

## Peritoneal mesothelioma: Contribution of computerized tomography and magnetic resonance imaging findings to differential diagnosis

### *Peritoneal mezotelyoma: Bilgisayarlı tomografi ve magnetik rezonans görüntüleme bulgularının ayırıcı tanıya katkısı*

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#### ABSTRACT

**Objective:** In this article, we review radiologic findings of malignant peritoneal mesothelioma with our patient archives. We also want to determine importance of radiologic findings about differential diagnosis of malignant peritoneal mesothelioma.

**Materials and methods:** We scanned our patient archive of mesothelioma between 2008 and 2012 years. We included 15 patients with peritoneal mesothelioma who underwent computerized tomography (CT) or magnetic resonance imaging (MRI) at their initial diagnosis.

**Results:** We found peritoneal irregularity and nodular thickening in 11 patients (73.3%), diffuse peritoneal thickening (omental cake) in 5 patients (33.3%), ascites in 9 patients (60%), extension of adjunct tissue and hepatic metastases in only one patient (6.6%).

**Conclusion:** The diagnosis of peritoneal malignant mesothelioma may be difficult with only clinical findings. CT and MRI are helpful to diagnose and show spread of disease, but tissue biopsy is required for the definitive diagnosis.

**Key words:** Magnetic resonance imaging, mesothelioma, peritoneum, diagnosis

#### ÖZET

**Amaç:** Bu makalede hasta arşivimizdeki peritoneal mezotelyomalı hastaları derlemek ve ayırıcı tanıya yaklaşımında radyolojik bulguların önemini vurgulamak istedik.

**Gereç ve yöntem:** 2008-2012 yılları arasında malign peritoneal mezotelyoma tanısı alan hastalar tarandı. Başlangıç tanısında bilgisayarlı tomografi (BT) veya magnetik rezonans (MR) görüntüleme incelemesi yapılan 15 hasta çalışmaya dahil edildi.

**Bulgular:** On bir (%73,3) olguda peritoneal düzensizlik ve noduler kalınlaşma, 5 (%33,3) olguda diffüz peritoneal kalınlaşma, 9 (%60) olguda asit, sadece 1 (%6,6) olguda komşu organa uzanım ve karaciğer metastazı izlenmiştir.

**Sonuç:** Malign mezotelyoma tanısını sadece klinik bulgularla koymak zor olabilir. BT ve MR hastalığın tanısında ve yayılımının gösteriminde tanıya yardımcıdırlar. Ancak kesin tanı için histopatolojik tanı gereklidir.

**Anahtar kelimeler:** Manyetik rezonans görüntüleme, mezotelyoma, periton, tanı

#### INTRODUCTION

Malignant mesothelioma is an asbestos-associated malignancy arising from the mesothelial cells of the pleural and peritoneal cavities, as well as the pericardium and the tunica vaginalis.

There are six minerals which cause asbestosis. These are chrysotile, crocidolite, amosite, anthophyllite, tremolite ve actinolite. The most carcinogenic mineral is chrysotile. Diyarbakır, Sivas,

Erzincan Eskişehir, Elazığ, Tokat, Yozgat, Çankırı, Çorum ve Karaman are the most known asbestos cot in Turkey. Mesothelioma usually presents in the fifth to seventh decades, and 70-80 % of cases occur in men.<sup>1</sup> Although most of the mesotheliomas cover the pleural surface, approximately 35% arise only from peritoneum. Patients with malignant peritoneal mesothelioma may present with abdominal pain, distention, anorexia, and weight loss.<sup>2</sup> Radiologic modalities play a crucial role in the evaluation

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of malignant mesothelioma. Computed tomography (CT) is the primary imaging method used for the diagnosis and the staging of malignant mesothelioma, but also for guiding biopsy for tissue diagnosis. Magnetic resonance imaging (MRI) is useful for detection of extension of disease, especially to the chest wall and diaphragm.<sup>1,3</sup> In this article we review radiologic findings of malignant peritoneal mesothelioma with our patient archives. We also want to give some information about differential diagnosis malignant peritoneal mesothelioma.

