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Case Report

Hung up with a Huang class 4: our experience with bilateral emphysematous pyelonephritis in a COVID 19 patient

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Abstract: The COVID 19 pandemic has forced us to rethink our management strategies for surgical diseases. Patients with COVID 19 have increased risk of morbidity and mortality after surgical intervention. Emphysematous pyelonephritis (EPN) is often seen in diabetics and can be a life threatening condition. All patients require immediate treatment with antibiotics and close monitoring. Bilateral EPN is a rare entity seen in less than 10% of patients. We present a case of bilateral EPN in a COVID positive patient which was successfully managed conservatively. A 70 year old hypertensive female, presented to us with fever, breathlessness, loss of appetite, generalised weakness requiring oxygen supplementation & was diagnosed with COVID 19. Bilateral EPN (Grade 4) with perinephric collections was found on evaluation for acute kidney injury. She underwent bilateral pig tail insertion followed by bilateral DJ stenting after stabilization. She recovered dramatically, blood parameters improved and was discharged. At 1 year of follow up, patient was doing well. In the present COVID-19 pandemic where case selection for surgical intervention is crucial, we would like to highlight how a conservative approach for even Class 4 EPN is feasible after weighing the risks and benefits of the same. Patients can be spared the immediate morbidity and mortality risks due to surgical intervention during COVID 19 infection. Triaging surgical intervention can also help in better utilization of critical care facilities and man power, both invaluable in the ongoing crisis.

Keywords: Bilateral emphysematous pyelonephritis, COVID 19, conservative management

Introduction

The COVID 19 pandemic has forced us to rethink our management strategies for surgical diseases. Elective procedures have been put off and only dire emergencies are being taken up. The EAU guidelines advice patients to be triaged by looking into the clinical parameters before deciding on surgical intervention [1-3] [https://uroweb.org/guideline/covid-19-recommendations/?type=appendices-publications]. The risk to health care workers is significant [4]. Patients with COVID 19 have higher morbidity and mortality after surgical intervention [5]. Emphysematous pyelonephritis (EPN) is an acute necrotizing infection that involves the renal parenchyma and perirenal tissues. It is often seen in diabetics and can be life threatening. The presentation maybe varied with very few symptoms in mild cases to others who may present in sepsis or shock requiring intensive care. All patients require immediate treatment with antibiotics and close monitoring. Patients may require nephrectomy if conservative management fails. Bilateral emphysematous pyelonephritis is a rare entity seen in less than 10% of patients. Lower grades of EPN are routinely managed conservatively. Higher grade EPN require surgical intervention. Patients undergoing surgical management have a 30% mortality rate [6-9]. We present a case of bilateral emphysematous pyelonephritis in a COVID positive patient which was successfully managed conservatively. To our knowledge, this is the first such case reported in literature.

Case report

A 70 year old hypertensive female, presented to our screening OPD with fever, breathless-

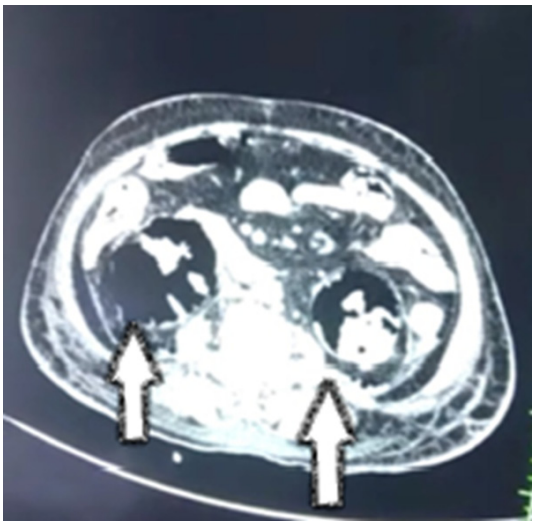

Figure 1. Bilateral emphysematous pyelonephritis: Gas replacing the renal parenchyma (arrows pointing to lesion).

ness, loss of appetite and generalised weakness since 2 days. She had a heart rate of 120 per minute, blood pressure of 170/100 mm Hg and a room air saturation of 70%. Respiratory rate was 26/min. She required oxygen by bag and mask at 15 L/min to maintain saturation. She was admitted to the COVID suspect ward after sending a throat swab for RT PCR. Antibiotics Ceftriaxone 1 g IV twice daily, T. Ivermectin 12 mg stat dose and T. Azithromycin 500 mg once daily were started along with Vitamin and Zinc supplementation. IV steroids and subcutaneous LMWH were initiated and anti hypertensives were modified. On failing to maintain saturation with oxygen supplementation, she was put on BiPAP ventilation. Chest X ray showed fluffy shadows. Laboratory investigations showed a total WBC count of 21,000 and creatinine of 5.6 mg/dL. She was COVID positive by RT PCR on the throat swab.

