FROM ANEURYSMAL BONE CYST TO TELANGIECTATIC OSTEOSARCOMA WITH METASTASIS IN INGUINAL LYMPH NODES – CASE REPORT

OD ANEURIZMALNE KOŠTANE CISTE DO TELANGIEKTATIČNOG OSTEOSARKOMA SA METASTAZOM U INGVINALNIM LIMFNIM ČVOROVIMA – PRIKAZ SLUČAJA

Vesna JANEVSKA1, Liljana SPASEVSKA1, Milan SAMARDZISKI2, Violeta NIKODINOVSKA3, Julija ZHIVADINOVIK4 and Elizabeta TRAJKOVSKA5

Introduction
Aneurysmal bone cyst (ABC) is a benign bone lesion composed of blood filled cystic cavities lined by fibrous septa. Its malignant transformation of is a rare event. Case report. We report a case of a lesion in the second metatarsal bone in a 29-year-old male, presented as a slight swelling of the right foot. After the curettage had been done, the diagnosis of aneurysmal bone cyst was made but the recurrence occurred 4 years later. The biopsy of the recurrent tumor showed compact neoplastic tissue consistent with diagnosis of giant cell tumor with malignancy. The malignant component was recognized as a high grade sarcoma with osteoid production. A tumor mass with the whole II metatarsal bone was extirpated and a resected part of fibula was transplanted. A year later, another recurrence occurred, an amputation was performed and a telangiectatic osteosarcoma with inguinal lymph nodes metastases was diagnosed. No other tumor mass was confirmed, either clinically or by imaging techniques at the time of his third operation. He died 4 months later with multiple pulmonary metastases.

Conclusion. We emphasize the importance of team work in order to achieve the accurate diagnosis, highlighting careful radiological examinations, good sampling and awareness of unusual cases in bone tumor pathology.

Key words: Bone Cysts, Aneurysmal; Osteosarcoma; Neoplasms Metastasis; Lymph Nodes; Adult; Giant Cell Tumors; Metatarsal Bones; Diagnosis

Sažetak

Ključne reči: Aneurizmalna koštana cista; Osteosarkom; Metastaţe; Limfni čvorovi; Odrasli; Tumori gigantskih čelija; Metaatarzalne kosti; Dijagnoza

Summary
Introduction. Aneurysmal bone cyst is a benign bone lesion composed of blood filled cystic cavities lined by fibrous septa. Its malignant transformation of is a rare event. Case report. We report a case of a lesion in the second metatarsal bone in a 29-year-old male, presented as a slight swelling of the right foot. After the curettage had been done, the diagnosis of aneurysmal bone cyst was made but the recurrence occurred 4 years later. The biopsy of the recurrent tumor showed compact neoplastic tissue consistent with diagnosis of giant cell tumor with malignancy. The malignant component was recognized as a high grade sarcoma with osteoid production. A tumor mass with the whole II metatarsal bone was extirpated and a resected part of fibula was transplanted. A year later, another recurrence occurred, an amputation was performed and a telangiectatic osteosarcoma with inguinal lymph nodes metastases was diagnosed. No other tumor mass was confirmed, either clinically or by imaging techniques at the time of his third operation. He died 4 months later with multiple pulmonary metastases.

Conclusion. We emphasize the importance of team work in order to achieve the accurate diagnosis, highlighting careful radiological examinations, good sampling and awareness of unusual cases in bone tumor pathology.

Key words: Bone Cysts, Aneurysmal; Osteosarcoma; Neoplasms Metastasis; Lymph Nodes; Adult; Giant Cell Tumors; Metatarsal Bones; Diagnosis

Introduction
Aneurysmal bone cyst (ABC) is a benign bone lesion composed of blood filled cystic cavities lined by fibrous septa. The septa are composed of mesenchymal tissue containing fibroblasts, multinucleated giant cells and osteoid or immature trabeculae of reactive bone. It may be a primary or secondary lesion developing into other benign and malignant tumors [1–3]. Malignant transformation of ABC is a rare event and has been described as a result of previous treatment, more often radiation than curettage. Malignant tumors developed from ABC are recognized as malignant fibrous histiocytoma or osteosarcoma [4–6].
Metastatic dissemination in osteosarcoma occurs haematogenously, though the regional lymph node involvement is rarely reported [7]. We present a patient with aneurysmal bone cyst of foot who developed a telangiectatic osteosarcoma with metastases in the inguinal lymph nodes four years later.

