Interdepartmental Conference

Malignant Mesothelioma

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Abstract : **A 27 years old Thai male presented with progressive abdominal distension without leg edema, low grade fever and 10 kg weight loss over 2 months. Physical examination revealed cachexia, a markedly distended abdomen with fluid thrill, but no hepatosplenomegaly. An abdominal tap revealed serosanguinous fluid. Analysis of the ascitic fluid demonstrated white blood cell 300 /mm^3, red blood cell 270,000 /mm^3, SAAG 0.9 g/dl, ascites protein 3 g/dl, AFB stain no organisms seen. Cytology showed a few mesothelial cells but no malignant cells. A chest X-ray was normal. The patient underwent laparoscopy. The peritoneum was studded with whitish miliary nodules and fibrin plaques. Peritoneal biopsy revealed chronic inflammation with fibrosis, no granuloma or specific organism. Abdominal CT images demonstrated a large multiseptated cystic mass with a thick wall, occupying almost the entire abdominal cavity. Abdominal exploration demonstrated a huge intraabdominal cystic mass, with multiple discrete white nodules on the surface of the cystic wall and the liver. Histology demonstrated most tumor cells deeply embedded in collagenous tissue with a biphasic pattern and high mitotic figure. Immunoperoxidase staining demonstrated tumor markers as follow : vimentin, cytokeratin (AE1/AE3), epithelial membrane antigen (EMA), and neurospecific enolase (NSE). The final diagnosis was *biphasic malignant mesothelioma*. Up to now, no standard treatment is available. Surgery for localized tumors has been reported. Other treament, such as external radiation, intraperitoneal instillation of radioactive gold and chemotherapy, have generally failed to improve overall survival. The median survival is 2 to 12 months after diagnosis with a total duration of about 1 year from the onset of symptoms.**

เรื่องย่อ : **Malignant Mesothelioma**

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ผู้ชายไทย อายุ 27 ปี มาโรงพยาบาลด้วยปัญหาท้องโต มีไข้ต่ำ และน้ำหนักลด 10 กก. ในช่วง 2 เดือน ตรวจร่างกายพบท้องโตเนื่องจากมีน้ำในช่องท้อง เจาะท้องได้น้ำปนเลือด ตรวจทางห้องปฏิบัติการน้ำในช่องท้องพบเม็ดเลือดขาว 300 ตัว/ลบ.มม., เม็ดเลือดแดง 270,000 ตัว/ลบ.มม., SAAG 0.9 กรัม/ดล., โปรตีน 3 กรัม/ดล. ตรวจเซลล์วิทยาพบมีโซทีเลียลเซลล์จำนวนเล็กน้อย ไม่พบเซลล์ผิดปกติและเชื้อโรค เอ็กซเรย์ทรวงอกผลปกติ ผู้ป่วยได้รับการส่องกล้องช่องท้องพบจุดขาวและพังผืดคลุมเยื่อบุช่องท้องทั่วไปหมด ผลการตัดเนื้อตรวจเยื่อบุช่องท้องด้วยกล้องจุลทรรศน์พบการอักเสบเรื้อรังและพังผืด ไม่พบเชื้อโรคและแกรนูโลมา ตรวจเอ็กซเรย์คอมพิวเตอร์ช่องท้องพบก้อนถุงน้ำขนาดใหญ่ในช่องท้องเบียดอวัยวะภายใน การผ่าตัดเปิดช่องท้องพบถุงน้ำขนาดใหญ่ ผนังถุงน้ำหนามีจุดขาวกระจายทั่วไปทั้งบนผิวก้อนถุงน้ำและตับ ผลการตรวจทางกล้องจุลทรรศน์พบเซลล์มะเร็งฝังตัวอยู่ในเนื้อเยื่อคอลลาเจน ตรวจย้อมอิมมูโนเปอร์ออกซิเดส สำหรับเซลล์มะเร็งติด vimentin, cytokeratin (AE1/AE3), epithelial membrance antigen (EMA) และ neurospecific enolase (NSE) วินิจฉัยโรค biphasic malignant mesothelioma ในปัจจุบันยังไม่มีการรักษาที่เป็นมาตรฐาน มีรายงานการผ่าตัดในกรณีที่เป็นก้อนขนาดเล็กได้ผล การรักษาด้วยวิธีการอื่น ๆ เช่น การฉายรังสี การใส่แร่ทองคำในช่องท้อง และเคมีบำบัดรักษา ยังไม่แสดงการเพิ่มอัตราการอยู่รอดของผู้ป่วย อัตราการอยู่รอดโดยเฉลี่ย 2 ถึง 12 เดือนหลังจากการวินิจฉัย และประมาณ 1 ปีหลังจากแสดงอาการของโรค

INTRODUCTION

Peritoneal mesothelioma is a rare disease and about one fifth to one third of all mesotheliomas are peritoneal. Because of its unusual nature, the disease has not been clearly defined, either in terms of its natural history, diagnosis, or management. We report a case of a 27 years old male who suffered from an abdominal cystic tumour.

