

## Pelvic pseudotumor following total hip arthroplasty. Case report

Luben Stokov<sup>1</sup>, Elka Angelova<sup>2</sup>, Asen Todorov<sup>2</sup>, Georgi P. Georgiev<sup>3</sup>(✉)

<sup>1</sup>Clinic of Orthopedics and Traumatology, UMHAT “St. Anna”, Sofia, Bulgaria

<sup>2</sup>National Oncology Hospital, Sofia, Bulgaria

<sup>3</sup>Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Sofia, Bulgaria  
georgievgp@yahoo.com

**Abstract**—According to the literature, the development of metallosis after hip arthroplasty occurs in approximately 5% of patients. Metallic debris in the joint results in massive local and systemic release of cytokines. Excision of the pelvic pseudotumor, as well as revision surgery, is mandatory if there is evidence of osteolysis and loosening of the endoprosthesis. Imaging diagnostics, including magnetic resonance and computed tomography, are crucial for the preoperative planning of surgical intervention.

**Keywords**— pseudotumor, hip arthroplasty, operative treatment.

### 1 Introduction

Metallosis is a rare but potentially fatal complication after hip arthroplasty with metal-on-metal implants, but it has also been described in cases with polyethylene and ceramic implants<sup>1-5</sup>. Metallosis is defined as aseptic fibrosis, local necrosis, and/or loosening of implants secondary to metal corrosion and release of metal debris<sup>2,6</sup>. The use of polyethylene and ceramic prosthetic implants is the main reason for reducing these complications<sup>3</sup>.

Metallosis was first described by von Lüdinghausen et al.<sup>7</sup> in 1970 in patients operated on with metal implants for fractures. Subsequently, the development of total hip arthroplasty resulted in more than one million patients being operated on annually. An increasing number of local and systemic side reactions related to the release of metal ions and nanoparticles from prosthetic components have been registered. Historically, the large-diameter metal-on-metal hip prostheses introduced in practice provided greater load, low wear rates, and increased stability<sup>8</sup>. Subsequently, this type of prosthesis led to a threefold increase in revision surgery compared to modern hip prostheses<sup>3,8</sup>. This fact is explained by an increase in the production of metallic debris leading to a wide range of pathological changes, including tissue necrosis, osteolysis, sterile periarticular effusions, and solid or cystic masses known as pseudotumors<sup>2,3,6,8</sup>. They have a progressive nature and lead to compressive syndromes on neuro-vascular structures and gastrointestinal and genitourinary organs<sup>2,6,8</sup>. Despite the possible significant

expansion of the tumor in the pelvis and possible damage, precise criteria for the volume and boundaries of the pseudotumor are lacking<sup>4,6</sup>. In many cases, patients have no symptoms until the pseudotumor reaches such a size that it manifests itself with swelling in the tissues above the hip joint, moderate pain on palpation and joint movements. The pathophysiology of pseudotumor formation is complex, unclear and still debatable<sup>7,8</sup>.

The diagnosis in these cases is made with imaging studies, incl. echography, CT, MRI with contrast, consultations with gynecologist, surgeon, urologist, orthopedist and vascular surgeon. Deviations of the femoral head within the acetabulum, loss or narrowing of the joint space suggestive of wear or "liner fracture", amorphous density in the periprosthetic tissues (the so-called "cloud sign"), and hyperdense circular shadows of deposited metal are commonly observed particles (the so-called "bubble sign"). Joint puncture for diagnostic purposes is not always effective. The paraclinical indicators, incl. leukocytes, ESR, and CRP are usually normal or at the upper limit. The microbiological examination was negative, and the histological examination established so-called "joint debris" accompanied by a histiocytic reaction.