**Case Report**

A 29-year-old male was admitted to the hospital because of the pain lasting for a few months and a slight swelling of his right foot. Radiography showed a lytic lesion with benign radiographic characteristics in the proximal part of the second metatarsal bone. The differential diagnosis, based on radiographic examination, was giant cell tumor (GCT) or aneurysmal bone cyst (Figure 1). Curettage was performed and the histological analysis confirmed aneurysmal bone cyst (Figure 2).

Four years later in October 2008, the patient was admitted to the same hospital because of a local recurrence manifested as a large swelling of the foot, followed by severe pain during walking. Imaging studies showed a lytic lesion that expanded the bone and destroyed the cortex (Figure 3).

After a needle biopsy had been performed and malignant cytology confirmed, a surgical intervention was done. A tumor mass with the whole II metatarsal bone was extirpated and a resected part of fibula was transplanted (Figure 4). The microscopic analysis confirmed giant cell tumor with malignancy (Figure 5).

The patient refused any other therapy except surgery and was disease-free till 2009.

Recurrent tumor mass was found in October 2009, affecting the first and third metatarsal bone as well. An inguinal lymph node enlargement was present at the same side. The amputation and lymphadenectomy were performed and the histological examina-

---

**Abbreviations**

ABC – aneurysmal bone cyst
GCT – giant cell tumor
COSS – Cooperative Osteosarcoma Study Group

---

**Figure 1.** Lytic lesion with benign radiographic characteristics consistent with ABC  
**Slika 1.** Litična lezija sa benignim radiografskim karakteristikama koje odgovaraju aneurizmalnoj koštanoj cisti

**Figure 2.** Microphotograph of ABC (H.E. 10 x 10)  
**Slika 2.** Mikrofotografija aneurizmalne koštane ciste (H.E. 10 x 10)

**Figure 3.** Computed tomography of the first recurrence; a lytic lesion that expanded the bone and destroyed the cortex  
**Slika 3.** Kompjuterizovana tomografija prvog recidiva; litična lezija koja je uvećala kost i uništila korteks
tion confirmed telangiectatic osteosarcoma with lymph node metastases (Figure 6).

No other tumor mass was confirmed, either clinically or by imaging techniques at the time of his third operation. He died 4 months later with multiple pulmonary metastases. Autopsy was not performed.

**Histological Examination**

Tissue samples were taken from the operative material, fixed in formalin and cut in 5 microns thin sections for routine light microscopy.

**Pathologic Findings**

The first operation: The curettage material was composed of numerous bone and soft tissue fragments, with different shapes merged in coagulated blood.

Microscopically, the tumor tissue was composed of multiple fibrous septa containing capillary vessels, fibroblasts, myofibroblasts, giant cells, some hemosiderin loaded macrophages, osteoblasts and osteoid. They enclosed the vascular spaces filled with blood.

The second operation: The operative material was composed of 10 tissue fragments (cut by the surgeon), which were recognized as parts of metatarsal bone measuring 9x4x3.7 cm and meaty tumor tis-

suec having reddish-gray color, firm consistency merged with soft yellow areas and areas of hemorrhage.

Microscopically the tumor tissue contained 2 different components. The first was recognized as GCT and the second as a high grade sarcoma with osteoid production. The first type of tissue was composed of round and elongated mononuclear cells mixed with multinuclear osteoclast-like giant cells. The nuclei of mononuclear and giant cells were identical. Cytological and nuclear atypia were mild and there were no atypical mitoses, although some mitotic activity was present. Spindle cell rich areas with fascicular and storiform pattern and areas of hemorrhage were also found, but no cystic spaces or any other certain morphological signs of preexisting ABC was found. The second type of tissue, juxtaposed to GTC, was recognized as a malignant neoplasm with the characteristics of osteosarcoma with areas of heavy deposition of osteoid. There were some giant cells in the sarcomatous stroma.

The third operation: The amputated right lower extremity had a large tumor mass at the dorsal site.
of the foot measuring 18 x 10 cm. There were 3 ulcerations of the skin due to tumor infiltration and a 20 cm long scar from an old surgical incision over it. After the dissection of the soft tissues, a highly vascular tumor mass was found. The blood-filled cyst at the centre and some more solid tissue at the periphery with necrosis were macroscopically recognized.

Microscopically large part of the tumor was composed of blood and necrotic tissue, in which some malignant cells could be found. Small amount of the tumor tissue from the periphery contained blood-filled spaces separated by thin cell rich septa and areas of more solid tissue. The septa contained benign looking giant cells and mononuclear cells with malignant cytological characteristics. Deposition of osteoid was found in some tumor areas.

Two lymph nodes extirpated from the right inguinal region were enlarged, measuring 6 x 3 and 1.5 x 1.5 cm. Gray-white tumor tissue was present at the cut surface in both of them.