CASE REPORT

A 27 years old thai male presented with progressive abdominal distension without leg edema, together with low grade fever and 10 kilograms weight loss over 2 months. He had a history of acute hepatitis 20 years ago and annual check-ups over the last six years had shown positive hepatitis B surface antigen. Physical examination revealed a cachectic young man who was mildly pale without signs of chronic liver disease and had no leg edema. Abdominal examination showed marked distension with a positive fluid thrill. There were no superficial dilated vein and no hepatosplenomegaly. The laboratory findings of this patient are shown in Table 1 and Table 2.

An abdominal tap revealed serosanguinous fluid. Ascitic fluid analysis demonstrated white blood cell 300 /mm^3, red blood cell 270,000 /mm^3, albumin 2.4 g/dl (serum albumin 3.3 mg/dl), total ascites protein 3 gm/dl. Gram and AFB stains of ascitic fluid showed no organisms. Cytology demonstrated a few mesothelial cells but no malignant cell.

The differential diagnosis of ascites is based on the albumin concentration gradient between serum and ascitic fluid. This patient had low serum ascitic fluid albumin gradient (SAAG 3.3-2.4 = 0.9 mg/dl). As anticipated, a low gradient is found in peritoneal disease such as malignant or infectious disease.

Causes of a low SAAG

Malignant disease

Disruption of the integrity of the peritoneal membrane is manifested by weeping of fluid into the peritoneal cavity.

Mesothelioma

It is the single primary malignancy of the peritoneum. Some may have history of exposure to environmental carcinogen such as asbestos, which was absent in this patient. The presenting features may be either a pleural or peritoneal mesothelioma.

Table 1. Haematologic laboratory findings of the patient.

Variable	Admission	Normal value
Hematocrit (%)	25.7	37-52
Mean corpuscular volume (μm^3)	83.3	81-99
White cell count (per mm^3)	5,760	4,000 - 11,000
Differential count (%)		
Neutrophils	60	40-74
Lymphocytes	23.2	19-48
Monocytes	11.9	3.4-9
Eosinophils	1.5	0-1.5
Platelet count (per mm^3)	340,000	150,000 - 440,000

Table 2. Blood chemical values and results of virological tests of the patient.

Variable	Admission	Normal value
Blood sugar (mg/dl)	104	76-110
Creatinine (mg/dl)	0.7	0.5-1.5
Cholesterol (mg/dl)	165	100-200
Triglyceride	69	50-200
Lactate dehydrogenase (U/L)	538	113-246
Protein (g/dl)		
Albumin	3.3	3.5-5.5
Globulin	3.0	3.1-5.2
Alkaline phosphatase (U/L)	205	39-117
GGT (g/dl)	241	2-50
Aspartate aminotransferase (U/L)	91	0-37
Alanine aminotransferase (U/L)	79	0-40
Bilirubin (mg/dl)		
Total	0.5	0.3-1.2
Conjugate	0.5	0-0.5
Sodium (mmol/L)	135	140-150
Potassium (mmol/L)	3.5	3.5-5
Chloride (mmol/L)	97	100-115
Bicarbonate (mmol/L)	21	21-24
HBsAg	Positive	
Anti HIV	Non-reactive	

The most common presenting symptoms are abdominal pain and weight loss. The presence of exudative ascites is rarely definitive, making direct biopsy necessary for diagnosis.

Metastatic carcinoma

Metastatic carcinoma is one of the most common peritoneal disease to cause ascites. Metastatic disease in the peritoneum is usually due to adeonocarcinoma. Less common causes are lymphoma, carcinoid, myeloma and other malignancies. Patients often present with abdominal distension together with pain and weight loss. Cytologic examination of ascitic fluid does not necessarily show the diagnosis.

Infectious diseases

Tuberculous peritonitis

Tuberculosis is a major cause of ascitic fluid infection. Although the pathogenesis of tuberculous peritonitis is unclear, reactivation of dormant disease is postulated. Absence of concomitant pulmonary tuberculosis is common. Underlying hepatic disease may be a predisposing factor. Frequent presenting symptoms are abdominal distension, fever, and weight loss. The disease process is often incidious. Presence of exudative ascites is the cardinal sign. Ascitic protein is often >3 g/dl and ascitic WBC is usually >300 cells/mm^3 with lymphocytic predominance. Definitive diagnosis requires the demonstration of acid-fast organism in the ascitic fluid or compatible peritoneal histology. It is extremely uncommon to find *Mycobacterium tuberculosis* organisms in ascitic fluid but culture of the fluid may be positive in nearly half the cases. Negative culture result does not exclude the disease. Hence, biopsy is often necessary.

Laparoscopy which was performed in this patient, showed 1-2 mm whitish miliary nodules with fibrin plaques studded on both the parietal and visceral peritoneum. Peritoneal biopsy revealed chronic inflammation with fibrosis; there was no granuloma. Special staining of the biopsied specimens showed no specific organism. The patient was empirically treated with a short course of antituberculous drugs (2 IRZE/ 4 IR). At follow-up, the patient was further investigated and the results were as follows : ascitic PCR-TB negative (specificity 100% and sensititvity 33.3% for PCR 16 Sr RNA one tube nested method), ascitic fluid adenosine deaminase (ADA) 48.8 U/L (normal <60 U/L), CEA 5.0 ng/ml (0.0-4.1), CA 19-9 0.8 u/ml (0.0-35.6), AFP 4.5 iu/ml (0.0-5.3) and repeated abdominal paracentesis showed no malignant cell. Esophagogastroduodenoscopy was done because the patient had persistent abdominal pain, early satiety and postprandial vomiting that showed only erosive esophagitis. After 3 weeks of empirical treatment for tuberculous peritonitis, the patient had progressive bulging of the abdomen, persistent abdominal pain, and a low grade fever. The abdominal ultrasonography, computerized tomography and GI follow through suggested an intraabdominal mass with lymphadenopathy.

