

## From Knee MRI To Ventricular GIST - A Case Presentation of Benign Incidental Finding which Led To Severe Pathology. A Case Report

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Received: 04 May 2022

Accepted: 23 May 2022

Published: 27 May 2022

J Short Name: JCMI

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### Citation:

Iva Peric, From Knee MRI To Ventricular GIST - A Case Presentation of Benign Incidental Finding which Led To Severe Pathology. A Case Report . J Clin Med Img. 2022; V6(10): 1-3

### Keywords:

Bone marrow reconversion, GIST

## 1. Abstract

Bone marrow reconversion (BMR) is a replacement of yellow bone marrow for red bone marrow in adults. It can have numerous causes, including malignancy, edema, infection, anemia, and other diseases. We report a case in which BMR was found incidentally on MRI of the knee. The initial complaint in our patient was right knee pain, which led to the early diagnosis of gastrointestinal stromal tumor (GIST). Upper endoscopy and examination of CT revealed a polypoid mass in the antrum of the stomach. The patient underwent atypical gastrectomy with pathologic confirmation of GIST. We would like to emphasise that incidental findings on MRI should not be dismissed and that findings such as BMR can lead to early cancer detection.

## 2. Introduction

According to the American College of Radiology, an incidental finding is an incidentally discovered mass or lesion detected by some imaging modality performed for an unrelated reason [1]. In MR imaging of the knee, incidental findings are those that have no direct relationship to the patient's symptoms [2]. There are limited papers covering this issue, but several reports found incidentaloma in less than 5% of routine knee MRIs [3]. Most of the lesions are benign like enchondroma, Baker cyst, fibrous cortical defect,

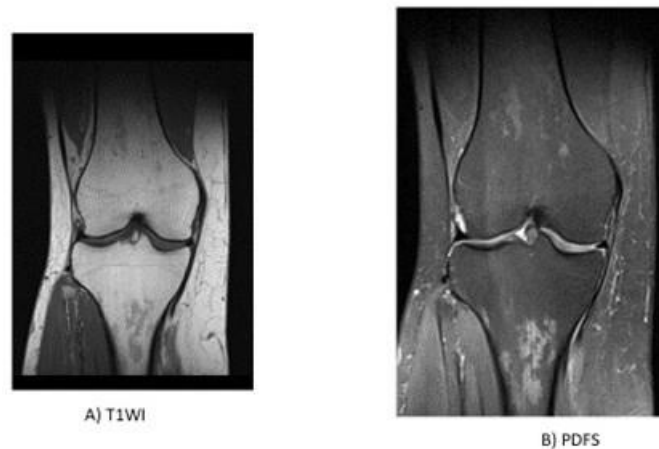
ganglion, and marrow hyperplasia [2-4]. Although the MRI signal abnormalities in the bone marrow are not infrequent, very few of them connect bone marrow abnormalities with malignancy [5,6]. We report a unique case of how incidental findings of bone marrow reconversion led to the detection of the hidden gastrointestinal stromal tumor (GIST) which has not been described before to the best of our knowledge.

## 3. Case Presentation

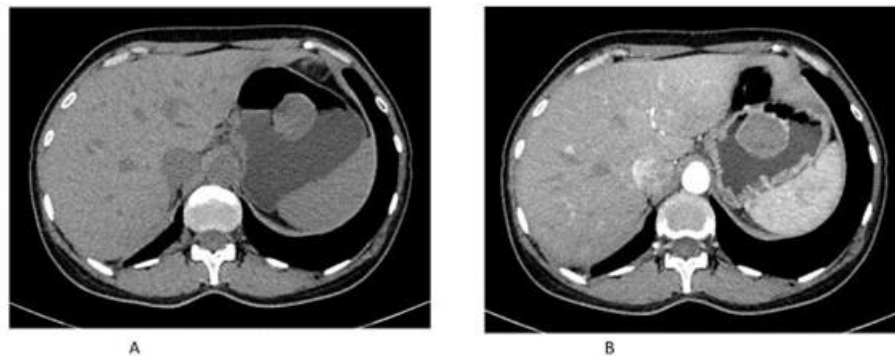
A previously healthy 45-years-old female presented with intermittent right knee pain and instability in her knee joint for the last 6 months. The family history was positive for malignancies: the father had colon cancer, the mother had chronic lymphocytic leukemia, the aunt had breast cancer and her uncle had stomach cancer. At the clinical examination, she had only modest pain in the medial part of the joint and positive "Anterior drawer" and Lachman's test. In further evaluation, an MRI of the knee was performed. On the MRI, two pathologic findings were reported: minimal joint effusion and patchy red marrow in the distal femur, tibia, and fibula consisting of bone marrow reconversion (BMR) (Figure 1). Due to BMR further hematologic follow up were suggested. Standard blood evaluation was performed which determined microcytic, hypochromic anemia with mild thrombocytosis (low he-

