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Симптом «рисовых телец» при магнитно-резонансной томографии плечевого сустава у пациентки с ревматоидным артритом

С.Ф. Агеева, Д.А. Филатова, Е.А. Мершина, В.Е. Сеницын

Московский государственный университет имени М.В. Ломоносова, Москва, Российская Федерация

АННОТАЦИЯ

Симптом «рисовых телец» при магнитно-резонансной томографии плечевого сустава у пациентов с ревматоидным артритом — редкая, но специфическая находка, характеризующаяся наличием в синовиальной жидкости сустава, синовиальных сумках или влагаллицах множественных мелких округлых структур, схожих друг с другом, похожих на зёрнышки риса. Этиология «рисовых телец» до сих пор окончательно не ясна. Предполагается, что они образуются в результате микроинфарктов синовиальной оболочки у пациентов с ревматоидным артритом или некоторыми другими воспалительными заболеваниями суставов. Клинически наличие «рисовых телец» может вызывать у пациента болевой синдром, однако так происходит не всегда. Среди методов лучевой диагностики ведущей ролью для выявления «рисовых телец» обладает магнитно-резонансная томография.

В данной статье представлено описание клинического случая выявления этого симптома при магнитно-резонансной томографии плечевого сустава у пациентки с длительным анамнезом ревматоидного артрита, обратившейся в связи с безболезненным увеличением в объёме левого плеча. Выполненные исследования (компьютерная томография и магнитно-резонансная томография левого плечевого сустава) позволили обнаружить симптом «рисовых телец» как проявление основного заболевания и определить дальнейшую тактику лечения.

Ключевые слова: ревматоидный артрит; плечевой сустав; рисовые тельца; магнитно-резонансная томография; компьютерная томография; клинический случай.

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“Rice bodies” symptoms on magnetic resonance imaging of the shoulder in a patient with rheumatoid arthritis

Sofia F. Ageeva, Daria A. Filatova, Elena A. Mershina, Valentin E. Sinitsyn

Lomonosov Moscow State University, Moscow, Russian Federation

ABSTRACT

The “rice bodies” symptom on magnetic resonance imaging of the shoulder joint in patients with rheumatoid arthritis is a rare but specific finding characterized by the presence of multiple small, round, rice-grain-like structures in the synovial fluid of the joint, synovial pouches, or sheaths. The etiology of the “rice bodies” is still not fully understood. They are suggested as the result of microinfarcts of the synovial membrane in patients with rheumatoid arthritis or other inflammatory joint diseases. Clinically, the “rice bodies” symptom may cause pain, but not in every case. Among radiological diagnostic methods, magnetic resonance imaging is the leading method for the detection of rice bodies. This article presents a clinical case of “rice bodies” symptoms diagnosed by magnetic resonance imaging in a patient with a long history of rheumatoid arthritis who presented with a painless enlargement in the left shoulder. Computed tomography and magnetic resonance imaging of the left shoulder could detect “rice bodies” as a manifestation of an underlying disease and determine further treatment techniques.

Keywords: rheumatoid arthritis; shoulder joint; rice bodies; magnetic resonance imaging; computed tomography; case report.

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类风湿性关节炎患者肩关节磁共振成像上的米粒体症状

Sofia F. Ageeva, Daria A. Filatova, Elena A. Mershina, Valentin E. Sinitsyn

Lomonosov Moscow State University, Moscow, Russian Federation

简评

类风湿性关节炎患者肩关节磁共振成像（MRI）上的米粒体症状是一种罕见但特殊的发现。其特征是关节滑液、滑膜囊或滑膜鞘中出现多个圆形小结构。这些结构彼此相似，就像米粒一样。米粒体的成因至今不明。据推测，米粒体是因类风湿性关节炎或其他炎症性关节病患者滑膜微梗塞而形成的。在临床上，米粒体的存在可能会使患者感到疼痛。然而，情况并非总是如此。在放射诊断方法中，磁共振成像在检测米粒体方面发挥着主导作用。