Radiographic Discussion

The ultrasound and CT images demonstrate a large multiseptated, thick-walled cystic mass occupying almost the entire abdominal cavity. It displaces and compresses stomach, spleen, pancreas and small bowel loops posteriorly (Figure 1, 2). Only a thin layer of fluid is seen coating the liver surface but not in the pelvic cavity. A GI follow through study shows marked luminal narrowing with an irregular surface of the gastric body and antrum (Figure 3). This could be caused either by an infiltrative lesion of the stomach itself or by an extrinsic pressure effect from associated stomach invasion. However, there was no evidence of bowel obstruction. Besides the pressure effect on the small bowel

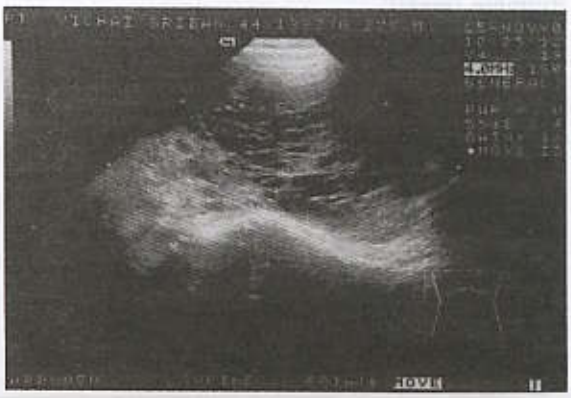

Figure 1. Abdominal ultrasonography shows a large multiseptated cystic mass occupying almost the entire abdominal cavity.