moglobin level 77 g/L, red blood cell count  $3,84 \times 10^{12}/L$ , and hematocrit 0,266 L/L, with high platelets, count  $506 \times 10^9 /L$  and normal white blood cell count). The ferritin and iron were lower than expected for her age. The renal function and the tumor markers were within the normal range. The patient was admitted to the hospital for a complete workup. Due to anemia chest, abdominal, and pelvis multislice computed tomography (MSCT) was conducted. A polypoid mass arising from the gastric fundus was described and the gastrointestinal stromal tumor (GIST) was highly suspected (Figure 2). No signs of local progression or metastatic disease

were found. The biopsy result after the gastroscopy was negative so the Endoscopic ultrasound-guided fine-needle biopsy (EUS-FNB) was taken which confirmed a GIST with low Ki-67 (4-5%) and positive CD117, CD34, and DOG1. After gathering all the results and considering the intraluminal growth with no dissemination, surgery was performed with atypical ventricular resection. After a few days, the pathology report confirmed the diagnosis and classified the patient in the low-risk group for recurrence. No signs of recurrence were noted at one-year post-diagnosis.



**Figure 1.** MRI of the right knee. The T1-weighted (a) and proton density (PD) fat saturated coronal image (b) revealed patchy red marrow in the distal femur and proximal tibia.



**Figure 2.** Computed tomography of the abdomen, pre- (a) and post-(b) intravenous administration of iodinated contrast medium revealed a polypoid mass in the stomach, measuring approximately 3 x 4 cm. The final pathological diagnosis was the GIST tumor.

#### 4. Discussion

Since red bone marrow and yellow bone marrow have different chemical compositions, MRI is the optimal diagnostic imaging modality to evaluate marrow structure [7]. On MRI the distinction between red and yellow marrow is best seen in the T1-weighted fast spin-echo sequence and the T2-weighted fat-suppressed sequence. Red marrow contains around 40% of adipocytes however yellow contains up to 80% of adipocytes and due to different fat and water amount they show different MRI signals [8]. The finding of red bone marrow in femur and tibia on MRI in our 45-years-old women indicated BMR and suggested further investigation. BMR is a replacement of yellow with red marrow in adults and occurs due

to increased hematopoietic needs. Incidentally found bone marrow changes are relatively commonly encountered, mostly without any clinical significance [9], though some abnormalities require further diagnostic investigation. The BMR around the knee joint can present as a normal finding in heavy smokers and younger patients [9,10]. In the presented case, the patchy red marrow was found (as shown in Figure 1) and classified the patient into grade 3 BMR due to Gonzales et al [11] with a higher risk of anemia and the need for further follow-up, especially since our patient was not a heavy smoker or young. Shah et al [6] evaluated an incidental abnormal BM signal on MRI and the prevalence of a subsequent oncologic diagnosis. The 25% of patients had malignant diagnoses such as

multiple myeloma, mucosa-associated lymphoid tissue (MALT) lymphoma, or metastatic lesion.

Gronningsaeter et al [5] reported four cases of incidentally seen MRI bone marrow abnormalities that led to hematologic malignancy. The malignancy in both reports was suspected due to only MRI changes, like in our case, and further diagnostics were recommended. In the presented case, further work up revealed microcytic anemia and iron deficiency. Sideropenic anemia often originates from blood loss, usually in younger women with a history of heavy menstrual bleeding. If there is no history of heavy menstrual bleeding, as was in our case, the complete diagnostic algorithm must be followed because it can lead to a much more serious diagnosis. The possible next cause is gastrointestinal bleeding owing to gastrointestinal ulcers or tumors. In our case, upper endoscopy showed a polypoid mass that was confirmed as GIST with the use of EUS-FNB. GIST accounts for most gastrointestinal mesenchymal tumors. Despite the stomach being the most frequent site (60–70%) [12] among all gastric malignancies GIST accounts for around 2-3% [13]. These lesions are most diagnosed in the fifth to seventh decade of life with equal gender distribution, and a number of mitoses. Our patient had a low number of mitoses. Gastric and smaller lesions tend to be less aggressive [14,15]. Current endoscopic tissue sampling techniques do not provide specimens suitable for assessing malignant potential [13].

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