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Osteoid osteoma of the capitate (case report)

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Abstract

Introduction Osteoid osteoma (OO) is a rare bone pathology of the hand. OO localization and pain syndrome associated with it may present a challenging diagnosing problem as its symptoms are nonspecific and the X-ray pattern is unclear. Our research **is aimed at** presenting the findings of the clinical and instrumental examination, and the outcome of successive surgical management of a patient with OO of the capitate. **Material and methods** We examined a 46-year-old male patient to verify the diagnosis of OO; he had the ultrasonic examination of his hand soft tissues and joints, biplane radiography of the wrist joint, computed tomography (CT), and magnetic resonance imaging (MRI) of his left hand. A 0.6-cm defect of the capitate bone along with its increased bone density was visible in the X-rays of the patient's left hand. In CT and MRI images, a 0.65 × 0.65 cm and up to 0.45-cm deep marginal bone defect on the capitate dorsum was identified. A 0.55 × 0.45 cm loose bone fragment was also found at that level. The examination was followed up by surgical management that involved marginal excision and extraction of the nidus of the left capitate bone. **Results** The patient reported the absence of pain in his hand and the increase in the range of motion in his wrist joint right after the surgery. The check-up X-ray images after three months revealed the signs of bone remodeling in the area of surgical intervention. The capitate defect was not found. **Discussion** OO in the hand may resemble a grainy remodeling of the osseous structure. A comprehensive examination that includes CT and MRI is crucial for revealing this rare OO localization. **Conclusion** The atypical localization and the patient's age unusual for the liaison challenge the diagnosis and provide for the wrong choice of the treatment strategy.

Keywords: osteoid osteoma, hand, capitate bone, wrist joint

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INTRODUCTION

Osteoid osteoma (OO) is one of the most common benign bone neoplasms, which is characterized by thickening of the cortical layer of the bone, including the so-called OO "nidus", a non-progressive lesion, accompanied by a pronounced pain syndrome which intensifies at night and is well stopped by taking non-steroidal anti-inflammatory drugs (NSAIDs) [1–4]. The onset of the disease most often occurs in the second decade of life [5, 6]. The most common OO localization is long bones; less frequently, OO can be found on short tubular bones and bones of the hand [4, 7]. A search of the studies indexed in PubMed found a total of 279 sources on the topic of OO in the bones of the hand, of which lesions of the capitate are mentioned in 22. In Russian-language specialized publications, studies of OO with lesions of the capitate of the hand were not found. The localization of OO in the bones of the hand and pain associated with it can be a difficult diagnostic task due to nonspecific symptoms and unclear radiological picture of the disease [2, 8, 9, 10].

The purpose of the work was to demonstrate the data of clinical and instrumental examination, as well as the results of successful surgical treatment of a patient with OO of the capitate of the hand.

MATERIAL AND METHODS

We present the results of the treatment of male patient A., aged 46, who applied to NIITON SSMU with complaints of severe pain in the area of the left hand, which had been bothering him for three years. The patient gave his informed voluntary consent to participate in the study, approved by the decision of the local ethics committee of NIITON SSMU (protocol No. 1 dated September 11, 2018). The patient could not associate the onset of the pain with anything. Pain intensified in the last six months, especially at night; full use of the hand was impossible. The intensity of the pain syndrome according to the visual analog scale of pain (VAS) was 9. NSAIDs were used to relieve the pain. The patient went to a traumatologist at the place of his residence and was diagnosed with arthritis of the wrist joint. He had repeated courses of physiofunctional treatment, but no positive effect was noted.

Visual examination did not show any changes in the hand compared to the contralateral one; palpation of the wrist area was accompanied by a sharp pain reaction. The volume of active and passive movements in the wrist joint was sharply restricted due to pain but motion in the adjacent joints was full and painless.

