Emphysematous Pyelonephritis: A Consequence of Adenocarcinoma of Urinary Bladder in a Nondiabetic Patient

Singh I, Pachisia SS,¹ Kumar S,¹ Arora VK,² Kumar P

ABSTRACT

Emphysematous pyelonephritis (EP) is a life threatening condition of acute necrotising renal parenchymal infection that encompasses a much wider spectrum of complicated urinary tract infections such as renal abscesses, emphysematous pyelitis, pyelonephritis, acute renal papillary necrosis, and sepsis. We report an unusual case of adenocarcinoma bladder in a middle aged nondiabetic patient, presenting with EP. Emphysematous pyelonephritis was the initial symptom in this case with an underlying carcinoma of the bladder. The role of imaging is prime in management of such cases, if an early diagnosis is to be made and a potentially devastating outcome is to be avoided. The literature regarding EP has been reviewed and discussed. The goals of managing EP should be (1) early institution of parenteral antibiotics and a (2) staged nephrectomy (preceded by a temporary percutaneous drainage particularly with antibiotic resistant septicemia) so as to maximize survival rather than proceeding directly to emergency nephrectomy.

We aim to present and describe the diagnosis, management and outcome of an extremely uncommon case of emphysematous pyelonephritis (EP) in a patient that on work-up turned out to be a case of adenocarcinoma of bladder. Emphysematous pyelonephritis represents an extremely morbid form of the far end of the spectrum of complicated urinary tract infections. A high clinical and diagnostic index of suspicion is warranted and prompt treatment maximizes the survival in such cases. The association of emphysematous pyelonephritis with bladder cancer has not been described before.

Case History

A 44-year-old male presented with right flank pain for the past 2 weeks. There was no history of dysuria, hematuria, graveluria or retention. Past history revealed he had undergone a right percutaneous nephrostomy elsewhere about 1-month back with drainage of pus. On admission the patient was febrile with a pulse rate of 110/minute, respiratory rate of 30/minute and a BP of 100/70 mmHg. Local examination revealed right flank tenderness on deep palpation. The renal function tests were within normal limits and urine analysis culture revealed no growth, casts or pus cells. X-ray kidney-urinary-bladder (KUB) region suggested gas shadows in the right renal area without evidence of urinary tract calculus. Ultrasonography of the KUB region revealed a small right pyonephrotic kidney and hydrourter with perinephric gas (hydropneumonia). Contrast enhanced computed tomographic (CT) scan confirmed a nonfunctioning right pyonephrotic renal unit with hydrourter, cortical cyst and gas in the renal and perinephric regions (Figure 1A) along with a mass lesion at the lower end of the ureter in continuity with the bladder (Figure 1B). The urine cytology and blood sugar were normal. A clinical diagnosis of right ureteric tumor with right EP was entertained. A retrograde pyelography could not be attempted as the tumor prevented cannulation of the right ureteric orifice. No other obvious cause of EP and or obstructive uropathy could be demonstrated. Despite aggressive parenteral antibiotic therapy for more than 2 days he failed to improve as tachycardia and flank pain persisted. On the third day with due preparation he underwent an open right nephroureterectomy with removal of a 2 cm bladder cuff. Histopathology revealed evidence of chronic pyelonephritis with adenocarcinoma of bladder invading >50% of the muscularis propria extending sub-mucosally till the lower end of the right ureter (Figure 2). Postoperatively he made an uneventful recovery and was discharged after a week. A cystoscopy done 1 month after surgery revealed a puckered right postero-lateral bladder wall with no evidence of gross tumor. The patient declined a radical cystectomy. He was sub-
ing of hyperchoic areas corresponding to gas, as was seen in this case.\(^3\) The ultimate confirmation of the presence of intra-renal parenchymal gas can be achieved only with computerized tomography, which is also currently the best accepted modality for demonstrating intrarenal air and for characterizing the location of the air and its ramifications (intracalyceal, intraparenchymal, perinephric, or pararenal).\(^3\)\(^-\)\(^7\) The association of renal carcinoma and ureteric transitional cell cancer with EP demonstrating similar imaging signs has also been described elsewhere.\(^9\)

Though traditionally gas producing organisms such as *Escherichia coli* and or proteus species have been believed to be the cause of gas formation, in the present case however we failed to isolate any organism from the pus and urine, this may have been due to the effect of potent broad spectrum parenteral antibiotics.

