Case report

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COMPARISON BETWEEN ULTRASONOGRAPHY RESULTS AND RESULTS OF MAGNETIC RESONANCE IN SHOULDER PATHOLOGY – CASE REPORT

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The common pathological condition of the shoulder joint is rotator cuff diseases.

Patient, 68 years, had pain in the shoulder with limited joint mobility. After clinical examination, blood tests (SE >100 nmol/L, CSF normal, hypergammaglobulinemia) and radiographic examination (bone dilution with deformities of the humeral head), a solitary plasmocytoma was suspected. This diagnosis was excluded after biopsy. Patient was referred to the magnetic resonance imaging (MRI) of the shoulder, so ultrasonographic (US) examination was performed. Our case study points to comparability between US and MRI results regarding tendinitis of muscles in the rotator cuff. By applying both diagnostic methods, calcifications within muscle tendons were evident.

Sonography is faster, cheaper, more accessible and readily available method that certainly is a valuable tool for clinicians when it comes to rotator cuff lesions. *Acta Medica Medianae 2013;52(4): 39-43.*

Key words: *rotator cuff, shoulder, ultrasonography, magnetic resonance*

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Introduction

In the elderly, common pathological condition of the shoulder joint is rotator cuff diseases, mostly due to degenerative changes associated with ageing (1). The rotator cuff consists of shoulder muscles, shortly called SITS: m. supra-spinatus (m.SsP); m. infraspinatus (m.IsP); m. teres minor (m.TM) and m. subscapularis (m.SubS). Rotator cuff diseases may range between tendinosis and ruptures. Calcifying tendinitis (CT) is a rotator cuff disease when calcium hydroxya-patite deposit is forming in tendons. CT is most frequent in m. SsP tendon and mostly occurs in Caucasians, with registered prevalence between 2.7% to 22%, in females aged 30 to 50 years. As already mentioned, it mostly affects m. SsP and even 10% of patients have bilateral localization (2). Authors of one study have suggested the use of "calcifying tendinitis", emphasizing its still unknown pathogenesis - whether the process is localized in the tendon body or at its insertion into the bone (3). It is emphasized that this process is mediated by activities at the cellular level (3). Clinical manifestations of the calcific process within the tendons include chronic activity-related pain, tenderness, localized edema and various degrees of decreased range of motion. A spontaneous resorption of deposits and reduction in symptoms is also possible, although some authors have described persistent tenderness and decreased joint mobility (4,5). In diagnosing pathological conditions of rotator cuff, ultrasonographic (US) and magnetic resonance (MR) diagnostic methods are widely used, enabling to avoid shoulder arthrography altogether (6). Due to technical development and understanding anatomical and pathological characteristics of rotator cuff, these two modalities developed further. For ultrasonographic examination, a linear probe is used with 5-12 MHz frequency. Ultrasonic waves should hit tendons perpendicularly and even the slightest change of angle may cause error in findings interpretation due to hypo/ anechoic areas that may look like a pathologic condition of a tendon. Tendons of the rotator cuff are observed in different arm positions, examining tendons in both shoulders every time, beginning on the side which is less painful or asymptomatic (7). Tendons are viewed in two scans, transversal and longitudinal ones (Ts and Ls). Although the long head of the BB does not belong to the SIAS group, it is always evaluated by the sonogram. Echostructure in normal tendon is hyperechoic in comparison to surrounding muscles and has internal fibrillar structure. At the MR, standard positions for the shoulder joint are axial, coronal and sagittal (8). Real-time high resolution US has proven to be a successful

imaging modality for rotator cuff lesions (9) and other shoulder diseases (10). Technology advance considerably improved US picture quality, creating spatial resolution obtained with MR (11). MR is at the moment considered a reference standard for diagnosis of shoulder pathological conditions. An upside of MR is its potential to appraise areas unreachable for sonography, as bones, cartilage, deep parts of various ligaments, capsule and parts not visible due to the presence of a bone. US is useful when lesions are limited and more superficial. US usually has a complementary role to MR, and particular benefit is obtained by the combined use of both modalities (12). Advantage of US is in its sensitivity for identification of calcium deposits, dynamic view, possibility of intervention procedures and examination of patients with metal and pacemakers present, as well as of claustrophobic ones (13).

