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Ultrasound Assessment of Primary Pyomyositis in a Man with Uncontrolled Type 2 Diabetes: A casereport

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Case Report

Ultrasound Assessment of Primary Pyomyositis in a Man with Uncontrolled Type 2 Diabetes: A Case Report

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A 38-year-old man with uncontrolled type 2 diabetes mellitus complained of a mild painful swelling over the right posterior thigh that had been present for 3 days. He was initially diagnosed as having a right hamstring strain. After a 7-day treatment with non-steroidal anti-inflammatory drugs, the symptoms progressed to a prominent painful swelling over the right posterior thigh. Leukocytosis and high inflammation indices were noted. The ultrasonography of the right posterior thigh showed an ill-defined heteroechoic lesion surrounded by an irregularly thick hyperechoic and hypervascular wall in the muscle layer. The diagnosis was pyomyositis of the right biceps femoris muscle, which was compatible with the finding of a subsequent magnetic resonance imaging. Incision and debridement were performed. The patient was treated with a 7-week regimen of antibiotics and recovered well, without any significant sequelae.

Physicians should become more familiar with this potentially life-threatening disease and appropriately use ultrasound to aid in the early diagnosis and treatment of primary pyomyositis. (Tw J Phys Med Rehabil 2010; 38(4): 247 - 253)

Key Words: primary pyomyositis, ultrasound, type 2 diabetes, trauma

INTRODUCTION

Primary pyomyositis is a subacute and deep bacterial infection of the skeletal muscle that does not develop from either a skin or bone infection and can lead to abscess formation.[1,2] It is common in tropical areas, but is rarely reported in non-tropical areas.[3-5] In Taiwan, there were either a small number of case reports or reports of small series of patients. Thus, the true incidence of pyomyositis has not been determined yet.[6-9] Human immunodeficiency virus (HIV) infection, diabetes mellitus (DM), hematological malignancies, rheumatic disease, steroid utilization, and drug abuse are the major risk factors for the development of pyomyositis.[5,10-13] The etiology of primary pyomyositis is unclear.[14] Transient bacteremia may precede or occur with muscular injury.[14,15] *Staphylococcus aureus* is the most common cultured microbiologic agent.[14,16]

The diagnosis of pyomyositis is often delayed because of its non-specific or misleading signs and symptoms. It is frequently ignored and misdiagnosed as muscle strain, synovitis, sciatica, thrombophlebitis, and neoplasm.[5,14] Appropriate imaging studies aid early diagnosis and treatment, which are important for preventing muscle necrosis, sepsis, and even death.[14] Ultrasonography is useful to localize the lesion and demonstrate the progres-

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sion of pyomyositis and can provide guidance for operations or invasive procedures.[17,18]

Here, we report a case of a man with uncontrolled type 2 DM who sought medical attention for a painful thigh and was diagnosed as having primary pyomyositis.

CASE REPORT

A 38-year-old man was diagnosed by an Endocrinologist in a health examination as having type 2 DM, with no medical control, about 1 year prior to the writing of this report. He visited a rehabilitation clinic because of a sudden onset of pain in his right posterior thigh 3 days before the visit. The patient denied having fever, chest pain, shortness of breath, or other constitutional symptoms. There were no history of recent trauma, heavy exercise, recent travel, animal contact, or injection drug use. He works as a structural engineer and has to climb up and down stairs frequently. On physical examination, there was tenderness, a little noticeable swelling, local heat, and erythematous change over his right posterior thigh. A normal walking gait and a full range of motion, with some discomfort when flexing his right knee, were also noted.