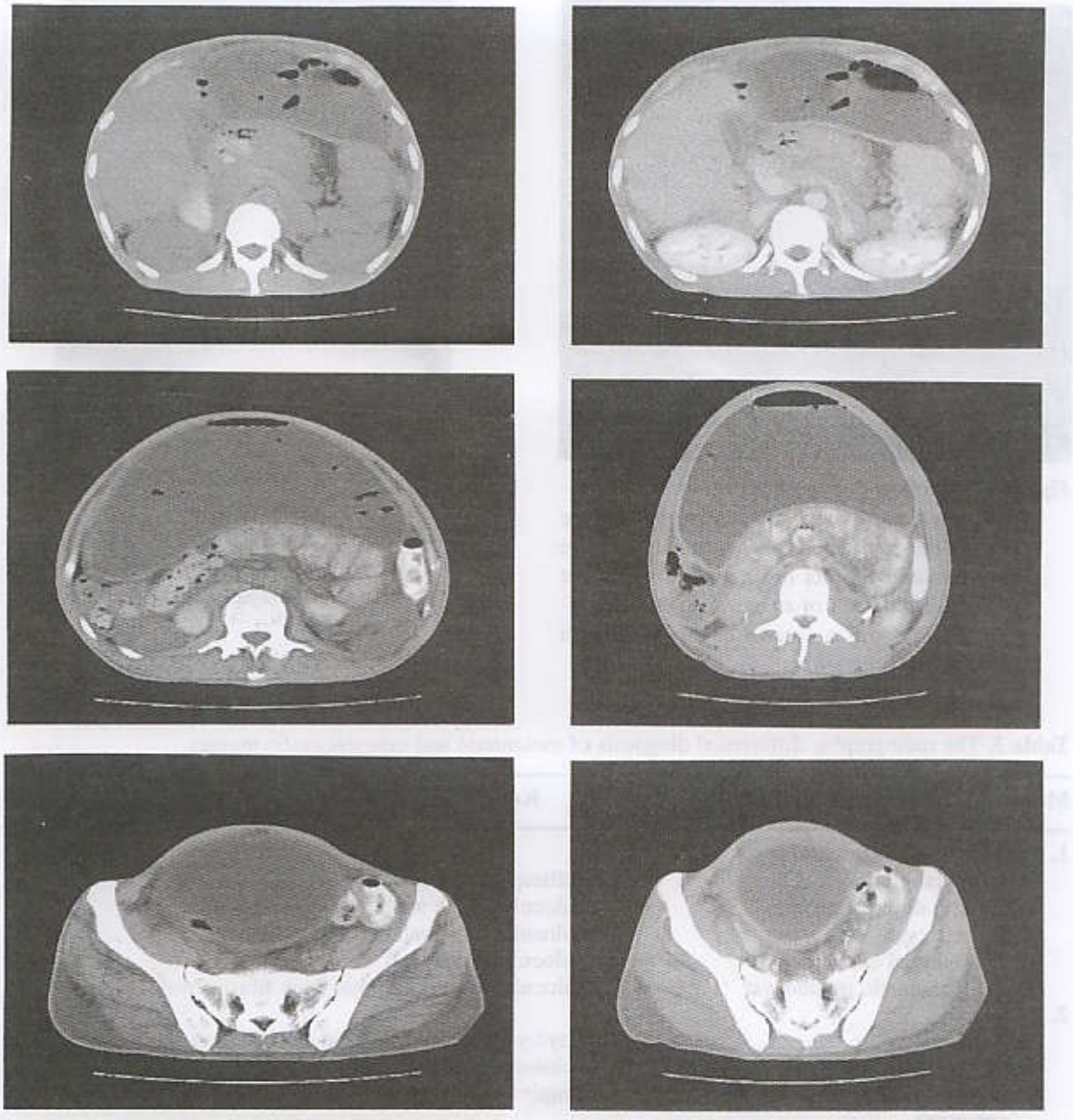

Figure 2. Non enhanced CT scan of abdomen (a to c) shows a large, well defined, cystic mass with multiple septations in the peritoneal cavity. It displaces the stomach and bowel loops posteriorly. A very small amount of free fluid is seen coating the liver surface. No calcification or intraabdominal lymphadenopathy is detected. Noted air within the lesion due to previous laparoscopy. Enhanced CT scan (e to f) shows a thick enhancing wall of the lesion. Other structures are unremarkable.

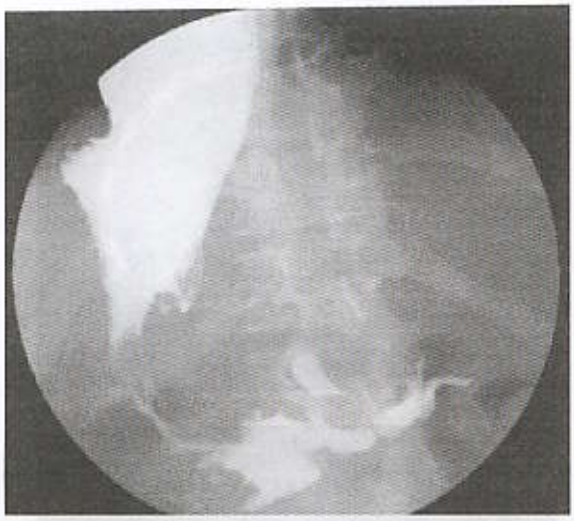

Figure 3. GI follow through study shows marked luminal narrowing with an irregular surface of the gastric body and antrum. It could be caused by either infiltrative lesion of the stomach itself or an extrinsic pressure effect from a lesion associated with stomach invasion.

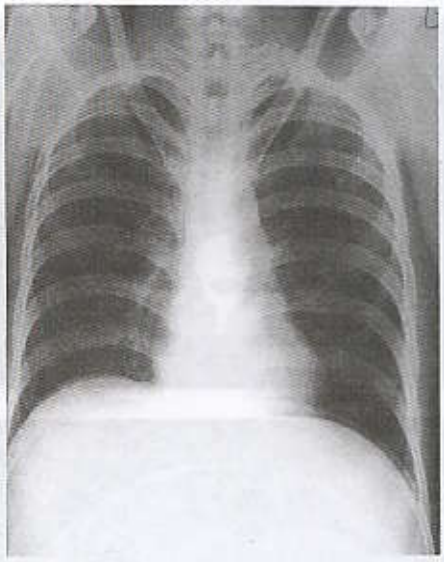

Figure 4. Chest radiograph shows no pulmonary infiltration or pleural lesion. Normal mediastinal structures and bony thorax are noted.

Table 3. The radiographic differential diagnosis of mesenteric and omental cystic masses.

Mesenteric and omental cystic masses	Key findings
1. Mesenteric and Omental cysts	
A. Lymphangioma	A. Multiseptate, thin wall
B. Enteric duplication cyst	B. Unilocular, thick wall
C. Enteric cyst	C. Unilocular, thin wall
D. Mesothelial cyst	D. Unilocular, thick wall
E. Nonpancreatic pseudocyst	E. Unilocular or multiseptate, thick fibrous wall
2. Neoplasm	
A. Teratoma	A. Fatty/cystic mass with focal calcification
B. Cystic mesothelioma	B. Multiloculated, thin wall cyst
C. Cystic spindle-cell tumor / peritoneal sarcomas	C. Complex mass with irregular thick wall
D. Pseudomyxoma peritonei	D. Loculated pseudoascites, scalloped liver/spleen surface
3. Miscellaneous	
A. Pancreatic pseudocyst	A. Sequelae of acute pancreatitis (clinical correlation)
B. MAI adenopathy	B. Low attenuation adenopathy mimic multiple cystic masses
C. Complicated ascites	C. Multiseptated pseudomass
D. TB peritonitis (wet type)	D. High attenuation ascites, nodular peritoneal thickening

Source: Modified from reference 1

loops, there was no remarkable abnormality in other visceral structures. It is unlikely that the lesion arised from a solid abdominal organ but most probably from the mesentery or omentum. The differential diagnoses of a mesenteric or omental cystic mass including their diagnostic clues are shown in Table 3. Some of the diagnoses can be diagnosed on the basis of imaging findings alone, while others have no specific radiologic appearance and are therefore included in the differential diagnosis list.

The evidence of a multiseptated cystic mass with thick enhancing wall, without calcification or intraabdominal adenopathy as shown in the radiograph suggested the diagnosis of complicated ascites, e.g., wet type tuberculous peritonitis, cystic spindle-cell tumor / peritoneal sarcoma, malignant mesothelioma or pseudocyst. Lymphangioma and cystic mesothelioma are less likely because they often have a thin walled appearance.

