

CASE REPORT

Chondrosarcoma of the pelvis – case report

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Abstract

Chondrosarcoma (CHS) is the third most common primary bone tumor after myeloma and osteosarcoma. Histologically, it is made of pure hyaline cartilage differentiation. The tumor itself may have myxoid modification and calcification. It occurs especially after 50 years, with an equal gender distribution. Most CHS are solitary, the etiology is still unclear and most of them are discovered accidentally. Early diagnosis is crucial for a good prognosis. In this paper, we would like to present a case of a female patient with an accidentally discovered CHS of the iliopectineal and ischiopectineal ramus of the pelvis. The purpose of this report is to highlight the importance of multidisciplinary management of tumor pathology, especially when the site of the tumor is surgically hardly accessible and to underline possible common genetic aspects of benign and malignant tumors.

Keywords: chondrosarcoma, primary bone tumor, surgical management.

Introduction

Chondrosarcoma (CHS) is the third most common primary bone tumor after myeloma and osteosarcoma. Histologically, it is made of pure hyaline cartilage differentiation [1, 2]. The tumor itself may have myxoid modification and calcification. It occurs especially after 50 years old, with an equal gender distribution. Most CHS are solitary, the etiology is still unclear and most of them are discovered accidentally. In the majority of cases, the tumor arises from the surface of the metaphyseal regions of long bones, especially of the proximal femur, humerus, scapula, pelvis and ribs [3, 4]. Certain studies showed that diseases like Ollier's disease and Maffucci syndrome are predisposing factors for CHS [5–7]. The biological behavior of the tumor plays a key role in the prognosis, thus for a better clinical management of this pathology there are three grades of CHS:

- grade 1: representing a moderate hyperchromatic nuclei, most of them being uniform, similar to enchondroma;
- grade 2: characterized by a greater nuclear atypia;
- grade 3: multiple nuclear atypia, the so-called dedifferentiated CHS, with the most preserved prognosis.

Some studies showed that over 60% of cases CHS are grade 1, in 36% of cases CHS are classified as grade 2 and only in 3% are dedifferentiated grade 3 CHS [8, 9].

The symptoms are non-specific, swelling and local pain may be present for a long period of time. Conventional X-ray should be the first clinical investigation, which helps the specialist in taking the right direction for correct diagnosis. The radiological aspect of the tumor includes a cortical thickening and a non-uniform structure (mineralization alternating with radiolucency). Cortical destruction is present, which can lead to pathological fractures with minimal or even without trauma. Computed tomography (CT) scan, magnetic resonance imaging (MRI) and bone scintigraphy are helpful in detecting the truly size of the tumor, the surrounding soft tissue involvement and metastases. As prognostic factors, the most important ones are the number of mitoses, tumor necrosis and presence of myxoid matrix, thus grade 1 CHS has the best prognosis, with an 89% of 5-year survival [10, 11]. Although the best therapeutic option for non-metastatic CHS is surgical removal of the tumor, some authors observed that if the tumor is detected in early phases without cortical involvement, extensive intra-lesional curettage followed by adjuvant treatment like phenolization and/or poly(methyl methacrylate) (PMMA) can be performed [12, 13]. The preferred therapeutic method for grade 2 or grade 3 CHS is en-bloc resection with or without reconstruction depending if the tumor site. Early diagnosis is crucial for a good prognosis. In this paper, we would like to present a case of female patient with an

accidentally discovered CHS of the iliopubic and ischiopubic ramus of the pelvis. The purpose of this report is to highlight the importance of multidisciplinary management of tumor pathology, especially when the site of the tumor is surgically hardly accessible and to underline the common genetic aspects of benign and malignant tumors.

Case presentation

We report the case of a 43-year-old female patient, which was referred to the Department of Obstetrics and Gynecology, University Emergency Hospital of Bucharest, Romania, for dyspareunia. During gynecological examination, we detected a firm tumor of approximately 10/8/9 cm on the lateral right wall of the vagina. She affirmed that dyspareunia debuted one year ago but she did not undertake gynecological examinations in the last five years, dining any other associated pathologies. During ultrasound examination, we detected a large non-homogenous pelvic tumor of 10/8/9 cm; the uterus was enlarged by the presence of multiple infra-centimeter hypo-echogenous tumors (suggestively for multiple uterine fibroids) (Figure 1). On a standard anterior-posterior X-ray of the pelvis we detected an osteolytic lesion of the right iliopubic and ischiopubic (Figure 2). The patient was transferred in the Department of Orthopedic and Traumatology, University Emergency Hospital of Bucharest.

After a routine inquiry about past medical history of her and her family, we found that her family has an important oncological pathology. Her father had lymphoma, her mother had a renal carcinoma and her nephew (son of her brother) had leukemia.

