

The black garland sign in ovarian fibromatosis

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Section: Genital (female) imaging

Area of Interest: Abdomen Genital / Reproductive system female

Procedure: Localisation

Procedure: Surgery

Procedure: Imaging sequences

Imaging Technique: MR

Special Focus: Tissue characterisation Pathology Case

Type: Clinical Cases

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Patient: 63 years, female

Clinical History:

A 63-year-old female patient consulted her gynaecologist for her annual check-up. She was asymptomatic and her physical examination showed no abnormalities. Her medical history was unremarkable.

Imaging Findings:

On transvaginal sonography, a right adnexal mass with intermediate to low echogenicity was seen, measuring ± 3 cm. Magnetic resonance (MR) imaging for further characterisation demonstrated a homogeneous and smooth spherical mass, originating from the right ovary. The morphology, localisation and intermediate-to low-signal intensity on both T1 and T2-weighted images suggested an ovarian fibroma (Fig 1).

As an incidental finding, an abnormal enlargement and aspect of the ovaries was noted. The ovarian cortex was thickened and demonstrated a homogeneous low-signal intensity on both T1 (Fig 2a) and T2-weighted images (Fig 2b), suggestive of fibrous tissue. On T2-weighted images, a few normal cystic follicles were identified and the central stroma was preserved. After administration of gadolinium (Fig 2c), only slight and delayed enhancement was seen, mainly located in the ovarian cortex.

Discussion:

Background and clinical perspective:

Ovarian fibromatosis is a rare benign, non-neoplastic condition with ovarian enlargement due to fibrosis of the ovarian stroma [1]. It may occur at any age, but is typically seen in younger patients, with a mean age of presentation of 25 years. Patients can be asymptomatic, or present with abdominal pain, menstrual irregularities and occasionally hirsutism or virilisation [2].

Similar to massive ovarian oedema, this entity appears to be related to partial or intermittent torsion and subsequent

venous and lymphatic obstruction, leading to ovarian enlargement and fibrosis [1]. On pathology, the characteristic proliferation of collagen-producing spindle cells is seen in the ovarian stroma, surrounding the normal ovarian structures with collagenous thickening of the ovarian cortex (Fig 3) [3]. The partial preservation of normal ovarian anatomy within the fibrous mass is present on all imaging modalities and allows differentiation from similar conditions with predominant fibrous content, e.g. thecomas, fibrothecomas, Brenner and Krukenberg tumours [4].

Imaging findings:

Ovarian fibromatosis presents as a solid ovarian mass with smooth borders, with most often unilateral ovarian involvement. Due to the infiltration of fibrous tissue, the thickened cortex has a low signal intensity on both T1 and T2-weighted images, with only slight delayed enhancement after administration of gadolinium [5]. The normal cystic follicles and the central ovarian stromal tissue are preserved. On T2-weighted images, the pathognomonic black garland sign of ovarian fibromatosis can be seen where the entrapment of the normal cystic follicles in the fibrous tissue resembles Christmas balls in a garland (Fig 4) [3]. This black garland appearance can be diagnostic, but is not always observed.

Outcome:

Even though it is a benign entity, the ovaries are frequently surgically removed due to overlap in appearance with other solid ovarian lesions. In our case, the patient was anxious and a bilateral salpingo-oophorectomy was performed. However, an intra-operative biopsy excluding malignancy may open the possibility of ovary-sparing surgery. The role of the radiologist in the multidisciplinary approach of an ovarian mass is to recognise this benign entity.

Take home messages:

In conclusion, ovarian fibromatosis is a benign condition with ovarian enlargement due to fibrosis, which may be secondary to torsion and oedema. On T2-weighted images, the pathognomonic black garland sign can be seen, with the normal cystic follicles entrapped in the thickened, fibrous cortex. Accurate diagnosis is essential to avoid radical surgery, especially since most of the patients are young females.

