

# Clinical Manifestations and Prognostic Factor of Iliopsoas Abscess

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## ABSTRACT

**Introduction:** Iliopsoas abscess (IPA) is a collection of pus in the iliopsoas compartment, which is considered rare in Japan. However, the number of patients with IPA has recently increased among the elderly or compromised hosts. **Subjects and Methods:** This retrospective study aims to examine the clinical pictures, pathological findings, and the prognostic factor of IPA. We analyzed all patients with IPA who were admitted to our hospital from April 2006 to July 2011. Patients' characteristics, treatment, clinical outcome, radiological findings, bacteria isolated, and comorbidities were evaluated. The comorbidities were evaluated by the Charlson comorbidity index (CCI). We compared the survival and non-survival groups to assess the prognostic factors of IPA. **Results:** A total of 33 patients were enrolled in this study, which included 14 males and 19 females. The mean age of the patients was 71.5 years (range 32-92 years). The most common underlying disease was spinal disease (16 of 33, 48.5%). Twenty-nine patients (87.9%) were cured and four patients (12.1%) died. While 12 patients (36.4%) were initially treated conservatively with antibiotics alone, percutaneous drainage was performed initially in 19 patients (57.6%). Two patients (6%) directly underwent exploratory surgery and open drainage. In terms of patients' characteristics, there were no significant differences in either group. The score of CCI in non-survivors was higher than that in survivors (1.38 vs. 5.5,  $P < 0.001$ ). **Conclusions:** The epidemiology of IPA is quite different from what it used to be. CCI appears to be useful in evaluating the patients' prognosis with IPA.

**Key words:** Charlson comorbidity index, Iliopsoas abscess, Percutaneous drainage

## INTRODUCTION

Iliopsoas abscess (IPA) is a collection of pus in the iliopsoas compartment, which was first described by Mynter in 1881.<sup>[1]</sup> It can be caused by the contiguous spread of infected organs or by hematogenous spread from sites of occult infection owing to the rich vascular supply of muscles.<sup>[2]</sup> Thus, IPA may be classified as primary or secondary, depending on the presence or absence of underlying disease. It commonly used to occur by the spread of spinal tuberculosis.<sup>[3]</sup> However, the decline of this major pathogen has affected the etiology and epidemiology of IPA after the discovery of modern anti-tuberculosis treatment.<sup>[3]</sup>

Although IPA is thought to be uncommon in Japan, it

recently has shown to be increased among the elderly or compromised hosts. This retrospective study aims to examine the clinical pictures, pathological findings, and the prognostic factor of IPA. The Charlson comorbidity index (CCI) is one of the most common methods for evaluating patients' prognosis.<sup>[4]</sup> This study found the scores by CCI to be significantly higher in non-survivors than those in survivors. This is the first report demonstrating the prognostic factor of IPA evaluated by CCI.

## SUBJECTS AND METHODS

A retrospective review of all the patients diagnosed as having IPA at our hospital from April 2006 to July 2011 was performed. Patients' characteristics, treatment, clinical outcome, radiological findings, bacteria isolated, and comorbidities were evaluated. The comorbidities were evaluated by CCI. We compared the survival and non-survival groups to assess the prognostic factors of IPA.

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**Figure 1:** Magnetic resonance imaging shows bilateral iliopsoas abscesses (IPAs). (a) T2 weighted coronal image shows bilateral high-intensity lesions (→) within iliopsoas muscles with discitis (←). (b) T2 weighted axial image shows bilateral IPA. (c) Diffusion weighted image reveals the lesions as high intensity, which is consistent with IPA

## Diagnosis

The diagnosis of IPA was confirmed by abdominal computed tomography (CT) or magnetic resonance imaging [Figure 1]. All the radiological examinations were reviewed and the reports were made by a radiologist.

## The Charlson comorbidity index

This index predicts the 10-year mortality for a patient who may have a range of comorbid conditions such as heart disease, AIDS, or cancer (22 conditions in total). Each condition is assigned with a score of 1, 2, 3, or 6 depending on the risk of dying associated with this condition. Then the scores are summed up and given a total score, which predicts mortality. There are many variations of CCI, including the Charlson/Deyo, Charlson/Romano, Charlson/Manitoba, and Charlson/DHoores adaptations.