本文介绍一例在肩关节磁共振成像中发现该症状的临床病例。该症状是在一名有长期类风湿性关节炎病史的患者身上发现的。患者因左肩部无痛性增大而就医。对左肩关节进行了电子计算机断层扫描（CT）和磁共振成像检查。医生通过这些检查发现了，米粒体症状是基础疾病的一种表现形式。这些检查有助于确定进一步的治疗策略。

关键词： 类风湿性关节炎； 肩关节； 米粒体； 磁共振成像； 电子计算机断层扫描； 临床病例。

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BACKGROUND

Rheumatoid arthritis (RA) is a chronic systemic autoimmune disorder characterized by articular and extraarticular involvement. RA is more common in women. Generally, RA onset occurs at the age of 35–60 years, except for juvenile RA [1–3].

In the adult general population, the incidence of RA ranges from 0.5% to 2%, which is quite high. The World Health Organization reported that 18 million people had RA in 2019 [4]. In Russia, the official number of registered patients with RA was 301,200 as of 2017; however, the results of a Russian epidemiology study suggested that RA affected approximately 0.6% of the general population [2].

RA is diagnosed based on clinical and laboratory results, including radiological examinations. According to the criteria issued by the American College of Rheumatology and the European League against Rheumatism in 2010 (2010 ACR-EULAR), a patient's score ≥ 6 (out of 10 possible) is indicative of RA (Table 1) [2, 5].

The following clinical signs are the most common for RA:

- Arthralgia
- Morning stiffness of the affected joints (>30 min)
- Fever
- Rheumatoid nodules under the skin

Table 1. 2010 American College of Rheumatology and European League against Rheumatism criteria for the diagnosis of rheumatoid arthritis [2, 5].

Clinical signs of joint involvement (swelling and/or tenderness in physical examination) (a score of 0–5)	
1 large joint involved	0
2–10 large joints involved	1
1–3 small joints involved	2
4–10 small joints involved	3
>10 joints involved, including at least one small joint	5
Laboratory results for RF and ACPA (a score of 0–3; positive by at least one method)	
RF neg.; ACPA neg.	0
RF weak + / ACPA weak + (>ULN to $\leq 3 \times$ ULN)	2
RF high + / ACPA high + (>3 \times ULN)	3
Laboratory results for acute-phase reactants (a score of 0–1; positive by at least one method)	
Normal ESR and CRP levels	0
Increased ESR/increased CRP	1
Duration of arthritis (a score of 0–1)	
<6 months	0
≥ 6 months	1

Notes: +, positive; ACPA, anticyclic citrullinated peptide antibodies; CRP, C-reactive protein; ESR, erythrocyte sedimentation rate; neg., negative; RF, rheumatoid factor; ULN, upper limit of normal.

- Fatigue
- Weight loss

Usually, small joints are involved first (proximal interphalangeal and metacarpophalangeal) symmetrically. Later, as the disease progresses, larger joints are involved. RA may have pulmonary, renal, cardiovascular, and cutaneous manifestations [1–3].

X-ray methods are widely used for RA diagnosis and follow-up. They allow the identification and evaluation of articular and extraarticular RA signs (e.g., respiratory involvement, heart damage, splenomegaly in the Felty syndrome).

Currently, magnetic resonance imaging (MRI) is often used to evaluate articular involvement in RA. This method offers high-resolution imaging of soft tissues, allowing the detection of early signs of RA (e.g., synovitis, bone erosion, and cartilage lesions) [6].

In some RA cases, small rice-shaped structures, so-called “rice bodies,” may be visualized in the synovial fluid and synovial bursae. Rice bodies are multiple small rounded inclusions of similar shape resembling rice (hence, their name). When examined histologically, they have an amorphous core surrounded by fibrin or collagen. The exact etiology of rice bodies remains unknown. It was suggested to be caused by the detachment of small particles of synovium because of local microinfarctions, and their surface is later covered by fibrin. Rice bodies are possibly associated with inflammatory joint diseases. They are common in RA but may also appear in tuberculous arthritis, chronic bursitis and synovitis, and other diseases. Rice body formation may be asymptomatic or manifest clinically with pain [3, 9]. The most efficient method of rice body visualization is MRI [9, 10].