Since a right hamstring strain was initially diagnosed, a 7-day course of non-steroidal anti-inflammatory drugs and muscle relaxants was suggested. This management, however, was unsuccessful. The patient subsequently visited our clinic and complained of severe painful swelling over the right posterior thigh. A physical examination disclosed diffuse tenderness, marked swelling, local heat, and erythematous change, with a wooden consistency, over his right posterior thigh. Laboratory data revealed an elevated white blood cell count of 17970/μL with 81.3% neutrophils, a decreased hemoglobulin level of 13.4 g/dL, an increased erythrocyte sedimentation rate of 46 mm/h, an elevated serum C-reactive protein level of 13.4 mg/dL, an elevated blood glucose level of 364 mg/dL checked after meal, and an elevated glycohemoglobin of 13.7%.

Ultrasound (Envisor; Philips Ultrasound, Bothell, WA, USA) with a 7- to 12-MHz transducer was used to examine the patient. Ultrasonography of the right posterior thigh showed an ill-defined heteroechoic lesion surrounded by an irregularly thick hyperechoic wall in the muscle layer (Figure 1A and 1B). Color Doppler imaging revealed peri-focal hypervascularity around the lesion (Figure 2). The diagnosis was an abscess at the right biceps femoris muscle. A subsequent magnetic resonance imaging (MRI) also demonstrated an intramuscular abscess of 14 × 7 cm at the right biceps femoris muscle with generalized subcutaneous edema at the right posterior thigh (Figure 3A and 3B), which was compatible with the diagnosis of the ultrasonography.

Incision and debridement of the muscle were done. Histologic examination of the surgical specimen showed conspicuous tissue necrosis with dense acute and chronic inflammatory cell infiltration. Pus culture results showed the growth of methicillin-sensitive *S. aureus*. Based on the clinical presentation, laboratory data, imaging findings, histological findings, and the result of the pus culture, the final diagnosis was primary pyomyositis of the right biceps femoris muscle. The patient was treated with intravenous antibiotics for 10 days and oral antibiotics over the subsequent 39 days. He recovered well, without any significant sequelae after completing the therapy.

DISCUSSION

Poorly controlled DM is the predominant risk factor for primary pyomyositis.[19,20] The incidence of pyomyositis in type 2 DM patients has been reported as high as 31%.[2] In a previous study, DM was reported to be the most common underlying disease of pyomyositis.[21] Depressed neutrophil function and impaired cell-mediated immunity are related to the increased risk of the development of pyomyositis in diabetes.[21,22] In a previous study, only 2 muscle abscesses were found in 327 patients who had died of Staphylococcal septicemia.[23] Bacteremia alone is incapable of causing intramuscular abscesses.[1,23] A blunt trauma to the affected muscle or vigorous exercise, resulting in alteration of the local muscle structure, may be a causative factor.[14,15] The abnormal muscle tissue structure is susceptible to opportunistic superinfection via transient bacteremia.[24] A history of trauma to the affected muscles was reported in 10-66% of pyomyositis cases.[1,13,15] Trauma was also the second leading predisposing factor of pyomyositis.[21] The uncontrolled DM and overuse of the muscles of the patient's lower extremities, which compromised the muscle structure, may have led him to be more susceptible to bacteremic infection

