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Case Report

A Giant Lymphatic Cyst of the Adrenal Gland: Report of a Rare Case and Review of the Literature

Makoto Furihata[1], Yuuki Iida[1], Tadashi Furihata[2], Eisaku Ito[3]

[1]*Department of Surgery, the Mutual Aid Association for Teachers and Officials Sanraku Hospital, 2-5 Kandasurugadai, Chiyoda-ku, Tokyo 101-8326, Japan*

[2]*Department of General Surgery, Kyouwa Chuo Hospital, 1676-1 Kadoi, Chikusei-shi, Ibaraki 309-1195, Japan*

[3]*Division of Surgical Pathology, Tokyo Medical and Dental University, Tokyo, Japan*

Lymphatic type of adrenal cysts is most common; however, this type of endothelial cyst is quite rare in excessively large adrenal cysts. A 37-year-old Japanese woman was admitted to our institution with distension of her left flank and the upper quadrant of her abdomen. Abdominal ultrasonography revealed a cystic lesion with a homogenous anechoic texture, and measuring 21 cm in diameter. Computed tomography and magnetic resonance imaging displayed a giant cystic lesion adjacent to the liver, pancreas, kidney, and spleen. The origin of the cyst was not identified. We were not able to make a preoperative diagnosis; therefore, the patient underwent resection of the mass by open laparotomy for therapeutic diagnosis. Intraoperatively, the mass was identified to be cystic and adhered to the left adrenal gland. It was filled with more than 2000 mL of serous brown-red fluid. The content of the cyst contained no atypical cells on cytological examination. The wall of the cyst was composed of a lining of a single layer of lymphatic vessel–derived cells, and the cyst was pathologically classified as a true cyst. No abdominal symptoms were observed and a postoperative radiological work-up showed no evidence of recurrence during a 6-year follow-up period. We describe a case of a patient with a giant lymphatic cyst of the adrenal gland. The preset data suggest that surgeons should decide treatment strategy for large adrenal cysts in consideration of hormonal function, degree of size, and possibility of malignancy.

Key words: Giant adrenal cyst – Adrenal gland – Lymphatic cyst – Endothelial cyst

Reprint requests: Makoto Furihata, Department of Surgery, the Mutual Aid Association for Teachers and Officials Sanraku Hospital, 2–5 Kandasurugadai, Chiyoda-ku, Tokyo 101-8326, Japan.
Tel.: +81-3-3292-3981; Fax: +81-3-3292-5023; E-mail: ryoutamankeitaman@yahoo.co.jp

Cystic lesions of the adrenal gland are relatively rare. In 1903, Doran suggested that the first case of an adrenal cyst was described by Greiselius in 1670.[1] In an autopsy series, the incidence of adrenal cysts was reported to be 0.06 to 0.18%.[2] The actual frequency remains unknown; however, the detection rate of adrenal cysts has risen dramatically due to frequent application of new imaging modalities such as computed tomography (CT) and magnetic resonance imaging (MRI), which accounts for the identification of approximately 5% of incidental adrenal lesions.[3] As patients with small adrenal cysts seldom have any symptom, these cysts are rarely recognized. Small adrenal cysts are usually clinically silent and incidental,[4] whereas large adrenal cysts—especially greater than 10 cm in diameter—are associated with symptoms because of the mass effect and compression of adjacent organs.[5] Cases of excessively large adrenal cysts have been reported sporadically, only few dozens of adrenal cysts over 20 cm in diameter have been found.[5–28] Moreover, the lymphatic type of endothelial cyst of the adrenal gland is quite rare in excessively large adrenal cysts.[20,22] Here, we report a rare case of a giant lymphatic cyst of the adrenal gland in a middle-aged woman and summarize the current clinicopathological information on excessively large adrenal cysts and lymphatic type of endothelial cysts.

Case Report

A 37-year-old woman presented with a history of distension of the left flank and the upper quadrant of the abdomen. The patient was hospitalized for further examination and treatment of her symptoms. There was no history of trauma. Physical examination revealed a soft palpable mass in the left side of the abdomen. Her laboratory data on admission were within the normal range, including her hormone levels. Ultrasonography (US) showed that the mass was cystic with a homogeneous anechoic level. On contrast enhanced CT, a giant cystic mass measuring 21 × 16 × 13 cm was identified beside the lateral segment of the liver, the lower pole of the spleen, and the left kidney, which compressed the pancreas to the ventral side. On MRI, the cystic mass was found to be high intensity in T2-weighted images (repetition time = 2500 ms, echo time = 72 ms) with a thin wall, indicating the presence of serous fluid inside (Fig. 1A).