CASE REPORT

The patient was a 59-year-old woman who had a chronic RA. In September 2022, she presented to a clinic with nontender swelling of the left shoulder joint and underwent MRI.

History of the disease

2015: The patient was diagnosed with RA, with involvement of the left knee and foot joint arthritis. The patient scored 7 ACR-EULAR points out of 10 (scores >6 are required for a definite diagnosis).

2017: The patient was diagnosed with Hashimoto thyroiditis.

2021: The patient presented to a rheumatologist with significant handwriting difficulties. MRI interpretations of both shoulder joints dated February 2021 (scans were performed in another clinic) were as follows:

- A significant amount of effusion was visualized in the subdeltoid and subacromial bursa, which was more pronounced on the right side.

- Joint synovia were thickened, and a small amount of effusion was observed in the joint cavity.
- The signal intensity of the cartilage surfaces decreased.

Laboratory results

On September 16, 2022, blood tests were performed to evaluate the ongoing therapy (methotrexate 17.5 mg; folic acid):

- Thyroid-stimulating hormone, normal (4.08 μ U/mL; N: 0.27–4.2 μ U/mL)
- Rheumatoid factor, increased (107.9 IU/mL; N: 0–14 IU/mL)
- C-reactive protein, increased (11.84 mg/L; N: 0–5 mg/L)
- Erythrocyte sedimentation rate, increased (36 mm/h; N: <30 mm/h)

Investigations

On September 17, 2022, CT of both shoulder joints was performed because of further swelling of the left shoulder joint, based on the patient's complaints. MAGNETOM Vida (Siemens Healthineers, Germany) was used at a field

magnitude of 3 Tesla for a standard-protocol MRI scan (T1- and T2-weighted images with/without fat suppression; transverse, frontal, sagittal, and oblique slices) with a surface radiofrequency coil for the shoulder joint.

Under the deltoid, inside the subacromial bursa and subdeltoid bursa enlarged to the size of 7.7 \times 2.5 \times 5 cm, T2-weighted imaging (WI) showed multiple similarly shaped oval structures measuring 2–3 mm to 8–10 mm in diameter with an intermediate signal intensity, separated by areas of increased signal intensity (in T2-WI). In T1-WI, these structures demonstrated homogeneous intermediate signal intensity (Figs. 1 and 2). Agglomerations of small inclusions resembled space-occupying masses in the joint cavity.

Noncontrasted CT images of the shoulder joints obtained with Somatom Drive (Siemens Healthineers, Germany) with a 0.625-mm slice thickness showed large lens-shaped hypodense structures on both sides in the subacromial and subdeltoid bursae (Fig. 3):

- On the left side: 7.5 \times 4 \times 9 cm; the mass is bigger than the MR evaluation (7.7 \times 2.5 \times 5 mm)
- On the right side: 4 \times 1.4 \times 4 cm

