

# Epidermal Inclusion Cyst in an Intra-pancreatic Accessory Spleen: a Differential Diagnosis for Pancreatic Cystic Neoplasms and Review of the Literature

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## Introduction

The incidence of accessory spleen is approximately 10% in autopsy findings, with the most frequent location being at the tail of the pancreas [1, 2]. Epidermoid cysts arising from ectopic spleen tissue in the tail of the pancreas are a benign and extremely rare pathology. At present, less than 50 cases were being reported in the English literature. This entity is not well characterized; we aim to shed some light in this rare entity with a brief literature review and our experience in two cases.

## Methods

We conducted a MEDLINE database review of the relevant medical literature published in English from year 1980 to

2016 and identified all reported cases of ECIPAS using the following keywords: epithelial cyst, pancreas, and intra-pancreatic accessory spleen. Relevant publications were evaluated and demographic data as well as findings on imaging were collected.

## Results

A total of 39 articles were found describing this clinical condition, with the largest series described containing three cases. In this series, we present two cases of epidermoid cysts arising from an intra-pancreatic accessory spleen. The patients' characteristics and clinical information and outcome are summarized in Table 1. From our review, ECIPAS is more common in female compared to male, 27 (61.4%) and 17 (38.6%), respectively. They were usually diagnosed in the 40s with the median age of 49 (12–63 years old). Tumor sizes ranged between 13 and 510 mm. All lesions were uniformly found in the tail of the pancreas, and the pancreatic duct is usually not dilated in patients diagnosed with ECIPAS. In the majority of the cases, the pancreatic mass was an incidental finding. More than half of the patients (52.3%) were asymptomatic. Some present with abdominal symptoms with the most common symptoms were epigastric pain (27.3%), followed by abdominal discomfort (6.8%) and nausea and vomiting (2.3%). A total of 31.8% (14 out of 44) had raised CA 19–9.

## Case 1

A 56-year-old Chinese gentleman, with a past medical history of hypertension, dyslipidemia, and gout, presented to our clinic for a sensation of epigastric fullness and discomfort. He denied abdominal pain, nausea, anorexia, or weight loss. The physical examination and laboratory investigations including full blood

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**Table 1** Demographics and management of epidermal cyst in intra-pancreatic accessory spleen (ECIPAS)

No.	Author/year/ reference	Gender	Age	Symptoms	Tumor size (mm)	Tumor location	Radiological features	Tumor markers		Treatment
								CEA	CA 19-9	
1.	Davidson et al. 1980 [3]	M	40	Abdominal pain, nausea, vomiting	55	Tail	NA	NA	NA	DPSL
2.	Hanada et al. 1981 [4]	M	50	Abdominal pain	60	Tail	NA	NA	NA	DPSL
3.	Nakae et al. 1991 [5]	F	37	Abdominal pain	65	Tail	US: cystic mass MRI: low signal intensity on T1 and high on T2	NA	NA	SPDP
4.	Morohoshi et al. 1991 [6]	F	32	Abdominal pain	60	Tail	NA	Normal	Normal	Excision of cyst
5.	Tang et al. 1994 [7]	M	38	Asymptomatic	14	Tail	NA	NA	NA	DPSL
6.	Higaki et al. 1998 [8]	F	46	Back pain	NA	Tail	CT: oval nodule with distinct margin	NA	Raised	DPSL
7.	Furukawa et al. 1998 [9]	M	45	Asymptomatic	20	Tail	NA	NA	NA	DP
8.	Tateyama et al. 1998 [10]	F	67	Abdominal pain	30	Tail	NA	Raised	Raised	DPSL
9.	Sasou et al. 1999 [11]	F	49	Asymptomatic	43	Tail	NA	Raised	Raised	DPSL
10.	Choi et al. 2000 [12]	F	54	Epigastric discomfort, nausea, vomiting	150	Tail	US: cystic mass CT: solid cystic component MRI: low signal intensity on T1 and high on T2	NA	NA	DPSL
11.	Tsutsumi et al. 2000 [13]	M	51	Asymptomatic	510	Tail	US: cystic mass	Normal	Normal	DPSL
12.	Horibe et al. 2001 [14]	M	48	Asymptomatic	20	Tail	CT: mucinous tumor	NA	Raised	DPSL
13.	Sonomura et al. 2002 [15]	F	45	Epigastric pain	35	Tail	CT: solid cystic component	NA	NA	DPSL
14.	Yokomizo et al. 2002 [16]	M	38	Asymptomatic	30	Tail	NA	NA	Raised	DPSL
15.	Fink et al. 2002 [17]	F	12	Sepsis	20	Tail	US: cystic mass CT: cystic lesion with solid nodule Tc-labeled WBC radionuclide scan: ↑uptake	NA	NA	Excision of cyst
16.	Watanabe et al. 2004 [18]	F	55	Asymptomatic	30	Tail	US, CT, MRI: multilocular cysts ERCP: no communication between main pancreatic duct and cystic lesion	Normal	Raised	DPSL
17.	Kanazawa et al. 2004 [19]	F	58	Asymptomatic	25	Tail	US: multilocular cyst	Normal	Raised	SPDP
18.	Won et al. 2005 [20]	F	49	Abdominal pain	20	Tail	CT: cystic lesion with septations	Normal	Normal	Lap DP
19.	Won et al. 2005 [20]	M	32	Asymptomatic	75	Tail	US: cystic mass CT: unilocular cystic mass	NA	Raised	SPDP
20.	Ru et al. 2007 [21]	M	41	Asymptomatic	25	Tail	NA	NA	NA	DPSL
21.	Gleeson et al. 2007 [22]	F	32	Abdominal pain	15	Tail	CT: cyst without septation EUS: tissue within the cyst similar echodensity to spleen	NA	NA	DPSL
22.	Servais et al. 2008 [23]	F	52	Asymptomatic	100	Tail	NA	Raised	Raised	DPSL
23.	Itano et al. 2008 [24]	M	40	Asymptomatic	40	Tail	US: cystic lesion CT and MRI: solid cystic with compartment same attenuation as spleen	Normal	Normal	DPSL
24.	Zhang et al. 2009 [25]	F	26	Asymptomatic	25	Tail	US: cystic lesion CT: cystic lesion with wall similar density to pancreas EUS: similar	Normal	Normal	SPDP
25.		M	49	Asymptomatic	36	Tail	CT: heterogeneously enhancing mass	NA	NA	DPSL

