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Diagnosis of an Aneurysm by Musculoskeletal Ultrasonography: A casereport

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Case Report

Diagnosis of an Aneurysm by Musculoskeletal Ultrasonography: A Case Report

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High resolution musculoskeletal ultrasonography has been a comprehensive tool for differentiation of soft tissue mass. However, it is not commonly used as a standard examination in the diagnosis of an aneurysm. We present a case of a growing mass in the medial aspect of the left thigh status post internal fixation of periprosthetic fracture. Initial examination with a 10 MHz linear array probe revealed a blurred hypoechoic lesion at a depth of 5 cm. After switching to a 7.5 MHz curve-linear array probe, we found a well-defined, ovoid, hypoechoic cystic lesion with posterior enhancement. In color Doppler mode, a half-blue/half-red swirling signal inside the lesion with pulsation was noted. Angiography showed an aneurysm of the left deep femoral artery with extravasation. After trans-artery embolization and debridement, the symptom of left thigh swelling improved. We conclude that the key to accurate diagnosis of this case is proper application of probes of various array and frequency, and Doppler mode. (Tw J Phys Med Rehabil 2007; 35(3): 159 - 163)

Key words: aneurysm, soft tissue mass, musculoskeletal ultrasonography

INTRODUCTION

A growing soft tissue mass developing within one month around an operative area may have various etiologies, including hematoma, abscess, iatrogenic foreign body inflammatory process and iatrogenic aneurysm. Aneurysm of the femoral artery has been a complication of internal fixation of femoral fracture, [1-3] periprosthetic fracture [4] and total-hip replacement surgery. [5] The symptoms of femoral artery aneurysm include localized swelling, bruising and pain in the groin or medial aspect of the thigh. The most common sign is a localized palpable mass that may or may not be pulsatile. A new bruit and/or a palpable thrill may also be a sign. [6]

To define the mass nature, musculoskeletal ultrasonography may be the first choice of image study because of its low cost, convenience, non-invasiveness and radiation-free characteristics. High resolution musculoskeletal ultrasonography has been a comprehensive tool for differentiation of soft tissue mass. [7,8] However, it is not commonly used as a standard examination in the diagnosis of an aneurysm. Color Doppler is the procedure of choice for the diagnosis of artery aneurysms. [9]

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CASE REPORT

A 76-year-old man, who had a past medical history of cerebrovascular disease with neurological deficit of left hemiplegia, suffered a fall resulting in left femoral neck fracture in July 2004. He underwent surgical treatment with left hip bipolar hemiarthroplasty. Unfortunately, he fell again with impaction to his left hip in December 2005. The X-ray showed a periprosthetic fracture. Internal fixation with plate, screw and cable was then performed. During the period of clinical follow up, a growing, deep mass in the medial aspect of the left thigh developed over one month. Progressive swelling of the left thigh finally made him wheelchair-bound. However, he did not complain of pain. He was referred for ultrasonographic examination of the mass.

For the initial examination, we used a 10 MHz linear array probe and found a 4-5 cm deep hypoechoic lesion (Figure 1). The boundary could not be shown entirely in both transverse and longitudinal views despite adjusted parameters including depth, gains and focus. For further study of the mass, we changed transducer to a 7.5 MHz curve-linear array for a deeper and broader image. Finally, we found a 4.7x5.0 cm (Figure 2) / 5.2x3.5 cm (Figure 3), well-defined, round shaped, non-compressible, hypoechoic, cystic lesion with posterior enhancement at a depth of 5-9 cm close to the femoral cortex. Fine floating particles were also shown dynamically inside the cystic lesion. In color Doppler mode, we found a half-red/half-blue swirling pattern inside the cystic lesion with pulsation (Figure 4, 5). A well-defined cystic mass with turbulent flow indicates an aneurysm. [10] Completely opposite directions of flow within a cystic lesion also implies an impression of aneurysm. Several lobulated areas with heterogeneous echotexture surrounding the cystic lesion were also noted and extravasation was suspected. We suggested further angiography study for a definite diagnosis.

Angiography 9 days later revealed an aneurysm of the distal muscular branch of the left deep femoral artery with extravasation (Figure 6). Trans-arterial embolization with two stainless steel coils was performed at the same time. Three days later, debridement of the extravasation hematoma from the aneurysm was also performed. After treatment, the swelling subsided and the patient gradually regained his walking ability.