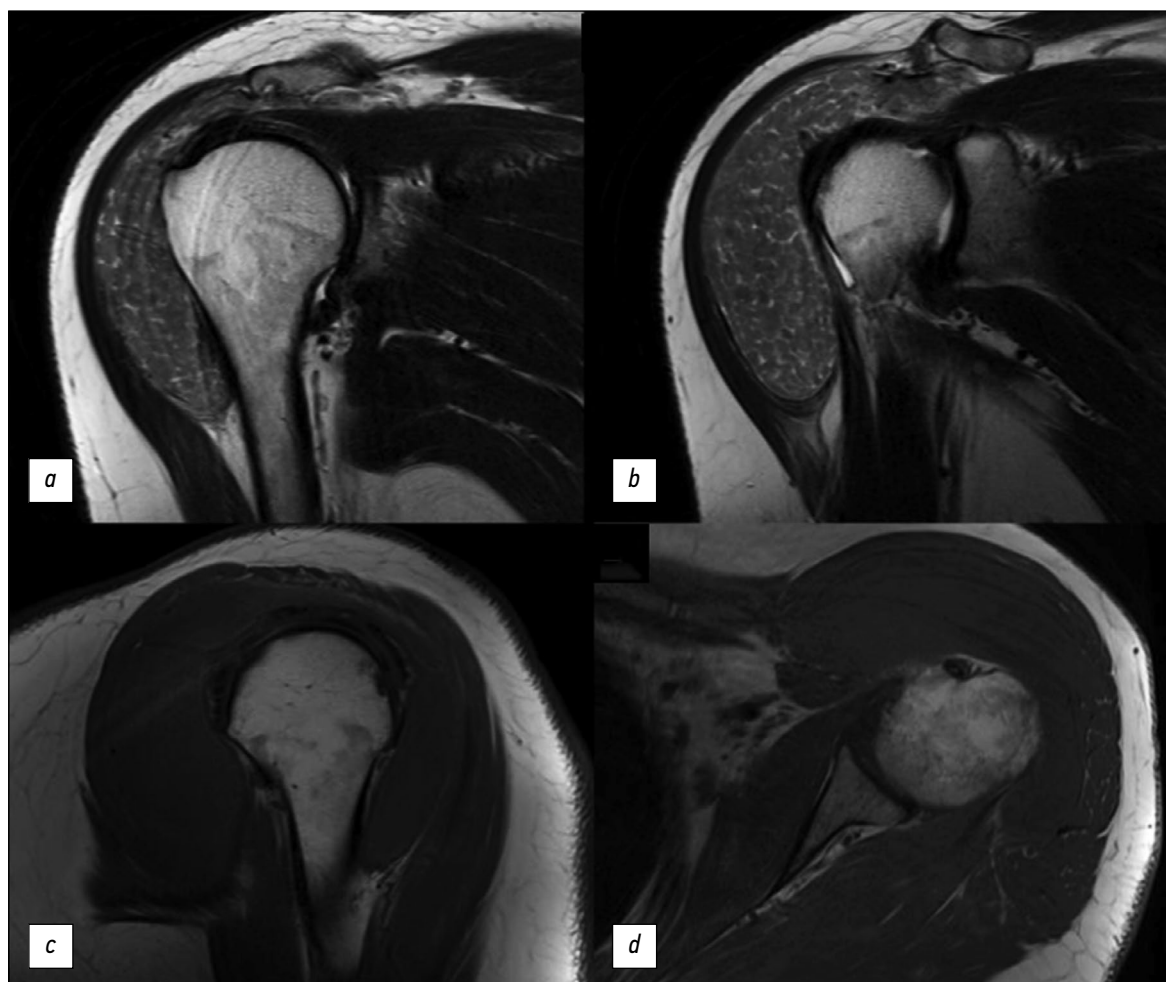


Fig. 1. Magnetic resonance imaging (MRI) of the left shoulder joint. (a), (b): T2-weighted images, coronal projections; (c): T1-weighted image, sagittal projection; (d): T1-weighted image, transverse projection.

