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CLINICAL NOTE

Pseudomyxoma retroperitonei: report of 2 cases and review of the literature

Orestis Ioannidis[1], Angeliki Cheva[2], George Paraskevas[3], Nikolaos Papadimitriou[1], Athina Konstantara[1], Stavros Chatzopoulos[1], Anastasios Kotronis[1], Apostolos Makrantonakis[1] and Emmanouil Kakoutis[1]

[1]First Surgical Department and [2]Department of Pathology. General Regional Hospital "George Papanikolaou". Thessaloniki, Greece. [3]Department of Anatomy. Medical School. Aristotle University of Thessaloniki. Thessaloniki, Greece

ABSTRACT

Pseudomyxoma peritonei is a rare clinical condition that is characterized by the presence of mucinous ascitis. It is believed to originate predominately from a mucinous neoplasm of the appendix including a heterogeneous group of tumours ranging from indolent to malignant. It was first described in the late 19th century. Pseudomyxoma retroperitonei is extremely rare with only 33 cases having been reported since the first description in the middle of the 20th century. We report two additional cases of pseudomyxoma retroperitonei and present a review of the literature.

Key words: Retroperitoneal. Retroperitoneum. Mucinous. Neoplasm. Tumour. Appendix.

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INTRODUCTION

Pseudomyxoma peritonei, which literally means untrue peritoneal mucinous tumour, is a rare clinical condition that is characterized by the presence of mucinous ascitis in which mucinous and gelatinous material spreads and accumulates in the abdomen and pelvis regardless the malignant potential of the primary tumour, including a heterogeneous group of pathological lesions ranging from indolent tumours without any aggressive behaviour to malignant tumours with invasive growth capacity and metastatic ability (1,2). However, until today there are no uniform criteria for the term pseudomyxoma peritonei (2). The incidence of pseudomyxoma peritonei is about 1 to 2 per million per year with a female predominance (female to male ratio 2-3:1) and in most cases it originates from appendiceal mucinous epithelial neoplasms, usually mucinous adenoma, and seldom from other primary sites including the ovaries, colon, stomach, pancreas and urachus (1,2). Pseudomyxoma of the retroperitoneum, called both pseudomyxoma retroperitonei and pseudomyxoma extraperitonei, is extremely rare with only 35 cases having been reported in the international literature including the current 2 cases (3-35) (Table I).

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Correspondence: Orestes Ioannidis.
e-mail: telonakos@hotmail.com

CASE REPORTS

Case 1: a previously healthy 74 year old male presented to the emergency department of our hospital complaining about abdominal pain for 2 days. Physical examination revealed a palpable tender mass in the right lower abdominal quadrant and a fever of 39.2 °C. Laboratory examination revealed leukocytosis with a WBC count of 15,690 x 10^6/mL (83.5% neutrophils), anaemia with 11.5 g/dL haemoglobin and 34.4% haematocrit and thrombocytosis with 420,000/mm^3. All other blood chemistry, urianalysis, chest and abdominal X-rays were within the normal limits. Abdominal ultrasonography revealed a tender solid mass in the right iliac fossa measuring about 4 x 4 cm. Abdominal CT scan demonstrated a large mass in the right retroperitoneal space extending from just below the right kidney to the right iliac fossa (Fig. 1). The mass, which had fluid density and air bubbles, infiltrated the psoas muscle and the paraspinal lumbar muscles. The findings were indicative of a retroperitoneal abscess possibly secondary