The patient relates pain in the lower back and in both lower limbs but a pain, which was described with an intensity of 3 on a scale from 1 to 10. She used only non-steroidal anti-inflammatory drugs (NSAIDs) medication occasionally and it would be enough for a normal day. It has to be mentioned that the patient's body mass index (BMI) was 35 kg/m², thus the clinical examination was not satisfying. Routine laboratory exam showed leukocytosis with neutrophilia; the other tests were unremarkable.

For a better view of tumor extension, a CT scan of the pelvis and abdomen was recommended. The only pathological findings were in the uterus, which had an increased volume of 149/80/120 mm, having mechanical effect on the rectum and the urinary bladder. The iliopubic ramus had an osteolytic lesion with cortical destruction, extending to the ischiopubic ramus (Figure 3).

In order to discover any secondary pulmonary determination of the tumor, the CT scan was extended to the thorax. As routine examination a whole body scintigraphy with ^{99m}Tc-hydroxydiphosphonate (HDP) of 20 mCi/4.2 mSV, combined with single photon-emission computed tomography (SPECT)/CT took place (Figures 4 and 5).

The results were the followings: vascular phase was without modification, the immediate phase was without modification and in the metabolic phase, there was moderate heterogenic intake at the level of the right ischiopubic ramus, without metastases. Angiography of the tumor helped us to perform a safe biopsy, after a minimal embolization of the inferior gluteal artery (Figure 6). An incisional biopsy was performed, with a direct inguinal approach, centered on the iliopubic ramus, followed by histological and immunohistochemistry (IHC) exam (Figures 7 and 8). The confirmed diagnosis was a moderate differentiated CHS (grade 2), with a positive Ki67 IHC and a 20% nuclear index.

The surgical indication was an en-bloc resection at the base of the iliopubic and ischiopubic ramus. The surgery was performed with the patient with general anesthesia, in a gynecological position with an ilioinguinal approach, which was extended to the level of the ischial tuberosity. After a careful soft tissue dissection and hemostasis, the inguinal ligament was discovered and sectioned at the level of the iliopectineal ligament. The underlying neurovascular band (femoral vein, femoral artery, and femoral nerve) was gently pulled to lateral. Further dissection of the adductor muscles took place. The resection was made at the level of the iliopectineal eminence, just under the acetabulum. The resection was completed at the level of the pubic symphysis and at the level of the ischial tuberosity, leaving the peritoneum intact (Figure 9).

The surgical team was a multidisciplinary one, including orthopedic specialists, general surgeon, gynecologist and vascular surgeon. Control X-ray shows the completely removed tumor, without tumor involvement at the level of the resection (Figure 10).

After the operation, the patient stayed two days at the intensive care unit, for a closer monitoring of the hemodynamic status. The short-term result of surgery was good, postoperative bleeding was minimal. After five days of surgery, the patient started mobilization without weight bearing for the affected lower limb. Unfortunately, the removal of the tumor sacrificed the adductor muscles leaving a deficit in hip adduction.

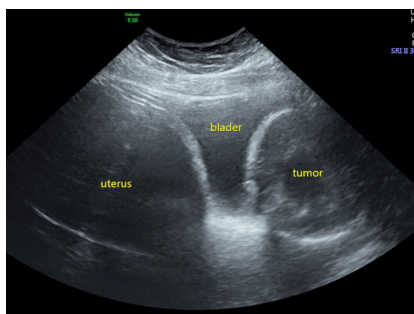


Figure 1 – Ultrasonography of the pelvis showing the pelvic organs and the presence of a non-homogenous large tumor.



Figure 2 – Standard anterior-posterior X-ray of the pelvis – note the presence of an osteolytic lesion in the right iliopubic and ischiopubic ramus.



Figure 3 – CT scan of the pelvis showing cortical destruction of the right iliopubic ramus. CT: Computed tomography.

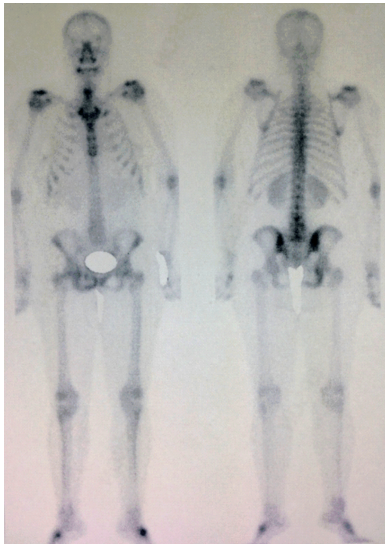


Figure 4 – Whole body scintigraphy with increased metabolic activity of the right iliopubic ramus, without secondary determinations.

