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*RESEARCH ARTICLE*

# A COMPARATIVE STUDY BETWEEN PERCUTANEOUS DRAINAGE AND OPEN SURGICAL DRAINAGE AS A TREATMENT MODALITY FOR ILIOPSOAS ABSCESS

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## Abstract

**Introduction:** Most of the relevant literature on Iliopsoas Abscess(IPA) is in the form of case reports and short case series.[1] The incidence of IPA is reported to be 12 new cases per year worldwide.[2] A secondary IPA shows direct extension of infection from a neighbouring organ, and primary IPA shows hematogenous spread from an unknown source.[3,4]Computed Tomography(CT) and Magnetic Resonance Imaging(MRI) have helped in the early diagnosis of IPA.[8,9] Treatment consists of adequate drainage.

**Aim:**To compare percutaneous drainage and open surgical drainage as a treatment modality for iliopsoas abscess.

**Settings and Design:** Retrospective study.

**Methods and Materials:** All patients aged 18 to 60years with IPA admitted to the Department of GeneralSurgery of our institute, between 1st of March, 2012 and 31st of July, 2022 were included.

**Results:** Nineteen out of thirty patients(63.3%) were males. Average age was 30.5years. Seventeen(56.7%) cases had primary IPAs, and Staphylococcus spp. was the most common isolate. Thirteen(43.3%) cases had secondary IPAs, with spinal tuberculosis being the most common underlying condition. Eight patients(26.7%) were subjected to open surgical drainage and 22(73.3%) to percutaneous drainage(PCD) under ultrasound(US) guidance. Nine-and-a-half days on an average, were spent in the hospital. 8.5 days vs. 12.1 days, was the hospital stay for PCD patients compared to open drainage patients. The overall recurrence rate was 10%. No mortality was recorded.

**Conclusion:** When utilized to treat IPAs, US guided PCD with proper antibiotics is secure and productive, with a shorter hospital stay. Open surgical drainage may be required if the IPA is multiloculated or if there is an underlying disease.



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## Introduction:-

Iliopsoas abscesses (IPA) are rare, and the majority of the pertinent research takes the form of case reports and brief case series.[1] The incidence of iliopsoas abscess (IPA) is reported to be 12 new cases per year worldwide, with primary abscesses now predominating.[2] While a secondary IPA shows a direct extension of infection from a neighbouring organ, a primary IPA shows hematogenous spread from an unknown source of infection.[3,4] The indications and symptoms of an IPA may be vague, imprecise, and deceptive.[5,6] It is unusual and infrequent to have the characteristic trio of pain, fever and limp that Mynter described in 1881.[7] However, nonspecific symptom patients are increasingly being diagnosed with MRI and CT scans, and IPAs are becoming more frequently discovered before the onset of particular clinical indications.[8,9] Surgery or percutaneous drainage as well as the right antibiotic make up the course of treatment.[10] The first-line treatment for an IPA is percutaneous drainage (PCD), which has historically been used to treat intra-abdominal or pelvic abscesses.[8,11] Since PCD with US guidance is less invasive and has a shorter hospital stay than open surgical drainage, it is preferable. The price of CT-guided PCD is higher, and radiation risks are involved. We review our experience with IPAs and evaluate the various drainage procedures.

## Materials and Methods:-

The total of 30 patients admitted to the Department of General Surgery of our institution between March 2012 and July 2022 were included in the study and retrospectively reviewed. The causes of the diseases, clinical traits, laboratory results, microbiological data, radiographic data (US and CT), treatments, and results were all observed and recorded. Under US supervision, either a traditional extraperitoneal technique or PCD was used to drain abscesses. The choice of performing PCD is dependent on the technical accessibility, size, unilocularity and uncomplicated features of the abscess; while open surgical drainage may be warranted in multiloculated, difficult to access and complicated IPA.

**Study Design:**

As a retrospective study, the treatment algorithm was based on physician judgment at the time of intervention. Patients between 18-60 years were included in the study. Patients who did not come for followup for confirmation of completion of treatment were excluded from the study.