A metastatic osteosarcoma was confirmed microscopically in both lymph nodes.

Discussion

Aneurysmal bone cyst is a benign, locally destructive lesion of bone that was first described as a distinct entity in 1942 by Jaffe and Lichtenstein [1]. In about 79% of cases, it develops as a primary tumor without any recognized precursor bone lesion or, in about 30% of cases, as a secondary lesion when a preexisting osseous lesion can be identified [5]. ABC of a metatarsal is relatively uncommon, despite the predilection of this lesion for long bones [1, 8, 9].

The natural course of ABC involves a continued local growth and destruction, although the tumor is not considered to be a premalignant lesion [1, 10]. From a diagnostic standpoint, ABC is widely confused with other giant cell containing tumors of the bone. The differential diagnosis includes other more prevalent giant cell tumors of the bone such as giant cell tumor, giant cell reparative granuloma, brown tumor of hyperparathyroidism, and the less common but ominous telangiectatic osteosarcoma [1, 11].

There is a strong association of ABC and GTC [3]. Giant cell tumor is a neoplasm composed of mononuclear, plump, round, oval or spindle - shaped stromal cells and osteoclast-like multinucleated giant cells. The tumor has unpredictable potential of growth with possibility of recurrence and metastases [4, 12, 13]. GTC of bone accounts for about 5% of all bone tumors and 20% of all benign tumors. It most frequently occurs in the epiphysis of long bones around the knee, and in distal radius and proximal humerus. It rarely occurs in other bones.

GCT usually affects skeletally mature young adults and adults between the third and fourth decade of life, predominantly women. Rare examples of multifocal GCT have also been reported [4].

Radiographically, GCT is a lytic lesion with relatively well defined margins, eccentrically located within the bone. The bone is often expanded and the cortex thinned. There is a little or no periosteal reaction. There are no specific radiological features that predict malignancy in GCT [4].

The malignant transformation of GCT of bone is a relatively rare phenomenon. Malignant GCTs are divided into primary and secondary forms. Primary malignant GCTs are those with malignant sarcomatous components that are present de novo in conjunction with a giant cell tumor of bone and are exceedingly rare [5]. The term ‘dedifferentiated GCT’ is also used to describe these tumors [5]. Secondary malignant GCTs are high-grade sarcomas occurring at the sites of previously treated GCT of bone. Most malignancies in GCTs fall into the latter category and occur several years after radiation therapy or, much less frequently, after surgery [5, 14, 15].

Histologically, malignancy in giant cell tumors is recognized as malignant fibrous histiocytoma, fibrosarcoma or osteosarcoma [4–6, 16]. Heffernan et al. summarize the frequency at which each of these has been encountered in published cases of malignant transformation of GCT. Osteosarcoma occurred
most frequently, both primarily and secondarily, and was seen in 23 of the 42 cases reviewed. Fibrosarcoma and malignant fibrous histiocytoma were found in 10 and 7 of the 42 cases, respectively [5].

Osteosarcoma is a primary malignant bone tumour that affects both adults and children [7]. Metastatic dissemination in osteosarcoma usually occurs hematogenously, the lung and bones being the most common metastatic sites [17–20].

Regional lymph node involvement has been reported in patients with osteosarcoma in multiple case reports and case series, and is thought to be rare, with incidence rates varying from <1% to 10% [7]. Tobias et al. reported an incidence of regional lymph node involvement of 2.3% in their patients (4/176) [7]. They found that the patients with lymph node involvement did not differ by race, sex or age. The presence of regional lymph node involvement was found to be a poor prognostic factor. In their study, overall survival was poor for the patients, with median survival of only 8.5 months after diagnosis, which was similar to the patients with distant metastatic disease in their series. Thampi et al. reported the incidence rate of lymph node involvement to be 2.7%, with no significant difference between histologic subtypes. The Cooperative Osteosarcoma Study Group (COSS) reported the incidence of lymph node involvement in osteosarcoma of 0.8% (15/1702). In addition, the COSS found that the patients with the lymph node involvement had osteoblastic osteosarcoma subtype [7]. Case reports of regional node involvement have also been described in patients with osteoblastic osteosarcoma [7].

We present this case as a rare case of aneurysmal bone cyst transformation into telangiectatic osteosarcoma passing through a solid tumor phase in which the neoplastic tissue had the morphological features of giant cell tumor with malignancy having the morphological features of osteosarcoma. The second rarity of this case was the inguinal lymph node metastasis from the secondary developed osteosarcoma.

Another possible aspect of this case is worth considering.