The clinical conditions and scores are as follows: 1 each: Myocardial infarct, congestive heart failure, peripheral vascular disease, dementia, cerebrovascular disease, chronic lung disease, connective tissue disease, ulcer, chronic liver disease; 2 each: Hemiplegia, moderate or severe kidney disease, diabetes, diabetes with complication, tumor, leukemia, lymphoma; 3 each: Moderate or severe liver disease; and 6 each: Malignant tumor, metastasis, AIDS. For a physician, it is helpful in knowing how aggressively to treat a condition. For example, a patient may have cancer, but also heart

disease and diabetes so severe that the costs and risks of the treatment outweigh the short-term benefit from treatment of the cancer. Since patients often do not know how severe their conditions are, originally to calculate the index, nurses were supposed to go through the patients' chart and determine whether the patient had a particular condition. Subsequent studies have adapted it to a questionnaire for patients. The original citation follows: Charlson ME, Pompei P, Ales KL, MacKenzie CR (1987). A new method of classifying prognostic comorbidity in longitudinal studies: development and validation. *J Chron Dis*, 40(5):373-83.<sup>[4]</sup>

## Statistical analysis

Comparisons of group means were made by unpaired or paired *t*-tests or the Mann-Whitney *U*-test. Contingency tables were evaluated by Fisher's exact probability test. *P* values <0.05 were considered significant.

## RESULTS

### Patients' characteristics

A total of 33 patients were enrolled in this study. Characteristics of the patients and IPA are shown in Tables 1 and 2, respectively. They were 14 males and 19 females. The mean age of the patients was 71.5 years (range 32-92 years). The most common underlying disease was spinal disease (16 of 33, 48.5%), followed by diabetes mellitus (11 of 33, 33.3%).

**Table 1: Patients characteristics**

Variables	No. (%) of patients
Mean age, range	71.5, 32-96
Sex	
Male	14 (42.4)
Female	19 (57.6)
Underlying disease	
Diabetes mellitus	11 (33.3)
Malignancy	7 (21.1)
Renal disease	1 (3)
Collagen disease	3 (9.1)
Cerebrovascular disease	6 (18.2)
Spinal disease	16 (48.5)
Clinical features	
Fever	23 (69.7)
Lumbago	23 (69.7)
Psoas position	10 (30.3)
Weight loss	7 (21.2)
Abdominal or back pain	18 (54.5)
Consciousness disorder	6 (18.2)
Clinical outcome	
Cure	29 (87.9)
Death	4 (12.1)
Initial treatment	
Antibiotics alone	12 (36.4)
PCD and antibiotics	19 (57.6)
Surgical drainage and antibiotics	2 (6.1)
Initial antibiotics at the start of treatment	
$\beta$ -Lactams alone (not carbapenem)	15 (45.5)
Vancomycin alone	4 (12.1)
Carbapenem alone	3 (9.1)
$\beta$ -Lactams/carbapenem+VCM	6 (18.2)
$\beta$ -Lactams/carbapenem+NQs	3 (9.1)
$\beta$ -Lactams/carbapenem+CLDM	2 (6.1)
Charlson comorbidity index	
0-1	18
2-4	12
>5	3

PCD: Percutaneous CT-guided drainage; VCM: Vancomycin; NQs: New quinolones; CLDM: Clindamycin

**Table 2: Characteristics of iliopsoas abscesses**

Variables	No. (%) of patients (n=33)
Primary IPA	11 (33.3)
Secondary IPA	22 (66.7)
Size, mm	
<20	9 (27.3)
20-40	16 (48.5)
>40-60	6 (18.2)
>60	2 (6)
Side	
Unilateral	27 (81.8)
Bilateral	6 (18.2)

IPA: Iliopsoas abscess

### Clinical features

The most frequent symptoms were fever and lumbago in 23 (69.7%) and 23 patients (69.7%), respectively. The triad

**Table 3: Concomitant diagnoses associated with iliopsoas abscesses**

Cause	No. (%) of patients (n=33)
Spondylitis	20 (60.6)
Bacteremia	15 (45.5)
Immunosuppression	10 (30.3)
Malignancies and chemotherapy	7 (21.2)
Rheumatic disease and immunosuppressor	3 (9.1)
Abscesses	4 (12.1)
Liver	2 (6)
Splenic	1 (3)
Renal	1 (3)

of IPA (fever, lumbago, and psoas position) was detected in seven patients (21.2%).