While early diagnosis and an aggressive approach with parenteral antibiotics and treatment of septic shock may form the cornerstone of initial management, a staged percutaneous drainage has a vital role to play especially in the presence of documented pus collection and or obstructive uropathy as was seen in the present case. Failure to improve or recurrent pyelonephritis (as in this case) may be a valid indication to proceed to emergency nephrectomy, which may be life saving and complementary to percutaneous drainage in selected cases. We reported this interesting unusual case to alert the attending urologist and surgeon to the fact that EP might be the salient manifestation of nontransitional bladder cancers (adenocarcinoma in this case). Early and judicious consideration should be given to radiological imaging modalities such as CT scan if an early accurate diagnosis is to be done. A staged approach consisting of initial aggressive parenteral antibiotic therapy followed by a temporary complimentary percutaneous drainage and a delayed or staggered emergency nephrectomy will maximize survival of such cases. Though our current follow up of 1 month is too short to comment upon the actual survival it is obvious that invasive bladder cancer (such as adenocarcinoma in the current case) necessitates a radical cystoprostatectomy if ultimate cure and maximum long-term survival is to be expected in real terms.

**Discussion**

Emphysematous pyelonephritis is a rare life threatening condition.\(^1\)\(^-\)\(^3\) In the present case, there was history of recurrent pyonephrosis and hydroureter of the right renal unit due to an obstructing adenocarcinoma of the urinary bladder. This had gradually infiltrated the lower ureter leading to progressive functional loss of the renal unit culminating in recurrent pyonephrosis complicated by EP. Though the association of diabetes mellitus with EP is common, however in the present case there was no such evidence.\(^4\) We could not demonstrate other known causes of obstructive uropathy and pyelonephritis in this case such as urinary tract stones, ureteric stricture, papillary necrosis or urinary casts. The only apparent cause of pyelonephritis was a bladder tumor infiltrating the ureteric orifice. Invasive bladder tumors are known to cause hydronephrosis in the respective renal unit by (1) direct infiltration of the ureteric musculature as was seen in this case, (2) by metastatic pelvic nodes compressing the ureter extramurally, and (3) by directly obstructing the ureteric orifice.

Diagnosis is usually suspected on a conventional radiograph revealing gas, with an ultrasound corroborating it upon finding of hyperchoic areas corresponding to gas, as was seen in this case.\(^3\) The ultimate confirmation of the presence of intra-renal parenchymal gas can be achieved only with computerized tomography, which is also currently the best accepted modality for demonstrating intrarenal air and for characterizing the location of the air and its ramifications (intracalyceal, intraparenchymal, perinephric, or pararenal).\(^3\)\(^-\)\(^7\) The association of renal carcinoma and ureteric transitional cell cancer with EP demonstrating similar imaging signs has also been described elsewhere.\(^9\)

![Figure 1: Contrast enhanced computed tomographic (CECT) scan showing the presence on right intrarenal and perinephric gas with collection in the right nonfunctioning renal unit (see Figure 1A→) and a pelvic cut showing the bladder tumor in the region of the right ureteric orifice (see Figure 1B→) with perivesical and periureteral fat stranding (⇒)](image1)

![Figure 2: A microphotograph showing histopathological evidence of adenocarcinoma of the urinary bladder invading >50% of muscularis propria and extending sub-mucosally to the lower end of the right ureter suggestive of invasive bladder cancer (H&E, x40)](image2)

sequently lost to follow-up.

**References**