Table I. Pseudomyxoma retroperitonei reported cases

Case	*Number of patients*	*Sex*	*Age*	*Clinical data*	*Origin*	*Treatment*	*Outcome*	*Author/Reference*
1	1	M	74	Abdominal pain and mass	Appendiceal mucinous adenocarcinoma	Debulking, right hemicolectomy, chemotherapy	Recurrence at 6 months, fistula at 2 years	Ioannidis, 2011
2	1	F	68	Lumbar pain and mass	Appendiceal mucinous adenocarcinoma	Debulking, right hemicolectomy, chemotherapy	Disease free at 3 years	Ioanidis, 2011
3	1	F	48	Abdominal pain and mass	Ovary	Debulking, right oophorectomy and chemotherapy	Recurrence at 4 years	Chamisa, 2010
4	1	F	51	Right flank purulent and mucinous discharge, palpable mass	Appendiceal mucinous adenocarcinoma	*En block* resection with a portion of the iliac bone, appendectomy. Systemic chemotherapy and radiotherapy	NA	Cakmak, 2009
5	1	F	80	Lower abdominal mass	Appendiceal mucinous adenocarcinoma	Resection of mucous and ileum, cecum, both ovaries and uterus	NA	Niwa, 2007
6	1	M	57	Lower abdominal pain and mass	NA	Excision of cyst, radiotherapy, chemotherapy	Alive and disease free at 3 years	Solkar, 2004
7	1	F	55	Right lower abdominal pain and mass, retroperitoneal abscess	Ascending colon cancer	Right hemicolectomy, oophorectomy, mucous removal. Systematic chemotherapy (UFT/LV)	Alive, no recurrence 5 months	Hirokawa, 2004 (in Japanese)
8	1	F	78	Right abdominal tumor and pain	Appendiceal cystadenocarcinoma	Right hemicolectomy	NA	Kojima, 2001 (in Japanese)
9	1	M	NA	NA	Mucinous paraenteric cyst	NA	NA	Angelescu, 2001 (in Romanian)
10	1	F	68	NA	Appendiceal mucinous adenocarcinoma	Appendectomy, debulking of mucous, intraoperative chemotherapy, systemic chemotherapy (5-FU, MMC)	Reccurence at 5 months, disease free at 3 and a half years	Liu, 2001 (in Chinese)
11	1	F	58	Abdominal pain, retroperitoneal mass	Mucinous cystadenoma (primary or secondary)	NA	NA	Matsuoka, 1999
12	1	M	46	Skin fistula, abdominal pain and mass, weight loss	Appendiceal mucinous adenocarcinoma	Right hemicolectomy	Recurrence at 3 months	Koizumi, 1999
13	1	F	53	Retroperitoneal abscess	Appendiceal mucinous adenocarcinoma	Right hemicolectomy and debulking, systemic chemotherapy	Alive at 1 year	Edrees, 1999
14	1	NA	NA	NA	NA	NA	NA	Fujimura, 1999
15	1	M	69	Abdominal mass and pain, weight loss	Appendiceal mucinous adenoma	Debulking	NA	Tsai, 1998
16	3	NA	NA	NA	NA	NA	NA	Hemet, 1998
17	1	NA	NA	NA	NA	NA	NA	Oyama, 1997 (in Japanese)
18	1	M	56	Appendiceal abscess	Appendiceal mucinous adenocarcinoma	Drainage, radiotherapy	Recurrence. Death 39 months	Stevens, 1997
19	1	M	65	Abdominal mass	Appendiceal cystadenocarcinoma	Debulking and appendectomy	NA	Mor, 1996

(it continues in the next page)

Table I. Pseudomyxoma retroperitonei reported cases (cont.)

Case	*Number of patients*	*Sex*	*Age*	*Clinical data*	*Origin*	*Treatment*	*Outcome*	*Author/Reference*
20	1	NA	39	Right back pain and right lower abdominal mass	Appendiceal mucinous adenocarcinoma	Right hemicolectomy, resection of right iliopsoas muscle, partial peritonectomy	NA	Tamai, 1995 (in Japanese)
21	1	NA	NA	NA	NA	NA	NA	Nobusawa, 1995 (in Japanese)
22	1	NA	NA	Polyuria and back pain	Appendiceal mucinous cystadenoma	NA	NA	Baba, 1995
23	1	M	81	Abdominal mass	Appendiceal mucinous cystadenoma	Debulking and appendectomy	Persistent discharge	Shelton, 1994
24	1	M	47	Retroperitoneal mass with anterior thigh extension	NA	Excision	Disease free at 3 years	Fann et al., 1993
25	1	NA	NA	NA	NA	NA	NA	Koyama, 1992 (in Japanese)
26	1	NA	NA	NA	Appendix	NA	NA	Vladimirtseva, 1989 (in Russian)
27	1	M	58	Right loin pain and abdominal mass	NA	Drainage. Appendectomy and repeat drainage. Chemotherapy, radiotherapy mucolytic agents, radiofrequency hyperthermia	Recurrence at 3 weeks. Recurrence at 5 years with sinus formation. Alive at 10 years	Moran, 1988
28	1	M	67	Flank pain and mass	Appendix	Surgical debulking, retroperitoneal chemotherapy	Recurrence at 2 years. Recurrence at 5 years	Brady, 1986
29	1	NA	NA	NA	NA	NA	NA	Shimabukuro, 1984 (in Japanese)
30	1	NA	NA	NA	NA	NA	NA	Torgunakov, 1975 (in Russian)
31	1	NA	NA	NA	NA	NA	NA	Kayser, 1960 (in German)
32	1	NA	NA	NA	Appendix	NA	NA	Chetchueva, 1957 (in Russian)
33	1	NA	NA	NA	Appendiceal cyst	NA	NA	Chekharina, 1955 (in Russian)
34	1	NA	NA	NA	Probable appendicular	NA	NA	Coppini, 1950 (in Italian)