Coronal slice T2-weighted imaging also showed an obvious mass; however, we could not predict the origin of the cyst before the operation (Fig. 1B). The differential diagnoses considered included a renal cyst, pancreatic cystic lesion, retroperitoneal mucinous adenocarcinoma, and adrenal cyst. As the patient desired relief from abdominal distension, we decided to perform surgical treatment for therapeutic diagnosis. We chose open laparotomy because of the risk of malignancy owing to the large size of the cyst. Under general anesthesia, the patient was placed in the supine position. We made a left subcostal abdominal incision. Intraoperative findings confirmed that the cystic mass neighbored the spleen, pancreas, and left kidney, but it also adhered to the left adrenal gland (Fig. 2). We confirmed that the mass was derived from the left adrenal gland. Partial adrenalectomy was required for complete resection of the mass. The resected mass was about 21 cm in diameter, with over 2000 mL of brown-red serous fluid. No perioperative complications were encountered. The fluid of the cyst was found to contain no malignant component by cytological diagnosis. Hematoxylin-eosin staining indicated that the wall of the cyst consisted of a single flattened cell-lining. The cell lining was microscopically supposed to be derived from endothelium or mesothelium by hematoxylin-eosin staining (Fig. 3). To confirm the origin of the single cell-lining, immunostaining for podoplanin (D2-40), alpha-inhibin, cytokeratin AE1/AE3 was performed. Immunohistochemically, the single cell lining of the cyst was strongly positive for D2-40 (Fig. 4A), and negative for cytokeratin AE1/AE3 and alpha-inhibin, but the adrenal cortex or medulla was positive for alpha-inhibin. To confirm the origin of the lining further, additional immunostaining for calretinin and Wilms tumor suppressor gene (WT1) was performed. As a result, the lining was negative for calretinin and WT1 (Fig. 4B). These findings demonstrated that the wall of the cyst was not derived from the mesothelium but from the lymphatic vessels, and it had a different origin to that of the adrenal cortex or medulla. The final pathological diagnosis was a lymphatic type of endothelial cyst of the adrenal gland. No remaining abdominal symptoms were observed and a postoperative radiological work-up showed no evidence of recurrence during a 6-year follow-up period.

Discussion

Adrenal cysts are mainly benign and are uncommon entities. Adrenal cysts may occur at any age, but are often found in the fifth to sixth decade of life.[22] Adrenal cysts constitute clinical entities with

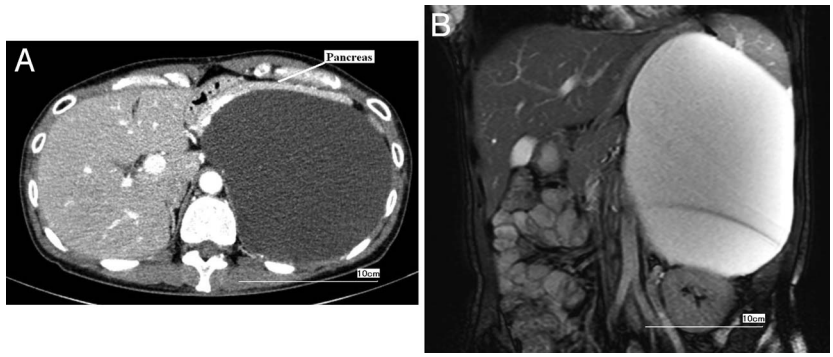

Fig. 1 In contrast enhanced CT, a giant cystic mass measuring 21 × 16 × 13 cm in diameter was neighboring the lateral segment of the liver, the lower pole of the spleen, and the left kidney, which compressed the pancreas to the ventral side (A), coronary slice of T2-weighted image also showed the mass obviously; however, we could not predict the origin of the cyst before the operation (B).