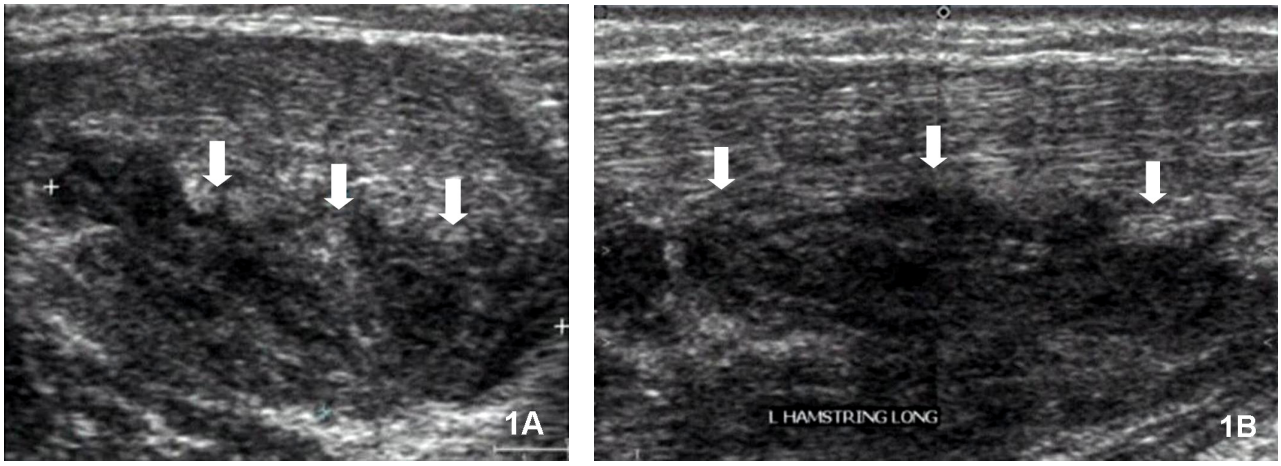

Figure 1. Ultrasonography of the right posterior thigh shows an ill-defined heteroechoic lesion (arrow) surrounded by a irregularly thick hyperechoic wall in the muscle layer. (A) transverse view, (B) longitudinal view.

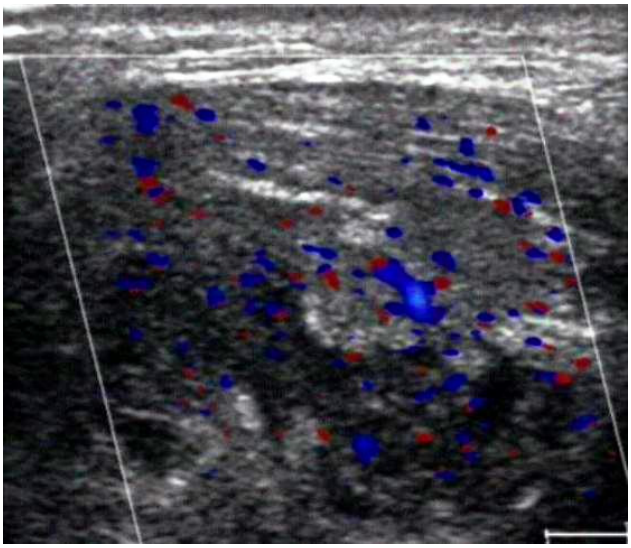

Figure 2. Color Doppler imaging of the right posterior thigh shows an ill-defined heteroechoic lesion with perifocal hypervascularity.

and the development of primary pyomyositis.

S. aureus is the most common pathogen in pyomyositis, representing up to 90% of cases.[14,16] Other pathogens include Streptococci, Escherichia coli, Salmonella enteritidus, and Mycobaterium tuberculosis.[14] As shown in this case, pyomyositis usually involves the largest muscle groups around the pelvic girdle and lower extremities.[14] A single muscle is often affected, although the involvement of multiple sites was reported in 12-43% of patients.[1,16,25] The most commonly involved muscle groups are the quadriceps, glutei, and iliopsoas, in decreasing order of frequency.[16]

Pyomyositis has 3 distinct clinical stages, which progress from non-specific symptoms to a septic state.[14,16,26] The first stage begins with the insidious onset of dull cramping and progressive pain in the affected area, as well as low-grade fever. One to 2 weeks later, the second stage is characterized by abscess formation with the local and systemic manifestations of infection. The affected area is tender and fluctuant and the overlying skin is swollen, erythematous, and warm. Our patient presented the first stage at the beginning, and the disease progressed to the second stage 7 days later. If pyomyositis is not treated in the second stage, it may progress to the third stage, with signs of toxicity, septic shock, and sometimes death.

