

# Pyonephrosis complicated with pleural empyema – case report

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## ABSTRACT

Pyonephrosis is defined as the infection of the dilated renal collector system, with a variety of etiological agents. The accumulation of pus may cause the destruction of renal parenchyma, leading to renal insufficiency. The symptoms may occur early or late in the disease's progress and can be of a great variability. We present a case report of a 53-year-old female which suffered of low back pain, fever and nausea. The ultrasound and CT examination revealed 4th stage pyonephrosis caused by stone obstruction. It was also observed right encysted pleural empyema and pericardial fluid as pyonephrosis' complications. The first part of the treatment consisted of inserting a percutaneous nephrostomy (PCN) probe along with the administration of antibiotics for the next two months, followed by radical right nephrectomy in renal insufficiency context. The postoperative evolution was favorable with no repercussions.

**Keywords:** pyonephrosis, percutaneous nephrostomy probe, nephrectomy, pulmonary empyema, renal insufficiency

## INTRODUCTION

Pyonephrosis is an infection of the upper reno-urinary system, which causes over time the suppurative destruction of the renal parenchyma (1). It has multiple etiology, but lithiasis obstruction and recurrent pyelonephritis (2) are the most common causes. In the most advanced stages, serious complications occur both at the level of the reno-urinary apparatus and extra renal. Untreated, the infection can generalize, resulting in septic shock (3) and death of the patient. Treatment varies depending on the stage of the disease from antibiotherapy to nephrectomy.

The patient's informed consent was provided for the development of this case.

## CASE PRESENTATION

We describe the case of a 53-year-old female teacher who came to the hospital for right lumbar back pain, renal colic, fever, pyuria and altered gen-

eral condition. We find out that these symptoms appeared one week ago. She went to another medical service where she was initiated in a treatment with broad-spectrum antibiotics (Ceftriaxone, Metronidazole and Ciprofloxacin), but the state of health did not improve. She didn't have any health issues before, nor any medical interventions. Her family also did not present anything related to the current illness.

She is hospitalized to establish the diagnosis.

Laboratory examination suggests severe anemia and changes specific to an inflammatory or infectious process, on the other hand the urine culture had a negative result (Table 1).

**TABLE 1.** First laboratory results

White blood cells	13.06	(4.0-10.0) x 10 <sup>3</sup> /mm <sup>3</sup>
Hemoglobin	7.7	11.5-16 mg/dl
Hematocrit	25.8	34.0-45.0
C-reactive protein	155.8	0-5 mg/dl
INR	1.4	0.8-1.3

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On abdominal ultrasound examination, pathological changes in the right kidney are observed: increased dimensions (185/75 mm), a renal pelvic calculus of 40 mm, right subcapsular hydrocalycosis with altered transonicity, right hydronephrosis. Left kidney in normal parameters. Bladder in fullness with declivous sediment.

The suspicion of right renal lithiasis pyonephrosis is raised, so the patient is subjected to computed tomography (CT) examination.

The first CT indicates at the thoracic level right pleurisy encysted postero-thoracic with inhomogeneous appearance, fused along the fissures and in the cardiophrenic sinus; pericardial fluid arising in the context of inflammation of the upper abdominal floor; increased size of the right kidney (193 mm long axis); hydronephrosis of grade IV; obstructive calculus (32/28/43 mm) but also calculi at the level of the inferior calyces (maximum 12 mm). A pseudonodular cortical lesion is also observed, at the apical pole (max 50/75mm), slightly iodophilic peripherally, centrally inhomogeneous, of renal abscess type. Pelvic fluid in pouch of Douglas is present.

Therefore, based on the symptomatology and paraclinical investigations, the diagnostic of 4<sup>th</sup> degree pyonephrosis secondary to lithiasis obstruction, with right pleural empyema is confirmed. Also, the CT revealed pericardial fluid which leads to pericarditis, as a complication of renal dysfunction caused by pyonephrosis. Therefore, percutaneous eco-guided nephrostomy of the right upper calyceal group was practiced with aspiration of frank pus and PCN probe insertion.

Since the total dysfunction of the right kidney has been found, as a result of untreated pyonephrosis, the patient is scheduled for right radical nephrectomy. In the meantime, she will be given treatment with antibiotics (Amoxicillin 500 mg/12 h x 10d).

Before the intervention, a second CT is performed where are observed: the net regression of the right pleural empyema, the slight regression of the pericardial fluid, the regression of the calyceal distension due to the presence of nephrostomy; instead, the upper polar lesion is maintained (Figure 1).



FIGURE 1. Abdominal CT after nephrostomy

It was practiced right radical nephrectomy with slowly favorable postoperative evolution and post-operative treatment with Sulfamethoxazole (2x25 mg/12 h x 5d) and Nadroparin (0,3 ml/24 h x 14d).

Two weeks after the nephrectomy, the blood tests presented a slight improvement.

TABLE 2. Postoperative results

White blood cells	7.60	(4.0-10.0) x 10 <sup>3</sup> /mm <sup>3</sup>
Hemoglobin	11.5	11.5-16 mg/dl
Hematocrit	34.8	34.0-45.0
INR	1.4	0.8-1.3

## DISCUSSIONS

Pyonephrosis is an infection of the superior reno-urinary system, which over time causes suppurative destruction of the renal parenchyma (1) by the process of accumulation of pus in the dilated collector system of the kidney. One of the most common causes is infection of hydronephrosis fluid arising from obstruction. Several obstructive processes are described: calculi, malignant processes, post-operative fibrosis, benign processes, pregnancy (4). Another source of pyonephrosis is chronic pyelonephritis.

In this case, the obstruction given by a pelvis calculus of about 40 mm was considered the trigger of the disease.

Common etiological agents are *Escherichia coli*, *Proteus mirabilis*, *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus* (4).

Allerberger et al. also described cases of urinary tract infection with *Salmonella non-typhi* (5), an etiological agent specific to the gastrointestinal tract, but usually this happens in immunocompromised patients.

The diagnosis methods of this disease are mainly represented by ultrasonography and CT examination. The first is much more accessible and can reveal liquid collections, calculi, but it is the CT scan that establishes not only the diagnostic but also the cause and stage of extra-renal expansion of pyonephrosis. At the same time through this method the Hounsfield unit can be calculated to differentiate the liquid in hydronephrosis from the pus in pyonephrosis (6). The diagnosis steps were followed exactly in our case, the CT being the one that confirmed the presumptive diagnosis. Because it was not detected early, our patient presented the total dysfunction of the affected kidney, and also encysted pleural empyema. This extra-renal complication is described as extremely rare in medical literature (7).

Several curative methods are applicable in this condition, depending on when it was detected. Antibiotics usually have no effect, unless the pus has

been drained by percutaneous nephrostomy (8) or ureteric stent (9). The use of nephrectomy in early-stage cases exponentially decreased. However, in this case it was applied after partial drainage of pus through the NSP probe as a result of renal failure.

Even though our case had some unexpected limitations like encountering the pleural empyema which postponed our nephrectomy intervention, the diagnosis and therapeutic processes were well done with no unfortunate consequences.

The peculiarity of our case emerges from the fact that pyonephrosis was asymptomatic, up to a very

advanced stage, at which time the patient had an acute onset. Also, the complication of empyema and pericarditis makes it particularly rare.

## CONCLUSIONS

Since pyonephrosis's symptomatology has an increased variability, it is clear that the importance of early diagnosis is crucial. As our case demonstrates, undetected for a long time it periclitates the health not only for the renal apparatus, but also for the other organ systems, endangering the patient's life.

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