a malignancy potential of 7%.[29] Adrenal cysts can develop within benign or malignant tumors, such as adenoma, hemangioma, pheochromocytoma, or malignant hemangioendothelioma.[22] Asbeshouse *et al*.[29] classified non-neoplastic adrenal cysts into 4 groups: endothelial (45%), pseudo or hemorrhagic (39%), epithelial (9%), and parasitic (7%). The symptoms associated with benign cysts are related to the position and size of the lesions. Pain, gastrointestinal disorders, dyspnea, or a palpable mass can be observed in large cysts. Patients may present with acute abdominal findings if intracystic hemorrhage or rupture occurs. Malignancy should be suspected in the presence of symptoms that are known to be caused by functioning neoplasms, such as Cushing syndrome, hyperadrenalism, hirsutism in women, acne and balding in men, and hypertension. An exact diagnosis is clinically important because an adrenal cyst more than 5 cm in diameter carries an increased risk of malignancy.[30,31] For a radiological diagnostic work-up, CT and MRI are useful. Friedlich *et al*. have shown that benign and malignant adrenal masses can be identified using CT with a sensitivity of 85 to 100% and a specificity of 95 to 100%.[32] Magnetic resonance imaging is also a precise imaging modality for exploring adrenal masses, and is important especially for masses undetected by CT. Table 1 shows the 26 previously reported cases of adrenal cysts larger than 20 cm in diameter and the present case. The giant adrenal cysts occurred in 21 women and 6 men with a mean age of 40.7 years (range: 20–80 years). This correlated with Asbeshouse *et al*., who reported preponderance of about 3:1.[29] Giant adrenal cysts are more likely to be left-sided (55.5%), and all reported cases were of unilateral cysts (100%). The greatest dimension of the cysts ranged from 20 to 50 cm (mean: 26.5 cm). All patients with the exception of cases 21 and 23 (Table 1) had complained of symptoms (92.6%). Most of the reported symptoms were pain, distention, and the findings of a palpable mass. Minor symptoms included gain or loss of weight, and gastrointestinal disturbances, such as nausea, or vomiting. An accurate preoperative diagnosis was obtained for only 14.8% of the cases (cases 7, 9, 13, and 16); however, the preoperative diagnosis was inaccurate or undetermined in the other cases. As giant adrenal cysts over 20 cm in diameter tend to adhere to many different adjacent organs, it can be difficult to detect the origin of the cysts. Asbeshouse *et al*. reported that malignancy of the adrenal lesions correlated with the size of the lesions.[29] No adrenal cyst without an associated adrenal neoplasm has been found to be a functioning lesion.[13,33] In contrast, there were no neoplastic and functioning cysts reported as giant adrenal cysts (Table 1). Therefore, we suggest that excessively large cysts and cysts with no function are

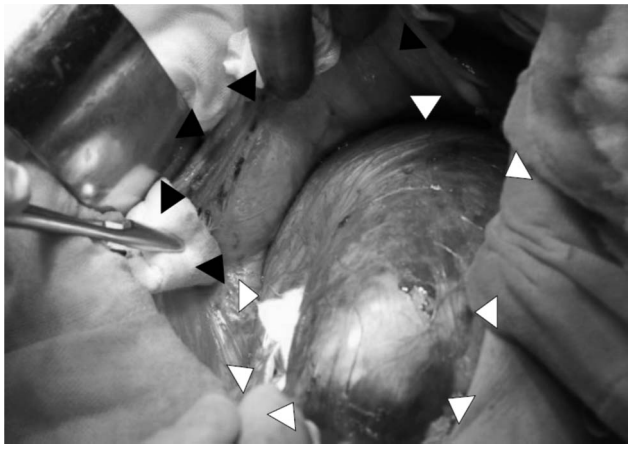

Fig. 2 Intraoperative findings showed the cystic mass was not only neighboring the spleen, pancreas, and left kidney, but also firmly adhesive to the left adrenal gland. This finding convinced us the mass was derived from the left adrenal gland. Black arrows: pancreas. White arrows: adrenal cyst.

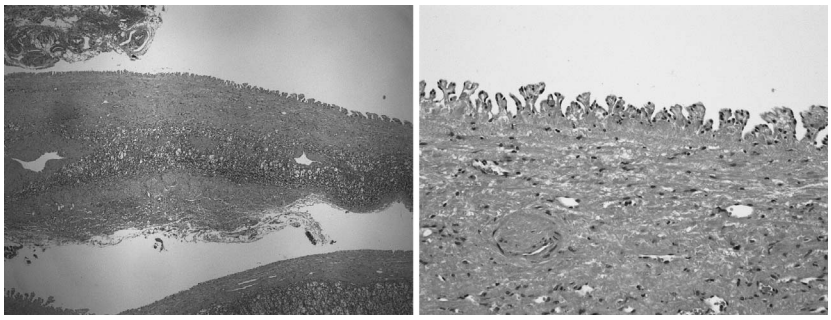

Fig. 3 Hematoxylin-eosin staining indicated that the wall of the cyst consisted of a single cell-lining. The cell lining was microscopically supposed to be derived from endothelium or mesothelium by hematoxylin-eosin staining.

