

Case report

Struma ovarii: MRI findings

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Abstract. We describe the MRI findings in three cases of struma ovarii. In all three cases, MRI showed a multilocular cystic mass with a variable signal intensity within loculi. Some loculi or small cysts within septations showed low signal intensity on T_1 weighted images and very low signal intensity on T_2 weighted images, corresponding pathologically to gelatinous colloid material in large follicles. In one case, with Gd-DTPA enhanced T_1 weighted images, the thick septations and locally thickened wall showed marked enhancement, corresponding microscopically to thyroid tissue.

Struma ovarii is an ovarian teratoma composed entirely or predominantly of thyroid tissue with large follicles containing colloid material [1]. Whilst most patients are asymptomatic, about 5% of cases have symptoms or signs of thyrotoxicosis [2]. It is therefore difficult to diagnose this disease pre-operatively. Magnetic resonance (MR) findings of struma ovarii have been described in only a few cases [3–6]. These cases demonstrated multilocular cystic tumour with a variable signal intensity within loculi owing to haemorrhage or viscous colloid material, and with a solid component that enhanced markedly with gadolinium-diethylenetriamine pentaacetic acid (Gd-DTPA) enhanced T_1 weighted MR images. We describe three cases of struma ovarii and discuss the correlation between MR findings and pathological features.

Case 1

A 55-year-old woman was admitted to hospital with an adnexal mass, which had been seen to be increasing in size on ultrasound over 2 years. Laboratory data were normal and serum level of CA-125 was within the normal range. Pelvic ultrasound showed a multilocular cystic mass with thick septations. MRI showed a multilocular cystic mass in the left adnexa and ascites. The mass showed a variable signal intensity within loculi. Following IV Gd-DTPA, T_1 weighted images (spin echo (SE): repetition time (TR)/echo time (TE)=510/15 ms) (Figure 1a) showed marked enhancement of the thick septations and locally thick wall. Small cysts with low signal intensity were demonstrated within the thick

septations. On T_2 weighted images (SE: TR/TE=2000/80 ms), the small cysts had very low signal intensity (Figure 1b).

As the pre-operative diagnosis of mucinous cystadenocarcinoma had been made, hysterectomy and bilateral salpingo-oophorectomy were performed. At operation there was a multilocular cystic tumour of the left ovary containing yellowish serous fluid with thick septations. These septations contained small cysts filled with green gelatinous colloid material. Histologically the tumour was composed of thyroid tissue within follicles of variable size. A diagnosis of struma ovarii was made (Figure 2). The small cysts within thick septations corresponded to large follicles containing green gelatinous colloid material.

Case 2

A 71-year-old woman was admitted to hospital for evaluation of a pelvic mass detected on routine ultrasound examination. Laboratory data were normal and serum level of CA-125 was within the normal range. Pelvic ultrasound showed a multilocular cystic mass in the right adnexa. MRI showed a multilocular cystic mass in the right adnexa with variable signal intensity within the loculi. The largest loculus contained a fatty component, with a non-fatty component layering in the dependent portion on T_2 weighted images (SE: TR/TE=2000/70 ms) (Figure 3b). Some other loculi showed low signal intensity on T_1 weighted images (SE: TR/TE=600/15 ms) (Figure 3a) and very low signal intensity on T_2 weighted images (Figure 3b).

A yellowish multilocular cystic tumour of the right ovary was removed at surgery. The fatty loculus was diagnosed histologically as a mature teratoma. Other loculi contained yellowish serous

Received 15 April 1999 and in revised form 24 August 1999, accepted 1 September 1999.