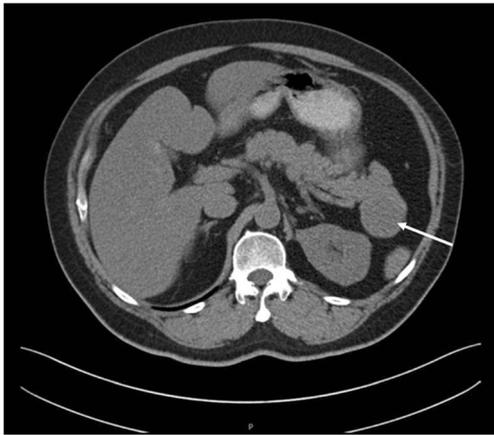
**Table 1** (continued)

No.	Author/year/ reference	Gender	Age	Symptoms	Tumor size (mm)	Tumor location	Radiological features	Tumor markers		Treatment
								CEA	CA 19-9	
	Reiss et al. 2009 [26]						EUS: cystic lesion with echotexture similar to spleen			
26.	Kadota et al. 2010 [27]	F	57	Asymptomatic	36	Tail	NA	Normal	Normal	DPSL
27.	Kadota et al. 2010 [27]	M	37	Asymptomatic	60	Tail	NA	Normal	Raised	DP
28.	Kadota et al. 2010 [27]	F	70	Asymptomatic	26	Tail	NA	Normal	Raised	DPSL
29.	Itano et al. 2010 [28]	M	67	Abdominal pain	22	Tail	NA	NA	Raised	Lap DPSL
30.	Horn et al. 2011 [29]	M	62	Abdominal pain	22	Tail	NA	NA	NA	Excision of cyst
31.	Urakami et al. 2011 [30]	F	50	Asymptomatic	30	Tail	US: cystic lesion CT: cystic lesion MRI: cyst no communication with main pancreatic duct	NA	NA	Lap SPDP
32.	Khashab et al. 2011 [31]	F	49	Abdominal pain	23	Tail	CT: solid mass EUS: cystic lesion	NA	NA	Lap SPDP
33.	Yamanishi et al. 2011 [32]	F	55	Asymptomatic	33	Tail	US: cystic lesion CT: cystic lesion MRI: low signal intensity on T1 and high on T2	Normal	Raised	DP
34.	Iwasaki et al. 2011 [33]	F	36	Asymptomatic	34	Tail	EUS: mural nodule in cyst US, EUS, PET: multilocular cyst in the tail of the pancreas	NA	Raised	Lap SPDP
35.	Panagiotopoulos et al. 2011 [34]	M	51	Asymptomatic	18	Tail	CT: cystic lesion	Normal	NA	SPDP
36.	Harris et al. 2012 [35]	F	39	Asymptomatic	20	Tail	CT, MRI: pancreatic cystic lesion	Raised	NA	Lap DPSL
37.	Hong et al. 2013 [36]	F	54	Abdominal discomfort	23	Tail	CT: cystic mass	NA	NA	SPDP
38.	Lee et al. 2013 [37]	F	41	Asymptomatic	40	Tail	CT: enhancement of the cystic wall PET: no uptake	Normal	Increased	DPSL
39.	Zavras et al. 2014 [38]	F	63	Nausea, vomiting	126	Tail	CT: mass with solid cystic component	Normal	Raised	DPSL
40.	Kwak et al. 2015 [39]	F	21	Fever, abdominal pain, diarrhea	16	Tail	C: cystic lesion MRI: low signal intensity on T1 and high on T2	Normal	Normal	Lap DP
41.	Bhutiani et al. 2016 [40]	M	55	Asymptomatic	59	Tail	CT: cystic lesion MRI: cystic mass	Normal	Normal	Lap SPDP
42.	Van Dijck et al. 2016 [41]	F	21	Abdominal pain	24	Tail	CT: pancreatic cyst MRI: cystic lesion with hyperintensity on T1	Normal	Normal	Robotic SPDP
43.	Case 1	M	56	Epigastric discomfort	39	Tail	CT: cystic lesion MRI: low signal intensity on T1 and high on T2	Normal	Normal	Lap DPSL
44.	Case 2	F	51	Early satiety	13	Tail	EUS-FNA: cystic lesion CT: cystic lesion MRI: hyperintense on T1 and T2 EUS-FNA: solid cystic lesion	NA	NA	Robotic SPDP