to complicated appendicitis. A CT guided aspiration yielded pus and confirmed the diagnosis. A pigtail catheter was placed for drainage and intravenous antibiotics were administrated, a combination of cefoxitin and metronidazole, which was changed to piperacillin/tazobactam according to the pus culture and antibiogram which revealed *Escherichia coli*. The patient presented clinical and laboratory improvement. The catheter was removed the 6th day, after a repeat CT scan, and the patient was discharged at the 8th day. At follow up after one month the patient was symptom free and an appendectomy was scheduled after three months. However, the patient presented one month later complaining about vague lumbar pain, while a palpable mass was present at the right lateral abdominal area. Laboratory examination was within the normal limit. CT scan revealed an inhomogeneous fluid collection of the right retroperitoneal space adjacent to the right psoas muscle (Fig. 2). An open biopsy through the retroperitoneal approach was performed which demonstrated the presence of mucinous adenocarcinoma possibly of colonic origin.

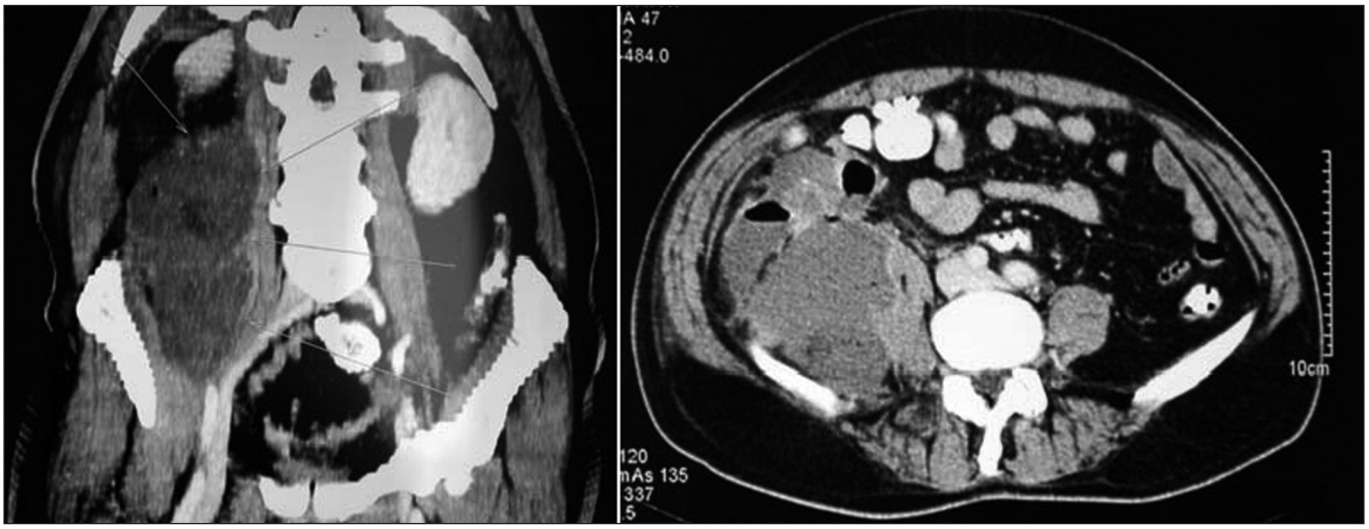

Fig. 1. CT scan showing the large retroperitoneal abscess.

Colonoscopy and gastroscopy were normal. At laparotomy the frozen section biopsy of the appendix revealed mucinous adenorcinoma and right hemicolectomy and debulking of the retroperitoneum was performed. Histopathology confirmed the diagnosis of pseudomyxoma and immunohistochemistry was positive for CK20 and CK8-18 (CAM 5.2) and negative for CK7 (Fig. 3). The patient received postoperative chemotherapy (capecitabine). However at 6 months follow up there was recurrence of the pseudomyxoma but the patient refused further surgical treatment. He is still alive after 2 years but a fistula has formed draining mucus to the right lumbar area.