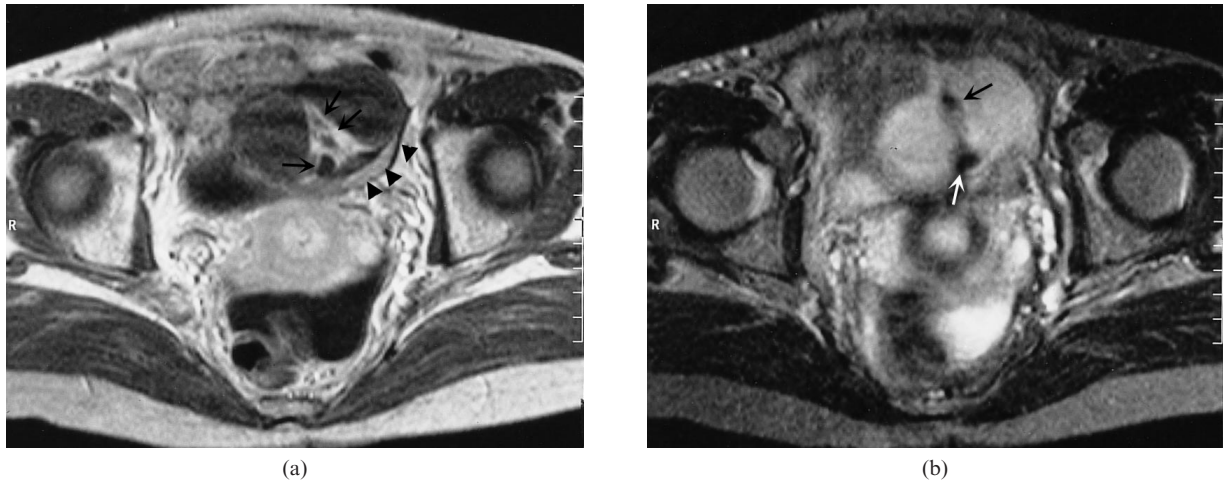


Figure 1. (a) Multilocular cystic mass in the left adnexa with slightly elevated signal intensity on Gd-DTPA enhanced T_1 weighted image. The thick septations and localized thick wall (arrowheads) are markedly enhanced. Small cysts with low signal intensity are seen in the septations (arrows). (b) On T_2 weighted image the small cysts (arrows) have very low signal intensity.

fluid or green gelatinous colloid material. Histologically these loculi were composed of thyroid tissue in follicles of variable size, giving a diagnosis of struma ovarii. The loculi, which were demonstrated as low signal intensity on T_1 weighted images and as very low signal intensity on T_2 weighted images, corresponded to green gelatinous colloid material.

Case 3

A 43-year-old woman was admitted to hospital for evaluation of a pelvic mass detected on routine ultrasound examination. Laboratory data were normal and CA-125 elevated at 59.9 U ml^{-1} (normal $<37 \text{ U ml}^{-1}$). Pelvic ultrasound and MRI showed a multilocular cystic mass in the right adnexa, with variable signal intensity on MRI within loculi. One loculus showed chemical shift artefact at the interface on T_1 weighted images and very low signal intensity on T_2 weighted images with fat

suppression (fast spin echo: TR/TE=4300/120 ms) (Figure 4c), indicating a fat-containing mass. Some other loculi showed low signal intensity on Gd-DTPA enhanced T_1 weighted images (SE: TR/TE=510/14 ms) (Figures 4a,b) and very low signal intensity on T_2 weighted images with fat suppression (Figures 4c,d).

A yellowish multilocular tumour of the right ovary was removed at surgery. The fatty loculus was diagnosed histologically as a mature teratoma. Other loculi contained yellowish serous fluid or green gelatinous colloid material. Histologically these loculi were composed of thyroid tissue within follicles of variable size and a diagnosis of struma ovarii was made. The cysts that demonstrated low signal intensity on T_1 weighted images and very low signal intensity on T_2 weighted images with fat suppression corresponded to gelatinous colloid material.

Discussion

Struma ovarii, an ovarian teratoma composed entirely or predominantly of thyroid tissue and containing variable size follicles with colloid material [1], comprises 0.3–1% of all ovarian tumours and 2–4% of ovarian teratomas [7, 8]. They may consist of pure thyroid tissue or, less often, are associated with a mature teratoma or mixed carcinoid tumour [9]. Most patients are asymptomatic and are not diagnosed until the development of symptoms related to torsion, hyperthyroidism or ascites [10–12]. About 5% of cases show symptoms or signs of thyrotoxicosis [2]. Ascites occurs in approximately one-third of cases, and rarely a Meigs syndrome is present [9]. 5–10% of all cases of struma ovarii are malignant [13].

