# Myomatous Erythrocytosis Syndrome, a Curable Cause of Erythrocytosis: Case Report

## Síndrome de Eritrocitose Miomatosa, uma Causa Curável de Eritrocitose: Caso Clínico

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## Abstract

Leiomyomata are frequent in women in reproductive age. They are usually associated with uterine bleeding and anemia. Leyomyomata are associated with increased production of erythropoietin. We present a case of a 45 years-old woman who presented at the emergency unit with pelvic pain. She had a large uterine mass and erythropoietin-mediated erythrocytosis, which resolved after surgical removal. The surgical pathology report confirmed the diagnosis of leiomyomata. Myomatous erythrocytosis syndrome is a curable cause of erythrocytosis that has been reported to be infrequent.

## Resumo

Os leiomiomas uterinos são frequentes em mulheres em idade fértil. Geralmente associam-se a hemorragia uterina anómala e a anemia. Os leiomiomas associam-se ao aumento de produção de eritropoietina. Apresentamos um caso de uma mulher de 45 anos de idade que se apresentou nas urgências por dor pélvica. A sua avaliação revelou uma massa uterina de grandes dimensões e eritrocitose secundária a aumento de eritropoietina, que resolveu após a ressecção cirúrgica da massa. O estudo anátomo-patológico demonstrou tratar-se de um leiomioma. A síndrome de eritrocitose miomatosa é uma causa curável de eritrocitose descrita como pouco frequente.

**Keywords:** Hysterectomy; Leiomyoma; Polycythemia; Uterine Neoplasms

**Palavras-chave:** Histerectomia; Leiomioma; Neoplasias Uterinas; Policitemia

## Introduction

Leiomyomata are frequently identified in women in reproductive age. Although most women are asymptomatic, some may present pelvic pain, uterine bleeding and anemia.[1] Leiomyomata are associated with increased erythropoietin (EPO) production, which is thought to play a role in tumor growth and vascularity.[2] In infrequent cases, the EPO hyperproduction can trigger EPO-mediated erythrocytosis. Women with myomatous erythrocytosis syndrome may require proper pre-operative planning. We hereby report a case of woman with myomatous erythrocytosis syndrome (MES).

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## Case Report

A 45 years-old woman presented to the emergency department with pelvic pain which was present for the last two months. She also mentioned headache, dizziness and intermittent blurry vision. Her menstrual cycles were irregular with metrorrhagia. She denied menorrhagia, fever, urinary symptoms as wells as nausea and vomiting. Weight loss, wasting symptoms, hypersomnolence or other neurologic symptoms, snoring, cough, dyspnea, cutaneous lesions and erythromelalgia were also excluded. She had no relevant medical history such as previous episodes of venous or arterial thrombosis. Previous lab results were unremarkable. She had had a single previous pregnancy delivered by elective C-section. She did not use hormonal contraceptives and did not refer smoking habits. She lived by the seaside. There was no family history of hematological disorders.

Blood pressure was 118 x 67 mmHg and heart rate was 87 bpm. Neurologic examination was normal. She was eupneic and pulmonary and cardiac auscultation were normal. An abdominal mass at 20 weeks gestation height was palpable. Spleen was not palpable. There were no cutaneous lesions.

An ultrasound study depicted a 16x10 mm nodule in the uterine fundus that did not exist in previous exams (Fig. 1). Blood tests revealed erythrocytosis (hemoglobin 20.2 g/dL, reticulocyte index 2.21, EPO 37.1 UI/L, carboxyhemoglobin 2.2%) and no relevant changes in the blood smear. Blood gases were normal. A thorax angiographic computed tomography (angio CT) was unremarkable and functional respiratory tests were normal.

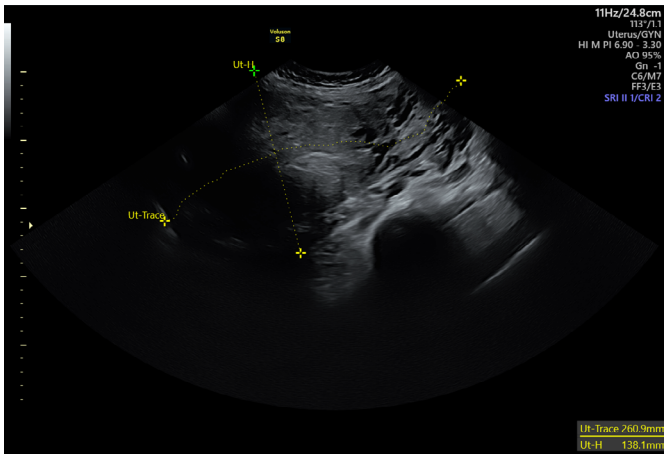


Figure 1. Transvaginal pelvic image demonstrating an anteverted uterus with irregular boundaries that measures 261x140x192 mm. Myometrium is substituted by a solid mass (*) with heterogeneous echogenicity, enhanced vascularity and cystic irregular areas. The isthmic part of endometrium has a normal thickness, 4.8 mm. Both ovaries were normal at the exam. No pelvic liquid in Douglas pouch was detected.