A routine laboratory evaluation for pyomyositis is rarely helpful and often non-specific.[5] Leukocytosis with a left shift was found in 50% of patients,[27] and C-reactive protein may be elevated.[1] Blood cultures are positive in 5-31% of cases[14,27] and elevated muscle enzyme levels are uncommon, with a rate of 13-25%.[5]

Imaging studies are helpful in establishing a diagnosis. Ultrasonography has also been used for the diagnosis of pyomyositis.[14,17,28] Two distinctive and complementary echographic patterns of pyomyositis had been reported.[17] In the early stage, the sonographic findings of

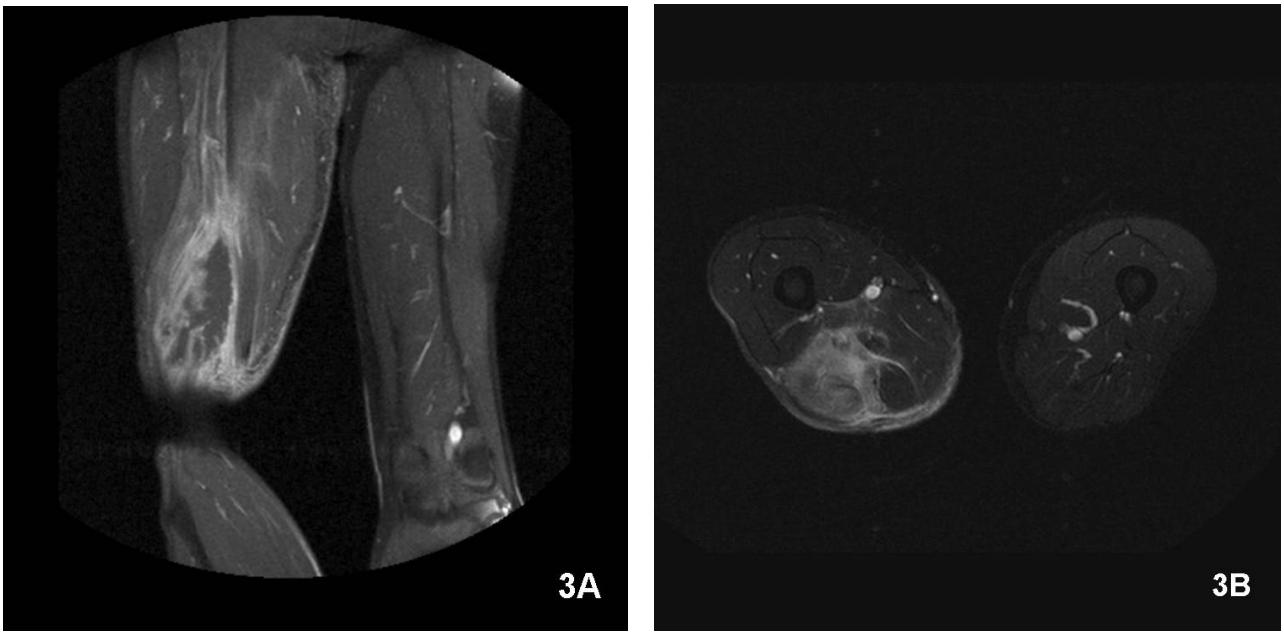

Figure 3. Post-contrast coronal T1-weighted fat saturated (FS) MRI reveals peripheral marginal contrast enhancement (A) and axial T2-weighted FS image reveals heterogenous hyperintensity (B) at the right biceps femoris muscle. Subcutaneous edema at posterior aspect of the entire right thigh is noted.

pyomyositis reveal a bulky muscle with diffuse hyperechogenicity with or without localized hypoechogenicity, which represents severe muscle edema or early necrosis.[18] Diffuse hyperemia is also manifested.[18] In the later stage, ultrasonography shows a focal, complex intramuscular fluid collection of mixed echogenicity, which may be surrounded by a thick hyperechoic wall.[29,30] Color Doppler imaging reveals variable hypervascularity of the abscess wall and the immediate surrounding tissues.[18,29,30] Septations are frequently present as a feature of a more chronic, low-grade infection.[18,29,30] Sometimes air bubbles appear as small hyperechoic foci with dirty shadowing.[18,30] Ultrasound is useful for differentiating the two different stages of the disease.[17]