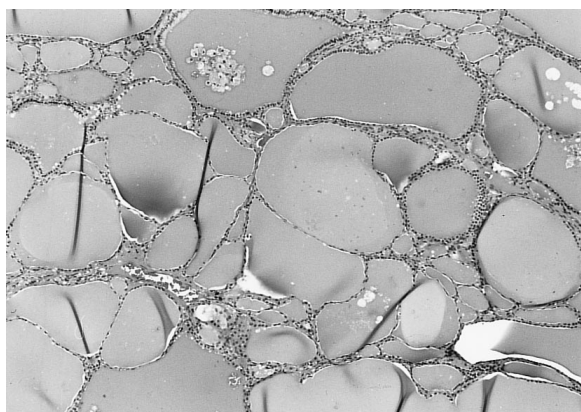


Figure 2. Microscopic appearance of the tumour shows thyroid tissue within follicles of variable size.

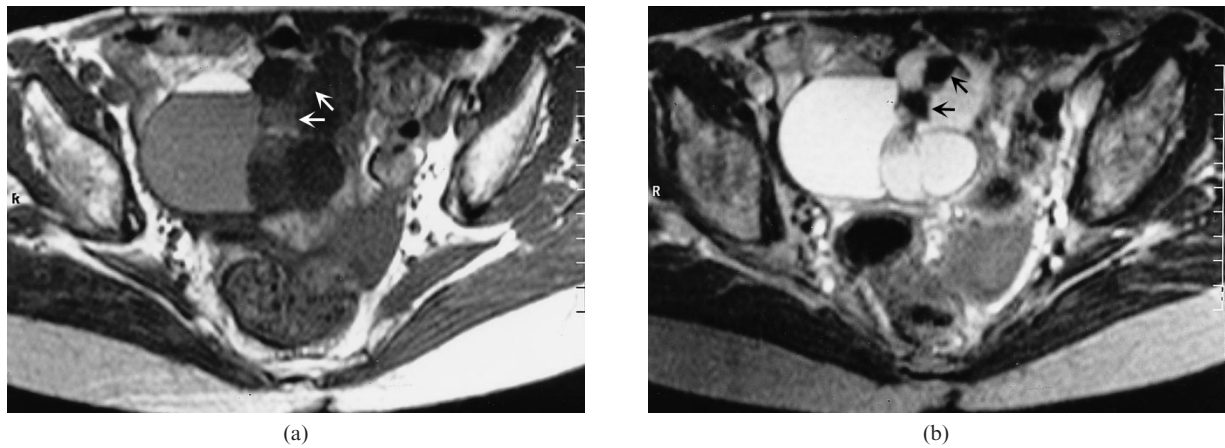


Figure 3. (a) T_1 weighted image shows a multilocular cystic mass in the right adnexa with variable signal intensity among loculi. The largest loculus contains fat with surrounding chemical shift artefact. Some loculi (arrows) seen as low signal intensity on T_1 weighted image (a) have very low signal intensity on T_2 weighted image (b).