Differential Diagnosis List: Ovarian fibromatosis, Thecomas, Fibrothecomas, Krukenberg tumours, Brenner tumours, Fibromas

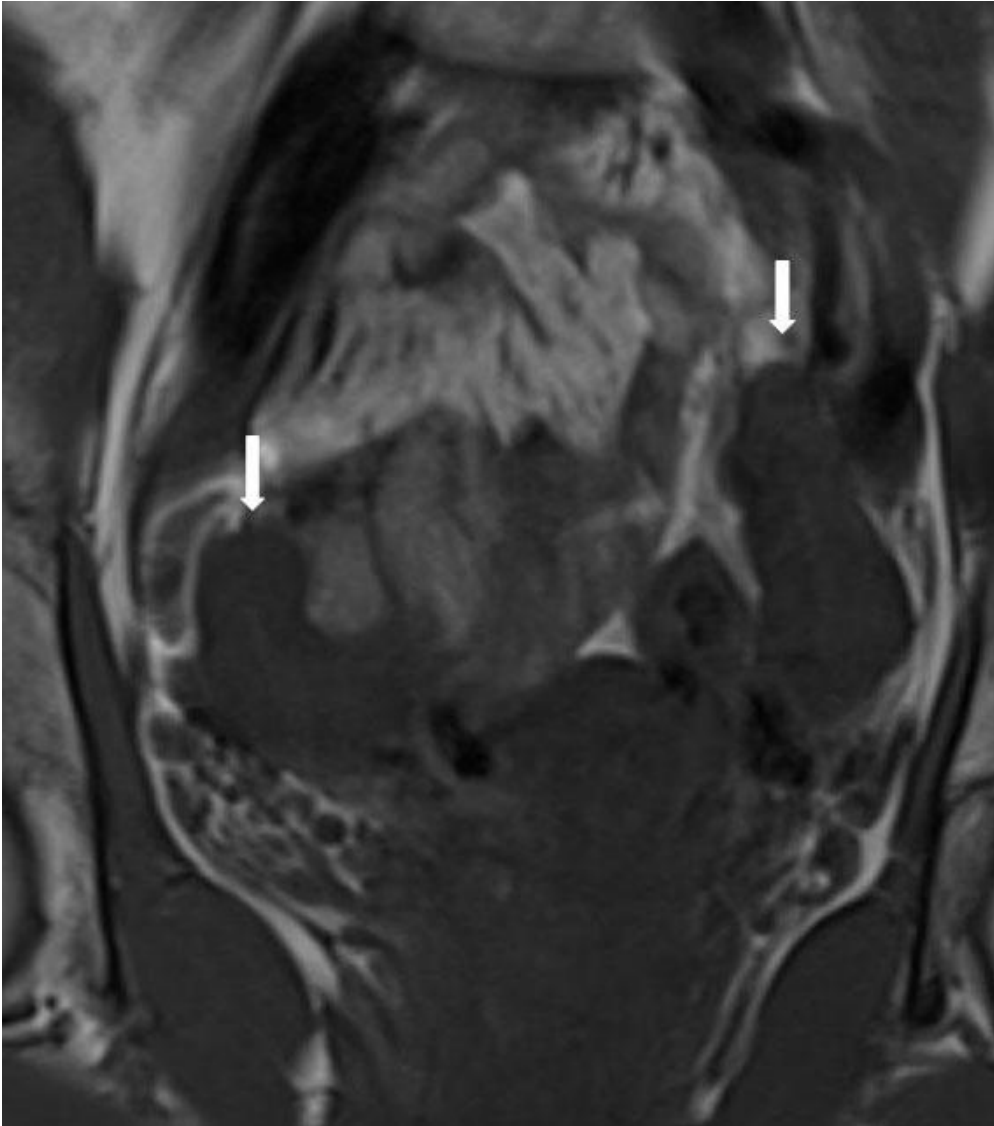
Final Diagnosis: Ovarian fibromatosis

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