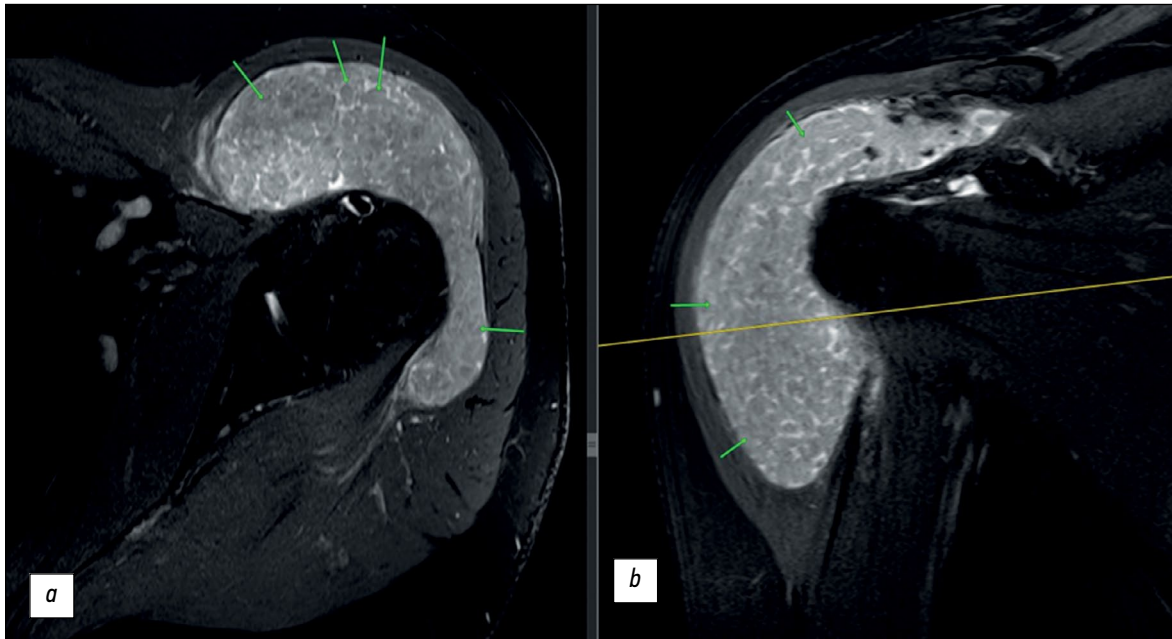


Fig. 2. Magnetic resonance imaging of the left shoulder joint, T2-weighted images with fat suppression: *a*, transverse view; *b*, coronal view. Small structures within the synovial sacs are indicated by arrows.

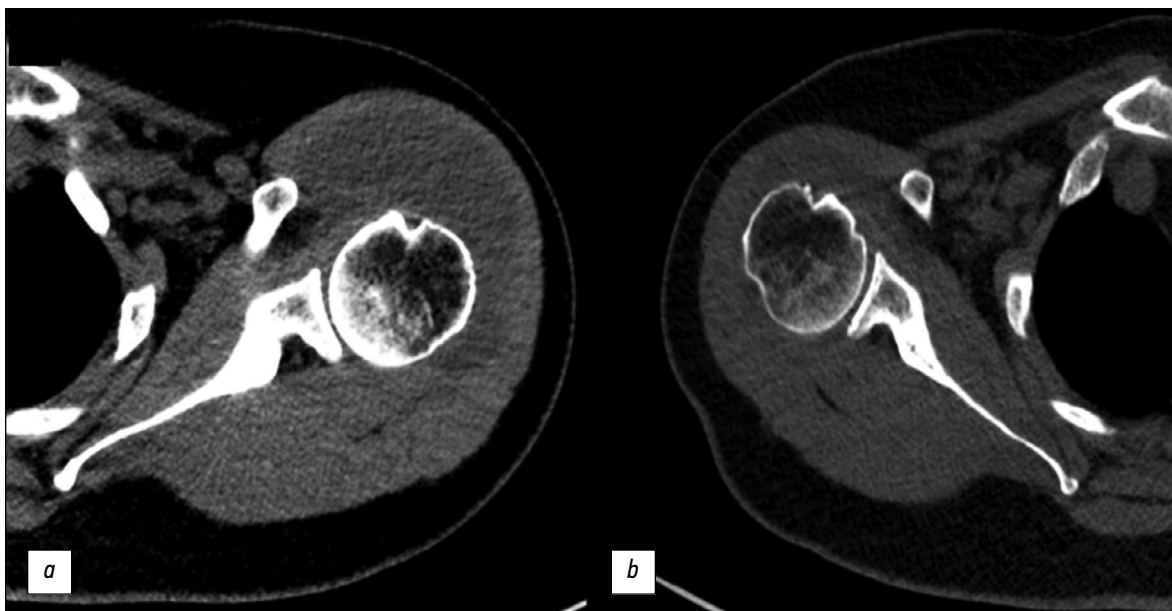


Fig. 3. Computed tomography of the shoulder joints, axial view: *a*, left shoulder joint; *b*, right shoulder joint.