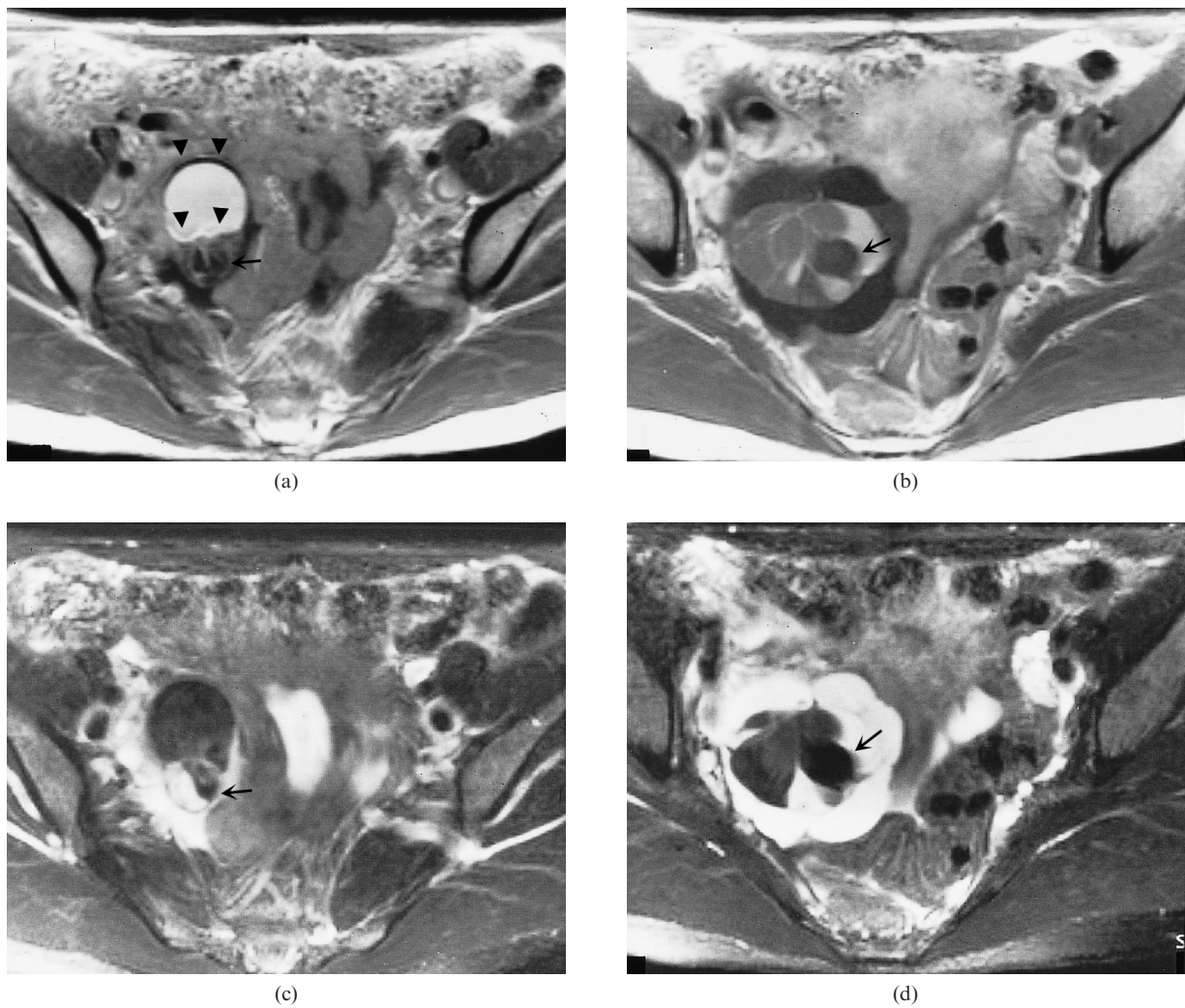


Figure 4. A multilocular cystic mass in the right adnexa exhibits a variable signal intensity among loculi. One loculus shows chemical shift artefact (arrowheads) at the interface on Gd-DTPA T_1 enhanced weighted image (a) and very low signal intensity on T_2 weighted image with fat suppression (c). Some other loculi (arrows) are seen as low signal intensity on Gd-DTPA enhanced T_1 weighted images (a,b) and as very low signal intensity on T_2 weighted images with fat suppression (c,d).

To our knowledge, MR findings of struma ovarii have been described in only a few reports [3–6]. In all of the present three cases there was a multilocular cystic mass showing a variable signal intensity between loculi, depending on the viscosity of the fluid. In one case with Gd-DTPA enhanced T_1 weighted images, the thick septations and the localized thick wall were markedly enhanced and corresponded microscopically to thyroid tissue. Dohke et al [4] and Yamashita et al [5] also reported cases of struma ovarii showing multilocular cystic tumour with a variable signal intensity among loculi owing to haemorrhage or viscous colloid material and with a solid component enhanced markedly on enhanced T_1 weighted images. These findings are difficult to differentiate from those of mucinous cystadenocarcinoma and may lead to hysterectomy with bilateral salpingo-oophorectomy, as in Case 1. In the present three cases, some loculi or cysts in the septations were demonstrated as low signal intensity on T_1 weighted images and very low signal intensity on T_2 weighted images, corresponding to gelatinous colloid material. Joja et al [6] reported that this pattern of signal intensity was caused by the high viscosity of colloid material. In mucinous cystadenocarcinoma, the T_1 and T_2 relaxation times are shortened owing to the protein concentration and viscosity of the mucinous fluid, and the content is demonstrated as high signal intensity on T_1 weighted images and low signal intensity on T_2 weighted images [14–16]. On the other hand, in struma ovarii the viscosity is more increased in gelatinous colloid material than in mucinous fluid and the content is demonstrated as low signal intensity on all MR sequences [15, 16]. Other material, such as haemorrhage, can cause the same signal intensity. However, if an adnexal mass with this signal intensity is seen, struma ovarii should be considered in the differential diagnosis and may prevent radical surgery.

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