To establish the diagnosis, the patient underwent a

comprehensive examination: ultrasound examination (US) of the soft tissues and joints of the hand, radiography of the wrist joint in two projections, computed tomography (CT) and magnetic resonance imaging (MRI) of the left hand. Ultrasound of the wrist joint revealed no pathology. On radiographs of the wrist joint in two standard projections (Fig. 1), a defect of the capitate bone of the left hand with a diameter of 0.6 cm was visualized due to compaction of the bone tissue. The articular surfaces were clear and even. The carpal bones on the left and in the distal third of the radius were porotic.

CT scan of the hand (Fig. 2) showed a marginal bone defect along the dorsal surface of the capitate bone measuring 0.65 × 0.65 cm and up to 0.45 cm deep. At this level, a free bone fragment measuring 0.55 × 0.45 cm was seen. The articular surfaces were clear and even. Edema of the paraosseous soft tissues was determined along the dorsal surface of the capitate bone.

MRI showed a marginal bone defect along the dorsal surface of the capitate bone, 0.65 × 0.65 cm in size and up to 0.45 cm deep (Fig. 3). A free body 0.55 × 0.45 cm in size was also found. There was severe edema of the bone marrow of the capitate, the bone was not swollen. No signs of hyperostosis were detected. On the dorsal surface, there was a pronounced edema of the paraosseous soft tissues. The articular surfaces were clear and even.

After the examination, the surgical intervention included marginal resection, removal of the pathological nidud of the left capitate bone. Under combined anesthesia, a longitudinal incision was made along the dorsal surface of the left hand in the region of the capitate bone. Acute and bluntly, the capitates was approached. The soft tissues over the capitate were not changed. The cortical layer along the dorsal surface of the capitate was swollen and thinned. When the latter was opened, a dense rounded formation 0.5 × 0.6 cm in size was exposed (Fig. 4, a), which was easily separated from the capitate bone; under the formation, a smooth "bed" of unchanged spongy bone was revealed (Fig. 4, b). After the removal of the formation, the wound was sutured in layers.

Histological preparations of the surgical material revealed fragments of the formation consisting of intertwining osteoid and bone trabeculae of varying mineralization; the spaces between the trabeculae were filled with loose fibrous tissue with thin-walled vessels, which corresponds to the OO nidus (Fig. 5).