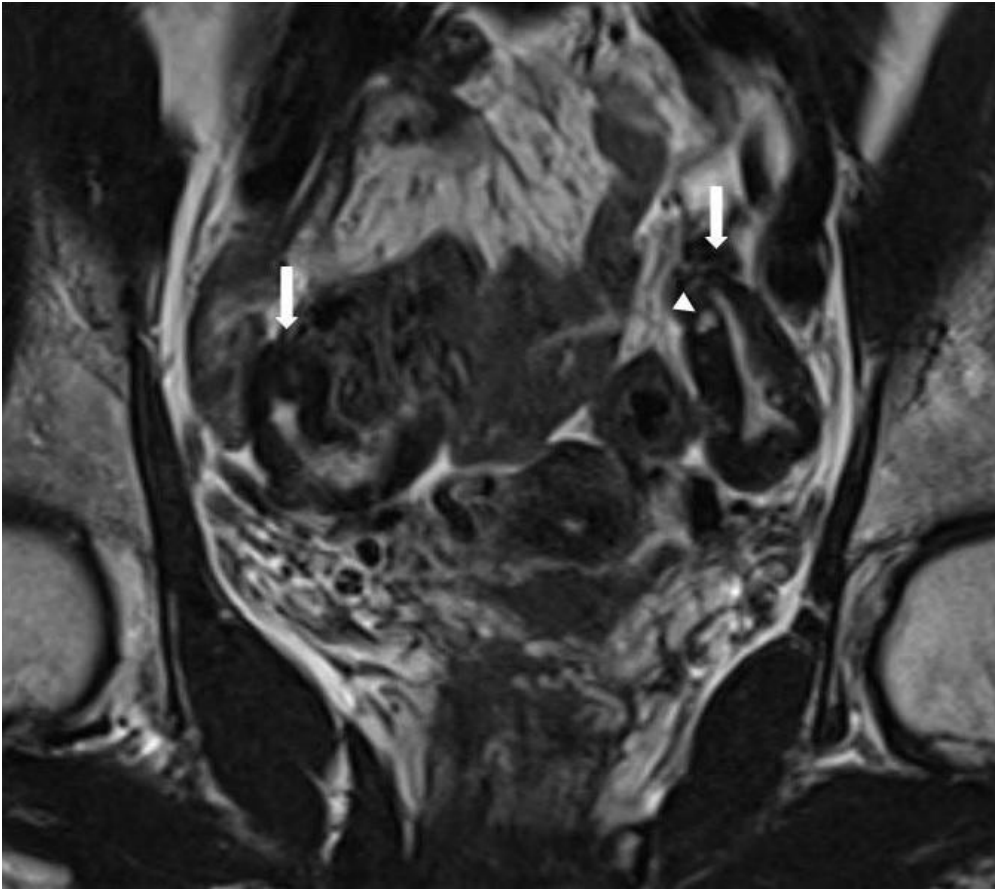
Figure 1

a



Description: Coronal unenhanced T1 WI. Both ovaries can be noted as nodular hypointense lesions, located laterally in the pelvis on both sides (arrows). **Origin:** GZA Hospitals, Antwerp