less likely to be malignant. Of the previously reported giant adrenal cysts, 19 were pseudocysts (70.3%); 4 were endothelial cysts (14.8%); 1 was a lymphangioma (endothelial cyst, 3.7%); 1 was an epithelial cyst (3.7%); and 2 were of unspecified (7.4%). Endothelial cysts are the most common type of adrenal cysts, which consist mostly of adrenal true cysts. Adrenal endothelial cysts are classified into angiomatous and lymphatic cysts. A lymphatic type of endothelial cyst is a more common type of adrenal cyst. An angiomatous type of endothelial cyst is the most uncommon form of adrenal cyst.[22] The cystic lesion of the present case was diagnosed as an endothelial cyst, and further determined to be lymphatic type by immunopositivity of D2-40, and negativity of both calretinin, and WT1 known as specific mesothelial marker. In Table 1, of 4 endothelial cysts reported previously, 3 were lymphatic cysts including the present case (cases 16, 18), and 1 was an angiomatous cyst (case 14). As Tagge *et al*. stated, the etiology of lymphatic cysts may be attributed to ectasia of the lymphatic vessels in the adrenal gland or to cystic degeneration of a hamartoma.[5] Moreover, Incze *et al*. described and speculated the etiology of endothelial cysts and pseudocysts of the adrenal gland. Through the use of electron microscopy, they proposed that pseudocysts might have started out as endothelial- lined cysts; then, cysts became organized because of trauma and hemorrhage, the lining being replaced by collagenous connective scar.[20] In light of these matters, the lymphatic cyst of the present case might have turned into a pseudocyst after a long period of time. As shown in Table 1, pseudocysts constituted 70.3% of the giant adrenal cysts. This percentage is much higher than that of pseudocyst reported of 45% by Asbeshouse *et al*.[29] We speculate that endothelial cysts of the adrenal gland tend to turn into pseudocysts with enlargement in size. Thus, pseudocysts consist of mostly of giant adrenal cysts.

Although there are no established guidelines for adrenal cysts, surgical intervention is generally indicated for adrenal cysts when they are hormonally functional, symptomatic, parasitic, malignant, enlarging, or more than 5 cm in diameter. Percutaneous aspiration or drainage has been suggested as an alternative treatment; however, it should be limited to the conditions when the cyst is not hormonally active and malignancy can be ruled out. It can lead to temporary improvement of the symptoms, but it is a palliative treatment, whereas surgical excision provides for not only removal of the cyst wall, but also a definite pathological diagnosis, and can achieve cure. Adrenal cysts can be managed by an open or laparoscopic approach.

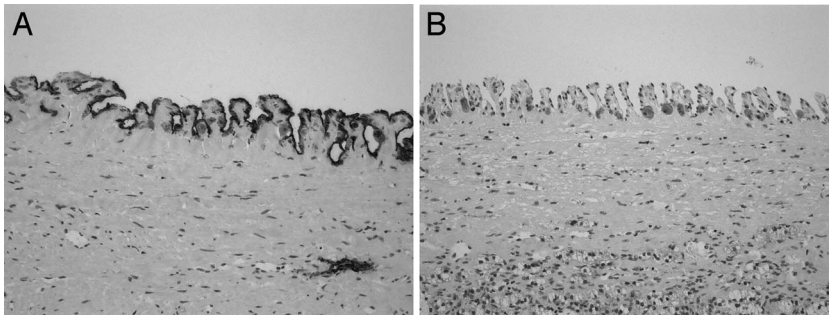

Fig. 4 Immunohistochemical studies with D2-40 (A) and calretinin (B) indicated the wall of the cyst consisted of a single cell-lining derived from lymphatic vessels.