DISCUSSION

Vascular injury is a rare but serious complication encountered after total hip arthroplasty and revision. Most reported cases of vascular injury are acute in onset and often are secondary to a direct injury during the operative procedure. [11-14] Reports in the literature have described multiple mechanisms of injury. They can be broadly classified into two groups: acute vascular injury and delayed vascular injury. Acute onset vascular injury may occur intraoperatively secondary to direct trauma from surgical instruments. Delayed vascular injury can result from postoperative trauma to vessels. [15]

An aneurysm of the deep femoral artery frequently presents late as a pulsating, expanding swelling of the upper thigh with an audible bruit. Potential complications include expansion and extensive soft tissue destruction, and pressure to neighboring structures resulting in neuropathy or venous outflow obstruction and thrombosis. Rupture and severe hemorrhage, infection of the aneurysm and sepsis of the nearby prosthesis, as well as fracture non-union, have also been reported. [16] Our patient did not feel pain from the growing mass, only localized swelling. As the potential aneurysm was detected early, the following angiography confirmed the diagnosis and disclosed extravasation with huge hematoma, which might have led to local compression of the femoral sheath of the nerve and vessels, and to uncontrolled anemia. Early detection of the aneurysm by ultrasonography led to a better prognosis.

For a post-operative growing mass near the operative region, physicians should consider ultrasonography as the first choice for differentiation. Ultrasonography is an image study with many advantages, including low cost, convenience, non-invasiveness, and radiation-free and dynamic characteristics. In this case, using a standard 10 MHz linear array probe, the mass could not be shown entirely and the inner characteristics could not be seen despite adjustment of the gain, focus and depth. While deeper penetration of the ultrasound beam and broader coverage of the examination field were taken into account, we changed to a probe with a lower frequency but deeper penetration and curve-linear array for a wider view. With these changes, the internal echotexture of the mass

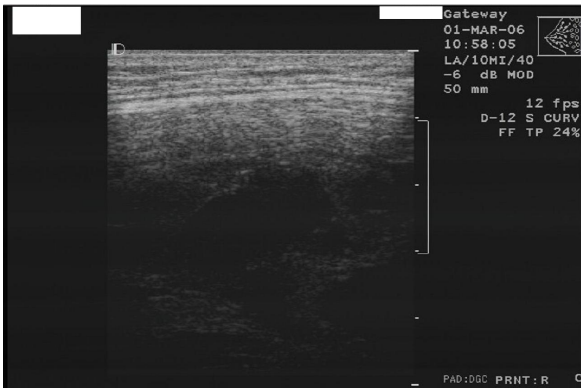

Figure 1. Using a 10 MHz linear array probe. A huge soft tissue mass located in the deep layer of the quadriceps muscle in the left upper medial thigh (3-5 cm in depth).

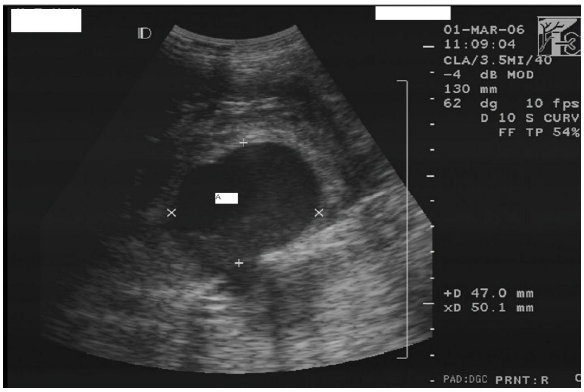

Figure 2. Using a 7.5 MHz curve-linear array probe. A well-defined hypoechoic lesion (A) measuring 47 x 50 mm, with posterior enhancement in transverse view.

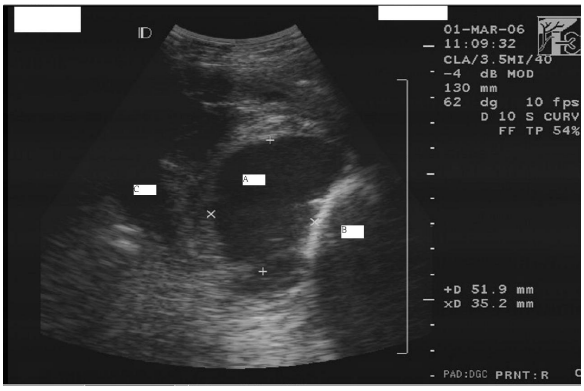

Figure 3. Using a 7.5 MHz curve-linear array probe. The same lesion (A) measuring 52 x 35 mm in longitudinal view, close to the femoral cortex (B). A large area of heterogeneous echotexture surrounding the cystic lesion (C).