CT computed tomography, DPSL distal pancreatectomy and splenectomy, DP distal pancreatectomy, EUS endoscopic ultrasound, FNAC fine needle aspiration cytology, F female, M male, MRI magnetic resonance imaging, NA not available, SPDP spleen-preserving distal pancreatectomy, Lap laparoscopic

count and liver function tests were unremarkable. Serum carcinoembryonic antigen (CEA) was 6.9  $\mu\text{g/L}$  and serum CA 19-9 was 4.1  $\mu\text{g/L}$ .

A non-contrast computerized tomography (CT) scan was performed in view of his mild renal impairment. This revealed a slightly hypodense well-defined lesion in the tail of the



**Fig. 1** Axial CT image showing a hypodense lesion in tail of the pancreas

pancreas measuring approximately  $3.5 \times 3.9 \times 3.1$  cm (Fig. 1). Magnetic resonance cholangiopancreatography (MRCP) showed a well-defined cystic lesion ( $3.6 \times 3.2$  cm) with thin internal septations attached to the posterior and inferior margin of pancreatic tail (Fig. 2). It had mildly increased T2 signal intensity and mildly increased T1 signal, possibly suggesting mucinous content. It did not communicate with the main pancreatic duct which was not dilated. The patient then underwent an endoscopic ultrasound (EUS)—which confirmed a pancreatic tail-septated cyst (Fig. 3).

Fine needle aspiration cytology yielded only cyst contents. The fluid CEA was  $458 \mu\text{g/L}$ , fluid amylase  $527 \text{ U/L}$ , and fluid CA 19–9 was  $1.5 \text{ U/mL}$ .

The patient was counseled on risks of malignant change as the lesion was larger than 3 cm and septated, and the MRCP performed suggested possible mucinous content. He underwent a laparoscopic distal pancreatectomy and splenectomy. The histology showed epidermal cyst in an intra-pancreatic accessory spleen. The lesion showed squamoid to columnar cells with underlying splenic tissue stroma (Fig. 4).

His post-operative recovery was complicated by a post-operative pancreatic fistula, which was percutaneously

drained under CT guidance. He was discharged well on day 10 post surgery.

## Case 2

A 51-year-old lady with past medical history of spinal stenosis was referred from another institution for an incidental finding of pancreatic tail cyst detected on CT scan. She had initially presented with symptoms of dyspepsia and early satiety for a duration of 5 months. There was no anorexia or weight loss. Her physical examination was unremarkable and the laboratory investigations performed were all within normal range.