Table 1 Adrenal cysts larger than 20 cm in diameter

Case	Sex	Age, y	Laterality	Size, cm	Function	Preoperative Diagnosis	Surgery	Pathology	References
1	M	66	Lt	22	NF	Renal mass	OS	Pseudocyst	Chatterjee *et al*.[6]
2	F	54	Lt	23 × 15 × 12	NF	NS	OS	Pseudocyst	Gupta *et al*.[7]
3	F	40	Lt	20 × 15	NF	Mesenteric cyst	OS	Pseudocyst	Karaman *et al*.[8]
4	F	39	Rt	29 × 20 × 17	NF	Renal cyst	LS	Pseudocyst	Ujam *et al*.[9]
5	F	27	Rt	30 × 40	NF	Ovarian cyst	OS	Epithelial cyst	Balci *et al*.[10]
6	F	57	Lt	20 × 17 × 15	NF	UD	OS	Hemorrhagic pseudocyst	Stimac *et al*.[11]
7	F	22	Lt	35	NF	Adrenal cyst	NS	Cystic lymphangioma	Bettaïeb *et al*.[12]
8	F	20	Rt	20	NS	Bleeding hepatic adenoma/focal nodular hyperplasia/ retroperitoneal cyst	OS	Hemorrhagic pseudocyst	Sivasankar *et al*.[13]
9	M	46	Lt	20 × 15 × 10	NF	Adrenal cyst	OS	Pseudocyst	Karayiannakis *et al*.[14]
10	F	30	Lt	22	NF	NS	LS	Pseudocyst	Koksoy *et al*.[15]
11	F	23	Rt	45	NS	Mesenteric or hepatic cyst	NS	Hemorrhagic pseudocyst	Tagge & Baron[5]
12	F	28	Rt	40 × 20	NS	Cyst of right adnexa	OS	Pseudocyst	Tait *et al*.[16]
13	F	33	Rt	20 × 14 × 11	ND	Adrenal cyst	OS	Pseudocyst	Trauffer *et al*.[17]
14	F	26	Rt	23 × 21	NS	Retroperitoneal sarcoma	NS	Endothelial cyst	Sell *et al*.[18]
15	F	53	Lt	22 × 15	NF	UD	OS	Pseudocyst	Davenport *et al*.[19]
16	M	56	Lt	24 × 20	NF	Adrenal tumor/cyst	OS	Endothelial cyst	Incze *et al*.[20]
17	F	29	Rt	20	NS	UD	OS	Pseudocyst	Uretzky *et al*.[21]
18	F	38	Rt	33 × 30 × 22.5	NS	Pelvic cyst	OS	Endothelial cyst	Foster[22]
19	F	23	Rt	20 × 12	NS	Ectopic pregnancy with massive hemorrhage	OS	Pseudocyst	Thompson & Jacobson[23]
20	M	80	Lt	50	NS	Renal cyst	OS	Hemorrhagic pseudocyst	Esquivel *et al*.[24]
21	F	37	Lt	25	NF	Mesenteric/splenic/ pancreatic cyst	OS	Pseudocyst	Elliott *et al*.[25]
22	F	60	Lt	20 × 17 × 10	NS	Large tumor of the stomach/infarct in an enlarged spleen	OS	Hemorrhagic pseudocyst	Stewart & Lester[26]
23	F	40	Rt	30	NS	UD	OS	Benign adrenal cyst	Armitage[27]
24	M	49	Lt	25	NF	NS	OS	Serous cyst	Ellis *et al*.[28]
25	M	49	Rt	30	NF	NS	OS	Hemorrhagic pseudocyst	Ellis *et al*.[28]
26	F	37	Lt	21 × 12 × 12	NF	NS	OS	Pseudocyst	Ellis *et al*.[28]
Present case	F	37	Lt	21 × 16 × 13	NF	Renal cyst, pancreatic cyst	OS	Endothelial cyst	

LS, laparoscopic surgery; Lt, left; NF, nonfunctioning; NS, not stated; OS, open surgery; Rt, right; UD, undetermined.

Laparoscopic management has the advantage of less pain, rapid recovery, and better cosmesis. Parnaby *et al*. suggested that there is no significant difference in the outcome for all tumor sizes. An evaluation of 242 laparoscopic adrenalectomies demonstrated a low complication rate, low conversion rate, and rapid functional recovery.[34] However, aspiration of the content of the cyst was required to achieve successful laparoscopic adrenalectomy in some cases.[9,15] We suggest caution as aspiration of the content of the cyst can lead to tumor cell dissemination of a malignancy. In the present case, we did not choose laparoscopic management for the following reasons. First, because the cystic mass was over 20 cm in diameter, malignancy could not be eliminated. Second, aspiration of the cyst is needed to achieve a better intraoperative when using laparoscope; however, there would be a potential for tumor cell dissemination by aspiration of the cyst in case of malignancy. We suggest that laparoscopic surgery be used when intraoperative view can be obtained without aspiration of the cyst.

Prior to cosmesis, maintaining oncological principles is the most important factor in choosing the operation method.

We conclude that an adrenal cyst should be the differential diagnosis when a giant abdominal cyst presents, and the origin of the cyst is not identifiable. The lymphatic type of the adrenal gland should be considered. In contrast to previous reports, our data show that excessively large adrenal cysts are less likely to be malignant and have hormonal function. However, surgical intervention for adrenal cysts should be carefully assessed because of the possibility of malignancy.

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