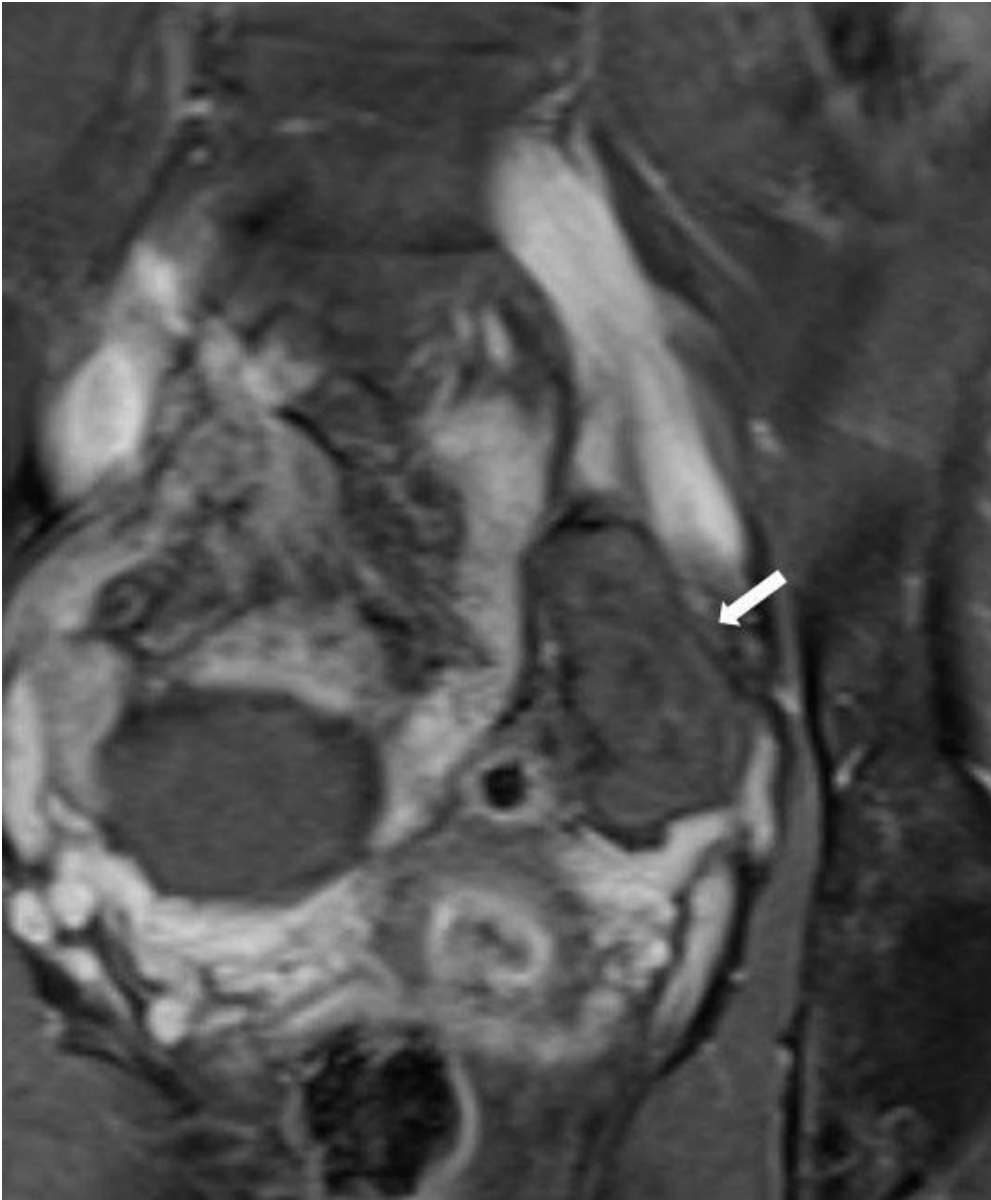
b



Description: Coronal T2 WI.

Characteristic appearance of the low-signal fibrous cortex (arrows) with entrapped normal follicles (arrowhead), known as the black garland appearance. **Origin:** GZA Hospitals, Antwerp