It is difficult to differentiate pyomyositis from non-infective inflammatory muscle conditions or tumors because the sonographic findings are usually non-specific. The sonographic findings of pyomyositis, idiopathic inflammatory myopathy, muscular sarcoidosis, tumor necrosis, and diabetic muscle infarct all reveal a hypoechoic area.[18,31-35] Hypervascularity is demonstrated in the ultrasonography of pyomyositis, intramuscular well-differentiated liposarcoma, and hemangioma.[18,36-38] Abscess formation is not a feature of idiopathic inflammatory myopathy and diabetic muscle infarct, but of pyomyositis.[29-31,35] Calcifications are evident in chronic dermatomyositis and hemangioma.[37-39] The sonographic findings of well-differentiated liposarcoma show evenly distributed, multiple, fine echogenic lines in the tumor.[36] Ultrasound can be used as a first-line screening tool for pyomyositis, but a definite diagnosis is still based on the result of a biopsy.

Ultrasound can also provide guidance for aspiration, drainage, and biopsy, and thus help in making a definite diagnosis for pyomyositis.[7,18,29] It can accurately localize the abscess and provide important information about its position and size in order to help in deciding when and where to perform aspiration or incision and drainage.[7,18,29] A muscle abscess may manifest as quite solid without any clearly discernible fluid by ultrasonography, yet still yield pus on aspiration.[18] Because it is difficult to make a definite diagnosis of pyomyositis based only upon ultrasonography, a MRI was arranged for this patient. MRI is the imaging modality of choice for the diagnosis of pyomyositis.[14,26,30] It clearly demonstrates diffuse muscle inflammation with increased signal inten-

sity on T2-weighted images and abscess formation by the use of Gadolinium enhancement.[14,30,40] MRI is also useful in differentiating other pathological processes, such as infectious arthritis, osteomyelitis, hematoma, or soft-tissue tumor.[14] In addition to MRI, computerized tomography is a diagnostic tool often used for the detection of pyomyositis.[6,9]

The choice of treatment for pyomyositis depends on its stage at presentation. During the early stage, the treatment could be intravenous antibiotics alone.[14,41] Once an abscess has formed, drainage, or surgical debridement, accompanied by parenteral antibiotics, are still the gold standard treatments.[14,26] Intravenous antibiotics are usually given for 7 to 10 days.[14] After the patient becomes stabilized, oral antibiotics are then given for a period of 5 to 6 weeks.[14,16]

Complete recovery without long-term sequelae has been reported in most cases of pyomyositis.[3,14-16] Despite advances in the diagnosis and treatment of this disease, the reported mortality rate varies from 0.5% to 17.9%.[13,16,21,26] The long-term sequelae include osteomyelitis of the adjacent bones, muscle scarring, residual weakness, and functional impairment. A defect at the infected area may also occur.[14]

CONCLUSION

Primary pyomyositis is an uncommon disorder and can be fatal. We hope that this report will help physicians to become familiar with pyomyositis and to consider the disease as one of the possible problems that may arise in diabetic patients with localized muscle pain. The use of ultrasound as a first line screening can possibly result in the early diagnosis and treatment of primary pyomyositis.