**Procedure Details:**

In all cases, open and PCD, physicians' opinion was taken before undergoing the procedure. PCD was performed under US guidance. Under US guidance, the entry site was marked, and an approach remote from major blood vessels and other organs was planned. Under local anesthesia, a wide-bore needle was inserted into the target area under US guidance, and the fluid was aspirated. Next, a catheter (a nephrostomy tube, 14–16 Fr, or a chest tube, No. 24) was inserted into the cavity and connected to a non-suction drainage system. In all cases, open and PCD, the drain was not removed until quantity of the drain was less than 5 ml for 3 consecutive days and the abscess had disappeared on follow-up US. Empirical broad-spectrum intravenous antibiotic therapy (Ceftriaxone 1gm IV BD and Metronidazole 500 mg TID) commenced immediately for all patients; the antibiotics were later changed according to the results of culture and sensitivity tests. Patients were kept on antibiotics for 2-3 weeks, and those who were discharged earlier were advised to continue on oral antibiotics thereafter. Patients who came up with tuberculous abscess results received anti-tuberculous therapy and were followed up by the concerned specialists.

**Statistical Analysis:**

With the help of SPSS version 18.0, all analyses were carried out. Student's t-test was used for the analysis of continuous variables, the Mann-Whitney test was used for nonparametric variables, and the chi-squared test was used for categorical variables. A p value $<0.05$ was considered to indicate statistical significance.

**Institutional Review Board:**

Consent was obtained from all participants in this study. All the procedures followed were in accordance with the Helsinki Declaration of 1975. Institutional Ethics Committee M.R Medical College, Kalaburagi issued approval ECR/889/Inst./2017. The Institutional Ethics Committee M.R Medical College, Kalaburagi met and scrutinized the research project, "A Comparative Study Between Percutaneous Drainage and Open Surgical Drainage as a Treatment Modality for Iliopsoas Abscess" from ethical clearance point of view. After scrutiny, the original version of the research project has been accorded ethical clearance.

## Results:-

Out of the total 30 patients, nineteen (63.3%) were males and eleven (36.7%) were females with an average age of 30.5 (18-60) years. Seventeen (56.6%) patients had primary IPAs and thirteen (43.3%) had secondary IPAs. Staphylococcus aureus was the most common organism isolated from the former group (65.6%). Tuberculosis of the spine was the underlying condition in eleven (84.6%) patients with secondary IPAs and urinary tract infection was the cause of two (15.4%) such cases.Lower back or flank pain was the most common manifestation (63.3%). Leukocytosis was the most common laboratory finding (53.3%). The clinical presentations on admission are shown in Figure 1.

