CASE REPORT

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Ultrasound in diagnosis of nontraumatic lower extremity pain syndromes: A case report

Uloga ultrazvuka u dijagnostici bolnog sindroma donjeg ekstremiteta

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Abstract

Introduction. Musculoskeletal impairment is the most prevalent impairment in people over 65. The spine involvement is the most frequently reported. However, common regional pain syndromes usually arise from undefined mechanical, musculoskeletal or soft tissue disturbances. Use of imaging methods is becoming a mandatory tool in the clinical practice in order to achieve the prompt and accurate disease definition. **Case report.** The Caucasian 79-year-old-male patient attended with the history of an acute, piercing pain along the postero-medial side of the right Achilles tendon and the medial side of the right sole. According to the spine magnetic resonance imaging, X-rays and electrodiagnostic studies, diagnoses of the radicular, neurogenic pain and plantar fasciitis was suspected. However, the popliteal groove ultrasound assessment revealed the presence of hypertrophied semimembranosus-gastrocnemius bursa, compressing the popliteal neurovascular bundle. **Conclusion.** In patients with a symptomatology of peripheral neuropathy, use of imaging techniques such as ultrasound may be essential for accomplishing patients' diagnostic approach.

Key words:
musculosceletal pain; knee; osteoarthritis; diagnosis; ultrasonography; synovial cyst.

Apstrakt

Uvod. Degenerativna oboljenja muskuloskeletnog sistema su najčešća oboljenja kod ljudi starijih od 65 godina, posebno oboljenja međupršljenskog diska u lumbalnom regionu. Međutim, uobičajeni regionalni bolni sindromi obično nastaju kao posledica nedefinisanih mehaničkih, muskuloskeletnih ili mekotkivnih poremećaja. U cilju brzog i preciznog definisanja bolesti primena vizuelizacionih metoda postala je neophodna u svakodnevnoj kliničkoj praksi. **Prikaz bolesnika.** Muškarac star 79 godina, belac, prijavio se na ultrazvučni pregled donjeg ekstremiteta usled nesnosnog, oštrog bola koji se širio duž dorzo-medijalne strane desne Ahilove tetive i medijalne ivice desnog stopala. U skladu sa magnetnom rezonanacom lumbalne kičme, rendgenom kolena i stopala kao i rezultatima elektrodijagnostičkih ispitivanja, postavljena je dijagnoza plantarnog fasciitisa kao i dijagnoza degenerativnog oboljenja međupršljenskog diska sa posledičnim radikularnim, neurogenim bolom i radijacijom u desni donji ekstremitet. Međutim, ultrazvučni pregled poplitealne jame ukazao je na prisustvo uvećane i dilatirane poplitealne ciste, koja je uzrokovala pritisak na poplitealni neurovaskularni splet uzrokujući navedene simptome. **Zaključak.** Upotreba ultrazvuka kod bolesnika sa simptomima periferne neuropatije može biti esencijalna za utvrđivanje uzroka neuropatije i postavljanje konačne dijagnoze.

Ključne reči:
bol, mišićno-skeletni; koleno; osteoartritis; dijagnoza; ultrasonografija; cista, sinovijalna.

Introduction

Degenerative spondylarthropathy includes a vast spectrum of symtomatology due to joints and their surrounding soft tissues involvement. Clinical course can last for many decades of profound disability and may be compatible with a variety of presentations.

Use of ultrasound (US) in the musculoskeletal system assessment has proved to be an accurate mean in the joint, ligament and synovial evaluation, so that calcifications, bone, tendon and ligament lesions may be assessed even when the X-ray exams are negative [1, 2]. Improvement of the US equipment has established the US technique as an indispensable tool in the clinical management of degenerative and inflammatory musculoskeletal system diseases [3–7]. Lately, there has been a huge progress in the assessment and management of peripheral nerves [8–15].

In this case presentation, the US evaluation will be decisive in the differential diagnosis and therefore in the following therapeutic choice.

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Case report

The Caucasian 78-year-old male patient attended with a history of an acute, piercing, devastating pain along the posteromedial side of the right Achilles tendon, particularly of its distal-third, the ankle, heel and the medial half of the same side sole. The most painful point was localized around the tip of the medial malleolus. Pain aggravation was observed during the midnight hours. Patient also reported the prolonged whole-body morning stiffness (an hour) without body-weight loss, general weakness or pyrexia.

