

The piriformis abscess: a case-based review

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ABSTRACT

This study reports a 43 years-old man diagnosed with piriformis pyomyositis. A literature review was conducted by searching MEDLINE via Pubmed for English language case reports, published from 8th December 2019 to 20th January 2020. Patients' symptoms, laboratory tests, imaging, treatment, and other comorbidities were evaluated. Thirty-two cases diagnosed with piriformis pyomyositis, of which 21 patients developed piriformis abscess (including one new patient added by us) of which 52.4% were female, and the mean age was 26.98 ± 17.5 . The most common manifestations were fever, lower back pain, and limited ambulation with increased ESR, CRP, or leukocytosis. *Staphylococcus aureus* was the most prevalent (57.14%) pathogen isolated. The authors suggested gynecologic manipulations, muscle overuse, and other co-infections as probable risk factors. However, we fail to find any association between these factors and abscess formation ($p > 0.05$). Piriformis abscess should be regarded as a probable diagnosis in patients with gluteal pain, fever, and limited ambulation that have raised inflammatory markers or leukocytosis. MRI and CT scans are beneficial in diagnosing pyomyositis in early-stage. Full recovery is expected with timely antibiotic and surgical treatments.

Keywords: Bacterial infection; Abscess; Staphylococcal infections; Piriformis muscle syndrome; Pelvic pain

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INTRODUCTION

Skeletal muscle infection is called pyomyositis, which mainly affects Quadriceps, iliopsoas, and gluteal muscles (1). Diagnosis of pelvic muscles infection is challenging regarding its non-specific symptoms and profound anatomical location. Delayed diagnosis increases severe infection and septic shock risk (2). Pyomyositis mostly presents with constitutional symptoms, leukocytosis, and local pain. However, imaging (MRI and CT scan) and laboratory techniques are essential to finalize the diagnosis. Crohn's disease, immunosuppression, and drug abuse are suggested as predisposing factors. Muscle manipulation (during surgery, trauma, or overuse) is also reported in some cases (3-5). A piriformis abscess is a rare form of pyomyositis. Therefore patients' clinical and epidemiological data are limited. We aim to report a case with piriformis abscess and reviewed literature to determine predisposing factors for abscess formation in these patients.

MATERIALS AND METHODS

We searched MEDLINE for English literature from 8th December 2019 to 20th January 2020 using the following keywords: Piriformis pyomyositis, Piriformis abscesses, Myositis Piriformis, Tropical myositis, myositis, tropical, pyomyositis, piriformis muscle syndrome/etiology, staphylococcal infection/diagnosis, pelvic pyomyositis, piriformis muscle syndrome/diagnosis, gluteal pyomyositis, lower limb pyomyositis. We identified additional articles by cross-referencing. The following data for 21 cases (including one new case with piriformis abscess added by us) were extracted: symptoms, laboratory findings, imaging, treatments, and predisposing factors (Table 1). We performed a univariate regression analysis to investigate the predisposing factors and abscess formation association. SPSS 25 was used for data analysis.

Categorical variables are presented as percentages.

CASE PRESENTATION

A forty-three years old man presented with chills, fever, and gluteal pain. The pain was chronic, severe, debilitating, and mostly persist in the gluteal region. It radiated to his left leg and caused a limited range of

motion for one month. Walking, standing, coughing, and sneezing exacerbated the pain while hip forward flexion ameliorate its intensity. He was not a smoker and had no drug addiction. He had no past medical or trauma history. He was not a professional athlete and worked as a hairdresser. Physical examinations showed fever (T: 39°C) and a tender warm fluctuating mass in his left buttock. Other examinations were normal. Laboratory tests revealed; leukocyte count 9.7×10^3 cell/ liter, C-reactive protein (CRP): 82 mg/L and erythrocytes sedimentation rate (ESR): 96 mm/hour. The blood specimen was taken and inoculated into the BacT/Alert FA Plus (aerobic) bottle and incubated in BacT/ALERT 3D system.

Gram-positive cocci were observed in smear microscopy and Gram staining. The bacterial suspension was prepared from the colonial growth on blood agar and subjected to the VITEC 2 system for both identification and drug susceptibility testing of Gram-positive cocci as instructed by the manufacturer (bioMérieux Clinical Diagnostics, France). Finally, methicillin-susceptible *Staphylococcus aureus* (MSSA) was identified. Pelvic MRI showed a low-density area of about 36 × 12 mm in the left piriformis that extended laterally through the great sciatic notch (Fig. 1). These findings were in favor of piriformis abscess in the field of myositis causing sciatic inflammatory neuritis. One Hundred (100 mL) pus was drained from the abscess under the percutaneous method and cultured on sheep blood agar and MacConkey agar. The growth in blood agar yielded *S. aureus* as it was catalase, coagulate and DNase positive in phenotypic test. Identification was confirmed using the VITEK 2 system. The organism was methicillin-susceptible *S. aureus* (MSSA) since the inhibitory zone for cefoxitin disk was >25 mm in agar disk diffusion test as instructed by The Clinical & Laboratory Standards Institute (CLSI).