A USG KUB showed bilateral emphysematous pyelonephritis and a CT KUB with HRCT thorax was done on day 4. CT showed bilateral bulky kidneys and marked distortion of bilateral renal parenchyma with necrosis of almost 50% parenchyma which was replaced by multiple foci of air (Grade 4). Diffuse fat stranding was seen around the renal pelvis, upper & mid thirds of the ureter bilaterally. There were bilateral lower pole perinephric collections. An image of the CT is shown in **Figure 1**. Taking into consideration her general condition, a USG guided bilateral pig tailing was done on day 5 and higher antibiotics were instituted. Both sides drained purulent material of about 90 mL/day. Urine culture showed E. Coli with favourable sensitivity pattern. Blood and pus culture showed no growth. She underwent serial dialysis. Her counts normalised and creatinine stabilized at 4.6 mg/dL. Her urine output improved to 1 litre per day on day 20. Hemodialysis was stopped. Once she was off bipap and her general condition improved, a repeat CT was done on day 24 (**Figure 2**). This showed significant reduction in the air foci within the kidney. Multiple wedge shaped areas were present in both kidneys. Right perinephric collection had reduced and left perirenal collection was 10 × 8 × 5 cm. She underwent bilateral Double J stenting on day 25 in view of the persistent perinephric collections. Following this, the pigtail drain outputs reduced to about 30 mL/day. Her general condition improved and she was weaned off oxygen support and tested COVID negative. She was then discharged with bilateral pig tail drains and double J stents in situ.

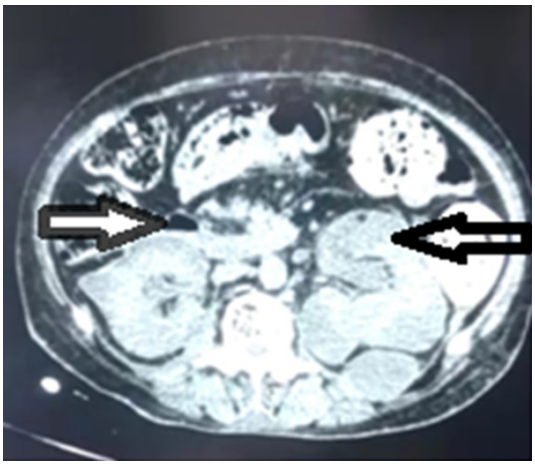

Figure 2. CT scan image after conservative treatment with right PCN seen in situ.

On follow up a month later her renal function tests and leukocyte counts were normal. An ultrasound done showed no residual collection. Her drain outputs had decreased to less than 10 mL per day. Hence the bilateral pig tail drains were removed first followed by bilateral stent removal a week later. She continued to remain asymptomatic at 1 year follow up visit.

Discussion

The COVID 19 pandemic hit our city in March 2020 and the number of cases quickly rose. Elective OT cases and OPDs in our hospital were shut and residents and faculty were diverted for COVID duties. The entire hospital became a dedicated COVID centre with 1045 beds. All Departments only handled COVID emergencies along with the COVID duties. The risk benefit ratio was carefully considered before taking up any patient for surgical intervention.

Puliatti S et al in their review have described how the pandemic has affected Urological care delivery to patients. They advised elective cases to be deferred to help capacity building, effective utilization of healthcare personnel and resources especially in areas of high prevalence. Emergencies have to be carried out with proper precautions [2]. Nyugen et al in their study found that health care workers in the frontline had a significantly higher risk of contracting the virus and hence use of adequate personal protective equipment and other precautions have to be strictly adhered to [4].

Doglietto et al found higher rates (19.5%) of surgical mortality and complications in COVID positive patients operated for various pathologies. It was attributed to the pulmonary and thrombotic complications encountered in such patients [1]. The COVIDSurg Collaborative in their multicentre, cohort study found similar findings with mortality rate of 38% and pulmonary complications in 51.2%. They recommended promoting non operative treatment and delay or avoid surgery [5]. Considering the above findings and recommendations, decisions for surgical intervention have to be reserved for patients who will clearly benefit from such procedures compared to the risks of post operative complications. The risk of aerosol generation and exposure of health care personnel in the operation theatre would also factor in the decision making.

The most common organism involved in EPN is E. coli. 70% of the all patients are found to be diabetic. Interaction of gas forming bacteria in the presence of high tissue glucose levels, impaired tissue perfusion and immune response leads to the classical pathological changes seen in this condition. Traditionally, mortality rates of patients on conservative management were 70% compared to 30% with surgical management. Hence surgical management is considered the mainstay of treatment for higher grades of disease [6-9].

Based on CT findings, emphysematous pyelonephritis is divided into four types. For Class 1 & 2 which represents the localized variety, antibiotic treatment combined with percutaneous drainage (PCD) showed good outcome. Patients with extensive emphysematous pyelonephritis (Class 3 & 4) with 2 or more risk factors have a higher failure rate with PCD and antibiotics only (92% vs 15% with no or 1 risk factor). Thrombocytopenia, acute kidney injury, altered sensorium and shock at presentation are considered the risk factors. Treatment options for EPN are antibiotics, PCD, ureteral stenting and emergency nephrectomy. Conservative treatment has the advantage of preservation of renal function. This is especially important in cases with bilateral EPN who would otherwise require lifelong renal replacement therapy. The need for a drainage procedure (PCD or Ureteral stenting) is decided based on radiological findings. Patients in whom conservative management fails or who have 2 or more risk factors are candidates for nephrectomy [10]. That antibiotics and image guided PCD could be an acceptable alternative to nephrectomy was suggested in 1996 by Chen et al [11].