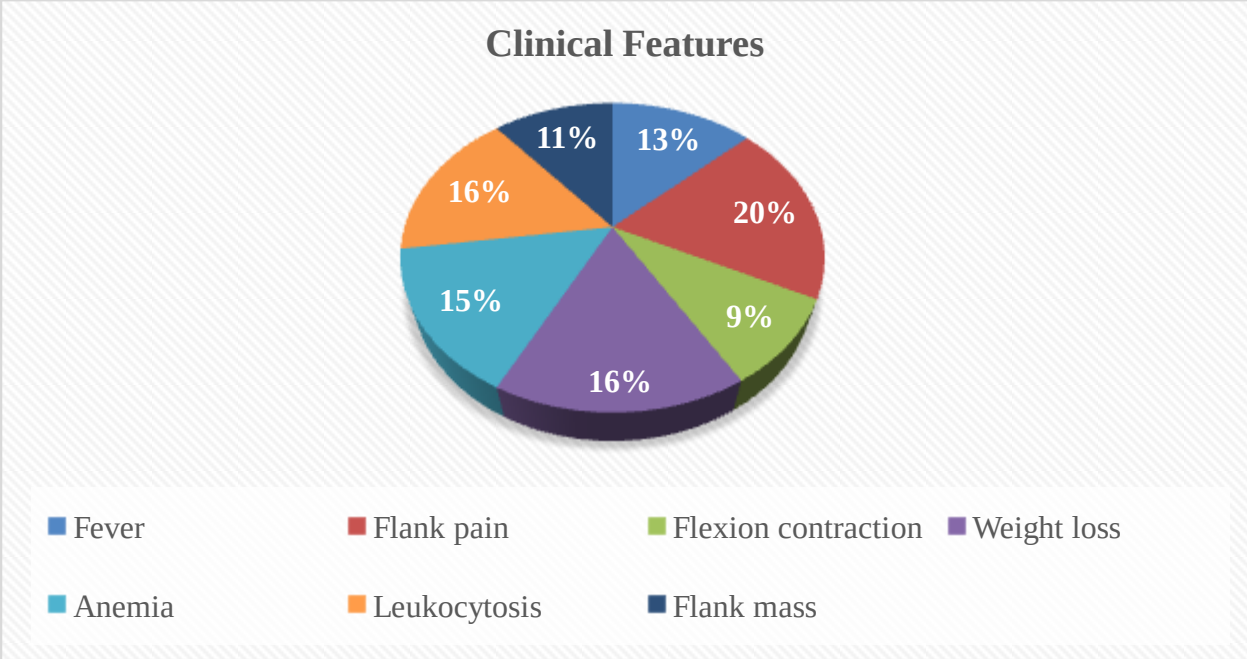


**Figure 1:-** Clinical presentation of patients on admission (relevant table with details of the figure is mentioned underneath).

| Clinical Presentation | No. (%) of patients |
|---|---|
| Fever | 13 (43.3%) |
| Low back/Flank pain | 19 (63.3%) |
| Groin/flank mass | 11 (36.7%) |
| Flexion contraction | 9 (30%) |
| Weight loss | 16 (53.3%) |
| Anemia | 15 (50%) |
| Leukocytosis | 16 (53.3%) |

Positive blood cultures were obtained from thirteen patients (43.3%), and positive pus cultures were obtained from sixteen patients (53.3%) Of the 30 patients, four (13.3%) initially had negative US findings. CT scans confirmed the clinical diagnosis of all patients, who were managed via drainage and antibiotic therapy. Investigation results are shown in Table 1.

| Investigations Results | No. (%) Of patients |
|---|---|
| Positive blood culture | 13 (43.3%) |
| Positive pus culture | 16 (53.3%) |
| Positive urine culture | 2 (6.7%) |
| Positive CBNAAT for pus | 11 (36.7%) |
| Positive CBNAAT for sputum | 3 (10%) |
| Size of IPA | |

| | | |
|---|---|---|
| | < 5cm | 4 (13.3%) |
| | 5-10cm | 20 (66.7%) |
| | 10-20cm | 4 (13.3%) |
| | 20-30cm | 2 (6.7%) |
| Uniloculated | | 20 (66.7%) |
| Multiloculated | | 10 (33.3%) |
| Easily accessible | | 25 (83.3%) |
| Difficult to access | | 5 (16.7%) |

**Table 1:-** Investigation results of patients.
IPA = Iliopsoas abscess

In all, eight patients (26.7%) underwent open surgical drainage, and twenty two (73.3%) received PCD under US guidance. No patient received antibiotics alone. No drainage-related complications were noted (Table 2).

**Table 2:-**Characteristics and outcomes of patients according to treatment received Data is presented as mean (range) or n (%); n = number; PCD = percutaneous drainage

| | **Open drainage (n=8)** | **PCD (n=22)** | **P value** |
|---|---|---|---|
| Primary | 7 (87.5) | 10 (45.5) | |
| Secondary | 1 (12.5) | 12 (54.5) | |
| Length of stay (days) | 12 (6-18) | 8.5 (5-14) | p=0.031 |
| Drainage time (days) | 5.3 (4-7) | 15.4 (4-29) | P=0.018 |
| Recurrence | 0 | 3 (13.6) | P=0.264 |
| Mortality | 0 | 0 | 0 |

The average duration of drainage was 12.6 days (range: 4–45 days). The average duration differed between those treated via PCD and open drainage (15.4 days (range 4-29 days) vs. 5.3 days (range 4–7 days); p = 0.018)). Further, the average duration of drainage was significantly higher in secondary than primary IPA (p = 0.027) (Table 3)

**Table 3:-** Characteristics and outcomes of primary and secondary IPA patients Data is presented as mean (range) or n (%); IPA = iliopsoas abscess; n = number; PCD = percutaneous drainage.