Ceftriaxone (1 gr) was administered intravenously every 12 hours as an empirical therapy and changed to 2 gr intravenous cefazolin every 8 hours and oral 600 mg rifampin daily. The patient was discharged three weeks later with no complaint. Informed consent had been obtained from the patient.

RESULTS

Thirty-two cases with piriformis pyomyositis were identified of which 20 cases developed piriformis

Table 1. The Piriformis abscess cases characteristics

Author	Case	Symptoms	Rised ESR, CRP, WBC count	Imaging	Aspiration	Predisposing factor	Germ
(Koda, Mannoji et al. 2013)	42 Female	sciatica Pain, fever, limited ambulation	yes	CT and MRI	No	Nurse	no data
(Elhagar, Kamar et al. 2019)	37 Male	fever, sciatica Pain limited ambulation, urinary retention and constipation	yes	CT and MRI	Yes	security officer	<i>S. aureus</i>
(Chong and Tay 2004)	30 Female	sciatica pain, gluteal pain, fever	yes	CT and MRI	No	3 month ago dilatation and curettage for missed abortion	(MSSA)
(Colmegna, Justiniano et al. 2007)	18 Female	Gluteal pain, fever, vaginal discharge, limited ambulation	yes	CT and MRI	Yes	1 month ago dilatation and curettage	<i>S. aureus</i> Group β streptococcus, <i>E. coli</i> , and mixed anaerobes
(Wong, Mullers et al. 2012)	31 Female	sciatica pain, limited straight leg raise (SLR) test, fever	yes	MRI	No	8th day post vaginal delivery	<i>S. aureus</i>
(Wong, Mullers et al. 2011)	45 Female	sciatica pain, fever, limited ambulation	yes	CT	No	No past medical history	<i>S. aureus</i>
(Wong, Mullers et al. 2011)	58 Female	lower back and gluteal pain, fever, chills and rigors	yes	CT	Yes	No past medical history	negative culture
(Hu, Shaw et al. 1998)	16 Female	gluteal pain, limited ambulation, fever, urinary retention	yes	MRI	Yes	No past medical history	<i>S. aureus</i>
(Oh 2016)	19 Male	low back pain, nuchal rigidity, fever and chills	yes	CT and MRI	No	No past medical history	(MSSA)
(Phadke, Gandhi et al. 2017)	21 Male	gluteal pain, fever	yes	MRI MRI	No	No past medical history	<i>Salmonella typhi</i>
(Giebal, Horriat et al. 2012)	8 Male	lower back pain, sciatica pain, impaired ambulation, fever	yes	MRI MRI	No	No past medical history	<i>S. aureus</i>
(Schots, Verlaak et al. 2016)	9 Male	pinpoint pain, fever, painful ambulation	yes	MRI	Yes	3 Weeks ago open blister on his right heel	<i>S. aureus</i>
(Toda, Koda et al. 2016)	6 Male	gluteal pain, fever, sore throat	no data	NO	No	No past medical history	no data negative culture no data
(Miller, Duncan et al. 2011)	2.5 Male	gluteal pain, fever, sciatica pain, fever	yes yes	CT and MRI	No	No past medical history	(MSSA)
(Burkhardt and Hansson 2003)	69 Male	pain, fever	yes	CT	No	After tennis tournament	(MSSA)
(Mori, Mori et al. 2010)	14 Female	pain, limited ambulation, fever	yes	CT	Yes	No past medical history	no data
(Perkethammer, Doherty et al 2005)	31 Female	Progressive pain, limited ambulation anorexia with 15-lb weight loss	yes	CT	No	Crohn's ileitis for 10 years	
(Arai, Kawakami et al. 1999)	14 Male	low back pain, fever	yes	CT	Yes	coincidence with right iliac thrombosis	<i>S. aureus</i>
((Scott, Carlan et al. 2015)	20 Female	gluteal pain at 20 days post partum thigh pain and swelling, limited ambulation	yes	CT	Yes	20 days post vaginal delivery axillary and gluteal furuncles	<i>F. necrophorum</i>
(Ruiz, Yohannes et al. 2005)	33 Female	Chiral pain favor limited ambulation	no data	MRI	No		(MRSA)
PRESENT CASE	43 Male		yes	MRI	Yes	Barber	(MRSA)

Abbreviations IV: intravenous, BD: 2 times a day, TDS: 3 times a day, QID: 4 times a day, *E. coli*: *Escherichia coli*, MRSA: Methicillin-resistant *Staphylococcus aureus*, *S. aureus*: *Staphylococcus aureus*, *F. necrophorum*: *Fusobacterium necrophorum*, ESR: erythrocyte sedimentation rate, CRP: C-reactive protein