Fig. 1 X-rays of the left wrist: ***a*** AP view; ***b*** lateral view

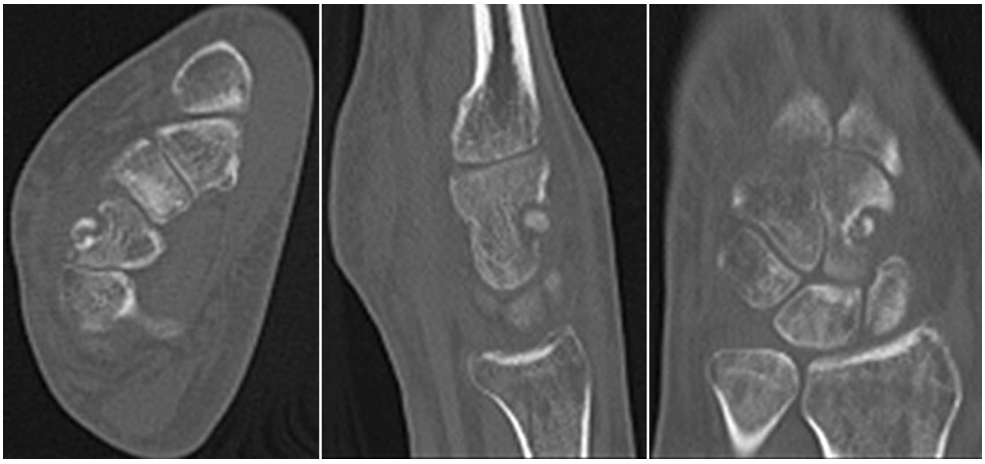

Fig. 2 CT scans of the left hand

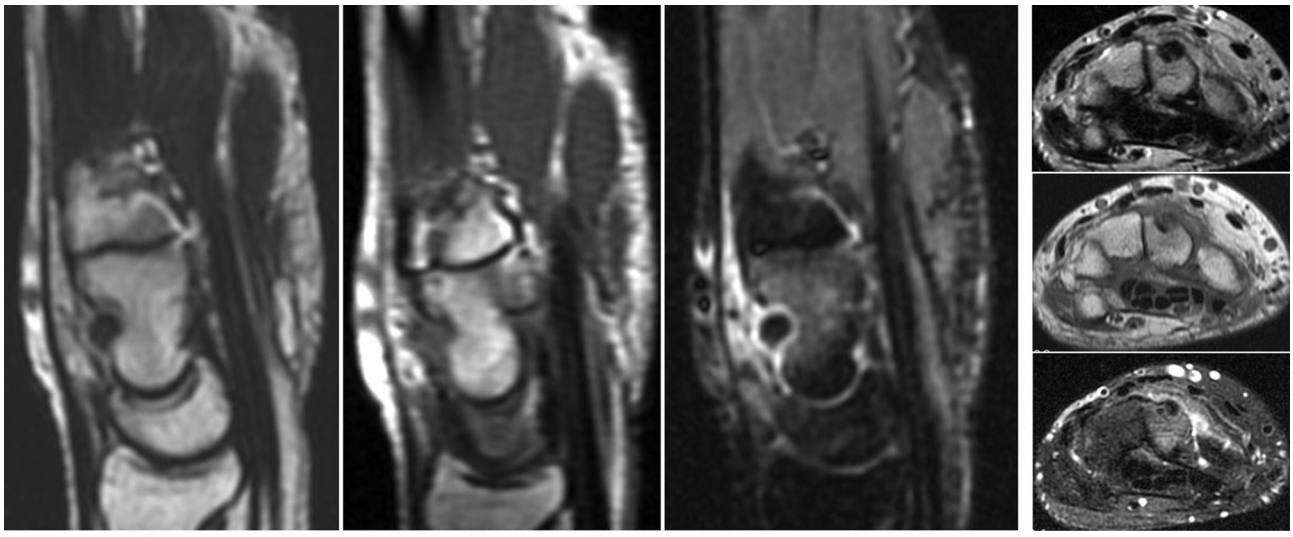

Fig. 3 MRI of the left hand: ***a*** in the sagittal projection, modes T2 WI, T1 WI, STIR; ***b*** in axial projection, T2 IP, T1 IP, STIR IP modes

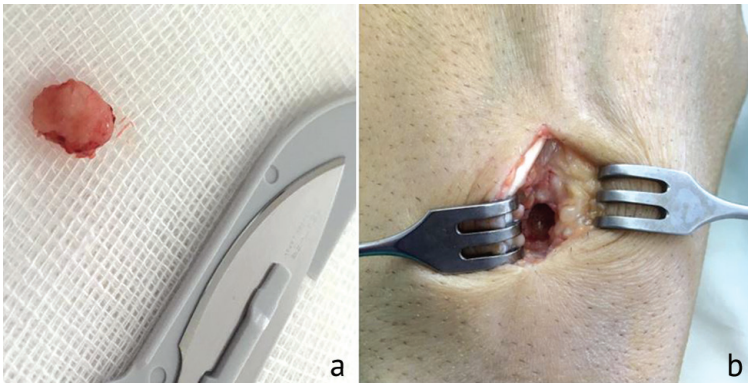

Fig. 4 Intraoperative photos: ***a*** excised pathological nidus; ***b*** the "bed" of the pathological midus