Tuberculous peritonitis

Generalized tuberculous involvement of the peritoneum may be secondary to local spread from a ruptured caseous lymph node, from a lesion in the gastrointestinal tract or from hematological dissemination. The chest radiograph is abnormal in only 50% of cases. Three types of tuberculous peritonitis are traditionally described. These are "wet" type (free or loculated ascites), "dry plastic" type (mesenteric thickening, caseous lymph nodes and fibrous adhesions), and "fibrotic" type (cake-like masses and fixation of bowel loops).[2] There is often considerable overlap between these types.

CT examination may reveal nodular thickening of the peritoneum, small bowel mesentery and greater omentum, enlarged mesenteric and peripancreatic lymph nodes.[3] Ascites, if present, may show high attenuation on CT (20-45 HU) owing to the increased protein content.[4] Septations may be identified within tuberculous ascites.

Cystic spindle-cell tumor / peritoneal sarcoma

More than half of all mesenteric tumors are sarcoma. The most common types are liposarcoma, leiomyosarcoma, malignant fibrous histiocytoma and fibrosarcoma[5]. Rarer subtypes include synovial sarcoma, angiosarcoma, hemangiopericytoma and neurofibrosarcoma. However, "cystic spindle-cell tumor" is the preferred term for leiomyoma or leiomyosarcoma. These tumors can undergo central liquefaction, necrosis and hemorrhage as well as appear on ultrasound or CT imaging as complex, cystic mesenteric or omental masses.[6] They may invade the surrounding structures such as the bowel or solid organs. Ultrasonographic findings may show a complex mass with large amounts of internal echoes. CT scan findings show a low attenuation central zone surrounded by irregular walls and a high attenuation peripheral rim that corresponds with viable tumor[1].

Mesothelioma

Cystic mesothelioma is a rare, benign neoplasm of the peritoneum that is unrelated to malignant peritoneal mesothelioma.[6] It is unrelated to asbestos exposure and is almost always encountered in middle-aged women. It is considered a low grade malignancy because it recurs locally, although generally it does not metastasize. On sonography, multicystic mesothelioma appears as a multiseptate cystic mass. Typically, CT reveals a well-defined, noncalcified multilocular cystic mass.[7]

Malignant mesothelioma is a primary malignancy of the peritoneum. This tumor is usually seen in middle-aged men with a history of previous asbestos exposure. Three different types of peritoneal malignant mesothelioma are recognized histologically : 1) carcinomatous, 2) sarcomatous, and 3) biphasic or mixed.[1] Each of these types has a different growth pattern and radiologic appearance. The carcinomatous type appears as diffuse thickening of both parietal and visceral peritoneum with small nodular plaques in the mesentery that produce fixation and diffuse thickening of the small bowel. The sarcomatous type manifests as a large encapsulated mass, similar in appearance to spindle-cell tumors. The biphasic or mixed type manifests as both, a band of tissue involving the peritoneal surfaces and masses. Regardless of histologic subtype, pleural plaques and calcification due to asbestos exposure can be present in approximately 70% of cases.[8]

Nonpancreatic pseudocyst

By definition, it has no inner cellular lining and is thought to be the sequel to mesenteric or omental hematomas or abscesses that do not resorb.[9] They are thick walled, usually septated and contain hemorrhagic or purulent debris[1].

Management of Omental Cyst

This patient had been diagnosed with intractable ascites and was treated by multiple sessions of abdominal paracentesis combined with antituberculous drugs. He responded poorly to this treatment. His ascites recurred and required repeated intermittent abdominal paracentesis to relieve abdominal distension every week. He could take only a little food for months due to abdominal distension and so his nutritional status deteriorated. There was also a question as to whether his persistent fever, warm and tender abdomen were due to secondary infection from multiple paracentesis. Finally, the imaging studies showed a large omental cyst. The fluid that was previously considered as an ascites was indeed fluid within a large cyst.

The treatment of choice for omental cyst is complete surgical excision of the cyst. Due to his poor nutritional status and the possibility of secondary infection. He was not a suitable candidate for immediate surgical excision. He was therefore treated supportively by percutaneous drainage and nutritional support in order to prepare for elective exploratory laparotomy.

The goal of exploration in a patient wth an omental cyst is to excise the cyst completely which is possible in 90% of cases.[10-12] In only 10% of cases, complete excision is not possible. In such cases, the treatment is marsupialization combined with electrocauterization of the cyst lining.[10]

After a period of nutritional treatment, he went for exploratory laparotomy which showed a huge intraabdominal cystic mass, about 20 cm in diameter, with dense surrounding adhesion. This cyst had a thick fibrin wall, 1.5 cm in thickness. There were multiple hard white nodules about 0.5-1.0 cm in size spreading all over the cyst wall. Nodules were also present on the anterior surface of the liver. The cut surface of the nodules showed white solid tumor without caseation. The 80 ml of fluid contained within the cyst was serosanguinous, and mixed with necrotic debris.

Based upon these findings, he was diagnosed with carcinomatosis peritonei.

Pathologic Finding

The surgical specimens consisted of multiple flat light brown tumor tissue, masses varying from 3 cm up to 7 cm in diameter. The surface was nodular and focally covered with blood. Serial sectioning revealed variegated cut surfaces, composed of firm gray-white tissue, semitranslucent myxoid tissue and hemorrhagic areas.

