

# Case Report: A 10-year Institutional Retrospective Analysis of Retroperitoneal Abscess



Fariborz Rashno<sup>1</sup> , Manoochehr Ebrahimian<sup>1\*</sup> , Esmail Hajinasrollah<sup>1</sup>, Rouzbeh Shadidi Asil<sup>1</sup>, Saman Roostambeigi<sup>2</sup>

1. Department of General Surgery, Loghman Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

2. Department of Cardiology, Rajaie Cardiovascular Medical and Research Center, Tehran, Iran.



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## ABSTRACT

**Background:** Retroperitoneal Abscess (RA) is a rare and often insidious disease, i.e., difficult to diagnose. RA could originate from different retroperitoneal or intra-abdominal organs. The disease manifests various clinical symptoms and is usually treated with a combination of antibiotics and therapeutic interventions.

**Methods:** Data from a total of 25 patients who were admitted to Loghman Hospital in Tehran City, Iran with a diagnosis of RA from 2010 to 2020 were reviewed in this research. Clinical findings, diagnostic tools, treatment approaches, and microbiology data were considered and analyzed.

**Results:** Out of the 25 patients, the most frequent sources of RA were primary infections (36%), followed by gastrointestinal origin (20%). Fifty-two percent of patients presented no underlying disease; however, diabetes mellitus was the most prevalent underlying disease in the remaining ones. Fever, chills, and back or flank pain (56%) were the most common symptoms in the studied patients. Besides, a high erythrocyte sedimentation rate (mean: 93.58%) was found in most of the researched patients. Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI) could reliably diagnose the disease with an accuracy of 100% and 92.3%, respectively. Seventy-two percent of the study patients eventually underwent surgery. By taking advantage of CT scan, 24% of abscesses were drained and only 4% required medications to achieve remission. Mycobacteria and Klebsiella pneumonia were the most prevalent pathogens among the explored patients. The total mortality rate was equal to 12%; it occurred in cases with RA of a gastrointestinal (8%) or genitourinary (4%) origin.

**Conclusion:** There exist 3 major choices for treating abscesses, including surgery, image-guided percutaneous drainage, and medical therapy. Image-Guided drainage is recommended in primary infections; however, extra-peritoneal surgery is useful to treat secondary infections, especially those of a gastrointestinal source.

\* Corresponding Author:

Manoochehr Ebrahimian, MD.

Address: Department of General Surgery, Loghman Hakim Hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran.

Tel: +98 (911) 3423866

E-mail: manoochehrehbrahimian@gmail.com

## 1. Introduction

**R**etroperitoneal Abscess (RA) is a very uncommon and potentially fatal disease; its silent course and subsequent delayed diagnosis are associated with increased mortality and morbidity. Anatomically, retroperitoneal space is a potential space defined by psoas fascia. It is also located between the mediastinum and the thigh in each side of the body; any inflammation or infection inside this area can cause abscess [1]. Herman Mynter first described the disease in 1881. He introduced fever and intense pain, sometimes lasting for weeks in the lumbar region, gradually extending to the thigh as the typical symptoms of the disease [2]. Staphylococcus species used to be the most common pathogen in retroperitoneal abscesses; however, in recent years, gram-negative bacteria, usually originating from retroperitoneal organs, such as the duodenum, colon, kidneys, psoas muscle, and lumbar spines, seem to be the main pathogens involved. Conventionally, RA has been drained by surgical or radiological interventions [2]. RA is divided into two subtypes of primary and secondary [2]. The etiology of the primary subtype is not easily distinguishable; however, blood or lymphatics infection by an occult source could be the main cause of it [3]. The secondary infection is usually related to structures, such as psoas muscle, kidney, ureter, pancreas, large and small intestines, and iliac lymph nodes [1]. The current study aimed to provide insight into the course and prognosis of the disease and potential diagnostic markers for RA.

## 2. Materials and Methods

From 2010 to 2020, 25 patients with retroperitoneal or iliopsoas abscesses were treated in our medical center. Lohman Hakim Medical Center is a well-known referral center for poisoning and forensics-related cases.

All data were retrospectively extracted from the hospital's medical records. Accordingly, the study patients' demographics, clinical and laboratory findings, the source of infection, predisposing factors, treatment methods, and microbiology test results were entered into an electronic spreadsheet.