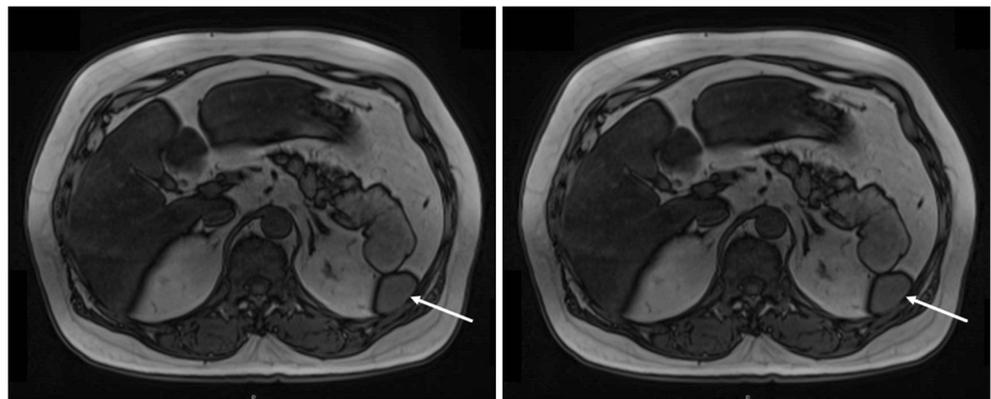
A CT scan performed revealed a unilocular  $1.3 \times 1.1$  cm cystic lesion in the pancreatic tail with no associated pancreatic duct dilatation. A MRCP performed showed a  $1.4 \times 1.0$  cm rounded lesion which is mainly T2FS and T1 hyperintense. There is no connection with the pancreatic duct, and there was no dilatation of the biliary tree or main pancreatic duct (Fig. 5). An endoscopic ultrasound performed revealed a  $22.6 \times 13.2$  mm well-defined hypoechoic lesion at the pancreatic tail, closely abutting the spleen. It consists of hypoechoic heterogenous solid component with a smaller area of cystic changes. The cytology specimen contained foamy macrophages with few and small clusters of poorly preserved epithelial cells. The presence of solid cystic lesion increases the risk of malignancy, and thus, she was counseled for surgery.

She underwent a robotic spleen-saving (vessel-preserving) distal pancreatectomy. The histology revealed a benign epithelial cyst in the accessory spleen. She was discharged well on post-op day 3.

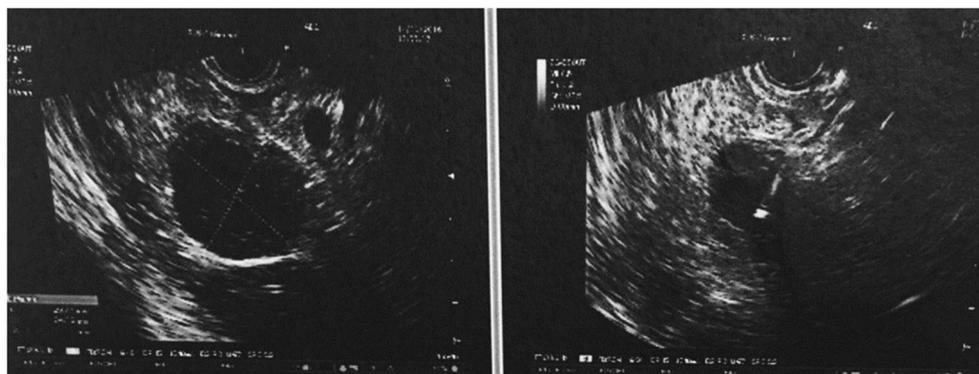
## Discussion

Studies have estimated that ectopic splenic tissue is present in about 10% of patients, with its most common site being in the splenic hilum [40]. In particular, epidermoid cysts in intra-

**Fig. 2** Left: Axial T1-weighted MR image of a well-defined cystic lesion in the tail of the pancreas with mildly increased T1 signal; Right: Axial T2-weighted MR image of the cystic lesion showing mildly increased T2 signal intensity with thin internal septations. No communication is noted with the main pancreatic duct



**Fig. 3** Endoscopic ultrasound image of hypoechoic pancreatic tail septated cyst



pancreatic accessory spleens are a rare phenomenon. First reported by Davidson et al. in 1980, there are only 42 cases being reported worldwide in the English literature to date [3]. Patients with epidermal inclusion cyst within an intra-pancreatic accessory spleen present us with a unique yet important clinical challenge, as its difficulty in pre-operative diagnosis often necessitates surgical intervention given the possibility of other cystic neoplasms or malignant change [38].