Microscopically, the tissue consisted of both collagenous and cellular components. Most of tumor cells were deeply embedded in collagenous tissue. This caused difficulty in obtaining tumor cells via exfoliative cytologic examination or minor biopsy. The tumor cells showed a biphasic pattern. The first pattern was epithelioid, composed of plump, polygonal cells with abundant eosinophilic cytoplasm. These cells showed coarsely clumped nuclear chromatin, distinct small nucleoli with moderate nuclear pleomorphism. The epithelioid tumor cells were arranged in a nest and cord masses, intimately mixed with the second pattern, of narrow cell-spindle sarcomatous (Figure 5). Cells were in the sarcomatous pattern, the tumor cells were elongated with long eosinophilic cytoplasm. The nuclei were hyperchromatic with mild nuclear pleomorphism. The spindle tumor cells grew in dense packs and short fascicles. Areas of myxoid degeneration were also noted. Both histologic patterns showed a high mitotic figure. The specific papillary or tubular pattern was not encountered. Periodic acid-schiff (PAS), alcian blue and mucicarmine stain did not demonstrate any intracytoplasmic mucopolysaccharides. Many immunoperoxidase stains were applied and demonstrated positive markers for vimentin, cytokeratin (AE1/AE3), epithelial membrane antigen (EMA), and neurospecific enolase (NSE). But carcinoembryonic antigen (CEA), S-100 and placental alkaline phosphatase (PLAP) were negative. A search for desmin, common actin (HHF35) and smooth muscle actin (1A4) was not done.

The final pathologic diagnosis was ***biphasic malignant mesothelioma***.

Pathologic Discussion

Pathologic differential diagnosis in this case includes:

1. Malignant mesothelioma with biphasic feature.
2. Diffuse peritoneal involvement of a metastatic adenocarcinoma with sarcomatous features.
3. Primary peritoneal adenocarcinomas.[13,14]

The primary peritoneal adenocarcinomas usually show papillary serous feature with high-grade nuclei and numerous psammoma bodies. However, it arises from the secondary Mullerian system and is present only in female.

A tumor with a biphasic pattern (as this case) or a monophasic sarcomatoid pattern, when encountered with diffuse peritoneal involvement, suggests malignant mesothelioma. The tubulopapillary features which are also suggestive of mesothelioma were not present in this case.

Metastatic adenocarcinomas are always a differential diagnosis for malignant mesothelioma because many types of adenocarcinoma may spread to the peritoneal cavity, simulating mesothelioma. Visceral organ invasion and lymph node metastasis are more commonly found than in mesothelioma. Foci of columnar tumor cells which are suggestive of adenocarcinoma were not found in this case.

Many histochemical immunohistochemical studies can be performed to differentiate between the two entities. Malignant mesothelioma is characterized by an absence of neutral mucin (demonstrate by mucicarmine stain) and the presence of acid mucin (predominantly hyaluronic acid, demonstrated by alcian blue stain and hyaluronidase-sensitive)[15]. In this case, both stainings were negative. However, hyaluronic acid might be washed out in the formalin fixation, resulting in false-negative staining.

Mesothelioma shows immunoreactivity for cytokeratin, epithelial membrane antigen and vimentin in both epithelioid and sarcomatous areas. However, this finding is also present in metastatic adenocarcinoma with sarcomatous features. Other immunostainings are useful to distinguish between the 2 types : carcinoembryonic antigen (CEA), B72.3, Leu-M1, BFR-EP4, S-100, and placental alkaline phosphatase (PLAP), if present, point to adenocarcinoma.[15-19] In this case, carcinoembryonic antigen (CEA), S-100 and placental alkaline phosphatase (PLAP) were negative. Thrombomodulin and calretinin are another two antibodies that are suggestive of mesothelioma. Thrombomodulin and calretinin stains are positive in the majority of mesothelioma but are absent in almost all serous carcinomas[19,20]. The two markers were not available in our institute.

Ultrastructural study is another useful tool to distinguish epithelial mesothelioma from adenocarcinoma but is less useful for discriminating between sarcomatous mesothelioma and sarcoma. The presence of long, thin and bushy surface microvilli is a diagnostic feature.[21] In this case, paraffin-embedded tissue was submitted for electron microscopic study. Due to the poor tissue fixation of the small foci of the epithelioid portion, only a long slender cell surface was present. But these findings are compatible with mesothelioma.

Malignant Mesothelioma

Malignant mesothelioma is a very uncommon cancer that is difficult to diagnose. They are mostly related to previous exposure to asbestos.[22,23] The pleura is the most frequent site of involvement and peritoneal involvement is found in 20% of cases. Most of these patients are men (M:F ratio is 4:1), with an average age of 60 years at the time of diagnosis (range 23-93 yr).[23-28] Ascites may not be obvious initially but can be present in up to 16% of patients.[28-30] In the past, the diagnosis was made at autopsy or laparotomy. In recent years, laparoscopy is used to diagnose malignant mesothelioma.[26,27] However, the final diagnosis is always made by histology.[23,27,30] No standardized therapy is available.[31] Surgical resection for localized tumors has been reported. External radiation, intraperitoneal instillation with radioactive gold (198Au), and chemotherapy have generally failed to produce a significant improvement in overall survival. A response rate of up to 50% is achieved using multimodal treatment. A retrospective analysis of 15 patients with peritoneal mesothelioma found a response rate of 30% to first-line chemotherapy.[32] The median survival of patients ranges from 2 to 12

months after diagnosis, with a total duration from onset of symptoms of about 1 year. Sebbag, et al reported improvement in survival with cytoreductive surgery with peritonectomy and perioperative intraperitoneal chemotherapy. The median survival was extended to 31 months. The morbidity and mortality rates for this combined treatment were 33 and 3 percent respectively.[33] Park BJ, et al reported that continuous hyperthermic peritoneal perfusion (CHPP) with cisplatin prolonged median survival to 26 months.[34]