No swelling, bruising, skin breaks, palpable prominences or defects in the heel and mid-foot region, were detected. No tenderness at the points of peroneal and tibial tendons' insertions was noticed either. The Lasègue's sign, crossed Lasègue's sign, Bell, hyperextension and the Cough tests were negative [16–18]. Heel pain was increased when the plantar fascia was stretched by ankle and toes' passive dorsiflexion. The pronation (active or passive) was extremely limited and painful. The heel pain was accompanied by neuropathic symptoms such as a tingling, burning and numbness, so the tarsal tunnel assessment was performed (nerve percussion) and the Tinel's sign proved positive.

During the last two decades the patient has been suffering from the bilateral knee osteoarthritis. Varus alignment, tenderness, swelling, crepitus and limited range of motion were detected bilaterally. Enlarged Baker cysts were palpated in popliteal grooves.

Blood tests indicative of systemic inflammation (blood sedimentation rate and C-reactive protein) as well as the rest of biochemical markers were in the normal range.

Nerve conduction velocities and electromyography (EMG) indicated a radiculopathy due to pathological involvement of lower lumbar roots. Lumbosacral X-rays depicted severe, degenerative lumbar scoliosis. The scoliotic curve was associated with intervertebral osteochondrosis (vacuum phenomena, disc space narrowing) and large bone spurs at the vertebral epiphyseal edges and facet joints. Magnetic resonance imaging (MRI) scan showed multiple herniated discs.

Ankles and knee X-rays were performed and the both side calcaneal spur as well as a severe knee osteoarthritis (OA), grade 4 – according to Kellgren and Lawrence [19] were detected.

Musculoskeletal US examination of involved joints and periarticular soft tissues was conducted, by using a standardized scanning technique and international definitions of pathology [20, 21] [Ultrasound Subcommittee of the European Society of Musculoskeletal Radiology [22] and the European League Against Rheumatism (EULAR) guidelines [20]]. A General Electric Logiq P6 Pro machine, equipped with a 10–13 MHz linear transducer was used, depth was adjusted depending on the joint size just at the point of interest, gain was set at the 55–65%; high power Doppler (PD) frequency was used (6.7 MHz), pulse-repetition frequency (PRF) was set to 500 Hz, gain was set just below the level at which colour noise appeared below the bone. Colour priority was maximised and the wall filter was decreased to minimum 60–80 Hz.

Medial and anterolatrel knee scans revealed typical OA findings (Figure 1).

Posterior left knee scans revealed enlarge hypertrophied both-side Baker cyst (Figure 2).

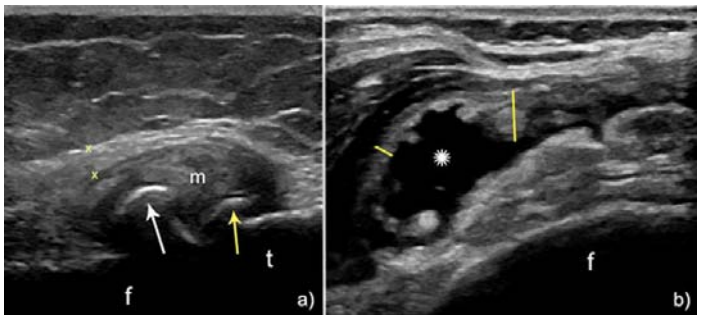

Fig. 1 – Right knee scans – a) Medial longitudinal scan; b) Transverse scan of lateral recess: m – medial meniscus – hypo/hyperechoic image of bulged medial meniscus base; f – femur; t – tibia – border points of medial collateral ligament; white arrow – enlarged femoral osteophyte; yellow arrow – enlarged tibial osteophyte; asterisk – presence of fluid inside the recess; yellow line – cross section of the hypertrophied synovial layer.