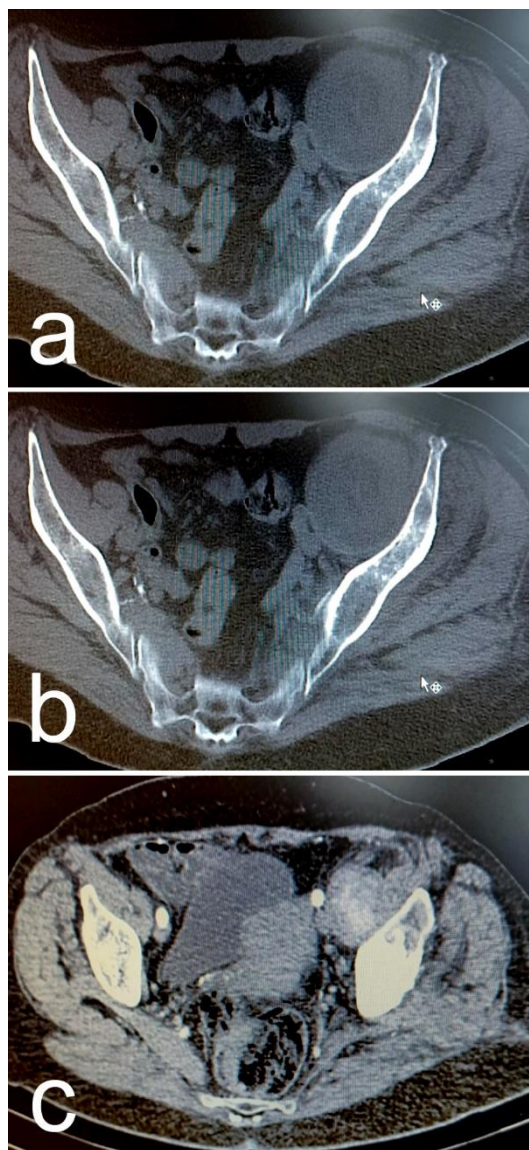
## 2. Case report.

A 63-year-old female patient was brought to the clinic with complaints of the presence of a soft tissue mass in the left ileo-inguinal region, moderate pain on palpation, and slightly painful movements in the left hip joint. No visible inflammatory changes were observed in the area. The complaints started 20 months ago. In 2010, due to hip osteoarthritis, arthroplasty of the left hip joint was performed. In 2021, due to loosening of the acetabular component, the joint was revised, and a new acetabular component was implanted (Figure 1).



**Figure 1.** Roentgenography after revision surgery

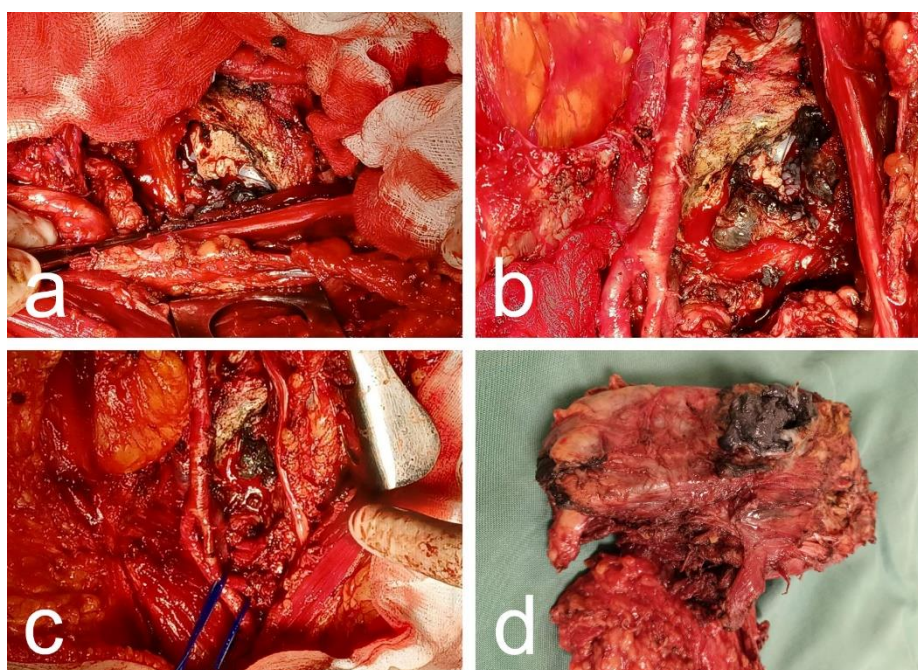
In the postoperative period, a CT scan was performed (Figure 2), which revealed a soft tissue mass in the ileo-inguinal area, and the patient was referred to a surgical oncologist.



**Figure 2.** Preoperative CT

After an MRI with contrast, a formation was started from the left acetabulum and entered the small pelvis in a proximal direction. After the preoperative evaluation, the patient underwent surgical treatment. The operation was performed with a combined ileo-inguinal and pararectal approach. A soft tissue tumor approximately 10 cm in length and approximately 6 cm in width was detected. It was encapsulated, dark gray in color and involved the adjacent vascular bundle. A partial resection of the external

iliac artery was performed, and the arterial defect was repaired with so-called autoarterial patch plasty. It was also necessary to perform circumferential resection of the external iliac vein with a length of 2 cm, and the defect was restored with so-called end-to-end anastomosis. This was followed by mobilization of the vessels and preparation and excision of the tumor mass (Figure 3). On the anterior abdominal wall, the defect was covered by a synthetic patch. Postoperatively, secondary wound healing was established. Five months after excision, there was no evidence of local recurrence.