## MATERIALS AND METHODS

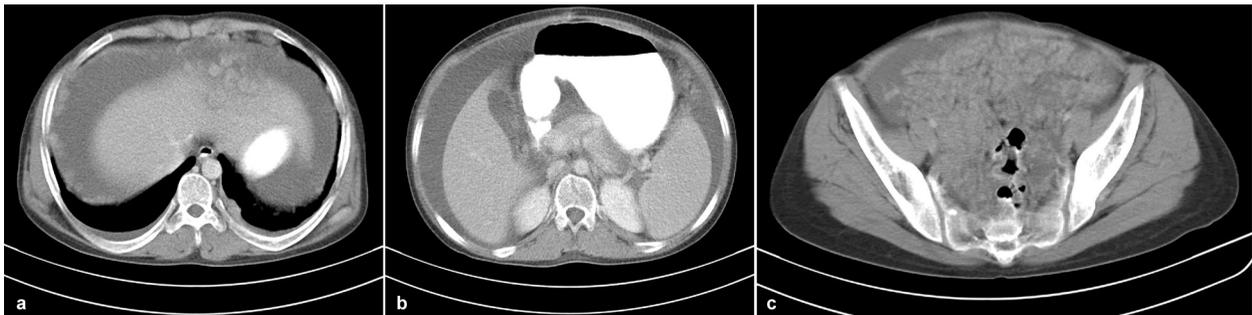
We scanned our patient archive of mesothelioma between 2008-2011 years. We accepted 15 patients with peritoneal mesothelioma who had CT or MRI at their initial diagnosis. Two and five year experienced radiologists evaluated in a consensus. We evaluated peritoneal irregularity and nodular thickening, diffuse peritoneal thickening, ascites, extension of adjunct tissue, lymph adenopathy.

## RESULTS

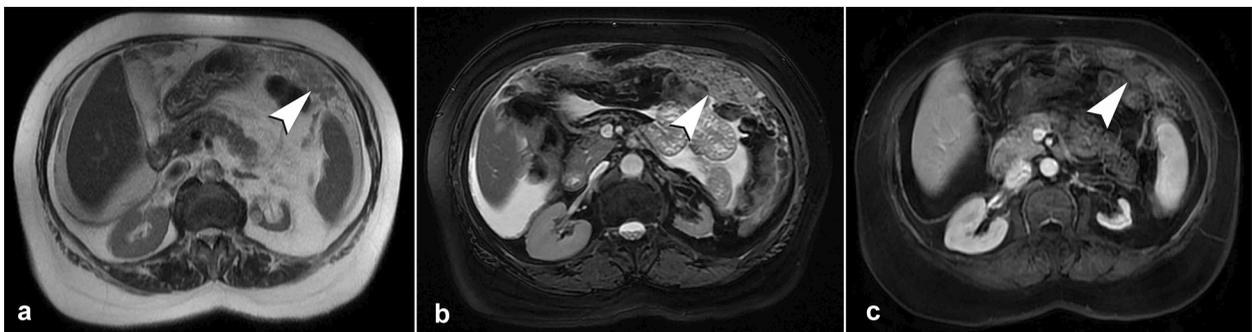
The average age  $56.5 \pm 10.4$  (range, 42-73) in peritoneal mesothelioma group. There were 6 female (40%) and 9 male (60%) patient. We found peritoneal irregularity and nodular thickening in 11 patients (73.3%) (Fig. 1), diffuse peritoneal thickening (omental cake) in 5 patients (33.3%) (Fig. 2), ascites in 9 patients (60%) (Fig 1, 2), extension of adjunct tissue in only one patient (6.6%) (Fig. 3), only one patient had retroperitoneal lymph adenopathy (6.6%) (Table 1).

**Table 1.** Malignant peritoneal mesothelioma radiological findings

Radiological Findings	%
Peritoneal irregularity and nodular thickening	73.3
Diffuse peritoneal thickening	33.3
Ascites	60
Extension of adjunct tissue	6.6
Lymph adenopathy	6.6



**Figure 1.** Malignant peritoneal mesothelioma. **a)** Contrast enhanced CT scan shows nodular peritoneal thickening. **b)** Axial contrast enhanced CT shows perisplenic and perihepatic large amount of ascites. **c)** Axial contrast enhanced CT shows diffuse peritoneal thickening with omental cake.