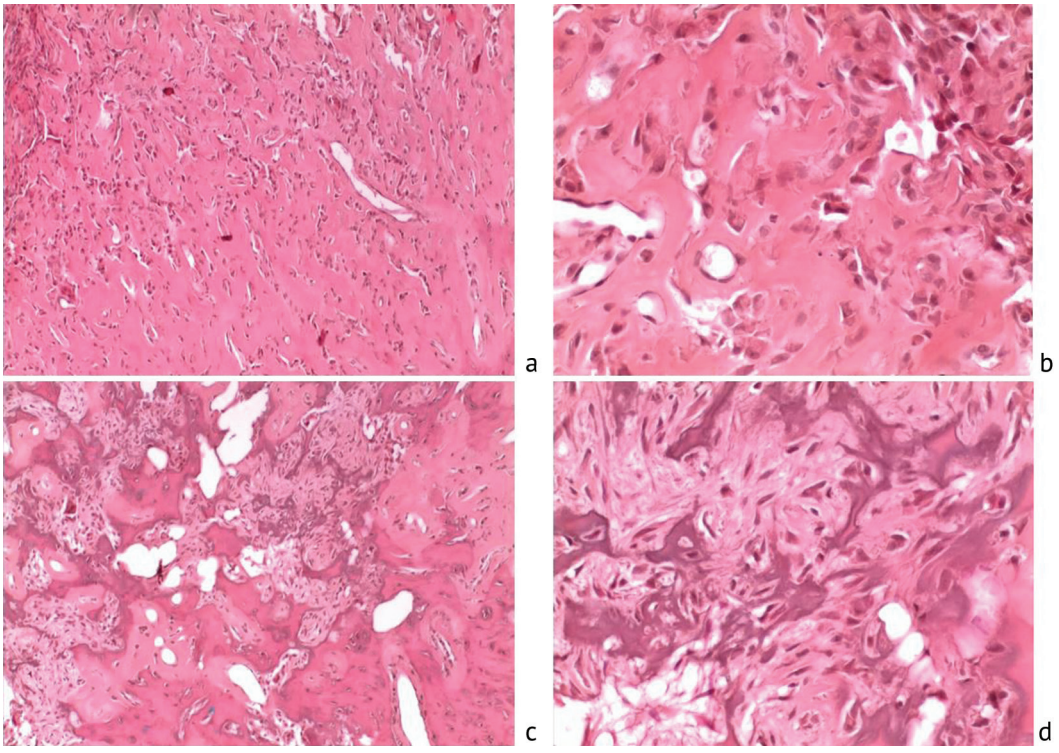

Fig. 5 Histological preparations of the surgical material. Nidus fragment: ***a*** with intertwining osteoid trabeculae, hematoxylin-eosin, ob. 10×; ***b*** bone trabeculae lined by osteoblasts, hematoxylin-eosin, ob. 40×; ***c*** with intertwining osteoid trabeculae of varying degrees of mineralization, hematoxylin-eosin, ob. 10×; ***d*** intertrabecular spaces filled with loose fibrous tissue, hematoxylin-eosin, ob. 40×

RESULTS

The postoperative period was uneventful. From the first day after the operation, the patient noted the absence of pain in the hand, an increase in the volume of active movements in the wrist joint. After seven days, the pain score on the VAS scale was 0 points. Hand function score according to DASH-RUSSIAN was 2.57 points. On the follow-up images of the wrist joint after three months, there were signs of bone restructuring in the area of the surgical intervention. No capitate bone defect was found (Fig. 6).

The patient returned to his professional activities. There is no pain syndrome. The range of active and passive movements in the wrist joint is satisfactory and painless (flexion/extension of the hand 85°/0/85°) (Fig. 7).