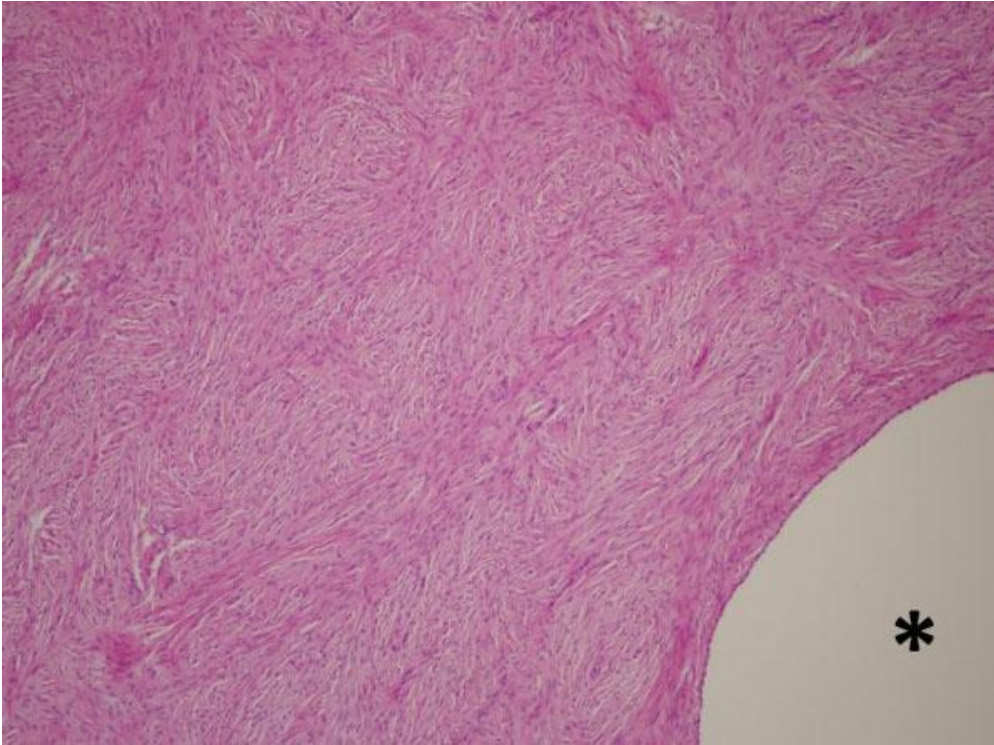
c



Description: Coronal gadolinium-enhanced 3D-gradient echo T1 WI with fat saturation. Only minimal enhancement of the fibrous tissue (arrow) in the periphery of the ovaries can be noted. **Origin:** GZA Hospitals, Antwerp

Figure 2

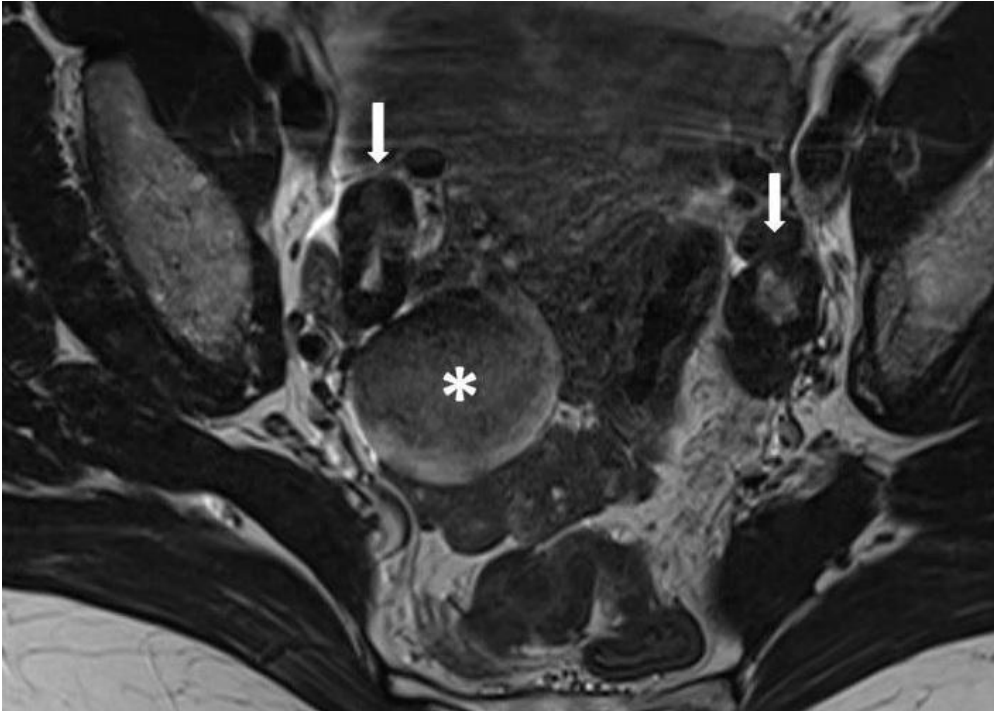
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Description: Proliferation of collagen-producing cells in the ovarian stroma, with preservation of a normal cystic follicle (asterisk). **Origin:** GZA Hospitals, Antwerp

Figure 3

a



Description: Axial T2 WI. Sharply delineated nodular hypointense mass lesion (asterisk), located posterior to the right ovary, compatible with an ovarian fibroma. Note also the abnormal aspect of both ovaries (arrows). **Origin:** GZA Hospitals, Antwerp

Figure 4

a



Description: The entrapment of the cystic follicles in the fibrous cortex resembles Christmas balls in a garland. **Origin:** GZA Hospitals, Antwerp