Inclusion criteria of the study consisted of a definite diagnosis of psoas muscle abscess or RA with the codes K68.12 and K68.19, respectively, based on the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10). ME and SR reviewed over 41 cases with a definite diagnosis of RA or iliopsoas abscess. The relevant data of 11 medical

files were unavailable; thus, they were excluded from the study. In 3 cases, the definite diagnosis was something different from iliopsoas abscesses. Two additional cases were also discharged against medical advice. Therefore, these additional cases were excluded as well.

Secondary abscesses were defined by the presence of an adjacent focus of infection, whereas the source of primary abscesses remained occult. The study patients were categorized into 5 groups based on the origin of infection (gastrointestinal, genitourinary, musculoskeletal, soft tissue associated, & primary); these data are similar to another retrospective study on this subject matter [4].

The obtained data were analyzed in SPSS, using descriptive tests, such as frequency, mean, median, range, as well as inferential tests. For inferential statistics, we compared mean scores by Dependent Samples t-test and Independent Samples t-test. Wilcoxon Signed-Rank test was also used to reveal dependency between non-scale parameters. In each case, the study patients' demographics data, clinical and laboratory findings, the source of infection, predisposing factors, treatment types, and microbiology test results were gathered and considered for further analysis.

Like any other studies, we encountered some limitations. The rarity of the disease and unicentric study were the most significant limitations of this research. Furthermore, in some cases the ICD-10 codes were inaccurate and the cases were excluded. Moreover, there may be more cases with a final diagnosis of RA; however, their medical records were not listed in our hospital's medical archive.

## 3. Results

Out of 25 patients, 15 (60%) were men. The age range of the study subjects was between 14 and 83 years (Mean $\pm$ SD: 47.4 $\pm$ 18.7 y) (Table 1). A men predominance was observed in Gastrointestinal (GI) origin with a 5:0 ratio of men to women. Contrarily, there was a women predominance with a ratio of 0:2 in cases with genitourinary sources. The gastrointestinal source was due to appendicitis (n=2), colon cancer (n=2), and necrotizing pancreatitis (one patient). Dermatomyositis was the origin of the soft tissue source in one research patient. The majority of the study patients presented no predisposing or underlying diseases (52%). However, the most common underlying condition was diabetes mellitus (16%). Moreover, 2 (8%) patients were substance abusers and 3 others manifested other immunosuppressive conditions, such as rheumatoid arthritis, dermatomyositis, or Hodgkin lymphoma. The total mortality rate was equal

**Table 1.** Demographic data of the study participants

Variable	Total	GI Origin	GU Origin	Bone Origin	Infectious	Muscle or Soft Tissue Origin	Unknown Origin
Cases No. (%)	25 (100)	5 (20)	2 (8)	4 (16)	9 (36)	1 (4)	4 (16)
Age, y (Mean±SD)	47.7 (14-83)	58.6 (29-68)	71.5 (60-83)	55.2 (48-63)	41.8 (20-70)	37	31.5 (14-63)
Sex (M:F)	15:10	5:0	0:2	2:2	5:4	1:0	2:2
Diabetes	4 (16)	0	1	0	2	0	1
Cardiovascular	3 (12)	2	0	0	0	1	0
Drug abuser	2 (8)	2	0	0	0	0	0
Rheumatologic disorders	1 (4)	0	1	0	0	0	0
Neurologic disorders	1 (4)	0	0	0	0	0	1
Hematologic disorders	1 (4)	0	0	1	0	0	0
No medical condition	13 (52)	1	0	3	7	2	0
Right Side	18 (72)	3	2	1	8	1	3
Left Side	6 (24)	2	0	2	1	0	1
Bilateral	1 (4)	0	0	1	0	0	0
Admission days (Mean±SD)	18.9 (6-37)	18 (8-32)	18 (12-24)	23 (15-34)	18.3 (12-30)	10	20.7 (6-37)
Mortality	3(12)	2	1	0	0	0	0

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**Table 2.** Clinical symptoms and laboratory data of the study participants