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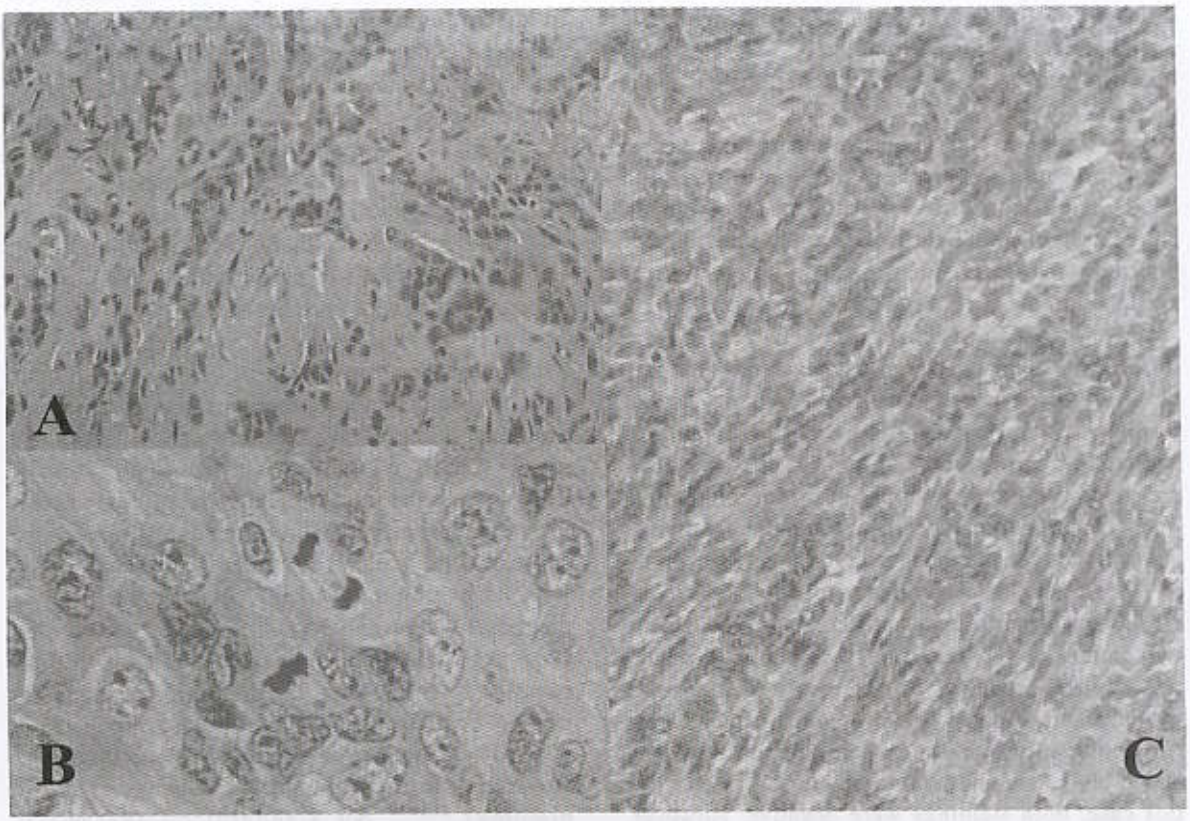

Figure 5. The epithelioid tumor cells are arranged in nests with hyalinized stroma between(A). In some areas, the epithelioid tumor cells are arranged in large sheets with a high mitotic figure (B). In the second sarcomatous pattern (C), the tumor cells are spindle shaped and grow in dense packs and short fascicles.