| | **Primary IPA** | | | **Secondary IPA** | | |
|---|---|---|---|---|---|---|
| | Open Drainage (n = 6) | PCD (n = 11) | p value | Open Drainage (n = 2) | PCD (n = 11) | p value |
| Length of stay(days) | 11.1 (6-17) | 9 (5-12) | 0.117 | 18 | 8.1 (5-14) | 0.109 |
| Drainage time (days) | 5.1 (4-7) | 11.6 (4-22) | 0.023 | 6 | 18.7 (5-45) | 0.206 |
| Recurrence | 0 | 2 (18.2) | 0.343 | 0 | 1(9.1) | 0.909 |
| Mortality | 0 | 0 | | 0 | 0 | |

The average length of stay in the hospital was 9.5 days (range: 5–18 days). 8.5 days (range: 5-14 days) vs. 12.1 days (range: 6-18 days), or less, were spent in the hospital for PCD patients compared to open drainage patients (p = 0.031). Outpatient follow-up typically lasted 7.4 months (5–22 months). The overall recurrence rate was 10% (3/30). No recurrence was noted in patients treated via open surgical drainage. Of the 22 patients who underwent PCD, three (13.6%) presented with recurrences 3-6 months into their follow-up periods. Under US direction, two primary IPA cases and one secondary IPA (spinal tuberculosis) patient who recurred were effectively treated with a repeat PCD. No mortality was recorded.Our study included a female patient of age 25 yrs in sixth month of gestation with right iliopsoas abscess and flexion deformity which was managed with adequate antibiotics and PCD, followed by physiotherapy. Patient was discharged with improved condition. No recurrence was noted on subsequent followup and delivered the baby at term in good health. Table 4 compares US-guided PCD and open drainage in patients with primary and secondary IPA.

**Table 4:-**Comparison of the US-guided PCD and open drainage in patients with primary and secondary IPA Data is presented as mean (range) or n (%); n = number.

| | **Primary (n=17)** | **Secondary (n=13)** | **P value** |
|---|---|---|---|
| Age (years) | 30.1 (19-60) | 30.5 (18-55) | 0.772 |
| Sex | | | |
| Male | 12 (70.6%) | 7(53.8%) | |
| Female | 5 (29.4%) | 6 (46.2%) | |
| Length of stay (days) | 9.8 (5-17) | 9 (5-18) | 0.583 |
| Drainage time(days) | 9.1 (4-22) | 17.5 (5-45) | 0.027 |
| Recurrence | 2 (11.8%) | 1 (7.7%) | 0.738 |
| Mortality | 0 | 0 | |

## Discussion:-

In 1992, 12 cases per year of IPA were reported worldwide, significantly higher than the 3.9 cases per year prior to 1985.[12] The true incidence of the condition is unknown.[13] However, the literature indicates that the condition is becoming more prevalent worldwide. In 1997, Gupta et al. studied 51 patients in India.[14] Yacoub et al., in 2008, reported on a series of 41 patients in California.[13] In 2009, Tabrizian et al. described a series of 61 patients in New York.[7] Navarro-López et al., in 2009, reported on a large series of 124 patients in Spain.[15] In 2013, Kim et al, described a series of 116 patients in Korea.[3] In 1986, Ricci et al. reviewed 367 cases of IPA described in the literature and found that 70% were primary IPAs (recorded principally in developing countries).[16] Secondary abscesses were exclusive to developed countries. In the present study, 15 (57.7%) cases were primary IPAs, and 11 (42.3%) were secondary IPAs. Medical conditions that trigger immunosuppression (diabetes mellitus, Human Immunodeficiency Virus (HIV) infection, steroid therapy, and chemotherapy) are risk factors for the development of a primary IPA.[10] None of our patients exhibited such risk factors. S. aureus was the most common (66.7%) causative organism in primary IPA patients, consistent with the literature.[1, 10, 12, 15, 16] No methicillin-resistant S. aureus was noted. The most common aetiology of a secondary IPA is Crohn's disease.[7, 16] Wong et al. found that spondylitis (spondylodiscitis with disc involvement) was the most common aetiology of secondary psoas abscesses, none of which were associated with Crohn's disease.[10] Authors found that most (9/11; 81.8%) secondary IPAs were attributable to Mycobacterium tuberculosis, followed by urinary tract infections (2/11; 18.1%). IPAs are frequently missed at initial presentation.[10] In the present study, the classical triad of back pain, limp, and fever was not commonly present; lower back/flank pain was the most common symptom (69.2%) and was usually nonspecific, consistent with previous studies.[6–8, 10, 12, 14] CT is the imaging mode of choice for IPA detection.[5-7, 10, 12, 17] In Tabrizian et al., 89% (54 of 61) of patients were diagnosed by CT.[7] Wong et al, reported that, in 95% (40/42) of all cases, IPAs were diagnosed via CT.[10] Taiwo et al. considered CT to be the diagnostic mode of choice; the sensitivity approached 100%, consistent with our findings.[17] In 1984, Mueller et al. used PCD for the first time to treat an IPA.[18] Imaging-guided PCD is currently used frequently.[11] Although PCD is the preferred strategy for treating IPA, there is ongoing debate over whether IPA PCD should be guided by US or CT. To the best of our knowledge, there isn't a direct comparison of the two methods in the literature. Many clinicians prefer CT guidance because CT reveals the entire abscess, which is not always possible with US because of the interference of overlying bowel gas. In addition, CT permits better visualisation of possible associated pathologies in adjacent structures.[11] In the present study, US-guided PCD cured 73.1% of patients, and the rate of recurrence, retreated successfully via US-guided PCD, was acceptable.