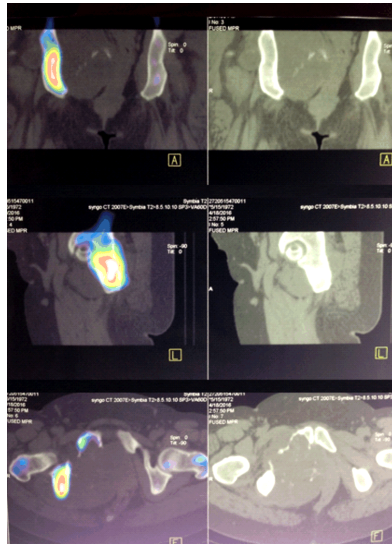


Figure 5 – SPECT/CT of the pelvis marking an increased cellular activity of the iliopubic ramus. SPECT/CT: Single photon-emission computed tomography/Computed tomography.



Figure 6 – Angiography of the tumor, and embolization.

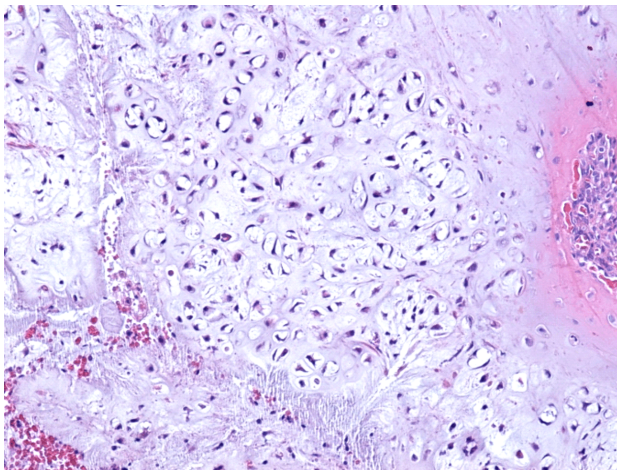


Figure 7 – Tumor with basophilic zones, moderate pleomorphic nuclei, for a grade 2 CHS. Increased vascularization on the lower left corner of the section. HE staining, $\times 40$. CHS: Chondrosarcoma; HE: Hematoxylin-Eosin.

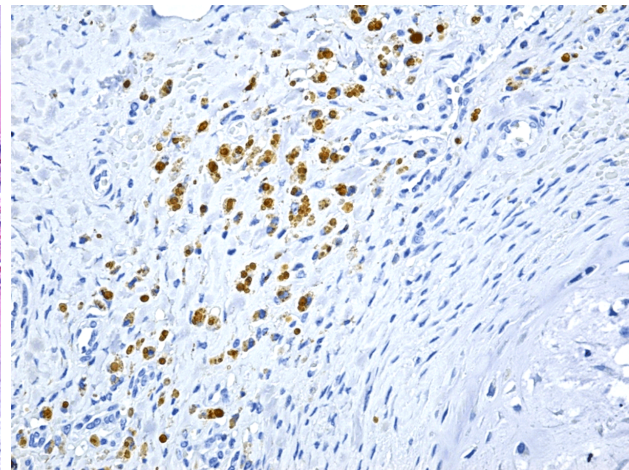


Figure 8 – Immunohistochemistry showing moderate positivity for p53. Anti-p53 antibody immunomarking, $\times 100$.

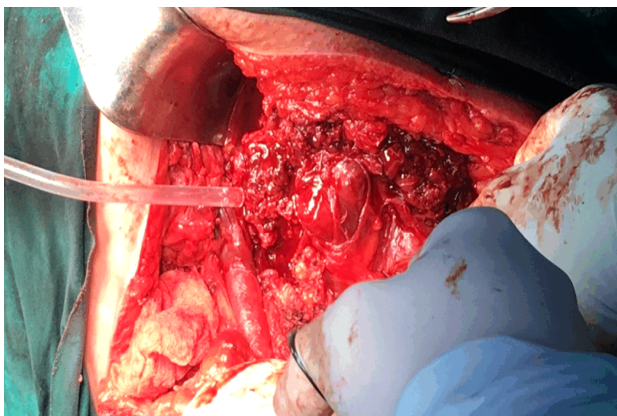


Figure 9 – Intraoperative picture showing the femoral vein and artery on the left side, a sectioned inguinal ligament and the tumor of the iliopubic ramus.