Fig. 6 CT scans of the left hand 3 months post-surgery

Fig. 7 Long-term result: wrist flexion/extension 85°/0/85°

DISCUSSION

The difficulty of diagnosing OO which is localized in upper limb small bones was stated by many authors [6, 10–12]. OO is often the cause of persistent pain in the hand of unclear etiology, which is explained by the complex anatomy of the upper limb and the tendency of OO in this area to mimic other clinical conditions [13, 14]. The differential diagnosis of OO at this site includes osteomyelitis, enostosis, degenerative joint disease, tuberculosis, and avascular necrosis. Frequently, degenerative changes in the hand can overshadow another less obvious but a more significant pathology [4, 15–18]. In the bones of the wrist, OO is usually accompanied by constant aching pain, which does not depend on physical activity, and a restriction in active and passive movements [19]. Since these manifestations are rather nonspecific, the diagnosis usually depends on instrumental methods of examination. However, the characteristic radiographic picture in the wrist may be absent. In the bones of the wrist, OO can manifest itself as a granular restructuring of the bone tissue structure, and not as a typical "luminous" focus with a sclerotic rim of the bone [1, 3, 8]. Under these conditions, the decisive role is played by high alertness regarding prolonged pain in the hand and a comprehensive examination, including CT and MRI to detect OO of rare localization [20, 21].

CONCLUSIONS

This clinical case confirms the need for a detailed and comprehensive examination of patients with prolonged pain in the hand. Surgical treatment with the removal of the OO "nidus" enables to fully restore the function of the hand and relieve pain.

СПИСОК ИСТОЧНИКОВ

1. Czinner M., Kebrle R., Matějovský Z., Němejc M. [Osteoid Osteoma of the Upper Extremity]. *Acta Chir. Orthop. Traumatol. Cech*., 2019, vol. 86, no. 1, pp. 77-82. (in Czech)
2. Al Shaikhi A., Hébert-Davies J., Moser T., Maillot E., Danino A.M. Osteoid osteoma of the capitate: a case report and literature review. *Eplasty*, 2009, vol. 9, pp. e38.