There have been multiple reports of higher grade EPN managed conservatively in literature. There have been twenty six cases of bilateral EPN managed successfully with conservative measures alone (i.e. with antibiotics alone or with a combination of antibiotics and PCD/ureteral stenting between 2000 and 2021). All reports where patients expired, complete details of conservative treatment were not available or needed surgical management were excluded after a detailed literature search. These cases have been summarized in **Table 1**. It can be observed that females are more commonly affected and diabetes is the most common co morbidity. It is important to note that similar to our case, none of the cases had obstructive lesion on imaging. This could contribute to the success of conservative management.

According to literature, fever is the commonest presentation in EPN patients. Other symptoms

Table 1. Summary of previous case reports

Sl. No	Author	Year	Case	Associated	Therapy
1.	Tahir et al [9]	2000	54/M	DM, ALD, CP	Antibiotics
2.	Flores et al [6]	2002	41/F	DM, TM	Antibiotics
3.	Karasavidou et al [12]	2006	82/F	DM	Antibiotics
4.	Hart et al [13]	2007	57/M	-	Antibiotics+PCD
5.	Shigemura et al [14]	2009	86/F	-	Antibiotics
6.	Su et al [15]	2009	51/F	DM, CAD, Stroke	Antibiotics+PCD
7.	Kumar et al [16]	2009	29/F	Pregnancy	Antibiotics
8.	Salvador et al [17]	2010	52/F	DM	Antibiotics+DJ stenting
9.	Dutta et al [18]	2013	38/F	-	Antibiotics
10.	Dutta et al [18]	2013	36/F	-	Antibiotics+PCD
11.	Dutta et al [18]	2013	38/M	-	Antibiotics
12.	Jaisuresh et al [19]	2013	57/M	DM, HTN, ADPKD	Antibiotics+PCA
13.	Mahashabde et al [20]	2013	61/M	DM	Antibiotics+DJ stenting
14.	Daoud et al [21]	2014	27/F	DM, LL	Antiibiotics
15.	Suzuki et al [22]	2015	80/M	DM, CKD	Antiibiotics
16.	Cheng et al [23]	2015	58/F	HTN	Antibiotics
17.	Misgar et al [24]	2016	41 (average)	DM	7 b/l EPN cases reported, 5 only antibiotics, 2 antibiotics+PCD
18.	Uscanga-Yépez et al [25]	2017	33/F	DM, Obesity, HTN	Antibiotics+PCD
19.	Frimpong et al [26]	2018	78/F	DM	Antibiotics
20.	Hollingshead et al [27]	2020	57/M	DM	Antibiotics+PCD

DM: Diabetes mellitus, ALD: Alcoholic liver disease, CP: Chronic pancreatitis, TM: Transverse Myelitis, CAD: Coronary artery disease, HTN: Hypertension, ADPKD: Autosomal Dominant Polycystic Kidney disease, LL: Lepromatous Leprosy, CKD: Chronic Kidney Disease.

described are flank pain, nausea, vomiting, shock, renal impairment and altered consciousness [12-27]. Our case presented with fever, breathlessness, loss of appetite and generalised weakness. The urine culture for our patient showed E. Coli which again is the most common organism isolated from patients with EPN in literature [6-9]. Our patient had only acute kidney injury as the risk factor, no other predisposing factors/obstruction. Hence, even though she belonged to Class 4 according to the CT classification, she could be managed successfully conservatively and showed remarkable recovery. Though the risk of shedding COVID 19 in urine is least among all body fluids (5.74%), significant risk of aerosol generation and exposure of health care personnel exists in the peri-operative period [28].

Misgar et al reported 26 cases of EPN over a 10 year period with 8 bilateral EPN patients. However, 7 were successfully managed with conservative treatment. The gender breakup of the bilateral EPN patients was not available [24]. In a meta-analysis done by Aboumarzouk et al, 32 studies covering 628 patients were looked at and it was found that shock was more commonly associated with death than obstructive uropathy (54.4% vs 15.1%). They also found PCD and medical management had significantly higher survival rates than emergency nephrectomy and adviced nephrectomy only if all other treatments fail to improve the clinical condition of the patient [29]. Olvera-Posada et al observed that there has been an improvement in survival of EPN patients over the last few years and attributed it to improvement and wide spread adoption of conservative strategies [30].

In the present COVID-19 pandemic where case selection for surgical intervention is crucial, we would like to highlight how a conservative approach for even Class 4 EPN is feasible after weighing the risks and benefits of the same. Patients can be spared the immediate morbidity and mortality risks due to COVID 19 infection. In the long term, risks of lifelong renal replacement therapy are also avoided. It is important not to give up even on high risk patients with COVID positive status since the disease is unpredictable and data on therapy is continuously added. Triaging surgical intervention can also help in better utilization of critical care facilities and man power, both invaluable in the ongoing crisis.

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Disclosure of conflict of interest

None.

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