

## Research Article

# Diagnostic and Therapeutic Aspects of Secondary Psoas Abscesses in Children

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## Abstract

Psoas secondary abscess is a rare condition with a variety of clinical manifestations.

**Aim:** To describe the diagnostic and therapeutic aspects and determine the different responsible germs of psoas secondary abscess in children.

**Patients and methods:** A retro-prospective study was carried out over 12 years, from January 1, 2010 to December 31, 2021 in all patients aged from 0 to 15 years treated in the pediatric surgery department of the teaching hospital Gabriel Toure for secondary psoas abscess.

**Results:** Thirty five cases of secondary psoas abscess were identified during the study period. The average age of our patients was  $49.9 \pm 0.8$  months (24-180 months). The sex ratio was 1.8. A notion of abdominal trauma was reported in 10 patients (28.6%). The average consultation time was  $29.8 \pm 28.6$  days (4-90 days). Abdominal pain with hyperthermia had been the reason for consultation in all our patients. A limp condition was noted in 14 patients (40%). Abdominal ultrasounds performed in all patients revealed a hypoechoic collection in all cases. The average volume of the abscess was  $120 \text{ ml} \pm 89 \text{ ml}$  (40 ml to 1100 ml). The appendicular abscess was noted in 11 patients, pyonephrosis in 8 patients, and intra-articular hip effusion in 6 others. The abscess was located on the right side in 25 cases (71.4%) and on the left side in 10 cases (28.6%). The treatment was surgical in 25 cases (71.4%) and by ultrasound-guided puncture-drainage in 10 cases (28.6%). Cytobacteriological examination revealed a germ in 23 cases (65.7%) and the main germs found were *Staphylococcus aureus* in 9 cases (25.7%). The average frequency of ultrasound-guided puncture-drainage was 3.4 (2-6 times). The average length of hospitalization was 29.6 days (4-90 days). Parietal suppuration was noted in 4 cases (11.4%). None of our patients has died.

**Conclusion:** Secondary psoas abscess is a rare condition. Its diagnosis is late. Surgical drainage associated with antibiotic therapy gives a good therapeutic result. Microbiology varies by etiology.

**Keywords:** Secondary psoas abscess; Diagnosis; Treatment; Germs; Children; Mali

## Introduction

Psoas abscess is a purulent collection in the iliopsoas muscle compartment [1]. It is a rare condition [2]. Secondary psoas abscess occurs as a result of direct spread of infection to the psoas muscle from adjacent structure. It may be uncertain whether involvement of a contiguous structure is a cause or a consequence of the psoas muscle abscess [3]. Etiologies are dominated by digestive, urogenital and bone causes [4,5].

Secondary psoas abscess may be mono or polymicrobial infection. Its clinical diagnosis is difficult due to the misleading clinical presentation, poor and/or non-specific symptomatology. Nevertheless, advances in medical imaging, including ultrasound, computed tomography and MRI have enabled rapid diagnosis.

The treatment of abscesses is based on antibiotic therapy which may or may not be associated with a percutaneous drainage or surgery. The prognosis depends on early management and is generally favorable. We carried out this work in the pediatric surgery department of the academic hospital Gabriel Touré with the objectives of describing the diagnostic and therapeutic aspects and determining the different responsible germs.

## Patients and Methods

We carried out a retro-prospective study over 12 years, from January 1, 2010 to December 31, 2021 in all patients aged from 0 to 15 years treated in the pediatric surgery department for secondary psoas abscess. The data were collected from medical records, consultation registers, operating reports and hospitalization registers of the department. Data were analyzed using IBM SPSS Statistic 25 software. The statistical test used was the Chi<sup>2</sup> test with a significance level of  $p \leq 0.05$ .

## Results

We identified 35 cases of secondary psoas abscess during the study period, an annual average of 2.9 cases. The average age of our patients was  $49.9 \pm 0.8$  months with extremes of 24 and 180 months. Children in the age group of 79-180 months were the most affected (77.1%). The sex ratio was 1.8. History of sickle cell disease was noted in 6 patients (17.1%) and 5 patients (14.3%) had positive HIV serology. A notion of abdominal trauma was reported in 10 patients (28.6%). Abdominal