Symptoms	Total No. (%)	GI Origin	GU Origin	Bone Origin	Infectious	Muscle or Soft Tissue Origin	Unknown Origin
Cases No. (%)	25 (100)	5 (20)	2 (8)	4 (16)	9 (36)	1 (4)	4 (16)
Fever	21 (84)	4	2	4	6	1	4
Chills	18 (72)	4	1	4	5	1	3
Night sweating	2 (8)	0	0	0	2	0	0
Cough	2 (8)	0	0	0	1	0	1
Abdominal pain	6 (24)	2	1	0	2	0	1
Malaise	5 (20)	2	2	0	1	0	0
Inguinal bulging	3 (12)	1	0	0	2	0	0
Back/flank pain	14 (56)	2	0	3	5	1	3
Limited hip movement/ lower limb pain/knee pain	8 (32)	1	0	1	3	0	3
Weight loss	2 (8)	0	0	0	2	0	0
Duration of symptoms before admission	26.1 (2-90)	11.4	16	33.3	38	5	23
Mean White blood Count on admission (x 1000)	13.1	16.6 (5.7- 28.6)	17.2 (12.1- 2.3)	9.5 (4-17.1)	12.4 (2.7- 25)	10.9	12.3 (6.3-18)
ESR*	93.58 (4-139)	91.6	95	82.5	102	94	92.3

\*Erythrocyte Sedimentation Rate.

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Table 3. Diagnostic tools

Diagnostic Tools	Positive: Valid cases No. (%)	GI Origin	GU Origin	Bone Origin	Infectious	Muscle or Soft Tissue Origin	Unknown Origin
Cases No. (%)	25 (100)	5 (20)	2 (8)	4 (16)	9 (36)	1 (4)	4 (16)
Plain radiography	1:24 (4.1)	0	0		0	0	1
Sonography	10:19 (52.6)	1	2	4	2	Not performed	1
CT scan	23:23 (100)	4	2	4	8	1	4
MRI	12:13 (92.3)	Not performed	Not performed	2	7	3	0

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Table 4. Culture and microbiology data of the study participants

Variable	Total No. (%)	GI Origin	GU Origin	Bone Origin	Infectious	Muscle or Soft Tissue Origin	Unknown Origin
Cases No. (%)	25 (100)	5 (20)	2 (8)	4 (16)	9 (36)	1 (4)	4 (16)
Polymicrobial	3 (12)	0	0	0	0	0	0
Monomicrobial	17 (68)	2	2	3	8	2	0
Negative culture	5 (20)	0	0	1	1	1	2
Coagulase-positive Staphylococci	1 (4)	0	0	1	0	0	0
Coagulase-negative Staphylococci	1 (4)	0	0	0	1	0	0
Staphylococcus aureus	4 (16)	0	1	1	0	0	2
Klebsiella pneumoniae	5 (20)	0	1	0	4	0	0
Escherichia coli	1 (4)	1	0	0	0	0	0
Mycobacteria	5 (20)	1	0	1	3	0	0

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Table 5. Treatment methods

Treatment	Total No. (%)	GI Origin	GU Origin	Bone Origin	Infectious	Muscle or Soft Tissue Origin	Unknown Origin
Cases No. (%)	25 (100)	5 (20)	2 (8)	4 (16)	9 (36)	1 (4)	4 (16)
Surgical	18 (72)	5	0	3	6	1	3
Extra-peritoneal	15 (60)	5	0	1	6	1	2
Intra-abdominal	1 (4)	0	0	0	0	0	1
Posterior	2 (8)	0	0	2	0	0	0
Radiological	6 (24)	0	2	1	2	0	1
Conservative	1 (4)	0	0	0	1	0	0

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**Table 6.** Antibiotics used for the study patients

Antibiotics	Total No. (%)	GI Origin	GU Origin	Bone Origin	Infectious	Muscle or Soft Tissue Origin	Unknown Origin
Cases No. (%)	25 (100)	5 (20)	2 (8)	4 (16)	9 (36)	1 (4)	4 (16)
Vancomycin	19 (76)	3	1	4	7	1	3
Ciprofloxacin	1 (4)	0	0	0	1	0	0
Piperacillin / Tazobactam	3 (12)	1	0	1	1	0	0
Cefazolin	3 (12)	1	1	0	0	0	1
Ceftriaxone	1 (4)	1	0	0	0	0	0
Meropenem	9 (36)	1	1	2	2	1	2
Imipenem	2 (8)	1	0	1	0	0	0
Metronidazole	1 (4)	1	0	0	0	0	0
Clindamycin	1 (4)	1	0	0	0	0	0
Amikacin	2 (8)	0	0	0	1	0	1
Other antibiotics*	6 (24)	0	0	0	6	0	0
One antibiotic regimen	2 (8)	0	1	0	0	0	1
Two drug regimen	21 (84)	4	1	4	9	3	0
Three or more regimens	2 (8)	1	0	0	0	0	1

\*Rifampin, Ceftazidime, Oxacillin, Cefepime, Ampicillin, Gentamycin: Each used only in one individual.

