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A Study of Clinical and Microbial Profile, Prognostic Factors and Outcome of Type 2 Diabetes Mellitus Patients with Acute Pyelonephritis

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Abstract:
Objective *:1)To study the clinical and microbial profile of T2 DM patients with acute pyelonephritis.2.To determine serum Albumin,Creatinine,CRP,PCN,Platelet,HbA1c level as prognostic factors in T2 DM patients presenting with acute pyelonephritis(EPN & NEPN) .**Background** : Diabetes mellitus is one of the most common cause of acute pyelonephritis seen usually in those patients with poorly controlled blood sugar .**Methods** : This study was conducted on 100 diabetic patients attending emergency and outpatient department of General Medicine at Gauhati Medical College & Hospital. All patients in the study group had undergone Complete blood count , Renal function test, Liver function test, Glycosylated hemoglobin , Erythrocyte Sedimentation rate, C reactive protein, Procalcitonin, Urine culture and sensitivity including imaging like NCCT and CECT KUB whenever required.*
Results *: Fever and loin pain was the most common presentations. The most common organisms was Escherichia Coli. The incidence of complications like shock, altered sensorium, azootemia were commonly seen in the EPN group of patients who had elevated serum Procalcitonin, elevated CRP, low Albumin, low platelet count .*
Conclusions *: APN was slightly more common in females compared to males.The presence of shock, altered sensorium, low serum albumin, thrombocytopenia, elevated procalcitonin, crp serve as poor prognostic markers associated with high mortality.*

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I. Introduction

Diabetes Mellitus has become a risk factor for numerous clinical conditions one among which is pyelonephritis that has become an important cause of hospital admissions in patients with diabetes . Its management includes empiric antimicrobial therapy based on local susceptibility pattern, isolation of the organism followed by pathogen directed therapy ,sometimes requiring surgical intervention . With the rise in incidence of extended spectrum Beta lactamase producing organisms, pyelonephritis has not itself become an issue but the costs of its care has become a serious issue. In recent community based studies , it was found that the incidence of UTI were found to be second to LRTI in patients with Diabetes mellitus .The extent of urinary tract involvement ranges from insignificant lower urinary tract colonization to cystitis , pyelonephritis to renal or perirenal abscess.

Pyelonephritis in diabetics can present either as emphysematous or nonemphysematous pyelonephritis . Non-emphysematous pyelonephritis is a common UTI encountered in diabetic patients , may present in patients with good glycemic control. Emphysematous pyelonephritis is a necrotising infection of the renal parenchyma with characteristic presence of gas in the renal parenchyma, collecting system and perinephric tissue . EPN is an uncommon lifethreatening condition, precipitated mainly by poorly controlled blood sugars and the presence of certain urinary tract abnormalities. Prevalence of EPN in diabetic patients ranges from 53-90%. EPN results in high morbidity and mortality, particularly if blood sugars are poorly controlled and the diagnosis as well as the treatment is delayed. A high index of suspicion and early imaging studies are required in diabetic patients presenting with features of pyelonephritis.

II. Materials And Methods:

This institution based observational study was carried out from 1st july 2020 to 31st june 2021 and includes patients with Type 2 Diabetes mellitus having Acute pyelonephritis presenting in the out patient and emergency department of Medicine at Gauhati medical college and hospital, Assam.

Inclusion criteria : Both Male and Female patients aged 40 years and above with Type 2 Diabetes mellitus having Acute pyelonephritis.

Exclusion criteria : Pregnancy, History of trauma, Malignancies, other immunosuppressed conditions like HIV, post transplant and other patients receiving immunosuppressive therapy.

All patients who fulfilled the inclusion criteria of the study underwent a thorough clinical and neurological examination with all the necessary investigations. The clinical and microbial profile,prognostic factors were studied and treatment outcome was assessed.

III. Results:

A total of 100 patients, both male and female were included with a mean age of 59.8 years (range 43 – 78 years).10 male(52.6%) and 9 females(47.4%) fall in the EPN group while 38 males(46.9%) and 43(53.1%) fall in the NEPN group. Majority of these patients (n=41) fall in the age group between 60 to 69. The most common symptoms in all the patients (n=100) was fever(100.0%). In the male group with EPN (n=10) 70.0% presented with altered sensorium while 44.7% (n=17) in the NEPN male group presented with altered sensorium. There was no drastic difference between male and female(n=9) in the EPN group presenting with altered sensorium which was 66.7%. Shock was more common in the EPN group of patients(n=13) compared to the NEPN group. Hypoalbuminemia which was seen in all the EPN group is associated with a bad prognosis compared to the other 37.5% who had hypoalbuminemia but good outcome. 11(100%) of the EPN patients who presented with HbA1c of >7.5 have more risk of having EPN as well as a poor outcome. 81.8% of the EPN patients with CRP above 200 have while only 12.5% have a good outcomes.This is in contrast to that seen in NEPN where CRP above 200(92.3%) was associated with bad outcome while only 2.4% have bad outcome. Thrombocytopenia and elevated PCN was directly related to a poor outcome in bothe the EPN and NEPN group of patients.