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pain with hyperthermia had been the reasons for consultation in all our patients. A limp condition noted in 14 patients (40%). The average consultation time was  $29.8 \pm 28.6$  days with extremes of 4 and 90 days. The majority of our patients, 21 patients (60%) had consulted after 16 days of evolution. An alteration of the general condition was present in 21 patients (60%) and mucocutaneous pallor in 25 others (71.4%). A swelling was palpated on the right flank in 8 cases (22.8%) and on the left flank in 2 cases (5.7%) and an impasto in the right iliac fossa in 6 cases (17.1%). Abdominal ultrasounds performed in all patients revealed a hypoechoic collection in all cases. The average volume of the abscess was  $120 \text{ ml} \pm 89 \text{ ml}$  with extremes of 40 ml and 1100 ml. The appendicular abscess was noted in 11 patients, pyonephrosis in 8 patients and intra-articular hip effusion in 6 others. Six patients were able to perform a computed tomography which had objectified two cases of pyonephrosis associated with a collection on the psoas muscle (Figure 1 showing renal collection with psoas abscess) and four effusions at the level of the hip with diffusion in the iliopsoas muscles. Hemoglobin electrophoresis confirmed SC sickle cell disease in 6 cases (17.1%). The skin test was negative in all patients. Table 1 summarizes the distribution of etiologies by age. C-reactive protein was elevated in 23 cases (66%). The abscess was located on the right side in 25 cases (71.4%) and on the left side in 10 cases (28.6%). The treatment was surgical in 25 cases (71.4%) and by ultrasound-guided puncture-drainage in 10 cases (28.6%). After evacuation of the pus, the cytobacteriological examination revealed a germ in 23 cases (65.7%). The main germs found were *Staphylococcus aureus* in 9 cases (25.7%), *Escherichia coli* in 5 cases (14.3%), *Staphylococcus epidermidis* in 3 cases (8.6%), *Pseudomonas aeruginosa* in 2 cases (5.7%), *Salmonella enteritidis* in 2 cases (5.7%), and *Proteus mirabilis* in 2 cases (5.7%). Pus culture was sterile in 12 cases (34.3%). Among the surgical gestures in addition to the pus drainage we carried out eleven cases of appendectomy, eight cases of nephrectomy (Figure 2 showing a nephrectomy piece) and six cases of arthrotomy of the hip. The average frequency of ultrasound-guided puncture-drainage was 3.4 with extremes of 2 and 6.

The average length of hospitalization was 29.6 days with extremes of 4 and 90 days. Parietal suppuration was noted in 4 cases (11.4%). None of our patients has died.

## Discussion

A psoas abscess is an uncommon variant of pyomyositis in which a purulent infection affects the psoas muscle. The psoas muscle is supplied by venous blood from the lumbar spine and has lymphatics from nearby intraabdominal organs. Psoas abscess is a rare condition in children. According to Sato, its prevalence is 1.21/100,000 cases per

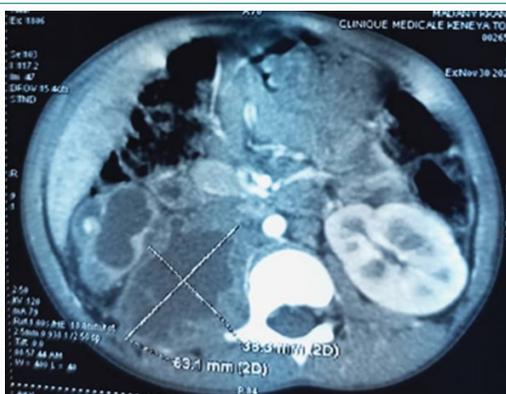


Figure 1: Right pyonephrosis associated to psoas abscess.

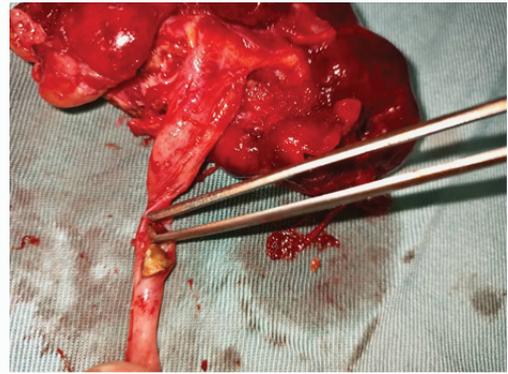


Figure 2: Ureteral lithiasis complicated of pyonephrosis and psoas abscess.

year [6]. Secondary psoas abscess constitute 70% of all cases and it occurs with the local spread from adjacent infected tissue [7].