Case report

Patient M.S., 68 years old, had intensive pain in the left shoulder (for about a year) with limited mobility. Pain was of inflammatory character, accompanied by reduced shoulder mobility. Patient was refereed to blood tests: test were normal, except for accelerated erythrocyte sedi-mentation rate (SE>100nmo/l) and hypergamma-globulinemia. On the radio-graphic shoulder findings (Figures 1 and 2, left shoulder radiographs), bone dilution was evident with deformities of the humeral head that could be described in differential diagnosis as a soli-tary plasmocytoma. This diagnosis was excluded after biopsy. Patient was referred further to the Department of Orthopedics, Clinical Center Novi Sad, where an orthopedic surgeon did not clarify the diagnosis but sent the patient for MR examination of the shoulder. In order to obtain more precise insight into the state of soft tissues of the joint, patient was referred for ultrasound examination of the left shoulder joint in the Special Hospital for Rheumatic Diseases in Novi Sad. Ultrasound examination of the shoulder was done by a physician who deals with diagnosis of musculo-skeletal disorders. US examination was done using the Voluson 730 apparatus, by linear probe with the frequency span 6-12 MHz. Examination was carried out according to the standard shoulder examination protocol. AC joint region was examined, followed by examination of tendons in rotator cuff, tendon of long head of m.BB, and posterior recess of the GH joint. Sonography examination of the left shoulder pointed to: AC joint arthrosis, tendon of the long head of m. BB expanded and nonhomogenous, anechoic areas and hypervascularisation within the tendon. Tendon of m. SubS was not clearly visible and was not seen in its full circumference (patient was not able to assume the correct arm position for tendon examination!). Tendon of m. SsP flattened towards m. deltoideus. Numerous bone erosions were visible at the humeral head surface and greater tubercle, as well as numerous linear calcifications within the tendon. Calcifi-cations positioned at the articular side of the tendon, intratendinous and at the insertion point to the humerus. Presence of Sa/Sd bursa was visible with thickened peribursal tissue. In posterior view, tendon of m. IsP widened, hypoechogeny present. Unclear view of shoulder joint cartilage, labrum not clearly visible. After several months MRI of the left shoulder was also done. Findings were as follows: a number of free joint elements. MRI mostly corresponded to synovial chondro-matosis. Diffusely and chroni-cally thickened synovium. Extensive arthrosis of glenohumeral (GH) joint with a loss of sphericity in the humeral head, massive ossifications of tendons of m. SsP and m. IfS with both muscles atrophy, tendinosis of m. BB in intraarticular segment, degeneration and maceration of labrum, fibrous changes of joint capsule.