Is there a possibility of a different order of events? It can be assumed that the primary lesion was underdiagnosed due to an extraordinary localization for osteosarcoma or scant curettage material. Since the second recurrence of the primary lesion was a clear and undoubted telangiectatic osteosarcoma, one can assume that the primary lesion was not ABC but osteosarcoma.

In this situation the first relapse becomes interesting for discussing the histopathological point of view. The diagnosis of malignant GCT was made at an institution other than the first one where the pathologist could not get the insight into the slides from the first lesion.

We revised the archived radiological data and all our histological slides. During the repeated analysis of the first lesion diagnosed as ABC we did not find any solid areas suggesting a preexisting giant cell tumor. There were no other morphological features except those consistent with ABC.

Immunohistochemical stains against CD68 and actin revealed CD68 positive giant cells and some actin positive fusiform cells in the septa. Careful examination of the slides by three independent pathologists did not reveal any morphological features of malignancy or even a field that would be suspected for telangiectatic osteosarcoma.

We made a review of the radiologic findings: the lesion was intraosseous, the osteolysis was of geographic type, there was no periosteal reaction, the cortex was intact, and there was a slight osteosclerotic rim at one site - all the features characteristic for benign lesion. Computed tomography was also consistent with benign lesion.

The revision of slides of the second lesion did not reveal any certain signs of preexisting ABC or typical telangiectatic osteosarcoma. The neoplasm consisted mostly of solid tumor parts. The greatest percentage of tumor tissue had features of a GCT which interfered with a lower percentage of high grade sarcoma with osteoid production.

From here it seems logical that GCT with malignancy is diagnosed, although it seems that a diagnosis of osteosarcoma would be more appropriate.

The parts of osteosarcoma were quite evident, but without certain morphological signs of telangiectatic type. Careful examination of the osteosarcomatous areas showed the presence of giant cells. It is not an unexpected finding of giant cells in this situation to be attributed to the GCT component instead to a giant cell rich osteosarcoma. In most areas, osteosarcomatous tissue was composed of small and atypical osteoblasts embedded in abundant osteoid. There were parts of tumor tissue in which hemorrhages were present; however, they were not identified as blood field cysts but as an ordinary hemorrhage.

It can be assumed that if the pathologist who diagnosed GCT with malignancy had had the access to the first diagnosis, he should have made an effort to make abundant sampling in order to prove telangiectatic osteosarcoma.

The revision of radiological findings showed the characteristics for malignant bone tumor. The cortex was destroyed and tumor spreading to the soft tissue was evident. No fluid levels were found.

The revision of the slides from the second recurrence (third lesion) showed the presence of tissue typical of telangiectatic osteosarcoma in most parts of the tumor. The infiltrating parts of tumor in the dermis showed abundant osteoid deposition. Atypical, predominantly small osteoblasts were embedded in the osteoid; a tissue very similar to that which was found in the previous lesion diagnosed as GCT with malignancy.

Basic precondition for the accurate diagnosis of bone tumors is the team approach which requires close cooperation between the pathologist, orthopedic surgeon and radiologist.

Clinical presentations of most malignant bone tumors are rather unspecific, but some of them, such as localization and age, together with the in-
sight into the radiographic findings, provide the pathologist some rational differential diagnostic possibilities. Radiographic findings of bone tumors should be an integral part of histological examination and diagnosis of these lesions.

A serious problem may appear in diagnosing telangiectatic osteosarcoma and giant cell rich osteosarcoma because of their similarity to the aneurysmal bone cyst and giant cell tumor. Extensive sampling should provide a correct diagnosis especially in cases in which radiography suggests malignancy.

In our case, radiologic findings in the first and second relapse correspond to the histopathological diagnosis.

The radiological characteristics of the primary lesion are consistent with benign tumor.

Is there a possibility that there are rare osteosarcomas presented with unusual radiological features and is the order of events that we propose possible?

Supported by X-ray findings, the primary lesion in our case seems to have been ABC that underwent malignant transformation.

Malignant transformation of ABC is a rare event and has been described as a result of previous treatment, more often radiation than curettage; in our case the previous treatment was curettage.

We report this case as an interesting example of different possibilities and as a case in which many unusual events happened: a) a malignant transformation of ABC or possible non representative tissue sample, b) a solid tumor phase in which the neoplastic tissue had morphological features of giant cell tumor with malignancy or osteosarcoma c) inguinal lymph node metastasis from the secondary developed osteosarcoma or late lymph node metastasis from the first misdiagnosed lesion instead a pulmonary one.

Conclusion

We emphasize the importance of team work in order to achieve the accurate diagnosis, highlighting careful radiological examinations, good sampling and awareness of unusual cases in bone tumor pathology.

References