**Figure 3.** Intraoperative photography

### **3. Discussion and Conclusion**

The problems related to metallosis are complex and their solution requires a complex approach. Systemic effects of metallosis include damage of vision, hearing, central and peripheral nervous systems, thyrotoxicosis, polycythemia, liver toxicity, damage to nearby organs as a result of the increased level of metal ions. Preliminary research in this direction leads to a reduction of complications reaching up to 50% in the revision surgery of the hip joint in patients with pseudotumor. The volume of the surgery for pseudotumor around the hip joint depending on its close connection to neuro-vascular structures, urological and genital organs, and require a multidisciplinary team of surgeon, urologist, vascular surgeon, gynecologist and orthopedist for excision. In cases of loosening of the components of the prosthesis, revision surgery is also required on the hip joint. In our opinion, if the prosthesis is stable, it is sufficient to excise the pseudotumor, without performing a revision procedure.

#### 4. References

1. Cipriano CA, Issack PS, Beksac B, Della Valle AG, Sculco TP, Salvati EA. Metallosis after metal-on-polyethylene total hip arthroplasty. *Am J Orthop (Belle Mead NJ)*. 2008;37(2):E18-25.
2. Willis-Owen CA, Keene GC, Oakeshott RD. Early metallosis-related failure after total knee replacement: a report of 15 cases. *J Bone Joint Surg Br*. 2011;93(2):205-9. doi: 10.1302/0301-620X.93B2.25150.
3. Pesce V, Maccagnano G, Vicenti G, Notarnicola A, Lovreglio P, Soleo L, Pantalone A, Salini V, Moretti B. First case report of vanadium metallosis after ceramic-on-ceramic total hip arthroplasty. *J Biol Regul Homeost Agents*. 2013;27(4):1063-8.
4. Oliveira CA, Candelária IS, Oliveira PB, Figueiredo A, Caseiro-Alves F. Metallosis. A diagnosis not only in patients with metal-on-metal prostheses. *Eur J Radiol Open*. 2014;2:3-6. doi: 10.1016/j.ejro.2014.11.001.
5. Mastel M, Boisvert A, Moore R, Sutherland F, Powell J. Metallosis following hip arthroplasty: two case reports. *J Med Case Rep*. 2022;16(1):115. doi:10.1186/s13256-022-03336-4
6. Milošev L, Antolić V, Minović A, Cör A, Herman S, Pavlović V, Campbell P. Extensive metallosis and necrosis in failed prostheses with cemented titanium-alloy stems and ceramic heads. *J Bone Joint Surg Br*. 2000 82(3):352-7. doi: 10.1302/0301-620x.82b3.9989.
7. Von Lüdinghausen M, Meister P, Probst J. Metallosis after osteosynthesis. *Pathol Eur*. 1970;5(3):307-14.
8. Chang EY, McAnally JL, Van Horne JR, Statum S, Wolfson T, Gamst A, Chung CB. Metal-on-metal total hip arthroplasty: do symptoms correlate with MR imaging findings? *Radiology*. 2012;265(3):848-57. doi: 10.1148/radiol.12120852.

#### Authors

**Luben Stokov, M.D., Ph.D.** is a member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an orthopaedic surgeon at Clinic of Orthopedics and Traumatology, UMHAT “St. Anna”, Sofia, Bulgaria. He is professor at the Department of Orthopedics and Traumatology, Medical University of Sofia, Sofia, Bulgaria. He is a member of the Editorial Board of the Journal of the Bulgarian Orthopaedics and Trauma Association (JBOTA).

**Elka Angelova, MD** works as surgeon at the Clinic of General Surgery, National Oncology Hospital, Bulgaria.

**Asen Todorov, MD** works as surgeon at the Clinic of General Surgery, National Oncology Hospital, Bulgaria.

**Georgi P. Georgiev, M.D., Ph.D., D.Sc.** is member of the **Bulgarian Orthopedic and Traumatology Association (BOTA)**. He works as an orthopaedic surgeon at the Department of Orthopedics and Traumatology, University Hospital “Queen Giovanna - ISUL”, Medical University of Sofia, Bulgaria. He is Assistant Professor at the Department of Orthopedics and Traumatology, Medical University of Sofia, Bulgaria. He is a member of the Editorial board of BMC Musculoskeletal Disorders and Clinical Anatomy.