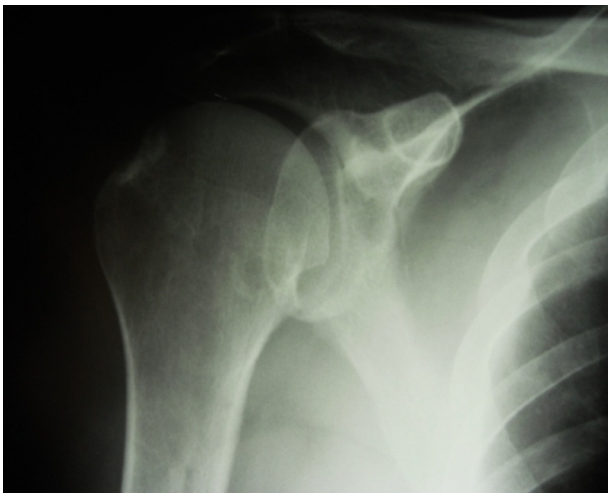

Figure 1. Radiographic finding of the left shoulder

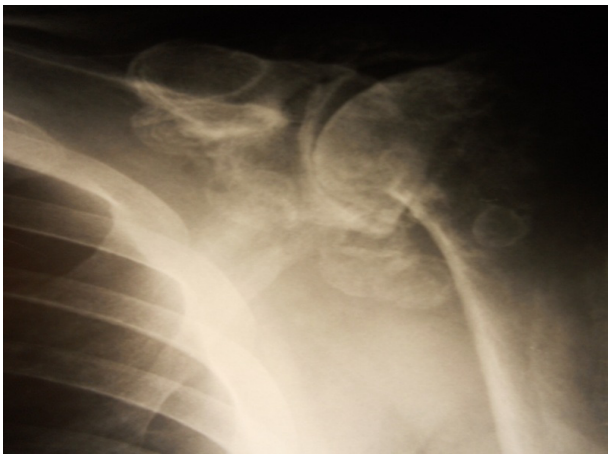

Figure 2. Radiographic finding of the left shoulder

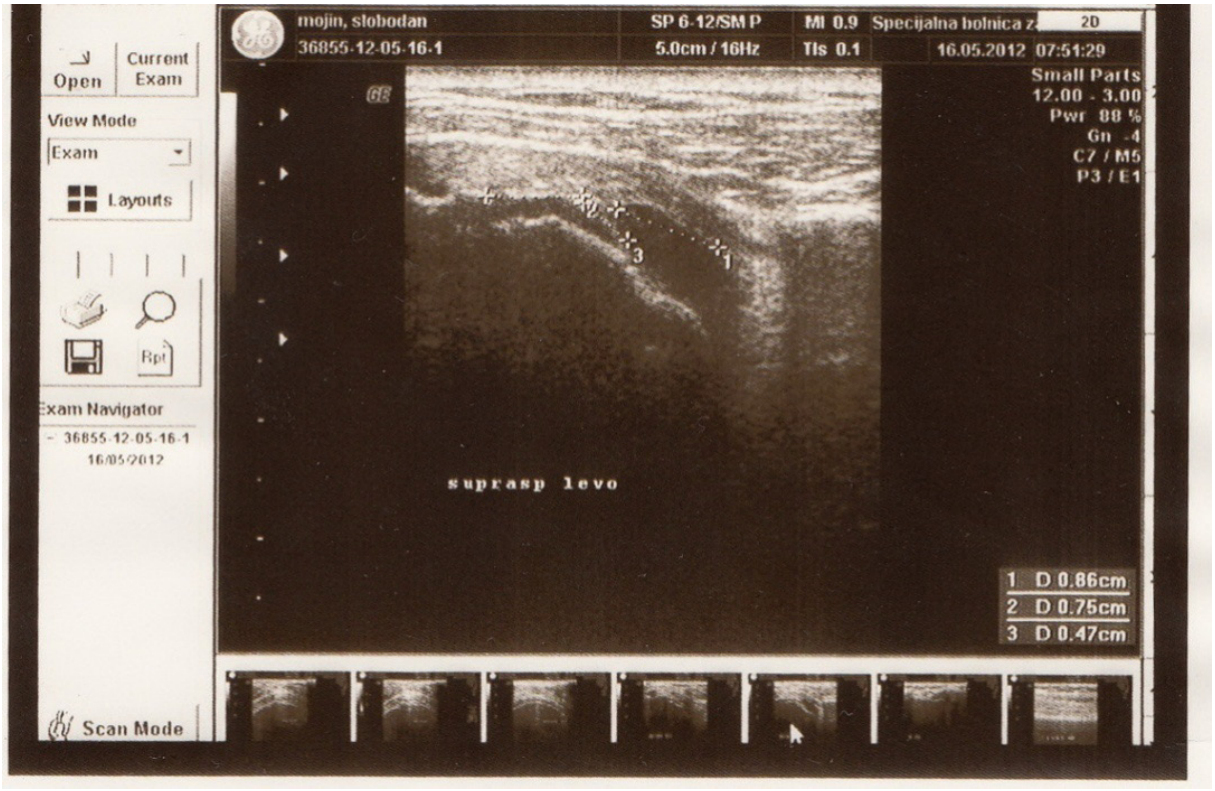

Figure 3. US view-tendinosis of the SsP tendon with multiple small calcifications

Discussion

Rotator cuff diseases may range between tendinoses and ruptures. Tendinosis as a notion should be used more than tendinitis because of underlying tissue degeneration and inflammation response is rare. Bacham et al.in their results have shown that sonography is as sensitive as MR regarding rotator cuff lesions, although US should be used as a first modality for screening method for shoulder pain primarily because of low cost, speed and availability, particularly when artifacts are avoided; this should be accomplished by adequate probe positioning, use of high resolution US and dynamic technique. Authors also concluded that MR is a sensitive procedure, especially for diagnosis of periarticular tissues, having lower risk for artifacts and giving more precise information regarding the size of a tendon. Although both methods are accurate, they may have limitations in evaluation of partial ruptures, because this situation should be distinguished from degenerative tendon changes. Diagnosis of partial tendon rupture improves if the contrast is used in MR examination (14). Ruten et al., in their article regarding occurrence of artifacts and limitations of sonography in the rotator cuff, state that degenerative tendon state (tendinosis) in sonography shows inhomogeneous and hypoechoic echo-structure compared with normal tendon (15). Our case report demonstrates comparability of US and MR findings in rotator cuff tendinitis m. long head BB, m.SsP, m IfS. In both diagnostic methods, there were calcifications within the muscle tendon. In the available literature we found a significant number of papers relating to the comparison of the two diagnostic procedures with tendon rupture, a very small number of studies that compared the findings with tendinitis. A comparative study in which shoulder rotator cuff lesions were evaluated using sonography and MR findings has shown that MR, although expensive, is a "gold standard" method in the evaluation of pathological conditions of rotator cuff. Although ultrasound depends on experience of a sonographer and is not as precise as MR, it provides very swift and non-invasive examination of a joint. Because of high resolution, ultrasound can be considered as the primary modality for the diagnosis of rotator cuff as it is available and affordable. This study included a total of 50 patients with pain in the shoulder joint, of which five patients had CT. Ultrasound revealed the presence of calcifications in four patients, and the MR found it in all five patients. The accuracy of US diagnosis for CT was 80%, while for the MRI it was 100% (16).