REFERENCES

1. Christin L, Sarosi GA. Pyomyositis in North America: case reports and review. Clin Infect Dis 1992;15:668-77.
2. Patel SR, Olenginski TP, Perruquet JL, et al. Pyomyositis: clinical features and predisposing conditions. J Rheumatol 1997;24:1734-8.
3. Geelhoed GW, Gray H, Alavi IA, et al. Pyomyositis: tropical and nontropical. N Engl J Med 1971;284:853-4.
4. Kerrigan KR, Nelson SJ. Tropical pyomyositis in eastern Ecuador. Trans R Soc Trop Med Hyg 1992;86:90-1.
5. Crum NF. Bacterial pyomyositis in the United States. Am J Med 2004;117:420-8.
6. Chen WS, Wan YL. Iliacus pyomyositis mimicking septic arthritis of the hip joint. Arch Orthop Trauma Surg 1996;115:233-5.
7. Chu CK, Yang TL, Tan CT. Tuberculous pyomyositis of the temporal muscle in a nonimmunocompromised woman: diagnosis by sonography. J Laryngol Otol 2004; 118:59-61.
8. Chiu SK, Lin JC, Wang NC, et al. Impact of underlying diseases on the clinical characteristics and outcome of primary pyomyositis. J Microbiol Immunol Infect 2008; 41:286-93.
9. Jou IM, Chiu NT, Yang CY, et al. Pyomyositis-with special reference to the comparison between extra- and intrapelvic muscle abscess. Southeast Asian J Trop Med Public Health 1998;29:835-40.
10. Rodgers WB, Yodlowski ML, Mintzer CM. Pyomyositis in patients who have the human immunodeficiency virus. Case report and review of the literature. J Bone Joint Surg Am 1993;75:588-92.
11. Yoneda M, Oda K. Type 2 diabetes complicated by multiple pyomyositis. Intern Med 2003;42:174-7.
12. Hoyle C, Goldman JM. Pyomyositis in a patient with myeloma responding to antibiotics alone. J Intern Med 1993;233:419-21.
13. Gomez-Reino JJ, Aznar JJ, Pablos JL, et al. Nontropical pyomyositis in adults. Semin Arthritis Rheum 1994; 23:396-405.
14. Bickels J, Ben-Sira L, Kessler A, et al. Primary pyomyositis. J Bone Joint Surg Am 2002;84:2277-86.
15. Hall RL, Callaghan JJ, Moloney E, et al. Pyomyositis in a temperate climate, presentation, diagnosis, and treatment. J Bone Joint Surg Am 1990;72:1240-4.
16. Chiedozi LC. Pyomyositis. Review of 205 cases in 112 patients. Am J Surg 1979;137:255-9.
17. Belli L, Reggiori A, Cocozza E, et al. Ultrasound in tropical pyomyositis. Skeletal Radiol 1992;21:107-9.
18. Chau CL, Griffith JF. Musculoskeletal infections: ultrasound appearances. Clin Radiol 2005;60:149-59.
19. Pozzilli P, Leslie RD. Infections and diabetes: mechanisms and prospects for prevention. Diabet Med 1994; 11:935-41.
20. Walling DM, Kaelin WG Jr. Pyomyositis in patients

with diabetes mellitus. Rev Infect Dis 1991;13:797-802.