IV. Discussions:

A total of 100 patients were included 48 were Males & 52 were Females among which 81% were diagnosed as NEPN while 19% had EPN. Patients who recovered were considered to have a good prognosis and outcome while those who died were considered to have bad prognosis/outcome. Out of 100 patients studied 14% patients were in the age group of 40-49 years, 33% patients were between 50-59 years, 41% patients were between 60-69 years and remaining 12% were above 70 years.The minimum age in Male was found to be 46 years and the maximum age was 75 , while in the Female group the minimum age was 43 years and the maximum was 78 years .

Diabetes has been notice as a common risk factor predisposing to UTI's . The prevalence of Diabetes in patients with pyelonephritis ranges from 53 – 90 % .The extent of involvement ranges from simple UTI to cystitis ,pyelonephritis to renal or peri-renal abscess . Despite the availability of treatment a certain subset of Pyelonephritis patients have a poor outcome .

There have been few large studies which have selectively look into the clinical profile and outcome of diabetic patients with both EPN and NEPN. However to address this issue this prospective observational study is undertaken to evaluate the clinical , microbial ,prognostic factors outcome of diabetic patients with pyelonephritis .

In previous study done by Akhaira et al,Inturolnephrol 41(4) 2009 April , clinical profile , prognostic factors and outcomes of 19 patients with emphysematous pyelonephritis , patients were followed for a period of 6 months . From 2001-2007 ,19 cases were studied , out of which 16 were females , 3 males .14 of these patients were Diabetic . E.coli was the predominant causative organisms .Shock (p=0.03) , serum creatinine >5 mg/dl (p=0.035) were independent poor prognostic factors .

In another study done by Sanjay Kumar Bhat et al,Saudi J kidney Transpl 2021;32(6):1646-1654 Emphysematous Pyelonephritis in T2 Diabetes-Clinical profile and management , a total of 76 diabetic patients diagnosed with pyelonephritis was included . At time of diagnosis altered sensorium , shock at presentation and thrombocytopenia were associated with poor outcome in EPN patients ($p<0.05$) ,while shock (p=0.04) and disturbances of consciousness (p=0.05) on hospital admissions being independent factors for poor outcomes .

In this study there was a slight Female preponderance with a F:M ratio of 1.1:1. There was 48% male and 52% female patients. This was comparable with the previous studies done by Christopher A. Czaja et al.

The most common presentation was fever and burning micturition in both the EPN and NEPN group, which was comparable to the study by V.Vishnu Vardhana Reddy et al and Dilip Onkar Patil et al.

Altered sensorium and shock were common clinical presentations in the EPN group of patients. 7(70%) of male patients with EPN(n=10) presented with altered sensorium while 6(66.7%) of the female with EPN(n=9)had altered sensorium.Such presentation were related with poor outcome. This was comparable to the study by R.Fatima et al and S.Kumar et al wherein altered sensorium were related with poor outcome.

Hypoalbuminemia was a common findings in both group of patients. Its presence predicts poor outcome. Both the EPN and NEPN group having hypoalbuminemia have a poor outcome.

In the EPN group of patients 7(70%) male had HbA1c above 7.5% while 8(88.9%) of female in the EPN group had HbA1c above 7.5%. EPN is more common in those with higher HbA1c and poor outcome. However in the NEPN group of patients, HbA1c level does not correlate with a poor outcome.

Thrombocytopenia was seen in 7(70%) of male and 7(77.8%) of female with EPN which was not commonly seen in the NEPN group. However its presence have been shown to signify poor outcome, as seen in this study where 11 of the 14 patients who had thrombocytopenia had poor outcome.

V. Conclusions :

The most common etiological agent in both the EPN and NEPN was E.coli, with fever and burning micturition as the most common symptoms. Patients presenting with altered sensorium, shock ,elevated serum creatinine, high HbA1c ,low albumin ,thrombocytopenia ,raised CRP portends to have a poor prognosis.

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