### Technical and clinical outcomes

Twenty-nine patients (87.9%) were cured and four patients (12.1%) died. No adverse events related to drainage procedures were found in this study. Twelve patients (36.4%) were initially treated conservatively with antibiotics alone. Percutaneous drainage (PCD) was performed initially in 19 patients (57.6%). Two patients (6%) directly underwent exploratory surgery and open drainage.

The most frequent initial antibiotics administered at the beginning of treatment was  $\beta$ -lactams alone except for carbapenem (15 of 33, 45.5%), followed by vancomycin, which was used for 10 patients (10 of 33, 30.3%).

### Concomitant diagnoses associated with iliopsoas abscesses

Eleven patients (33.3%) had primary IPAs without causal origin, and 22 (66.7%) had secondary IPAs. The mean size of IPA was 31.8 mm. IPAs affected bilaterally were found in 18.2%. The cause of the IPAs could be determined in 66.7% (22 of 33) of patients as shown in Table 3. The most common cause of IPA was spondylitis (20 of 33, 60.6%), followed by bacteremia (15 of 33, 45.5%) and immunosuppressive state (10 of 33, 30.3%).

### Comparison between survivor and non-survivor

There were no significant differences in both groups, except for CCI [Table 4]. The score of CCI in non-survivors was higher than that in survivors (1.38 vs. 5.5,  $P < 0.001$ ).

### Bacteriological findings

Cultures of the drainage and blood were positive in 14 (42.4%) and 15 (45.5%) patients, respectively.

**Table 4: Comparison between survivor and non-survivor**

Variables	Non-survivor (n=4)	Survivor (n=29)	P value
Sex (male/female)	1/3	13/16	0.62
Age, year (±SD)	70.5 (±15.3)	78.3 (±6.24)	0.332
Duration of antibiotics (days)	59.8 (±20.3)	56.1 (±31.3)	0.867
Escalation	2 (50)	5 (17.2)	0.19
De-escalation	2 (50%)	12 (41.4%)	1.000
Positive cultures by drainage procedure	2 (50%)	17 (58.6%)	1.000
Mean size of IPA, mm (±SD)	30 (±8.42)	32.1 (±17.1)	0.815
Complications			
Malignancy	2	4	0.142
Diabetes mellitus	1	10	1.000
Spinal disease	2	14	1.000
Renal disease	1	0	0.121
CCI	5.5	1.38	<0.001
CCI combined condition and age	9	4.1	<0.001

SD: Standard deviation; IPA: Iliopsoas abscess; CCI: Charlson comorbidity index

**Table 5: Pathogens isolated by abscesses**

Variables	
No. (%) of subjects with pathogens	19 (57.6)
No. (%) of subjects with single pathogens	16 (48.5)
No. (%) of subjects with multiple pathogens	3 (9.1)
No. (%) of isolates of	
<i>Escherichia coli</i>	5
<i>Bacteroides fragilis</i>	1
<i>Staphylococcus aureus</i>	
Oxacillin susceptible	7
Oxacillin resistant	1
<i>Staphylococcus capitis</i>	1
<i>Pseudomonas aeruginosa</i>	1
<i>Streptococcus atalactiae</i>	1
<i>Enterobacter faecium</i>	1
<i>Serratia marcescens</i>	1
<i>Acinetobacter</i>	1
<i>Morganella morganii</i>	1
Others	2

Others include group G streptococcus, *Streptococcus hemol***Table 6: Pathogens isolated by blood cultures**

Variables	
No. (%) of subjects with pathogens	15 (45.5)
No. (%) of subjects with single pathogens	15 (45.5)
No. (%) of subjects with multiple pathogens	0 (0)
No. (%) of isolates of	
<i>Escherichia coli</i>	2
<i>Staphylococcus aureus</i>	
Oxacillin susceptible	10
Oxacillin resistant	1
<i>Staphylococcus epidermis</i>	1
<i>Streptococcus anginosus</i>	1

Bacteriological results are shown in Tables 5 and 6. The most common pathogen isolated from abscesses was *Staphylococcus aureus* (8 of 14, 57.1%), followed by *Escherichia coli* (5 of 14, 35.7%). *S. aureus* was also the most common pathogen isolated by blood culture. Twelve (12 of 15, 80%) pathogens isolated by blood culture were identical to those isolated by drainage specimen from abscess.