Case 2: a previously healthy 68 years old female presented to the emergency department of our hospital complaining about lumbar pain for 5 days and high fever up to 39.8 °C. Physical examination revealed a palpable tender mass in the right lumbar area and a fever of 38.7 °C. Laboratory examination revealed leukocytosis with a WBC count of 36,600 x 10^6/mL (92.5% neutrophils), anaemia with 9.8 g/dL haemoglobin and 31.8% hematocrit and thrombocytosis with 512,000/mm^3. All other blood chemistry, urianalysis were within the normal limits. Chest and abdominal X-ray showed elevation of the right diaphragm. Abdominal CT scan revealed a large multilocular mass in the right retroperitoneal space extending from the right kidney to the pelvis infiltrating the oblique abdominal muscles (Fig. 4). The findings were indicative of a retroperitoneal abscess possibly secondary to appendicitis. A CT guided aspiration yielded pus and confirmed the diagnosis. A pigtail catheter was placed for drainage and intravenous antibiotics were administrated, a combination of cefuroxime and metronidazole, which was changed to ciprofloxacin according to the pus culture and antibiogram which revealed *Escherichia coli.* The patient presented clinical and laboratory improvement. The catheter was removed the 9th day, after a repeat CT scan, and the patient was discharged at the 12th day. The patient was scheduled for appendectomy but refused further treatment. However, the patient presented at 5 months with a palpable right lumbar mass. Laboratory examination was within the normal limit except of highly elevated tumour markers CEA (29.1 ng/mL) and CA-19-9 (107.4). Abdominal CT scan and MRI demonstrated an irregular fluid collection in the retroperitoneal space as well as a thickened appendix in a retrocaecal position (Figs. 5 and 6). At exploratory laparotomy the frozen section biopsy of the appendix revealed mucinous adenocarcinoma. Right hemicolectomy and retroperitoneal debulking was performed. Histopathology confirmed the diagnosis of pseudomyxoma and immunohistochemistry was positive for CK20 and CK19 and negative for CK7 (Fig. 7). The patient received postoperative chemotherapy (oxaliplatin, leucovorin and 5-fluorouracil). The patient is well and disease free at 3 years follow up.

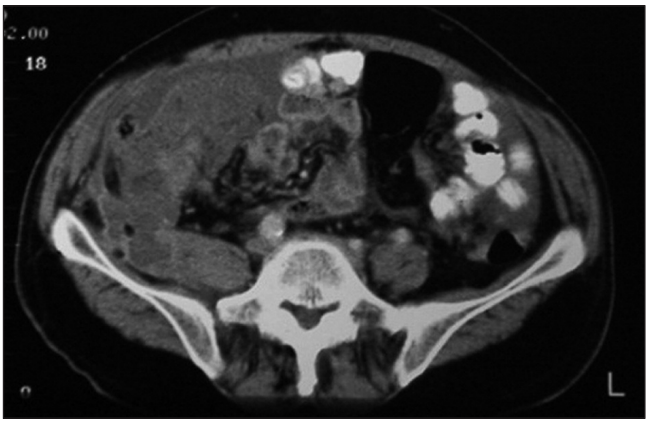

Fig. 2. CT scan demonstrating the retroperitoneal pseudomyxoma.