We advise US-guided PCD for the treatment of IPA. The method is affordable, the equipment is widely accessible, the entire process can be handled in real-time, and there is no radiation risk. The overall average drainage time in the current study was 12.6 days. The average duration of PCD was significantly higher than that of open drainage (15.4 vs. 5.3 days). This may be because PCD does not allow for the surgical debridement and complete evacuation of the abscess that are possible with open drainage. Cantasdemir et al. reported a mean PCD duration of 59.7 days.[11] This long period was because the criteria set for catheter removal were very strict and relatively large volumes of abscess were drained compared to those of other studies. Dinc et al. reported an average PCD duration of 12 days.[19] Gupta et al. reported an average PCD time of 11 days in patients with tuberculous iliopsoas abscesses; the figure of Staatz et al., who treated similar patients, was 31.1 days.[14, 20] The present study data are consistent with those of Gupta et al. and Dinc et al.[14, 19] Variations in drainage duration may reflect differences in abscess size and/or catheter diameter. The length of hospital stay was significantly shorter in patients treated via PCD compared to those who had received

open drainage; the overall average length of hospital stay was 9.5 days. Tabrizian et al. reported a mean hospital stay of 25 days, and Cantasdemir et al. reported a mean of 11.5 days.[7, 11] Yacoub et al. [13] reported a median hospital stay of 29 days. The patients in this study spent an average of about the same amount of time in the hospital as Cantasdemir et al. [11] did. The shorter hospital stay in our study may be attributed to the earlier discharge of patients with drainage catheters (particularly those treated with PCD), with follow-up as outpatients, and to the greater use of CT, which has sped up diagnosis. Overall, the recurrence rate in the present study was 11.5% (3/26). Two other studies reported recurrence rates of 14.3% and 9.7%, respectively.[11, 13] In contrast, Baier et al. reported a relatively high recurrence rate of 37.5%. There was no underlying pathology found to explain the recurrence in the present study.[21] However, the reasons for recurrence in those three patients were probably due to the early removal of the drainage catheter. In primary IPAs, the drainage catheter was removed on the 4th postoperative day in one patient and on the 7th in the other patient while for the patient with the tuberculous abscess, the drain was removed on the 5th postoperative day. Kim et al., Tabrizian et al., and Yacoub et al. reported mortality rates of 11.2%, 5%, and 3%, respectively.[3, 7, 13] Baier et al. reported a mortality rate of 15% (6/40); all patients were treated via open-access drainage. Three patients died of sepsis, and three died of cardiac failure (ischemic heart attacks).[21] We did not experience any mortality, possibly because most of the studied patients were young and lacked comorbidities.

## Conclusion:-

US-guided PCD along with appropriate antibiotic therapy is a safe and effective front-line treatment in IPA. However, open surgical drainage is indicated if the IPA is multiloculated or if there is an underlying pathology warranting definitive surgery.

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