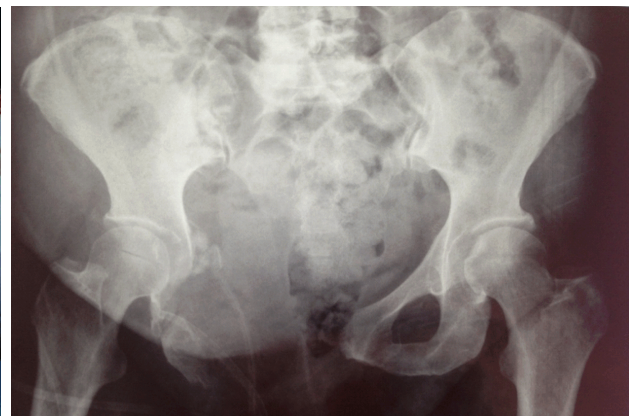


Figure 10 – X-ray control after resection.

✎ Discussions

The purpose of nowadays-surgical management of CHS is the limb salvage procedure. The histological type of the tumor has a significant predictive value. Tumor resection represents a major surgical challenge, with a limited reconstruction possibility, especially when the tumor affects the axial skeleton and pelvis. Our case report highlights the asymptomatic aspect of primary CHS, in a female patient with dyspareunia, diagnosed with multiple uterine fibroids. This case also represents a rare type of association of two, a benign tumor of the genital apparatus and a malignant, grade 2, CHS of the pelvis. The personal and familial findings of the medical history underline the importance of a series of genetic mutations in the family. A series of mutations has been described in the pathogenesis of CHS, including the newest ones: cyclin-dependent kinase inhibitor 2A (*CDKN2A*) gene mutation in parathyroid hormone(PTH)/parathyroid hormone-related peptide (PTHrP) type 1 receptor, a series of nonspecific chromosomal aberrations, especially of the 9p chromosome and tumor protein p53 (*TP53*) gene mutations in dedifferentiated CHS. Some molecular biology studies showed that the presence of platelet-derived growth factor (PDGF) stimulates proliferation of osteoblasts and chondrocytes and it has a positive correlation with the aggressiveness of the tumor [14–16]. Suo *et al.*, in a recent study, showed that PDGF receptor (PDGFR) has a high, 80% of expression rate in uterine fibroids [17]. This common aspect of both tumors might be a possible explication of the synchronous appearance of them, making necessary further investigations and studies. This common receptor expression may be a possible target of newer therapeutic option, reducing tumor growth and tumor cell multiplication. The *TP53* gene mutation is present in a series of neoplasm either in benign or malignant tumors, leading to an uncontrolled cell division enhancing chromosomal aberrations and gene mutations [18]. As the IHC and histological diagnosis showed, the Ki67 positivity (20% nuclear index) shows that there is a growing tumor, with a moderate nuclear proliferation. The role of *TP53* gene in programmed cell death was highlighted in many tumor pathologies, in our case the IHC exam as shown in Figure 7, showed a moderate positivity for the p53 malfunction. Some studies showed that proliferation index positively correlates with secondary determination of the tumor, decreasing the 5-year survival rate [18]. Another fact that negatively correlates with the 5-year survival rate is the vascularization of the tumor. CHS especially low grade ones are poorly vascularized; thus, tumor cell dissemination occurs in later stages [19]. In some of the histological sections (Figure 6), the presence of blood vessels represents a potential risk for pulmonary micro-metastases. The vascularity of bone sarcomas is an extremely important prognostic factor for tumor cell dissemination but also for the response to chemotherapy. The aggressiveness of a sarcoma can be estimated by the vascularity of the tumor, and the capacity to neo-angiogenesis, in high-grade fast growing tumors [20].

The short-term result of the surgical removal of the iliopubic and ischiopubic bone was good. The intact

peritoneum allowed us to a complete en-bloc resection of the tumor, without any effect of the abdominal and pelvic organs. The resections sites do not have tumor involvement; thus, the integrity of the acetabulum were maintained allowing for the patient mobilization without weight bearing for 6–8 weeks. The disadvantage of this resection is that sacrifices the origins of adductor muscles, compromising the medial stabilization of hip joint.

This case represents a rare association of a benign and a malignant primary bone tumor, with a possible common genetic disorder, which raises further questions in the etiology of tumors.

✎ Conclusions

Solitary, primary CHS of the iliopubic ramus limits the surgical and reconstruction possibilities after complete removal. Due to its particular anatomic location, bleeding or other pelvic organic consequences are not predictable. The short-term results of surgery were good; the patient was able to walk, with non-weight bearing of the operated part. As the patient medical history showed a series of a possible genetic mutation, might be the explanation of the tumors appeared in the family. As other researches showed, it might be a possible common genetic link between benign and malign tumor pathogenesis. This fact is not elucidated making necessary further biomolecular studies.

Conflict of interests

The authors declare that they have no conflict of interests.

Authors' contribution

Răzvan Ene and Dragoș-Virgil Davițoiu contributed equally to the manuscript.

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