The first case, published by Gotoh M. et al., described the male patient, aged 46 years, with diagnosed CT that progressed to m. SsP tendon rupture. Monitoring was carried out using standard radiography and MRI (17). CT is a disorder caused by deposition of calcium hydroxyapatite crystals in various shoulder tendons. These crystalline deposits are usually found in tendons or bursae around the joint and, most commonly, in tendon

of m.SsP. Usefulness and importance of the US findings were shown in a study that included a total of 34 patients with shoulder pain. In 65% of patients there were normal radiographic findings of the shoulder, while the other found great irregularity of the humeral bone and calcification.US finding of partial or complete rupture of m. SsP was found in 38% of patients; in 1/3 of patients tendinitis m.BB was registered, while in 18% of patients there was an irregular surface of the humeral bone and over 10% of patients had SD bursitis. CT was present in the same proportion. There was no correlation with rotator cuff lesions by age, sex, professional activity, and previous treatment. The authors of this study recommended US review as part of an early diagnostic protocol for patients with shoulder pain, and not conventional radiography (18). Shoulder rotator cuff tendons are composed primarily of collagen bundles, characterized in MRI by hypointensive signal intensity on all pulse sequences. As mentioned above, the histological changes of rotator cuff tendons are mostly mucoid degeneration and chondroid metaplasia, detected at the MRI as increased signal in rotator cuff tendons (19). Thus changed MR signal intensity is usually spherical and less linear than signal in abnormalities that can be seen with the rupture of the rotator cuff. The tendon may be normal in caliber or with diffuse or focal thickening (20). Sein et al. demonstrated high reliability in grading of mild, moderate and severe tendinoses (21). In practice, it is sometimes difficult to distinguish between severe tendinosis and partial tendon ruptures, and both possibilities have to be considered. In a cohort study with 27 patients having rotator cuff lesions, the MRI findings were compared to surgical findings. Interpretation of findings consisted of comparison of total and partial tendon ruptures, type of acromion, reefs of acromioclavicular joint or the signal changes, biceps lesions, size and lesion of partial ruptures, acromiohumeral distance, number of ruptured tendons, size of total ruptures and size of retraction, individual fatty infiltration of tendon and muscle atrophy. In even >80% cases there was an agreement for total and partial ruptures on MRI and findings obtained in a surgical way, somewhat less (>70%) for detection of AC joint signal, localization of partial ruptures, number of tendons included in total ruptures, size of retraction for total ruptures and for rupture of the long head of the m. BB. The least agreement was observed in grading the size of partial tendon ruptures (22). In the article Blanksteina concluded that calcification within the altered tendons affected by tendinosis is more visible by sonography than with magnetic resonance imaging (MRI). Sonography also has the capability to precisely localize calcification and the good assessment of treatment (23).

Sonography is faster, cheaper, more accessible and readily available method that certainly is the long arm of clinicians when it comes to rotator cuff lesions. As such, it should be the first choice in the diagnosis of rotator cuff lesions, but when it comes to inatraarticular lesions, MRI is still the gold standard.

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KOMPARACIJA ULTRASONOGRAFSKOG NALAZA SA NALAZOM MAGNETNE REZONANCE KOD PATOLOGIJE RAMENA – PRIKAZ SLUČAJA

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Česta patološka stanja ramenog zgloba su bolesti su rotatorne manžetne.

Bolesnik starosti 68 godina imao je bol u ramenu, uz ograničenje pokreta zgloba. Nakon kliničkog pregleda, laboratorijskih pretraga krvi (SE >100nmol/L, KKS: uredan nalaz, hipergamaglobulinemije) i radiološkog pregleda ramena (koštano razređenje glave humerusa uz teške deformitete), postavljena je sumnja na solitarni plazmocitom. Dijagnoza solitarnog plazmocitoma je isključena nakon biopsije. Bolesnik je upućen na snimanje ramena magnetnom rezonancom (MR), koje je trebalo da čeka, te mu je urađen ultrasonografski pregled (US) ramena. Naš prikaz slučaja pokazuje komparativnost US i MR nalaza kod tendinitisa mišića rotatorne manžetne. Obe dijagnostičke metode pokazale su kalcifikate unutar tetiva mišića.

Sonografija je brža, jeftinija, pristupačnija i lako dostupna dijagnostička metoda kojom se mogu potvrditi lezije rotatorne manžetne. *Acta Medica Medianae 2013; 52(4):39-43.*

Ključne reči: *rotatorna manžetna, rame, ultrasonografija, magnetna rezonanca*