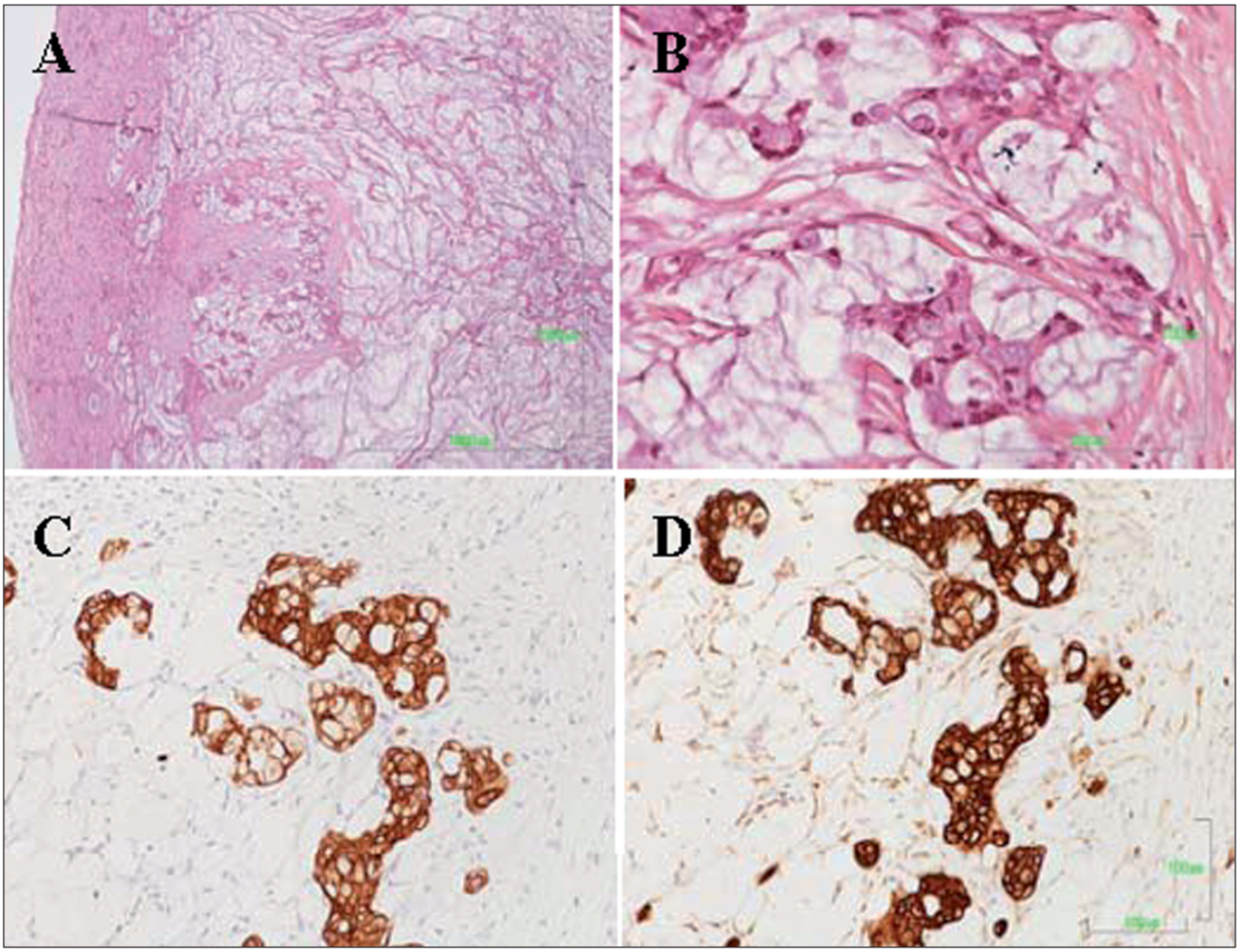

Fig. 3. Histopathology showed mucinous implants and neoplastic cells (A: Hematoxylin and eosin (H&E) x40) and signet ring neoplastic cells (B: H&E x 400). Immunohistochemistry was positive for CK20 (C: x200) and CK8-18 (CAM 5.2) (D: 200).

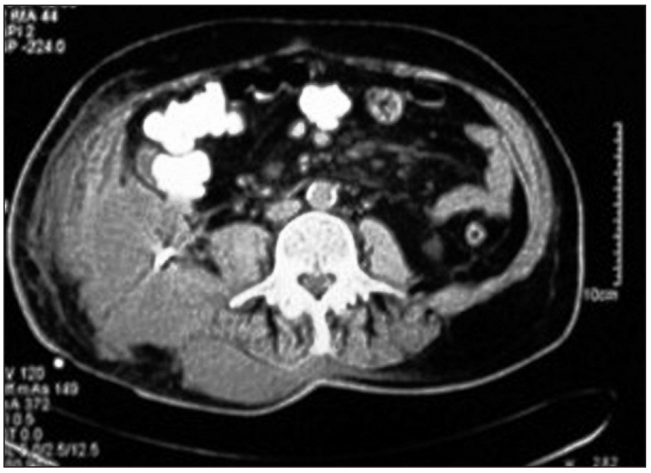

Fig. 4. CT scan showing the retroperitoneal abscess.

