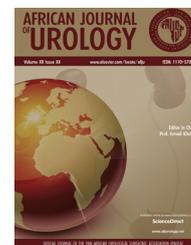




African Journal of Urology

Official journal of the Pan African Urological Surgeons' Association
web page of the journal

www.ees.elsevier.com/afju
www.sciencedirect.com



Infections and Inflammation

Case report

A near-fatal case of emphysematous pyelonephritis: Embracing the new management 'gold standard' – Saving the life while saving the kidney!



A. Adam*, K. Spencer

Department of Urology, Helen Joseph Hospital, & Department of Paediatric Urology, Rahima Moosa Mother & Child (Coronation) Hospital, & Division of Urology, Department of Surgery, Faculty of Health Sciences, University of the Witwatersrand, Johannesburg, South Africa

Received 31 July 2016; accepted 23 August 2016

Available online 17 January 2017

KEYWORDS

Diabetes;
Emphysematous
pyelonephritis (EPN);
Percutaneous drainage;
Nephrectomy;
Septic shock

Abstract

Introduction: Emphysematous pyelonephritis (EPN) is a rare, acute, severe infection of the renal parenchyma and its surrounding tissues and is associated with a significant morbidity and mortality. Underlying diabetes is the most commonly associated risk factor.

Observation: We report on the presence of EPN (Grade 3a) in a patient with poorly controlled diabetes, who presented in septic shock due to EPN. Although previous older treatment algorithms would proceed with an immediate nephrectomy, based on her grade, she was successfully managed by incorporating the new treatment 'gold standard': medical management with percutaneous drainage. A high index of suspicion is required to detect and manage this life-threatening condition associated with diabetes, since the presenting symptoms may be non-specific. The diagnosis, risk factors, and current management options of EPN are expanded further.

© 2016 Pan African Urological Surgeons' Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

Introduction

Emphysematous pyelonephritis (EPN) is a potentially life-threatening, rare, acute severe infection of the renal parenchyma and its surrounding tissues. In the development of EPN, the presence of underlying diabetes is the most commonly associated risk factor [1]. This infection, results in the presence of gas, due to necrosis in the renal parenchyma, collecting system or peri-nephric tissue and is associated with a significant morbidity and mortality [2,3].

* Corresponding author at: Division of Urology, Department of Surgery, Wits Medical School, University of the Witwatersrand, 9th Floor, Room 9S19, 07 York Road, Parktown, Private Bag X3, Johannesburg 2050, South Africa.

E-mail address: aadam81@gmail.com (A. Adam).

Peer review under responsibility of Pan African Urological Surgeons' Association.

<http://dx.doi.org/10.1016/j.afju.2016.08.003>

1110-5704/© 2016 Pan African Urological Surgeons' Association. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

