SHORT REPORT

Furunculosis and its complications: A cause of morbidity in renal transplant recipients: A retrospective observational study from Sindh Institute of Urology and Transplantation Karachi

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Abstract

Furunculosis in renal transplant recipients may be associated with increased morbidity. With the aim to study the presentation, morbidity, and risk factors for furunculosis, this observational study was conducted at the Sindh Institute of Urology and Transplantation, between January to December 2014. All patients with furuncles or abscesses were included. The clinical presentation and risk factors were recorded. A morbidity scale of 0 and 1 was made on the basis of hospital stay for ≥7 days, bacteraemia, large abscesses and repeated furunculosis. Out of 38 patients, 29 (76%) had large abscesses and 9 (24%) had furuncles, with gluteal region being the most common site. Twelve (32%) had severe disease; 29 (76%) had morbidity scale of ≥1. High dose immunosuppression was significantly associated with severe disease while repeated furunculosis had significantly more risk factors. Furunculosis is a severe disease with high morbidity in renal transplant recipients and more studies are needed on skin colonisation and preventive strategies.

Keywords: Furunculosis, renal transplant, morbidity, bacterial skin infections

DOI: https://doi.org/10.5455/JPMA.28650

Introduction

Furunculosis is the purulent infection of hair follicles caused by *Staphylococcus aureus (S. aureus)*.[1] According to the World Health Organisation (WHO) pyoderma including furunculosis is one of the commonest infections of skin in the developing countries.[2] Low socioeconomic status with overcrowding and poor hygienic conditions are the main reasons behind the increased frequency of furunculosis in developing countries.[3] El Gilany et al reported that 14% of patients presented with furunculosis in an outpatient dermatology clinic in Egypt.[4] In Pakistan the frequency of furuncles in the community is around 4-6% of all skin diseases.[5,6]

The main risk factor for transmission of furunculosis is direct physical contact with the infected patient. Nasal carriage of *Staphylococcus aureus* with poor personal hygiene may lead to recurrent infections.[7] Recurrent furunculosis is defined as three or more episodes within a year. Diabetes, previous hospitalisation, multiple lesions, previous antibiotic use, associated skin disease and immunocompromised states are independent risk factors.[4]

In solid organ transplant recipients, factors which may increase the risk of skin and soft tissue infections are skin abnormalities due to the use of Cyclosporine and Sirolimus, infections with unusual pathogens and the net state of immunosuppression.[8] On a mean follow up of 20 years, Hogewoning et al from Netherland reported bacterial skin infections to be one of the most frequent infections in renal transplant recipients.[9] In tropical countries like India, the incidence is as high as 18% in renal transplant recipients.[10] Due to immunosuppressive drugs and frequent hospital visits, furunculosis in transplant population may be more severe in presentation with increased morbidity and complications.

To the best of our knowledge, there is no study on the complications and morbidity of furunculosis in transplant recipients. Our aim was to study the presentation of furunculosis, the morbidity it may cause, and the assessment of risk factors for repeated episodes in kidney transplant recipients.

Patients, Methods and Results

A retrospective observational study was conducted at the Sindh Institute of Urology and Transplantation (SIUT), Karachi. All renal transplant recipients in whom *S. aureus* was isolatied from pus cultures were identified between January 2014 and December 2014. Patients' clinical records were reviewed. Diabetic foot, phlebitis, surgical site and trauma related infections were excluded. Type of lesion (furuncle small lesions or large abscess lesions needing drainage), site of lesion (localised or generalised), incision and drainage (I&D) required under local or general anaesthesia, bacteraemia, duration of hospital stay and outcome (whether discharged or died) were noted. Recurrent episodes of furunculosis (≥3 episodes in the last 12 months) were assessed. Risk factors noted were diabetes, anaemia (Hb<10g/dL), skin diseases, previous hospital stay (within 90 days) and multiple lesions (>2

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lesions on different parts of the body). The patients were grouped into three categories as having <1, 2-3 or > 3 risk factors. We documented high immunosuppression, Solumedrol or Anti-thymocyte globulins as the cause for rejection in the last six months before presentation. Large abscess was defined as abscesses deep enough to require I&D under general anaesthesia. Repeated furunculosis was defined as all episodes of furunculosis, including those of recurrent furunculosis. Severe disease was defined as the presence of large abscess and/or bacteraemia. A morbidity index was made by assessing four characteristics: hospital stay of ≥7 days, bacteraemia, large abscesses and recurrent or repeated furunculosis. A morbidity scale as 0 = no characteristics, 1= ≥1characteristics was made.

A total of 72 pus cultures grew *S. aureus*; out of these 38 patients had a clinical diagnosis of furunculosis. All of these isolates were methicillin-sensitive *Staphylococcus aureus* (MSSA). The baseline characteristics of 38 patients are described in Table 1. Twenty nine patients (76%) presented with abscesses and 9 (24%) had furuncles. Majority of the patients had lesions on the lower limb (26%) or gluteal region (24%). Twelve patients (31.5%) had severe disease. Blood cultures were sent for 20 patients, out of whom 5 (25%) had MSSA bacteraemia. Regarding morbidity index, 76% (29/38) had score 1 or more. (Table 2). A total of 6 patients received high immunosuppression. These patients presented with significantly more severe disease as compared to those who did not receive high immunosuppressives (4/6, 66.6% vs 8/32, 25%, p-value 0.04). Repeated episodes of furunculosis was found in 17 (45%) patients, out of whom 5 (13%) can be defined as having recurrent furunculosis with a maximum of five episodes a year. Patients with two or more risk factors have significantly more repeated episodes than those with less than two risk factors (Table 3).

