showed polymicrobial culture.
- Klebsiella pneumoniae, hemolytic Streptococci and Staphylococcus aureus were the commonly isolated organisms (60% of the patients).
- Other organisms isolated are Proteus mirabilis, Citrobacter species and anaerobes.
- 20% of patients showed negative culture.

On follow up, 40 % of the patients with positive culture went on to have lower extremity amputation (20% below knee amputation, 10% forefoot amputation, 10% toe amputation).

Discussion

The diabetic foot is a group of syndrome in which neuropathy, ischemia and infections lead to tissue breakdown resulting in morbidity and possible amputation [1]. Any infra malleolar infection in a patient with diabetes is diabetic foot. Diagnosis of a foot ulcer infection is based on clinical criteria and investigations. The global prevalence of diabetes was estimated to be about 194 million and is predicted to rise to 366 million due to longer life expectancy and changing dietary habits [1]. An estimated 15% of diabetic patients will develop lower extremity ulcer during the course of their disease [1]. Diabetes continues to be the leading cause of non-traumatic lower extremity amputation. Survival rates after amputations are generally lower for diabetics when compared to non-diabetics. The three year and five year survival rates being 50% and 40% respectively with cardio vascular disease being the major cause of death [2]. Researchers have reported a 50% incidence of serious contralateral foot ulcer following an LEA and a 50% incidence of contralateral amputation [5]. The magnitude of the problem is enormous

Hence, in this study we propose to study the prognostic significance of blood culture for non-enteric organisms in diabetic foot patients. This

infection is mostly polymicrobial in nature [3]. Infection is defined as invasion of the tissues with proliferation of microorganisms causing tissue damage with or without an associated inflammatory response by the host [4]. Diabetic foot infections generally follow an insignificant trauma. However infection must be distinguished from bacterial colonisation, a physiological phenomenon occurring all over the skin [4]. This can be modified in diabetes with a polymorphic appearance and growth of virulent bacteria. The progression to infection depends on multiple factors related to the wound, the pathogenic bacteria and the host.

Diabetic patients are at greater risk than general population to foot infections because [5]

- Increased glucose in the tissues precipitates infection
- Diabetic microangiopathy which affects microcirculation
- Increased glycosylated haemoglobin decreases oxygen dissociation
- Diabetic neuropathy involving all sensory, motor and autonomous components
- Associated atherosclerosis leading to arterial insufficiency
- Reduced leucocyte function; resistant infection; spreading cellulitis; septicaemia; diabetic ketoacidosis

Staphylococcus aureus and *beta haemolytic Streptococci* and *Klebsiella pneumoniae* are the most commonly isolated pathogens [3]. Chronic wounds develop a more complex flora including *Enterococci*, obligate anaerobes, *Pseudomonas aeruginosa* and other gram negative rods [3, 4].

In this study, we have included patients with severe infections in the foot with or without gangrene i.e. patients with Wagner Meggit classifications grade 3 and more.

Wagner-Meggit Classification [1]

Grade 0 - Foot symptoms like pain only.

Grade 1 - Superficial ulcer without subcutaneous tissue involvement.

Grade 2 - Deep ulcers with penetration through subcutaneous tissue exposing tendon, bone.

Grade 3 - Ulcers with bone involvement.

Grade 4 - Partial foot gangrene.

Grade 5 - Whole foot gangrene.

Patients with symptoms of sepsis, reduced urine output were also included. 47% of the patients were Meggit grade 3 and 10% had Meggit grade 5. 27% of the patients had renal failure and 30% had anemia. The patients were subjected to non-enteric cultures of blood under sterile precautions. More than 80% of the patients had positive cultures. 40% of people who had positive culture went on to have lower leg amputation.

Conclusion

- Non enteric blood culture in patients with diabetic foot has prognostic value. Half of the patients with positive culture went on to have lower extremity amputation
- Diabetic foot ulcer infections are mostly polymicrobial
- The commonly isolated organisms are *Klebsiella pneumoniae*, *beta Haemolytic Streptococci* and *Staphylococcus aureus*
- Less commonly isolated organisms are *Proteus mirabilis*, *Citrobacter Species* and anaerobes.

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