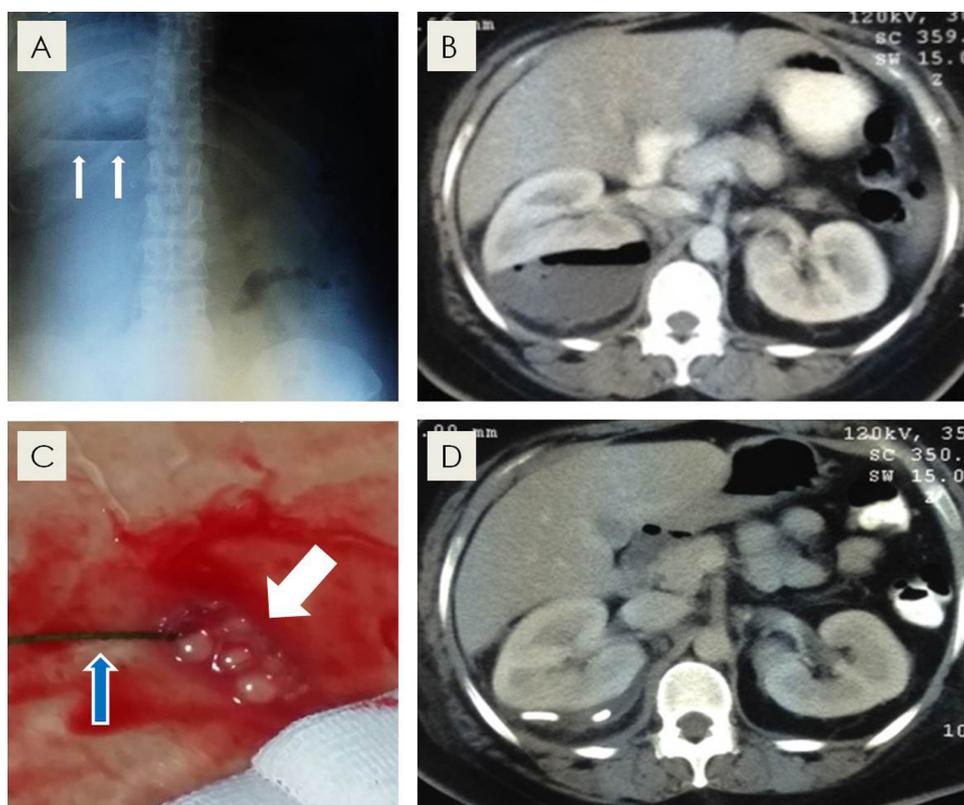


Fig. 1 (A) Plain (erect) abdominal X-ray, revealing the underlying air-fluid level (arrows). (B) Contrast-enhanced CT scan of the abdomen (transverse view) showing the gas and fluid collection – typical findings in EPN. (C) Gas bubbles (thick arrow) were visualised during the dilation of the nephrostomy (PCD) tract. The access guide-wire is identified in the photograph (thin arrow). (D) Post-intervention contrast-enhanced CT scan of the abdomen (transverse view) with the nephrostomy coil seen within the collection.

Case report

A 44-year-old woman presented to the emergency department with a 3-day history of right-sided flank pain. Examination revealed signs of septic shock. A background history of insulin dependent diabetes, with poor compliance was noted. A leukocytosis ($20.60 \times 10^9/L$), elevated C-Reactive Protein (231 mg/L) and hyperglycaemia was present. Plain abdominal X-ray (erect) films revealed an air fluid level in the right upper quadrant (Fig. 1A, white arrows). A diagnosis of emphysematous pyelonephritis (grade 3A) was made on the contrasted abdominal CT scan (Fig. 1B).

This was managed by ultrasound-guided percutaneous drainage (PCD). During insertion of the pig-tail catheter (14 Fr), pus and gas bubbles (Fig. 1C, white arrow) could be seen around the dilating guide-wire (Fig. 1C, blue arrow). Blood, pus and urine cultures revealed *Escherichia coli* sensitive to Cefuroxime/Ampicillin/Ceftriaxone. Follow-up scan (3 days post-intervention) showed a significant reduction in the collection (Fig. 1D).

The glycaemic control was optimised. She responded well to antibiotics and was discharged 12 days after her initial admission. At her one year follow-up she still remains asymptomatic.

Discussion

EPN may occur in both, insulin-dependent or non-insulin-dependent patients with diabetes, even in the absence of ureteric obstruction.

Patients without diabetes may also develop EPN, but the extent of disease is more limited [4]. Females are at particular risk due to their propensity to developing urinary tract infections [1]. *E. coli* or *Klebsiella pneumoniae* infection in patients with diabetes mellitus and/or urinary tract obstruction are two key aetiological factors in the development of EPN [5].

Factors within the pathogenesis of EPN include; elevated glucose tissue levels, impaired vascular supply, the presence of gas-forming organisms, reduced immunity and urinary tract obstruction [1].

With the glucose and lactate fermentation from gas producing Gram-negative organisms, an elevated local tissue carbon dioxide and hydrogen production results [1].

In confirming the diagnosis, there are no distinct pathognomonic features, however; costovertebral angle tenderness, abdominal distension and tenderness, leukocytosis, hyperglycaemia, electrolyte and acid-base imbalance may be present [6].

Radiological features on abdominal X-rays include; effacement of ipsilateral psoas muscle image and ‘gas bubbles’ within the renal parenchyma [6]. Details of the ultra-sound acoustic shadow may help discern EPN from an underlying calculus, since the posterior acoustic shadowing is ‘dirty’ in cases of EPN, and ‘clean’ in cases of calculus [2].

Based on the extension and location of the gas formation, on contrasted CT scan, Huang and Tseng developed a classification

grading from 1 to 4 [5]. Since renal dysfunction may be present in diabetes, intravenous contrast must be administered with caution [6].

Management of EPN consists mostly of resuscitation, and treatment of shock, correction of electrolyte imbalance, glycemic regulation, and relief of any obstruction. Urine and blood cultures should be obtained and parenteral empiric broad-spectrum antibiotics should be initiated. Specific antibiotic therapy should be tailored to culture sensitivity results [6]. Since Gram-negative bacteria are commonly isolated in EPN, the initial antibiotics considered include, Aminoglycosides, β -lactamase inhibitors, cephalosporins and quinolones [1].