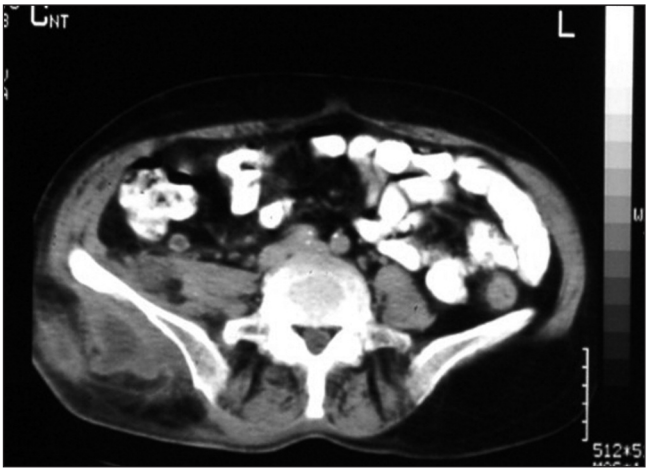

Fig. 5. CT scan demonstrating the retroperitoneal pseudomyxoma.

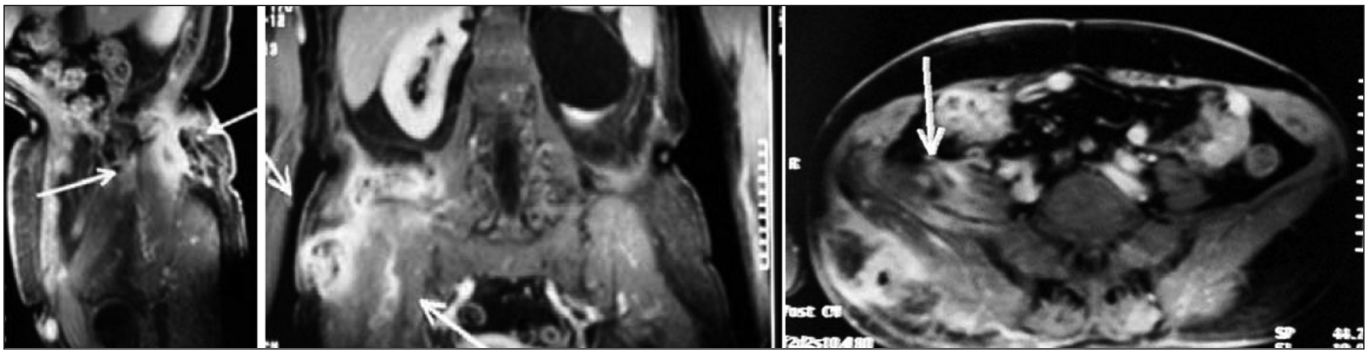

Fig. 6. MRI of the retroperitoneal pseudomyxoma.

DISCUSSION

Pseudomyxoma was first described in 1884 by Werth as an unusual peculiar peritoneal reaction to a jelly like substance produced by an ovarian neoplasm (36). Pseudomyxoma rertoperitonei was first described by Coppini, in 1950, probably of appendicular origin (35), while the first description in English literature was by Brady et al. reporting a case of pseudomyxoma retroperitonei in 1986 (29). Pseudomyxoma, both peritonei and retroperitonei, is believed to originate predominately from a mucinous neoplasm of the appendix that releases mucinous tumour cells into the peritoneal cavity or the retroperitoneal space respectively (1,2). Most cases of pseudomyxoma retroperitonei originate from the appendix and rarely from the colon, ovary and other sites. The appendiceal mucinous tumours have been classified into the following pathological lesions: mucocele, mucosal hyperplasia and hyperplastic polyp, serrated adenoma (mixed hyperplastic–adenomatous polyp), mucinous adenoma (mucinous cystadenoma), mucinous neoplasm of uncertain malignant potential, mucinous neoplasm of low malignant potential, adenocarcinoma (mucinous, intestinal and signet ring types) and goblet cell and tubular carcinoids (37).

Histopathologically, pseudomyxoma consists of mucinous implants that show a wide range of cell to mucus ratio and a great variety in the differentiation, amount and grade of atypia of epithelial cells (1). These cells are generally positive for CK20 and negative for CK7 (37). Pseudomyxoma has been classified in the benign disseminated peritoneal adenomucinosis or grade I, the malignant peritoneal mucinous carcinomatosis or grade III and the intermediate subtype or grade II (1,2).