3. Schindler A., Hodler J., Michel B.A., Bruehlmann P. Osteoid osteoma of the capitate. *Arthritis Rheum*., 2002, vol. 46, no. 10, pp. 2808-2810. DOI: 10.1002/art.10579.
4. Themistocleous G.S., Chloros G.D., Benetos I.S., Efstathopoulos D.G., Gerostathopoulos N.E., Soucacos P.N. Osteoid osteoma of the upper extremity. A diagnostic challenge. *Chir. Main*, 2006, vol. 25, no. 2, pp. 69-76. DOI: 10.1016/j.main.2006.02.001.
5. Gubina E.V., Ryzhikov D.V., Podorozhnaia V.T., Kirilova I.A., Andreev A.V., Sadovoi M.A., Fomichev N.G., Bondarenko A.V., Afanasev L.M., Revkovich A.S., Senchenko E.V. Khirurgicheskoe lechenie osteoid-osteom u detei i podrostkov [Surgical treatment of osteoid osteomas in children and adolescent]. *Pediatriia. Zhurnal im. G.N. Speranskogo* [Pediatrics. Speransky Journal], 2018, vol. 97, no. 2, pp. 117-121. (in Russian)
6. Bludov A.B., Fedorova A.V., Zamogilnaia Ia.A., Nered A.S., Kochergina N.V. Osteoid-osteoma. *Sarkomy kostei, miagkikh tkanei i opukholi kozhi* [Sarcomas of Bones, Soft Tissues and Skin Tumors], 2015, no. 3, pp. 26-33. (in Russian)
7. Volpin G., Shtarker H., Oliver S., Katznelson A., Stahl S. [Osteoid osteoma of the wrist joint resembling tenosynovitis]. *Harefuah*, 2006, vol. 145, no. 12, pp. 885-888, 942-943. (in Hebrew)
8. Mehdizade A., Danon M., Ellis S., Wolfe S., Adler R.S. Use of ultrasonographic guidance for needle localization of osteoid osteoma of the capitate. *HSS J*., 2006, vol. 2, no. 2, pp. 176-180. DOI: 10.1007/s11420-006-9015-2.
9. Roberts S.E., Mirzabeigi M.N., Naik A., Preciado C., Chang B. Osteoid osteoma of the trapezium: case report of an unusual tumor location presenting a diagnostic challenge. *Case Rep. Orthop*., 2017, vol. 2017, 3683854. DOI: 10.1155/2017/3683854.
10. GÜmÜŞtaŞ S.A., Çevik H.B., Kayahan S. [Management of Osteoid Osteoma in Unusual Locations]. Acta Chir. Orthop. Traumatol. Cech., 2020, vol. 87, no. 4, pp. 285-291. (in English)
11. Niamane R., Lespessailles E., Deluzarches P., Vialat J.F., Maitre F., Benhamou L.C. Osteoid osteoma multifocally located and recurrent in the carpus. *Joint Bone Spine*, 2002, vol. 69, no. 3, pp. 327-330. DOI: 10.1016/s1297-319x(02)00402-5.
12. Álvarez-Álvarez A., Riera Campillo M., Reimunde Seoane E., Iñesta Mena C., Pérez Méndez C. [Osteoid osteoma: unusual cause of chronic pain in the wrist in a child]. *Arch. Argent. Pediatr*., 2021, vol. 119, no. 1, pp. e61-e64. (in Spanish) DOI: 10.5546/aap.2021.e61.
13. Belassein A., Drouet C., Morel O., Boulahdour H. [Osteoid osteoma]. *Rev. Prat*., 2018, vol. 68, no. 5, pp. 525. (in French)
14. Tomasian A., Cazzato R.L., Auloge P., Garnon J., Gangi A., Jennings J.W. Osteoid osteoma in older adults: clinical success rate of percutaneous image-guided thermal ablation. *Clin. Radiol*., 2020, vol. 75, no. 9, pp. 713. e11-713. e16. DOI: 10.1016/j.crad.2020.05.018.
15. Afshar A. Osteoblastoma of the capitate bone. *J. Hand Microsurg*., 2012, vol. 4, no. 1, pp. 34-38. DOI: 10.1007/s12593-011-0050-y.
16. Carneiro B.C., Da Cruz I.A.N., Ormond Filho A.G., Silva I.P., Guimarães J.B., Silva F.D., Nico M.A.C., Stump X.M.G.R.G. Osteoid osteoma: the great mimicker. *Insights Imaging*, 2021, vol. 12, no. 1, pp. 32. DOI: 10.1186/s13244-021-00978-8.
17. Orth P., Kohn D. [Diagnostics and treatment of osteoid osteoma]. Orthopade, 2017, vol. 46, no. 6, pp. 510-521. (in German) DOI: 10.1007/s00132-017-3428-0.
18. French J., Epelman M., Johnson C.M., Stinson Z., Meyers A.B. MR Imaging of osteoid osteoma: pearls and pitfalls. *Semin. Ultrasound CT MR*, 2020, vol. 41, no. 5, pp. 488-497. DOI: 10.1053/j.sult.2020.05.013.
19. Balog L., Szakács N., Kiss J., Hetthéssy J.R. [Osteoid osteoma of the hand – Diagnostics and operative treatment]. *Orv. Hetil*., 2020, vol. 161, no. 7, pp. 263-268. DOI: 10.1556/650.2020.31645. (in Hungarian) DOI: 10.1556/650.2020.31645.
20. Dookie A.L., Joseph R.M. *Osteoid Osteoma*. In: StatPearls. Treasure Island (FL): StatPearls Publishing; 2022. PMID: 30725964.
21. Tepelenis K., Skandalakis G.P., Papathanakos G., Kefala M.A., Kitsouli A., Barbouti A., Tepelenis N., Varvarousis D., Vlachos K., Kanavaros P., Kitsoulis P. Osteoid osteoma: an updated review of epidemiology, pathogenesis, clinical presentation, radiological features, and treatment option. *In Vivo*, 2021, vol. 35, no. 4, pp. 1929-1938. DOI: 10.21873/invivo.12459.

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