A probable causative link between the myoma and the erythrocytosis was established. Surgical removal was scheduled, and pre-operative planning was done. Given the erythrocytosis, two phlebotomies were done for preoperative optimization reducing hemoglobin to 16.5 g/dL. A laparotomic total hysterectomy with bilateral adnexectomy was performed. Intraoperative blood losses were the expected for the procedure.

The extracted uterus weighted 1.992 kg. The surgical pathology exam confirmed the diagnosis of leiomyomata (Figs. 2 and 3), excluding signs of malignancy.

Figure 2. A huge tumor was compressing the endometrial cavity (formalin fixed specimen).

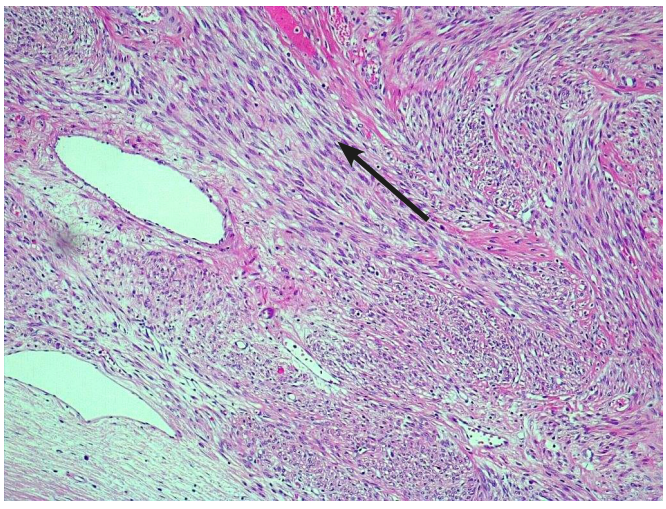

Figure 3. H&E stained section of the tumor at the periphery. Fusiform cells in haphazardly arranged fascicules (arrow). No mitosis, atypia or necrosis.

Three months after the procedure, the symptoms had subsided. Repeated blood tests showed normalization of the levels of hemoglobin (12.0 g/dL) and EPO (7 UI/L), thus confirming the diagnosis of MES.

## Discussion

Leiomyomata are frequently identified in women in reproductive age. The first report linking leiomyomata and erythrocytosis dates from 1953.[3,4] Subsequent cases of leiomyomata and erythrocytosis have showed association with increased production of EPO. In spite of the development of other theories, such as the abnormal production being due to anatomical changes caused by the tumor compression of the kidney and/or the urinary outflow tract,[5] there is evidence of ectopic production of EPO by leiomyomata as demonstrated by the detection of elevated levels of EPO by reverse transcription polymerase chain reaction in myomas of affected women.[6] Other tumors that have been associated with ectopic EPO production are hepatocellular and renal cell carcinoma.[3]It has been hypothesized that ectopic EPO production may explain discrepancies between the severity of the bleeding and the degree of anemia in patients with leiomyomata.[7] Our patient's main complaint was the pelvic pain. Despite having abundant menstrual flow, she did not have overt bleeding, which may have accounted for the development of erythrocytosis in this case.

She also presented with neurologic symptoms associated with blood hyperviscosity. There were no signs or symptoms related to systemic hemodynamic effects of the hyperviscosity, such as arterial hypertension or signs of heart failure.

It is also relevant that the patient's evaluation revealed elevated EPO levels associated, which alongside the normal blood smear, ruled out a myeloproliferative cause. This was consistent with the lack of consumptive symptoms. Other possible causes of this condition were unlikely given the presence of a concomitant uterine mass. Blood gases, carboxyhemoglobin levels and a chest CT scan were normal. The oxygen affinity to hemoglobin could have been tested in search of signs of hemoglobinopathy. However, since hemoglobin electrophoresis is a mandatory test in pregnancy surveillance according to local guidelines, it was assumed to be normal given the patient's obstetric history.

Erythrocytosis carries additional operative risks, mostly related to increased likelihood of peri-operative venous thromboembolism. Therefore, performing phlebotomies to lower hemoglobin before surgical procedures may be advised.[8] In this case, the patient underwent two phlebotomies to lower hemoglobin to almost normal levels before surgery.

The surgical pathology exam revealed a uterus weighing 1.992 kg. Indeed, MES has been observed in cases in which uterine weight is over 1.5 kg. Additional immunohistochemical studies could have been performed to verify excessive EPO production by the tumor, but they were not mandatory for establishing the diagnosis.

Both hemoglobin and EPO levels returned to normal after removal of the tumor, hence confirming the diagnosis of MES.

In conclusion, leiomyomata are associated with ectopic EPO production and, in rare cases, can cause secondary erythrocytosis. Symptoms of hyperviscosity may be present in those patients. MES can be associated with large tumors. Cure is achieved after hysterectomy confirming the diagnosis.

## Responsabilidades Éticas

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**MC and SP:** Drafting and reviewing of the article, bibliographical reviewing

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All authors approved the final version

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