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to 12% with a predominance in patients with GI origins. Two colon cancer cases that were treated surgically were eventually expired with their culture revealing polymicrobial infection. The other patient was an 83-year-old woman with a perinephric source whose abscess was drained percutaneously. The culture developed *Klebsiella pneumoniae* and the patient passed away 12 days after admission.

Furthermore, 18 (72%) abscesses were detected on the right and 6 (24%) on the left side. We also observed a case of bilateral abscess; she was a 48-year-old woman who underwent a lumbar discectomy two months before admission. The average days of admission equaled 18.9 with a range of 6 to 37; admission days were longer in patients with musculoskeletal origins (23 vs. 18.9).

The most prevalent symptoms among the study patients were fever (84%), chills (72%), and back or flank pain (56%), followed by limited hip movement and lower extremity pain (Table 2). Abdominal pain was not found to be a major symptom. Three patients presented inguinal bulging as their chief complaint. The average time from the onset of symptoms to hospitalization was 26.1 days (range: 2-90 d). ESR was measured in 19 patients, ex-

cept for one case with Hodgkin's lymphoma (ESR=4), ESR was >70 (mean: 93.5) in all patients (Table 2).

Diagnosis of the disease by plain radiography, Kidney, Ureter, Bladder (KUB), and Intravenous Pyelography (IVP) was only possible in one patient; however, Computed Tomography (CT) scan and Magnetic Resonance Imaging (MRI) could be considered as helpful diagnostic modalities, with an accuracy of 100% and 92.3%, respectively (Table 3). Ultrasound was only performed in 19 patients; out of whom, 10 (52.6%) patients provided positive results.

The culture samples of 5 patients were not positive. Most infections were monomicrobial (68%) among the patients who tested positive for culture. The infection was polymicrobial only in patients with a GI source (Table 4). The most frequent pathogens were *Klebsiella pneumoniae* (20%) and *Mycobacteria* (20%), followed by *Staphylococcus aureus*. In one case with a GI origin, *Escherichia coli* was the main pathogen.

Additionally, 18 (72%) patients were treated surgically. Abscesses were drained percutaneously in 6 (24%) other patients. Besides, only one case was solely treated via medications without any interventions. All the cases with

GI origin were surgically treated with an extra-peritoneal approach using Rutherford Morrison incision [5]. Two patients who were treated with a posterior incision had bone origins of infection and one patient with unknown origin underwent surgery through a midline incision, because of peritoneal symptoms (Table 5).

The vast majority of patients with a primary infection were also treated with an extra-peritoneal approach (6 out of 9). In 6 (24%) cases, retroperitoneal collections were drained percutaneously (CT- or ultrasound-guided). In addition to therapeutic interventions, intravenous antibiotics were prescribed in all cases.

In 84% of the research patients, 2 adjunct antibiotics were used; however, there were 2 cases of single-drug regimen and 2 cases of  $\geq 3$  drug regimen. The most commonly used antibiotics were vancomycin (76%) and meropenem (36%). Metronidazole and clindamycin were only used in the infections of GI origin; however, while different antibiotics were prescribed to treat primary infections (rifampin, ceftazidime, oxacillin, cefepime, amikacin, gentamycin, and ampicillin) (Table 6).

#### 4. Discussion

RA was first described by Hermann Mynter in 1881 [1]. He described nearly every aspect of the disease and noted clinical symptoms, such as back pain and hip movement limitation in this respect. He also found that psoas muscle contraction and relaxation could aggravate and relieve the pain associated with the disease. The role of the psoas muscle has remained significant after >100 years as the main structure involved in a RA. Therefore, the anatomy of this muscle and its anatomical relationships is beneficial in understanding the disease and its origin. The psoas muscle originates from the transverse processes and the bodies of the 12<sup>th</sup> thoracic and all the lumbar vertebrae. Its aponeurosis is inserted on the femur's lesser trochanter, inferiorly, and on the superior passes over diaphragm per side. The psoas muscle is medially related to the vertebra column, laterally lies beside the quadratus lumborum, and anteriorly located just beneath the peritoneum. Furthermore, the psoas muscle is related to organs, such as the duodenum, pancreas, colon, kidneys, ureters, and retroperitoneal lymph nodes [1]. Thus, every infection in related anatomical organs can lead to inflammation in the psoas muscle in humans and animals [6]. Conventionally, a RA can be divided into two types, namely primary in which the source of infection remains unknown, and secondary type results from the inflammation of its related organs [2].