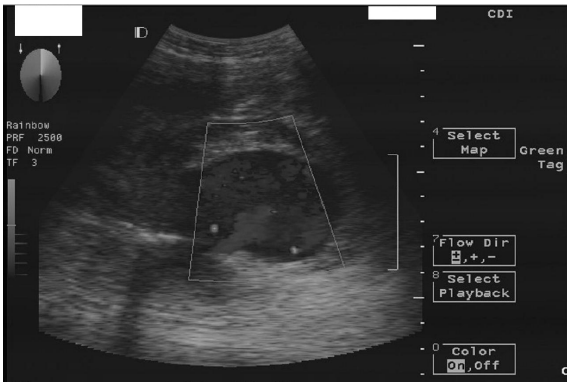

Figure 4. Color Doppler mode. In longitudinal view, completely opposite directions of flow within a cystic lesion appearing as a swirling pattern.

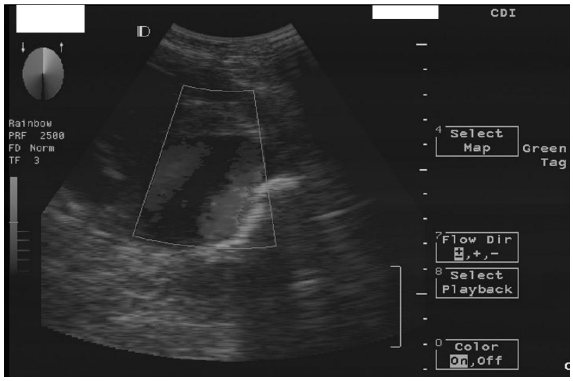

Figure 5. Color Doppler mode. In transverse view, completely opposite directions of flow within a cystic lesion.

Figure 6. Angiography of the left femoral artery. Arrow A shows an aneurysm of the muscular branch of the deep femoral artery near a circuit of wire cable. Arrow B shows contrast accumulation outside the aneurysm, which implies extravasation.

became more visible and then led us to use Color Doppler mode for vascular information. In color Doppler mode, we found a half-red/half-blue swirling pattern inside the cystic lesion with pulsation. Completely opposite directions of flow within a cystic lesion implies an impression of aneurysm. This was the key to correct diagnosis and further treatment.

CONCLUSION

High resolution musculoskeletal ultrasonography has been used as the first line tool for differentiating soft tissue mass but finding an aneurysm is very uncommon. Using a proper probe with adequate sound beam frequency/penetration, an array that depicts a wider view and color Doppler imaging techniques showing vascular flow will lead to a more accurate diagnosis.

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利用肌肉骨骼超音波診斷出動脈瘤：病例報告

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高解析度肌肉骨骼超音波雖已廣泛用於腫塊的鑑別診斷，但第一線即診斷出動脈瘤並不常見。

本病例為 76 歲男性，民國 93 年 7 月跌倒後造成左側股骨頸骨折，接受髖關節人工關節置換手術。不慎又於 94 年 12 月跌倒撞擊左髖，導致植入體周邊骨折，再次做內固定手術。術後追蹤期間，發現大腿內側有一逐漸變大之深部腫塊，安排超音波檢查。

我們用 10MHz 線性探頭，只隱約在 5 公分深處看到模糊的低回音區，改用 7.5MHz 弧線形探頭，清楚看到 5 到 9 公分深處有大片異質回音區，及一個邊緣清楚、圓形、水囊性、低回音腫塊，腫塊深部有後方強化現象。在彩色都卜勒超音波下，可明顯見到腫塊內有紅藍各半邊之渦流訊號且有脈動。血管攝影確定為深股動脈之遠端肌肉分枝有動脈瘤，合併有血液外滲之情形，配合當場動脈栓塞及後續手術清瘡，患者症狀及功能顯著改善。

靈活運用不同頻率、深度、排列的探頭，加上彩色都卜勒超音波，是本例正確診斷及治療成功的最大關鍵。（台灣復健醫誌 2007；35(3)：159 - 163）

關鍵詞：動脈瘤(aneurysm)，軟組織腫塊(soft tissue mass)，肌肉骨骼超音波(musculoskeletal ultrasonography)

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