PCD is minimally invasive and allows for nephron-sparing (as observed in our index case) and simple pressure relief of the underlying gaseous collection. It also may result in an acceptable success rate even within severe grades of EPN [5].

The PCD also relieves pressure on the underlying renal parenchymal tissue and may be flushed with anti-biotic solution if needed. The PCD stays in situ until imaging evidence has confirmed resolution of the collection [1].

Ureteral stenting may not be used as sole therapy as they may obstruct, or produce an antegrade cystitis and they do not adequately access or drain the peri-nephric space [1,7].

CT guided PCD insertion has a better success rate than ultra-sound guided insertion, furthermore PCD has even proved successful in the presence of loculations [1]. Chen et al., recommend the use of at least a 14 Fr Malecot catheter, based on their experience of 25 patients reviewed over a decade [8].

Poor prognostic factors in EPN associated with mortality, include; thrombocytopenia, disturbance of consciousness, and signs of shock (as observed in our index case) [5].

PCD failure is defined as progressive or persistent lesions post percutaneous drainage, that is also accompanied by an adverse clinical picture [5].

Recent systematic reviews, have recognised the role of delayed nephrectomy in EPN, however the evidence supports antibiotics with PCD as the new 'gold standard' in initial EPN management [9,10]. Furthermore, PCD with medical management showed a lower mortality compared to emergency nephrectomy [9,10].

In conclusion, rather than emergency nephrectomy (depending on the clinicopathological grade), PCD and medical management has now become first line therapy in EPN [5,10]. As illustrated here, this new 'gold standard' should be advocated, where possible, as it may result in 'saving the kidney' while 'saving the life'!

Authors' contributions

AA – contributed to the inception, concept, design, drafting, reviewing intellectual content, image selection.

KS – contributed to the design and drafting of the manuscript.

Ethical committee approval

Ethics Clearance Certificate Number: M160396, Date: 18/04/16, Chairman: Professor Peter Cleaton-Jones, Institution: Human Research Ethics Committee (Medical), University of the Witwatersrand.

Conflict of interest

Authors have none to declare.

Source of funding

Authors have none to declare.

References

- [1] Ubee SS, McGlynn L, Fordham M. Emphysematous pyelonephritis. *BJU Int* 2010;107:1474–8.
- [2] Aswathaman K, Gopalakrishnan G, Gnanaraj L, Chacko NK, Kekre NS, Devasia A. Emphysematous pyelonephritis: outcome of conservative management. *Urology* 2008;71:1007–9.
- [3] Aboumarzouk OM, Hughes O, Narahari K, Coulthard R, Kynaston H, Chlosta P, et al. Emphysematous pyelonephritis: time for a management plan with an evidence-based approach. *Arab J Urol* 2014;12:106–15.
- [4] Pontin AR, Barnes RD. Current management of emphysematous pyelonephritis. *Nat Rev Urol* 2009;6(5):272–9.
- [5] Huang JJ, Tseng CC. Emphysematous pyelonephritis: clinicoradiological classification, management, prognosis, and pathogenesis. *Arch Intern Med* 2000;160:797–805.
- [6] Uruc F, Yuksel OH, Sahin A, Urkmez A, Yildirim C, Verit A. Emphysematous pyelonephritis: our experience in managing these cases. *Can Urol Assoc J* 2015;9:7–8.
- [7] Turunc T, Kuzgunbay B. The management of emphysematous pyelonephritis and importance of minimally invasive treatment. *Urology* 2014;84(4):988.
- [8] Chen MT, Huang CN, Chou YH, Huang CH, Chiang CP, Liu GC. Percutaneous drainage in the treatment of emphysematous pyelonephritis: 10-year experience. *J Urol* 1997;157(5):1569–73.
- [9] Somani BK, Nabi G, Thorpe P, Hussey J, Cook J, N'Dow J, et al. Is percutaneous drainage the new gold standard in the management of emphysematous pyelonephritis? Evidence from a systematic review. *J Urol* 2008;179:1844–9.
- [10] Fatima R, Jha R, Muthukrishnan J, Gude D, Nath V, Shekhar S, et al. Emphysematous pyelonephritis: a single center study. *Indian J Nephrol* 2013;23(2):119–24.