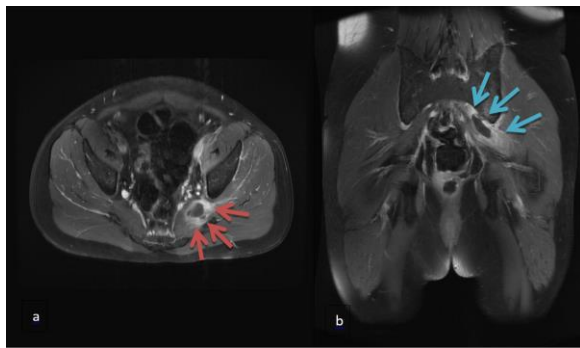


Fig. 1. Contrast-enhanced T1 fat-saturated axial (a, red arrows) and coronal (b, blue arrows) pelvic MRI, illustrating an abscess in left Piriformis muscle; (a) Post contrast axial image, (b) Post contrast coronal image

abscess based on CT/MRI imaging reports. The patients' mean age was 26.98 ± 17.5 (ranging from 3 to 69 years old). 52.4% of the cases were female. The most common manifestations were fever, lower back pain, and limited ambulation with increased ESR, CRP, or leukocytosis. *S. aureus* was the most prevalent (57.14%) isolated pathogen. Despite the authors' assumptions, we fail to find any association between different predisposing factors (gynecologic manipulations, infections, and muscular overuse) and abscess formation ($p > 0.05$).

DISCUSSION

"Piriformis Pyomyositis" is a rare muscular infection. Chiedozi et al. categorized myositis into three phases, including invasive, suppurative, and septic phases. Delayed diagnosis during the invasive phase results in abscess formation that can progress to life-threatening septic shock if it remains untreated (2).

Almost all cases experienced sciatica-like pain because Piriformis muscle inflammation compresses nerves in the surrounding tissue. Fever, lower back pain, and limited range of motion were the most common symptoms (Table 1). A single episode of urinary retention has been described in two patients (6, 7).

Our patient's clinical and laboratory manifestations were in concordance with prior reports. Pathogens spread via blood or the pelvic fascia to the piriformis muscle. The most common isolated organism was *S. aureus* (57.14%), similar to our case (Table 1). However, *Salmonella* Typhi (8), *Fusobacterium necrophorum* (9), *Escherichia coli* and Group b

streptococcus (10) were also reported in some cases.

Several predisposing factors increase myositis risk. Preclinical studies indicated increased vulnerability of traumatized muscles to *S. aureus* infection. Muscular trauma can be induced by its overuse (11). Piriformis pyomyositis has been reported in three athletes following muscular overuse of whom two developed an abscess (12, 13). The authors suggested that repeated movements induced muscular micro-injury and lead to pyomyositis in a swimmer, (11) tennis (12), and a rugby player (13). Poor body postures in some jobs also can hurt pelvic muscles as were described in two cases with piriformis abscess: a 37 years old security officer (6) and a 42 years old nurse (14). We assumed that poor standing posture caused piriformis abscess formation in our patient.

Gynecologic manipulations such as vaginal delivery, unsafe abortion, dilation, and curettage were described in four piriformis abscess cases (9, 10, 15, 16). Furthermore, gluteal furuncle and heel blister were reported in a 32 years old female and 9 years old boy as infection source (9, 17). Crohn's disease which has been the most common cause of iliopsoas abscess was also reported in one case of piriformis abscess (3).

Despite mentioned assumptions, we did not find any statistically significant association between gynecologic manipulations, muscle overuse, and co-infections with piriformis abscess formation ($p > 0.05$). That might be due to the small sample size and disease rareness. Since none of the variables were significantly associated with the outcome measure, multivariate regression analysis was not conducted for determining independent risk factors.

The Piriformis abscess was diagnosed based on imaging technique and impaired laboratory findings in all studies. Computed tomography and MRI successfully demonstrate pyomyositis of the piriformis muscle. We also used Pelvic MRI to confirm the diagnosis in our patient.

Surgical interventions and drainage are needed in patients with pyomyositis whose symptoms remained persistent despite proper treatment with antibiotics (5). Most piriformis abscesses responded well to antibiotic treatment and abscess drainage was only administered in eight cases. However, regarding the advanced phase of infection in our patient, abscess drainage was highly required. The antibiotic regimen and the duration of treatment of piriformis abscess depended on the patient's condition however

most authors used intravenous antibiotics followed by oral therapy for 2 to 6 weeks. Our case was treated with 2-gram intravenous cefazolin and rifampin for three weeks followed by cefalexin for two weeks. All piriformis abscess patients completely recovered following proper antibiotics regimen and timely surgical interventions. Our patient also improved following drainage and antibiotic treatment with no complications in follow-up visits.

The Piriformis abscess should be suspected in patients with gluteal pain, fever, and limited ambulation with raised inflammatory markers or leukocytosis. MRI and CT scans are beneficial in diagnosing pyomyositis in the early-stage and preventing abscess formation. Full recovery is expected with a proper antibiotic regimen and timely surgical intervention.

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