REFERENCES

1. Ros PR. Bubbles and marbles of the belly: Cystic and solid masses of the mesentery and omentum. IL. Radiol Soc North Am 1997.
2. Dahnert W. Radiology review manual. 4th ed. Baltimore: Williams & Wilkins, 1999.
3. Burn PR, Heally JC. Imaging benign peritoneal disease. Imaging 2000;**12:** 34-48.
4. Hulnick DH, Megibow AJ, Naidich DP. Abdominal tuberculosis: CT evaluation. Radiology 1985; **157:**199-204.
5. Shaw MS, Healy JC, Reznek RH. Imaging the peritoneum for malignant process. Imaging 2000; **12:** 21-33.
6. Hamrick-Turner JE, Chiechi MV, Abbit PL, Ros PR. Neoplastic and inflammatory processes of the peritoneum, omentum, and mesentery: diagnosis with CT. Radiographics 1992; **12:** 1051-68.
7. Liem T, Gina KM, Larry KO. Multicystic mesothelioma of the peritoneum. AJR 2002; **178:** 402.
8. Ros PR, Yuschok TJ, Buck JL. Peritoneal mesothelioma: radiologic appearances correlated with histology. Acta Radiol 1991; **32:** 355-58.
9. Ros PR, Olmsted WW, Moser RP, Dachman AH, Hjermstad BH, Sobin LH. Mesenteric and omental cysts: histologic classification with imaging correlation. Radiology 1987; **164:** 327-32.
10. Engum SA, Grosfeld JL. Pediatric Surgery. In: Townsend CM, ed. Sabiston Textbook of Surgery. 16th ed., Philadelphia, WB Saunders, 2001: 1488-89.
11. Daly JM. Abdominal wall, omentum, mesentery and retroperitoneum. In: Schwartz SI. Principles of Surgery. 7th ed. New York, McGraw-Hill, 1999: 1558.
12. Hines OJ, Ashley SW. Lesions of the mesentery, omentum and retroperitoneum. In : Zinner MJ, ed. Maingot's abdominal operation. 10thed. Connecticut, Appleton & Lange, 1997: 714.
13. Sternberg SS, Antonioli DA, Carter D. The peritoneum. In. Diagnostic surgical pathology, 3rd ed. Lippincott Williams & Wilkins, Philadelphia, 1999: 2422-24.
14. Fletcher CDM. Tumors of the peritoneum. In. Diagnostic histopathology of tumors, 1st ed. Churchill Livingstone, London, 1995: 846-48.
15. McCaughey WTE, Colby TV, Battifora H, et al. Diagnosis of diffuse malignant mesothelioma: experience of a US/Canadian mesothelioma panel. Mod Pathol 1991; **4:** 342-53.
16. Wick MR, Loy T, Mills SE, et al. Malignant epithelioid pleural mesothelioma versus peripheral pulmonary adenocarcinoma: a histochemical, ultrastructural, and immunohistologic study of 103 cases. Hum Pathol 1990; **21:** 759-66.
17. Sheibani K, Esteban JM, Bailey A, et al. Immunopathologic and molecular studies as an aid to the diagnosis of malignant mesothelioma. Hum Pathol 1992; **23:** 107-16.
18. Sheibani K, Stroup RM. Immmunopathology of malignant mesothelioma. Pathol State of the Art Reviews 1996; **4:** 191-212.
19. Ordonez NG. Role of immunohistochemistry in distinguishing epithelial peritoneal mesotheliomas from peritoneal and ovarian serous carcinomas. Am J Surg Pathol 1998; **22:** 1203-214.
20. Doglioni C, Dei Tos AP, Laurino L, et al. Calretinin: a novel immunocytochemical marker for mesothelioma. Am J Surg Pathol 1996; **20:** 1037-46.
21. Rosai J. Peritoneum, retroperitoneum an related structures. In. Ackerman's surgical pathology, 8th ed. Mosby, St.Louis, 1996: 2141-45.
22. Newhouse M. Epidemiology of asbestos-related tumors. Semin Oncol 1981; **8:** 250-57.
23. Chahinian AP, Rusch V. Malignant mesothelioma. In: Holland D JK, Bast RC Jr, et al, eds. Cancer medicine. 4th ed. Philadelphia, Williams & Wilkins, 1997: 1805-26.
24. Moertel CG. Peritoneal mesothelioma. Curr Clin Concepts 1972; **61:** 346-50.
25. Antman KH. Clinical presentation and natural of benign and malignant mesothelioma. Semin Oncol 1981; **8:** 313-20.
26. Van Gelder T, Hoogsteden HC, Versnel MA, et al. Malignant peritoneal mesothelioma: a series of 19 cases. Digestion 1989; **43:** 222-27.
27. Piccigallo E, Jeffers LJ, Reddy KR, et al. Malignant peritoneal mesothelioma: a clinical and laparoscopic study of ten cases. Dig Dis Sci 1988; **33:** 633-39.
28. Wengrower D, Sweedan W, Gips M, Felig Y, Goldin E. Malignant peritoneal mesothelioma: mucosal duodenal involvement and endoscopic diagnosis. Gastrointest Endosc 2000; **52:** 6-12.
29. Stefanini GF, Foschi FG, Marsigli L, et al. A rare case of peritoneal mesothelioma in a male with ascites. Am J Gastroenterol 1994; **89:** 2257-59.
30. Brady LW. Mesothelioma: the role for radiation therapy. Semin Oncol 1981; **8:** 329-34.
31. Aisner J, Wiernik PH. Chemotherapy in the treatment of malignant mesothelioma. Semin Oncol 1981; **8:** 335-43.
32. Eltabbakh, Piver MS, Hempling RE, Recio FO, Intengen ME. Clinical picture, response to therapy and survival of women with diffuse malignant peritoneal mesothelioma. J Surg Oncol 1999; **70:** 6-12.
33. Sebbag G, Yan H, Shmookler BM, Chang D, Sugarbaker PH. Results of treatment of 33 patients with peritoneal mesothelioma. Br J Surg 2000; **87:** 1587-93.
34. Park BJ, Alexander HR, Libutti SK, et al. Treatment of primary peritoneal mesothelioma by continuous hyperthermic peritoneal perfusion (CHPP). Ann Surg Oncol 1999; **6:** 582-90.