**Figure 2.** Diffuse irregular thickening of parietal peritoneum with omental cake is hypointense on axial T2 Weighted images (a), hyperintense on FIESTA sequence (b), shows minimal enhancement on post-gadolinium axial T1 Weighted images (c). We can see perihepatic minimal ascites.



**Figure 3.** Coronal post gadolinium T1 weighted image shows perihepatic focal parietal peritoneal thickening and hepatic metastases.

## DISCUSSION

Approximately 35% of all mesotheliomas arise only from the peritoneum. There are three pathologic subtypes of peritoneal mesothelioma: Malignant mesothelioma, cystic mesothelioma, or well-differentiated papillary mesothelioma. CT and MRI findings of these subtypes are different each other.<sup>2</sup>

Malignant peritoneal mesothelioma is seen at fifth and sixth decades. Asbestos exposure is a predisposing factor. We can see two different appearances at CT and MRI. Dry appearance is characterized with peritoneal based masses and wet appearance is characterized ascites, irregular or nodular peritoneal thickening and omental mass may be seen at CT and MRI. Our one patient had dry appearance and the others had wet appearance at their MR and CT. Peritoneal carcinomatosis, serous papillary carcinoma of peritoneum, tuberculous peritonitis and peritoneal lymphomatosis should be thought in differential diagnosis. It is very difficult to do differential diagnosis by using only CT. Prominent ascites and less severe peritoneal thickening is seen in peritoneal carcinomatosis. The incidence of liver metastasis and lymphadenopathy is also higher in peritoneal carcinomatosis. One patient had liver metastase and one patient had retroperitoneal lymphadenopathy. Serous papillary carcinoma is found predominantly in elderly women and postmenopausal women. We should think tuberculous peritonitis if we see smooth peritoneal thickening, mesenteric lymphadenopathy with central necrosis,

ascites with high attenuation, and splenomegaly at CT and MRI. Diffuse retroperitoneal and mesenteric lymph adenopathy and the lack of omental involvement should misgive about lymphomatosis.<sup>2,4,5</sup> There were few reports about radiologic findings of peritoneal mesothelioma which were case report. But Whitley et al. reported CT findings of peritoneal mesothelioma of 8 case.<sup>6</sup> In this study, CT findings included evidence of 8 peritoneal involvement (7/8, 88%), ascites (6/8, 75%), mesenteric involvement (6/8, 75%), pleural involvement (4/7, 57%), bone destruction (2/8, 25%), peritoneal mass (1/8, 12%), retroperitoneal lymph node involvement (1/8, 12%). Our series have maximum number of case about radiologic findings of peritoneal mesothelioma in the literature.

Cystic mesothelioma is a benign tumor that occurs mainly in young to middle-aged women. It is usually associated with a history of previous abdominal surgery or pelvic inflammatory disease. Relationship between asbestos exposure and cystic mesothelioma has not been reported. Involvement of pelvic region is typical. Hormonal therapy is usually useful for treatment of cystic mesothelioma. Multilocular cystic mass, multiple unilocular cystic thin-walled cysts, or a unilocular cystic mass. Cystic lymphangioma cystic epithelial neoplasms of the ovaries and endometriosis is thought in the differential diagnosis. Cystic lymphangioma is seen younger patients than cystic mesothelioma. It doesn't show regional predilection. Thick-walled cysts, thick internal septa, and high-attenuation internal debris favor the diagnosis of endometriosis.

Well-differentiated papillary mesotheliomas is found reproductive-age women. Peritoneal thickening, multiple peritoneal nodules, omental infiltration and ascites may be seen at CT and MRI. It should be thought the same disease that is thought in malignant peritoneal mesothelioma in differential diagnosis.<sup>2,4,7</sup>

There was no patient with cystic mesothelioma and well-differentiated papillary mesothelioma in our patient archives. All of our patients were malignant peritoneal mesothelioma.

In conclusion, malignant mesothelioma can be difficult to diagnose with only clinical findings. CT and MRI are necessary to show the spread of disease and differential diagnose. Neither CT scanning nor MRI provides an unequivocal diagnosis of me-

sothelioma; tissue biopsy is required for the definitive diagnosis.

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