21. Yang CC, Hsieh SC, Hsu PN, et al. Clinical characteristics and treatment of pyomyositis: review of 39 cases in a medical center in northern Taiwan. J Rheumatol ROC 2006;20:57-67.
22. Wierusz-Wysocka B. Disturbances of neutrophil granulocyte function in diabetics. Part II. Mechanisms responsible for impaired neutrophil granulocyte functions. Mater Med Pol 1988;20:255-7.
23. Smith IM, Vickers AB. Natural history of 338 treated and untreated patients with staphylococcal septicaemia (1936-1955). Lancet 1960;1:1318-22.
24. Steiner JL, Septimus EJ, Vartian CV. Infection of the psoas muscle secondary to Streptococcus pneumoniae infection. Clin Infect Dis 1992;15:1047-8.
25. Brown JD, Wheeler B. Pyomyositis. Report of 18 cases in Hawaii. Arch Intern Med 1984;144:1749-51.
26. Chauhan S, Jain S, Varma S, et al. Tropical pyomyositis (myositis tropicans): current perspective. Postgrad Med J 2004;80:267-70.
27. Fan HC, Lo WT, Chu ML, et al. Clinical characterictics of Staphylococcal pyomyositis. J Microbiol Immunol Infect 2002;35:121-4.
28. Datz FL, Lewis SE, Conrad MR, et al. Pyomyositis diagnosed by radionuclide imaging and ultrasonography. South Med J 1980;73:649-51.
29. Campbell SE, Adler R, Sofka CM. Ultrasound of muscle abnormalities. Ultrasound Q 2005;21:87-94.
30. Turecki MB, Taljanovic MS, Stubbs AY, et al. Imaging of musculoskeletal soft tissue infections. Skeletal Radiol 2010;39:957-71.
31. Weber MA. Ultrasound in the inflammatory myopathies. Ann N Y Acad Sci 2009;1154:159-70.
32. Tohme-Noun C, Le Breton C, Sobotka A, et al. Imaging findings in three cases of the nodular type of muscular sarcoidosis. AJR Am J Roentgenol 2004;183:995-9.
33. Otake S. Sarcoidosis involving skeletal muscle: imaging findings and relative value of imaging procedures. AJR Am J Roentgenol 1994;162:369-75.
34. Hartman DS, Hayes WS, Choyke PL, et al. From the archives of the AFIP. Leiomyosarcoma of the retroperitoneum and inferior vena cava: radiologic-pathologic correlation. Radiographics 1992;12:1203-20.
35. Delaney-Sathy LO, Fessell DP, Jacobson JA, et al. Sonography of diabetic muscle infarction with MR imaging, CT, and pathologic correlation. AJR Am J Roentgenol 2000;174:165-9.
36. Ishida H, Naganuma H, Konno K, et al. Retroperitoneal liposarcoma: sonographic findings. Abdom Imaging 2000; 25:554-8.
37. Hwang S, Adler RS. Sonographic evaluation of the musculoskeletal soft tissue masses. Ultrasound Q 2005; 21:259-70.
38. Kang B, Du J, Huang J. Ultrasonographic diagnosis of hemangiomas of soft tissue. J Tonji Med Univ 1997; 17:168-71.
39. Reimers CD, Finkenstaedt M. Muscle imaging in inflammatory myopathies. Curr Opin Rheumatol 1997;9: 475-85.
40. Trusen A, Beissert M, Schultz G, et al. Ultrasound and MRI features of pyomyositis in children. Eur Radiol 2003;13:1050-5.
41. Peckett WR, Butler-Manuel A, Apthorp LA. Pyomyositis of the iliacus muscle in a child. J Bone Joint Surg Br 2001;83:103-5.

以超音波評估原發性膿性肌炎於一位未受控制第二型糖尿病男性病患：病例報告

李亞眞　塗雅雯　吳韋廷　韓紹禮

汐止國泰綜合醫院復健科

一位 38 歲第二型糖尿病未受控制的男性患者，因右側後大腿輕微腫痛 3 天而求診。最初診斷爲右側腿後肌拉傷，經過一個星期的消炎止痛藥治療後，其臨床症狀進展爲顯著的右側後大腿腫痛，並有白血球及發炎指數升高的現象。超音波顯示右側後大腿有一邊界不明、混合回音的病灶，其周圍爲厚度不規則、高回音且高血流的組織，診斷爲右側股二頭肌膿性肌炎，與後續的核磁共振檢查結果相符。病患接受切開及擴創術，及七週的抗生素治療後，復原良好並無任何後遺症。

臨床醫師應該更熟悉此一可能危及性命的疾病，且適當地使用超音波來幫助早期診斷及早期治療膿性肌炎，以降低此疾病長期併發症的產生。（台灣復健醫誌 2010；38(4)：247 - 253）

關鍵詞：原發性膿性肌炎(primary pyomyositis)，超音波(ultrasound)，第二型糖尿病(type 2 diabetes)，外傷(trauma)

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