Therefore, inflammation in the retroperitoneal space can form an abscess. Besides, like any other abscess in the body, it can cause nonspecific symptoms, such as fever, chills, sweating, malaise, pain, vomiting, and anorexia [4, 7]. Depending on the severity of the infection and the extent of the abscess, it can also lead to such specific symptoms as flank pain, knee pain, or lower extremities movement limitations [8, 9].

In our study, misleading symptoms, such as inguinal swelling, weight loss, and coughing were present among the patients; however, the most prevalent symptoms were fever, chills, and back/flank pain. Back/flank pain was more frequent in the infections of non-gastrointestinal origin; however, abdominal pain was more frequently observed in gastrointestinal origins considering peritoneal irritation [2, 4, 7].

Primary infection is supposed to be more frequent in less-developed nations, while the secondary infection is more prevalent in developed countries [2, 10, 11]. However, in this study, 36% of cases encountered the primary subtype. Numerous risk factors have been identified in various studies for this disease, such as diabetes mellitus, immunodeficiency, urological and gastrointestinal procedures, as well as intravenous drug administration [2, 4, 7, 12].

In general, the bacterial etiology of primary and secondary subtypes is different. *Staphylococcus aureus* is the main pathogen in the primary and polymicrobial or gram-negative bacteria in the secondary subtype [2, 13]. Some researchers suggested that the main cause of the prevalence of *Staphylococcus aureus* in the primary disease is probably trauma and the entry of the organism from the surface of the skin or lymph nodes into the retroperitoneum [14, 15]. In the current study, no history of trauma was present. Furthermore, the high prevalence of polymicrobial infections in the secondary subtype seems to be due to GI perforations or infections [2].

Diagnosis has always been difficult due to nonspecific symptoms and the silent course of the disease. Ricci et al. reviewed 367 cases globally and found that only 53% of cases were correctly diagnosed earlier to the onset of the disease [2]. Symptoms such as fever, chills, and back/flank pain alongside laboratory, as well as radiological diagnostic tools, will significantly increase the diagnosis reliability.

ESR and white blood count are not reliable indexes concerning the disease [7]; however, in our case, almost every patient presented a high ESR (mean: 93.58).



The best diagnostic tools included CT scan and MRI; although various radiological measures, such as IVP are also used to diagnose the disease, they provided no promising results [1, 10, 16].

Interventional procedures, such as image-guided or surgery alongside antibiotic therapy are the first line of treatment [4, 17]. Yacoub et al. argued that RA rarely requires surgery and almost all primary abscesses can be treated percutaneously or only with antibiotics. They claimed that non-surgical management is successful about 90% of the time. Accordingly, surgical management can be reserved for occasionally complicated recurrences [18]. Due to the limitations of performing interventions, MRI, CT, or ultrasound could be considered as the best image-guided modalities for drainage [16]. We used all three diagnostic methods and CT scan was more helpful. Six patients were treated with CT-guided drainage and 18 of them were treated surgically in our study.

## 5. Conclusion

RA is a rare and insidious condition with primary and secondary subtypes. The clinical manifestations of the disease include fever, chills, flank/back pain, and hip movement limitations. There exist three major choices for the treatment of abscesses; surgery, image-guided percutaneous drainage, and therapeutic interventions. Image-guided drainage is recommended in primary infections, while extra-peritoneal surgery is useful to treat secondary infections, especially those of a gastrointestinal source. *Klebsiella pneumonia* and *mycobacteria* are more prevalent pathogens; using vancomycin adjunct to meropenem could be an effective treatment.

## Ethical Considerations

### Compliance with ethical guidelines

This study was approved by Ethics Committee of Shahid Beheshti University of Medical Sciences. Also the Helsinki declaration (Ethical principles in Medical Research on Humans) was also observed.

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### Author's contributions

Conceptualization and Supervision: Fariborz Rashno; Investigation and data collection: Manoochehr Ebrahimi;

Methodology: Esmail Hajinasrollah; Data analysis: Rouzbeh Shadidi Asil; Writing – review & editing: Saman Roostambeigi.

### Conflict of interest

The authors declared no conflict of interest.

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