Table-1: Baseline characteristics of patients (n=38).

Characteristics	n (%)
Age (years) median, (IQR): 35 (26.8-44)	
Male gender	29 (76)
Time since Transplant (years) median, (IQR): 4 (1-6)	
Immunosuppressive regimens	
CyA+Aza+steroid	12(32)
Tac+ Aza+steroid	9 (24)
Tac +MMF+steroid	1 (3)
Ever+MMF+steroid	2(5)
CyA+steroid	3 (8)
Aza+steroid	10(26)
MMF+steroid	1(3)
Anti-rejection therapy in the last six months	
Anti-thymocyte globulins	3 (8)
Solumederol	2 (5)
Both	1 (3)

CyA=cyclosporine A, Aza=azathioprine, Tac=tacrolimus, Ever: everolimus
MMF=mycophenolate mofetil

Table-2: Severity and morbidity.

Severity	n/ total (%)
Large abscess (requiring general anaesthesia for drainage	8/38 (21)
Bacteraemia	5/20 (25)
with Large abscess	1/8 (13)
with Small abscess	1/21 (5)
with Furuncles	3/9 (33)
Severe disease (large abscess and/or bacteremia)	12/38 (32)
Morbidity Index =1*	29/38(76)

*Characteristics included in morbidity index :> 7 days of hospital stay, bacteremia, large abscess, recurrent furunculosis, repeated furunculosis (0=no characteristics, 1=>1 characteristics

Table-3: Repeated furunculosis and risk factors.

Risk factors	Patients with repeated episodes of furunculosis n= 17 (%)	Patients without repeated episodes of furunculosis n=21 (%)	*p*-value	OR (95% CI)
Anaemia	11 (65)	11 (52)	0.44	1.66 (0.4-6.1)
Diabetes	5 (29)	4 (19)	0.45	1.77 (0.39-8)
Skin disease	3 (18)	3 (14)	0.77	1.28 (0.2–7.3)
Previous Hospitalisation	11 (65)	12 (57)	0.63	1.37 (0.36-5.13)
Multiple lesions	10 (59)	6 (29)	0.06	3.57 (0.92-13.8)
Number of risk factors among patients				
<1	2 (12)	10 (48)		
2-3	14 (82)	8 (38)	0.02	NA
>3	1 (6)	3 (14)		

NA=Not applicable

Discussion

Skin and soft tissue infections due to *S. aureus* are one of the most frequent infections in transplant recipients.[8] Floresco et al reported that 42% of staphylococcal infections in renal transplant recipients are those involving the skin and soft tissues.[11]

In the present study, the median duration of post-transplant presentation was 4 years. This can be explained by the fact that furunculosis is not an opportunistic infection and may be acquired from the community. There was a definite male preponderance, which is believed to be because of more body hair and oil content of the skin in males. This has also been observed in general population.[12]

In transplant recipients, furunculosis does not appear to be just a superficial skin disease. Around one-third of the patients in this study presented with severe disease with large abscesses requiring incision and drainage under general anaesthesia or MSSA bacteraemia. The patients had considerable morbidity with surgical interventions, prolonged hospital stay and repeated episodes leading to frequent hospital visits. The two most important factors for staphylococcal skin infection are defects in skin integrity

and dysfunction of polymorphonuclear cells (PMNs).[13] Loss of skin integrity is common among transplant recipients because of the side effects of Calcineurin inhibitors and frequent fungal or parasitic skin infections.[8] Hamaliaka et al demonstrated that a decrease in the production of reactive oxygen species and nitric oxide by PMNs is associated with severe or recurrent furunculosis.[14] Hutchinson et al conducted a laboratory assessment of immune function in renal transplant recipients and reported a significant reduction of reactive oxygen species production in the neutrophils of these patients.[15] Prolonged exposure to immunosuppressive medications causing PMNs dysfunction, loss of skin integrity and colonisation with pathogenic strains of *S. aureus* may be the reasons behind increased severity of furunculosis in our patients.

Patients who received high dose Solumedrol and Anti-thymocyte globulins developed more severe disease as compared to those who did not. Floresco et al reported steroid treatment as a significant independent risk factor for staphylococcal infections in kidney transplant recipients.[11]

Recurrent episodes of furunculosis are also one of the complications. Around half of our patients had episodes from one to as high as five during the last three years of follow up. Thirteen percent had recurrent furunculosis. Although we were unable to look into family history of furunculosis, other independent risk factors such as existing skin lesions, anaemia, diabetes, previous hospitalisation, and multiple lesions were very common in our study population and a significant association between risk factors and repeated episodes was observed. SIUT is a public sector hospital, and overcrowded living conditions and poor personal hygiene may also be a factor for recurrent episodes. Another factor can be the climatic condition in the tropics with high humidity; nasal furunculosis is found to be quite common.[16]

Our study had limitations. It was a retrospective observational study and we need to have a control group and larger sample size to validate our findings. Our patient population comprised only those patients whose pus cultures were sent, hence we may have missed those whose cultures were not sent. However, it is the first such study which focused on the complications of superficial skin infection in renal transplant recipients.

Conclusion

Furunculosis presents as severe disease in renal transplant recipients. There is definite high morbidity with the development of complications like bacteraemia. More focus should be put on preventive measures. Good personal hygiene, skin care and good nutrition need to be incorporated in post-transplant follow-ups.

Ethical approval: This study was approved by the ethical review board of the Cultural and Bioethical Center, SIUT.

Disclaimer: None.

Conflict of interest: None.

Funding disclosure: None.

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