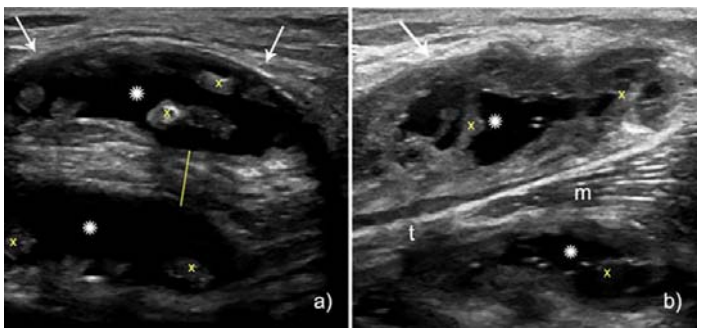

Fig. 2 – Left Baker-cyst scans: a) Posterior transverse scan; b) Posterior longitudinal scan: asterisk – cyst cavity – hypertrophied synovial tissue; yellow line – cross section of the large cyst septum; white arrow – Backer cyst wall; t – tendon of the medial head of the gastrocnemius muscle; m – muscular part of the medial head of the gastrocnemius muscle.

The right Baker cyst was compressing the popliteal neurovascular bundle (Figure 3). The compressed and dislocated tibial nerve appeared swollen and surrounded by an incomplete-anechoic hallo due to the presence of fluid between the nerve and its epineurium (Figures 4 and 5).

Medial longitudinal plantar scans revealed the large, both side calcaneal spur, accompanied by a respective plantar fasciitis (Figure 6).

US guided aspiration of the right Baker cyst was performed and 40 mL of serous fluid was removed. The fluid

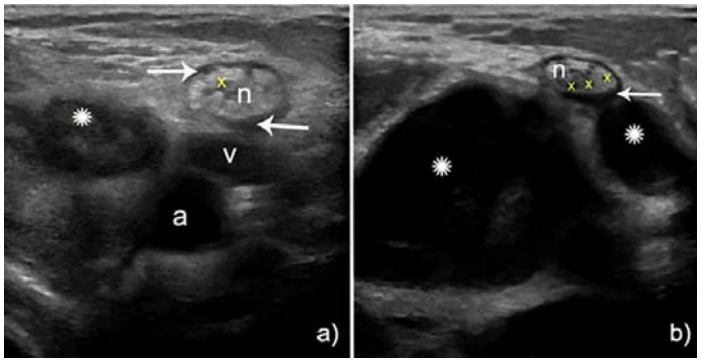

Fig. 3 – Right Baker-cyst transverse scans: a) Proximal part, b) Distal part (asterisk – cyst cavity with a cyst's hypertrophied synovial tissue: a – popliteal artery; v – popliteal vein; n – tibial nerve – hypoechoic, swollen nerve fascicles; white arrow – anechoic space in-between the epineurium and the nerve fascicles).

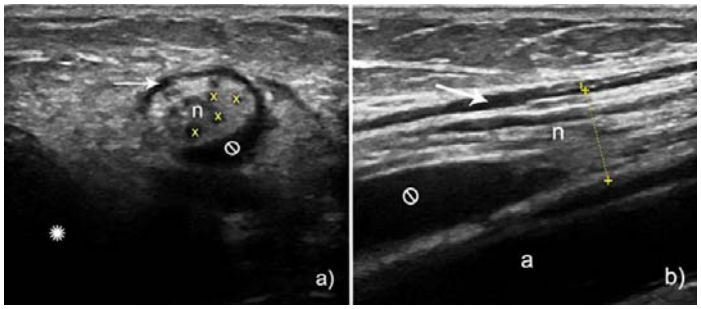

Fig. 4 – Right tibial nerve scans – proximal part: a) Transverse scan, b) Longitudinal scan: asterisk – Backer cyst cavity; n – tibial nerve – hypoechoic swollen nerve fascicles; white arrow – anechoic space in-between the epineurium and the nerve fascicles; circle – huge anechoic space underneath the epineurium (longitudinally spindle shaped).