Their structure appeared homogeneous in the CT images, without calcification or solid inclusions; the structure density was ~35 HU. Reactive lymphadenopathy associated with the underlying disease was observed in the axillary areas.

DISCUSSION

Rice body formation in the joints is a rare phenomenon associated with inflammatory joint diseases. It is most frequently observed in patients with RA. Rice bodies may be a sign of RA or precede disease onset in rare cases [11]. Rice

bodies may be asymptomatic or manifest as joint swelling (as in the case described) and pain.

In MRI, rice bodies are visualized as multiple small, similarly shaped, rounded structures. In T1-WI, they are isointense or hypointense; in T2-WI, they are hypointense. The T2-WI pattern in the described case consisted of densely agglomerated inclusions, which were hyperintense compared with the muscle tissue, which is typical in RA. As demonstrated in the case presented, MRI is superior to CT in identifying rice bodies.

Rice bodies are not only seen in RA but also in other diseases, such as synovial chondromatosis and pigmented

villonodular synovitis (PVNS), and chronic bursitis, including tuberculous etiology. MRI significantly facilitates the differential diagnosis of the listed disorders. In synovial chondromatosis, the cartilage is isointense or hyperintense in T1-WI, whereas rice bodies are hypointense in T2-WI compared with hyperintense fluid. Moreover, synovial chondromatosis is more commonly seen in men and affects a single joint. In patients with PVNS, the signal of the thickened synovia is inhomogeneously reduced in T1-WI and T2-WI because of hemosiderin accumulation [8].

Since fibrin causes irritation, rice bodies, once formed, may also cause synovial inflammation. Surgery is considered to improve a patient's clinical condition [12, 13], particularly in severe pain syndrome. In the case presented herein, further management techniques involved surgical treatment.

CONCLUSION

We report a rare case of intraarticular rice bodies in a patient with chronic RA. A brief literature review on the subject was provided, and the MR and CT signals of this phenomenon were described. Although rice bodies are rare,

knowledge of their potential presence in joint capsules of patients with RA and differentiation from similar signs of other disorders is necessary.

ADDITIONAL INFORMATION

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AUTHORS' INFO

* Sofia F. Ageeva;

address: Lomonosovsky av., 27/10, Moscow, 119991 Russian Federation;

ORCID: 0000-0003-4726-0806;

eLibrary SPIN: 9695-3717;

e-mail: son.ageeva13@gmail.com

Daria A. Filatova;

ORCID: 0000-0002-0894-1994;

eLibrary SPIN: 2665-5973;

e-mail: dariafilatova.msu@mail.ru

Elena A. Mershina, MD, Cand. Sci. (Med.), Assistant professor;

ORCID: 0000-0002-1266-4926;

eLibrary SPIN: 6897-9641;

e-mail: elena_mershina@mail.ru

Valentin E. Sinitsyn, MD, Dr. Sci. (Med.), Professor;

ORCID: 0000-0002-5649-2193;

eLibrary SPIN: 8449-6590;

e-mail: vsini@mail.ru

ОБ АВТОРАХ

* Агеева София Фаильевна,

адрес: 119991 Москва, Ломоносовский пр-т, 27к10;

ORCID: 0000-0003-4726-0806;

eLibrary SPIN: 9695-3717;

e-mail: son.ageeva13@gmail.com

Филатова Дарья Андреевна;

ORCID: 0000-0002-0894-1994;

eLibrary SPIN: 2665-5973;

e-mail: dariafilatova.msu@mail.ru

Мершина Елена Александровна, канд. мед. наук, доцент;

ORCID: 0000-0002-1266-4926;

eLibrary SPIN: 6897-9641;

e-mail: elena_mershina@mail.ru

Синицын Валентин Евгеньевич, д-р мед. наук, профессор;

ORCID: 0000-0002-5649-2193;

eLibrary SPIN: 8449-6590;

e-mail: vsini@mail.ru

* Corresponding author / Автор, ответственный за переписку