## DISCUSSION

Some studies previously reported that IPA is more common in the young than the elderly patients, and in males than in females.<sup>[3,5-7]</sup> In a study of 142 pediatric patients with IPA reported by Bresee, 57% had it in the right-hand side, 40% in the left-hand side, and 3% in the bilateral side.<sup>[8]</sup> The mortality rates in primary and secondary IPA were 2.4% and 19%, respectively.<sup>[3,9]</sup> Tate reported IPA cases mainly consisting of the elderly, whose mortality rate was 10%.<sup>[10]</sup> Our study showed that 42% of patients were males and 58% were females, and 22 of the 33 patients were more than 70 years of age. The mortalities of primary and secondary IPA in our study were 27.3% and 4.5%, respectively. The epidemiology of IPA might be changing annually due to an aging society and the progress of antibiotic therapy. Another possible factor affecting the epidemiology of IPA would be a remarkable radiological progress, including interventional radiology. Ultrasound sonography and CT-guided drainage are good alternatives to performing invasive procedures in the treatment of IPA. The elderly mostly present comorbidities such as chronic pulmonary disease and chronic renal disease, resulting in intolerance for surgery.

In general, *Staphylococcus aureus* is the causative organism in over 88% of patients with primary IPA.<sup>[11]</sup> Secondary IPA is caused by streptococcus species in 4.9% and by *E. coli* in 2.8%.<sup>[11]</sup> *Mycobacterium tuberculosis* as a cause of IPA is currently uncommon in the western world, but common in the developing countries.<sup>[3]</sup> The other causative organisms include *Proteus*,<sup>[12]</sup> *Bacteroides*,<sup>[13]</sup> *Clostridia*,<sup>[14]</sup> *Klebsiella*,<sup>[15]</sup> methicillin-resistant *Staphylococcus aureus*,<sup>[16]</sup> and non-tuberculosis mycobacteria.<sup>[17,18]</sup>

When the pathogen was sensitive to antibiotic therapy and initial empirical treatment was effective, it had been reported that de-escalation of antibiotic therapy improved the outcomes in terms of both the death and treatment failure rates, even for immunosuppressed patients.<sup>[19]</sup> In addition, various bacteria have been isolated in patients with IPA as above previously. Thus, the isolation of pathogens is very important for selecting adequate antibiotics and for successful de-escalation of antibiotic

therapy. Nineteen of the 33 patients (57.6%) received PCD as an initial treatment and no adverse events related to PCD were found in our study. PCD is a very safe procedure for abscess drainage as well as for detecting pathogens, even when patients are aged and have poor conditions.<sup>[20-24]</sup>

It is striking that the scores of CCI were much higher in non-survivors than those in survivors. CCI put a priority on malignancy. Cronin, *et al.* described that malignancy is considered to be one of the prognostic factors in the treatment of deep tissue abscesses.<sup>[25]</sup> Unfortunately, this study did not prove or disprove that malignancy is one of the prognostic factors in the treatment of IPA as shown in Table 4. We previously reported the efficacy of the CCI as a prognostic factor of lung abscess.<sup>[26]</sup> In the treatment of IPA, it might be difficult to predict the prognosis of the patients based on laboratory findings such as white cell count, C-reactive protein, or erythrocyte sedimentation rate, on age or on the size of the abscess compared with the management of lung abscess. CCI would be one of the useful methods to evaluate easily the severity of the disease. Regarding non-survival cases, two of the four patients died by cancer progression, although the IPAs seemed to improve. Worsening of chronic kidney disease in one of the four patients led to multi-organ failure, resulting in death.

We strongly believe that IPA could be treatable, irrespective of how old patients are owing to remarkable progress in antibiotic therapy. Thus, comorbidity would be the key in the successful treatment of IPA.

The limitation of our study is that it is a retrospective analysis in a very small population. First, retrospective studies may be less reliable in terms of the data collected, particularly for data such as physical examination. Prospective study will be necessary and more cases are to be expected. Second, we could not perform multivariate analysis in this study because of shortage of cases. To evaluate a prognostic factor for IPA, more cases should be collected and multivariate analysis should be performed.

In conclusion, the epidemiology of IPA is quite different from which it used to be. CCI would be useful in evaluating the patients' prognosis with IPA.

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