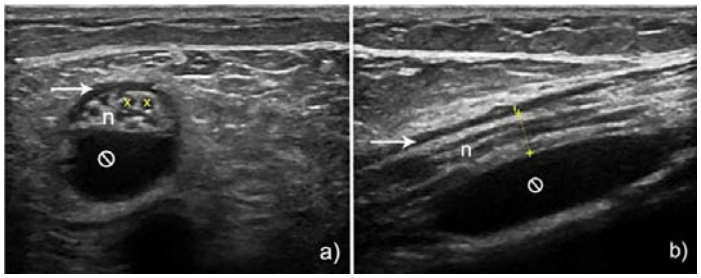

Fig. 5 – Right tibial nerve scans – distal part: a) Transverse scan, b) Longitudinal scan: asterisk – Backer cyst cavity; n – tibial nerve – hypoechoic swollen nerve fascicles; white arrow – anechoic space in-between the epineurium and the nerve fascicles; circle – anechoic space underneath the epineurium.

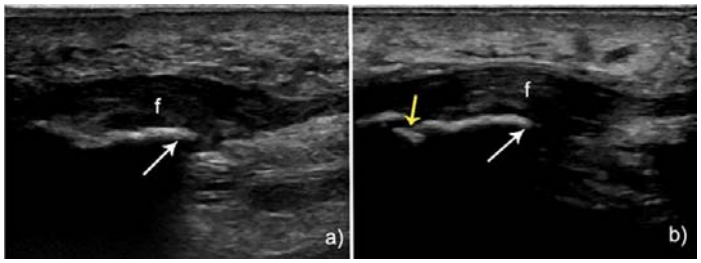

Fig. 6 – Calcaneal spurs and respective plantar fasciitis – plantar longitudinal scans: a) left; b) right: f – enlarged, swollen, hypoechoic plantar fascia (mainly the left side one); white arrow – calcaneal spur; yellow arrow – large depression (erosion) over the plantar aspect of the calcaneal tubercle.

laboratory tests were compatible with common inflammatory fluids (low viscosity, low white cell count/mm^3 and low percent of polymorphonuclear cells). No glucose, rheumatoid-factor or antinuclear-antibody was detected either. Betamethasone (10 mg) was injected within the bursal cavity and the symptoms resolved. While the similar signs and symptomatology reappeared 12 days later, the cyst aspiration was performed again. Four aspirations were necessary for the patient's full recovery. At patient's last visit, the right knee US evaluation revealed no fluid within the hypertrophied Baker cyst and the tibial nerve appeared normal. Ultimately, the patient was reported for the total right knee arthroplasty.

Discussion

Many different conditions can cause low-back and lower-extremity pain. While patients may have more than one disorder, it is necessary to undergo further testing to confirm or rule out these diagnoses. There is no gold standard for the diagnosis of degenerative spondylarthropathy and radiculopathy, so the combination of history, physical examination, imaging and EMG is used to obtain the diagnosis. The lack of the EMG sensitivity is its biggest limitation: though positive, the EMG is unable to ascertain the exact level of the involved root.

The peripheral nerve compression can occur acutely or chronically. In acute compression, the distal nerve portion retains normal function which tends to resolve after a decompression. Prolonged ischemia may cause significant damage of the myelin-sheath and/or axonal degeneration due to the intraneural microvascular supply and venous congestion that may produce endoneural edema. Increased fluid pressure in between the fascicles induces the microcompartment syndrome, producing the clinical image of the nerve impairment [23].

Thus, taking into account the patient's symptoms, blood tests, MRI, EMG and X-rays findings, the patient had been assumed as a patient with a lumbal radiculopathy and heel spur symptomatology correlated with plantar fasciitis. However, the cause of his symptomatology was clarified by means of the US-imaging.

US seems to be powerful weapon for clinicians, more sensitive and accurate method comparatively to the clinical examination. It is also relatively cheap, bed-side, not time-consuming and with no any radiation technique. The accuracy of the US-guided aspirations and local injections is also its great advantage [24–29].

The US is an efficient, appropriate and quick technique for diagnostic and treatment purposes (aspirations, injections) [30, 31] as well as for the patients' follow-up. Specifically, in patients with a symptomatology of peripheral neuropathy, use of imaging techniques such as ultrasound may be essential for patients' diagnostic accomplishment [8–15].

Conclusion

In patients with a symptomatology of peripheral neuropathy, use of imaging techniques such as ultrasound may be essential for accomplishing patients' diagnostic approach.

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Conflict of interest

The authors declare that they have no conflict of interest.

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