Pseudomyxoma retroperitonei seems to affect equally the 2 sexes (male/female ratio: 1.22 to 1) and most commonly presents at the age of 60.9 years old. Clinically, pseudomyxoma retroperitonei usually presents with abdominal or lumbar pain and the presence of a palpable mass. Sometimes the formation of abscess, with high fever, or discharge is possible and weight loss can also be seen (3-35). Laboratory tests may reveal elevated serum tumour markers, with CEA being increased in 56-75% and CA 19-9 in 58-67% (2).

Imaging modalities, mainly ultrasound and computed tomography (CT) can aid the diagnosis. Ultrasound would visualize the mucinous substance as retroperitoneal fluid and can be used for needle aspiration and cytology. CT should be performed with intravenous, oral and rectal contrast and can differentiate the watery normal fluid from mucinous fluid by analyzing density properties with the density of mucous being higher (5 to 20 Hounsfield units) compared to water (0 Hounsfield units) (1,2). CT findings

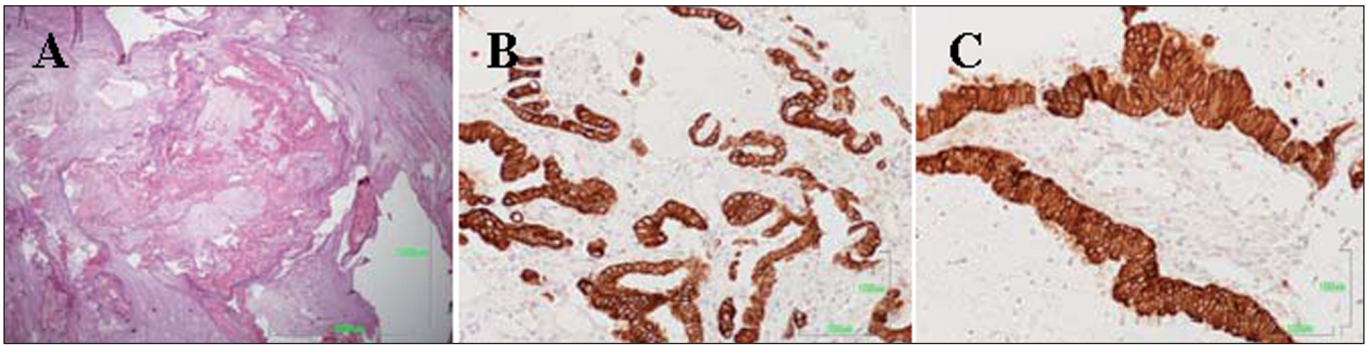

Fig. 7. Histopathology showed mucinous implants and neoplastic cells (A: H&E x40). Immunohistochemistry was positive for CK20 (B: x200) and CK19 (C: 200).

of pseudomyxoma retroperitonei resemble those of pseudomyxoma peritonei (38). Pseudomyxoma retroperitonei will appear as masses, usually multicystic, with septa or thick walls that distort and displace adjacent structures while punctuate mural or curvilinear calcifications may also be present (38). Magnetic resonance imaging (MRI) and positron emission tomography (PET) are less frequently applied and don't seem to have any additional value (1,2).

The treatment of pseudomyxoma is mainly surgical. The management of established pseudomyxoma based on traditional surgical treatment options included debulking of mucinous substance with or without additional modalities (1,2). Pseudomyxoma retroperitonei is usually treated with debulking and resection of the site of origin followed sometimes by systematic chemotherapy. Today the treatment of choice for pseudomyxoma peritonei is aggressive cytoreductive surgery with removal of all mucinous substance (including peritonectomy and resection of involved viscera) in combination with hyperthermic intraperitoneal chemotherapy (HIPEC) (1,2,39). Hyperthermic retroperitoneal chemotherapy hasn't yet been reported but should be considered as an option due to the high recurrence rate. Systematic chemotherapy seems to have a role only as palliative treatment in patients with progressive, recurrent disease and high grade malignant disease (1,2).

Due to the potential risk of recurrence or progression, which seems to be high in cases of pseudomyxoma retroperitonei, follow up is critical and consists of physical examination, CT scan and serum tumour markers (1,2). In the past standard surgical treatment has lead to increased recurrence (2) but, combined modality treatment results in 20-year survival rate up to 70% (39). Survival in the past was rather low and death was a result of intestinal obstructions and its complications and cachexia, but however in case of pseudomyxoma retroperitonei survival rates seems better as the disease is confined to the retroperitoneum and doesn't affect vital organs.

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