In recent decades, with the decline in tuberculosis in the developed world, there has been a shift to psoas abscess arising from genitourinary or gastrointestinal infections. This occurs usually in immunocompromised patients. Any age group may be affected, and there is no gender bias. In our study, the abscess was very common in preschool and school-age male children. Sickle Cell Disease (SCD) and HIV are associated with an increased risk of infections due to compromising host immune responses. These two pathologies are known to cause primary abscesses. However, they were noted in 11 patients who presented with secondary abscesses in our study.

The insidious nature of onset in the disease progression makes it very difficult to diagnose psoas abscess in early stage [8]. Detailed history, thorough clinical examination, and a high level of suspicion are needed for diagnosis. An examination can be difficult due to the deep anatomical location of the psoas muscle bellies, their sheaths, and their conjoined tendon. The diagnosis was late in our study. The average duration of symptom evolution was 29.81 days. We think that this delay could be linked to the illiteracy of the parents, the precariousness and the poor distribution of specialized doctors in our country.

The ultrasound often used in first intention shows a hypoechoic formation containing fine echoes. Sometimes the images are less specific, possibly suggesting a retroperitoneal tumor. This study, it had highlighted the origin of the abscess in 71.4% of cases. Mallick et al. [9] believe it is less sensitive than CT scans. CT with a specificity of 95% is the examination of choice showing an enlargement of the psoas muscle with a hypodense mass sometimes containing gas, round or oval, with a more or less thick wall which is enhanced after injection of contrast product [10]. In our study CT was performed in only 6 patients because of its cost.

Secondary psoas abscesses with enteric origin are commonly found in Europe and North America, and mixed enteric bacteria are the major pathogens involved [11]. Secondary psoas abscesses arising from intraabdominal infection are more likely to be polymicrobial and to involve enteric species such as *E. coli*, *Enterobacter*, *Salmonella*, and *Klebsiella*, as well as anaerobic species. In our study, *E. coli* was the most common germ found in appendicular abscesses.

Psoas abscess arising from adjacent hip arthritis may involve *Streptococcus pyogenes*, *Staphylococcus aureus*, *pseudomonas aeruginosa*, and *Neisseria gonorrhoeae*. In this study *Staphylococcus*

**Table 1:** Etiology according to age groups.

Etiology	Age groups			Total
	Infants	Toddler	Preschool and School age child	
Appendicular abscess	-	2	9	11
Abscessed hematoma	-	1	9	10
Pyonephrosis	-	2	6	8
Septic arthritis of the hip	2	1	3	6
Total	2	6	27	35

*aureus* was the most common germ found in abscesses with arthritis. It was also the most common germ found in the series of Kim in Korea [12]. *Staphylococcus aureus* that leads to additional complications such as septic shock, and epidural abscess at a younger age. In our study culture was sterile in 34.3% of cases. It was sterile in 40% in the series of Sato 6 and 27% of cases in that of Bounaim [13]. Their rates are not statistically different from ours ( $p>0.05$ ).

Psoas abscess appears to be unilateral in 95% to 97% of cases. In our series, it was unilateral in 100% of cases. The right side is affected in 57% to 60% of cases [11]. It was concerned in our study in 71.4% of cases. Management of psoas abscess depends on the both patient and disease factors. Patient factors include pre-existing medical conditions and fitness for surgery. Disease factors include the size of the abscess and causative organisms. Treatment of psoas abscess consists of drainage and prompt initiation of appropriate antibiotic.

Surgical drainage associated with antibiotic therapy was our method of choice. The ultrasound-guided puncture was reserved for abscesses resulting from an infected hematoma. This method associated with antibiotic therapy is recommended by most teams as a first-line treatment, due to its low morbidity compared to surgery. This drainage limits the spread of the contents of the abscess and thus reduces the risk of an inflammatory reaction, which is an advantage. The complications of radiological drainage encountered are displacement of the drain, obstruction, recurrence after ablation, fistulization and the formation of a hematoma [14,15].

The evolution depends on the precocity of the management. Mortality for secondary psoas abscess is 18.9%. Our rate was zero. On the other hand, Bounaim [13] had recorded a rate of 13%.

## Conclusion

Secondary psoas abscess is a rare condition. Its diagnosis is late. Surgical drainage associated with antibiotic therapy gives a good therapeutic result. Germs vary by etiology.

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