In our review, ECIPAS is more common in female compared to male, 27 (61.4%) and 17 (38.6%), respectively. They were usually diagnosed in the 40s with the median age of 49 (12–63 years old). Tumor sizes ranged between 13 and 510 mm. All lesions were uniformly found in the tail of the pancreas, and the pancreatic duct is usually not dilated in patients diagnosed with ECIPAS. Both our patients were diagnosed in their 50s and had tumor size of 39 and 13 mm, respectively. The lesions were found in the tail of the pancreas as well.

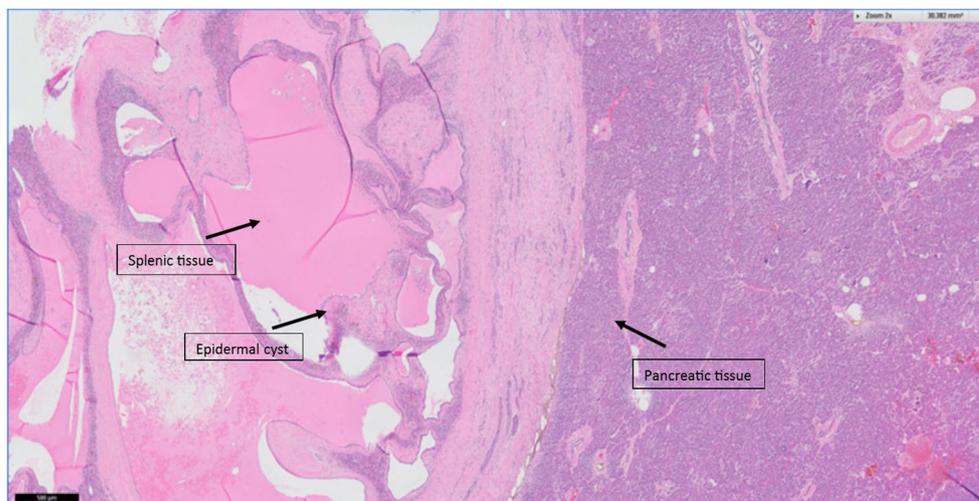
In the majority of the cases, the pancreatic mass was an incidental finding. More than half of the patients (52.3%) were asymptomatic although some may present with abdominal symptoms. The most common abdominal symptoms were epigastric pain (27.3%), followed by abdominal discomfort

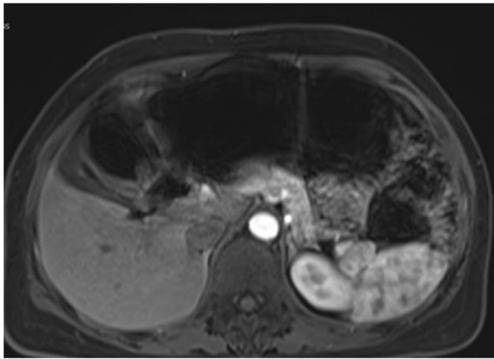
(6.8%), and nausea and vomiting (2.3%) [35]. Most of the cases reported in the literature revealed that patients were usually diagnosed with pancreatic cystic neoplasm and the definitive diagnosis of ECIPAS is only achieved after surgery. In our series, both patients had presented with vague abdominal symptoms and had been counseled for surgery due to potential risks of malignancy.

Serum CA 19-9 may be raised in some of the cases [36]. From the literature review that we had performed, a total of 31.8% (14 out of 44) had raised CA 19-9. This adds to the difficulty of differentiating between benign and malignant pancreatic conditions. Besides that, serum CA 19-9 may also decrease to within normal range after surgery in a patient diagnosed with ECIPAS, making tumor markers an unreliable tool [8].

The lesion is usually identified as a cystic lesion [32]. A triple-phase CT might be useful in identifying ECIPAS from other hypervascular pancreatic tumors. The attenuation of ECIPAS on all CT phases is usually similar to that of the spleen. In general, because attenuation of the spleen is higher than that of the pancreas on arterial, pancreatic, and portal venous phases, we can easily presume that ECIPAS will be brighter than the pancreas and same as the spleen on all three dynamic CT phases [42]. However, also due to their appearance as a hypervascular

**Fig. 4** H&E stained histology from post-operative specimen showing pancreatic tissue on the right and the cystic lesion on the left





**Fig. 5** 1.4 × 1.0 cm rounded pancreatic tail lesion

lesion, it may be difficult to radiologically distinguish these entities from malignant lesions or neuroendocrine tumors [40]. Accurate radiological diagnoses of ECIPAS is often dependent on the amount of enhanced splenic tissue in the pancreas as well as attenuation of the solid component of the cyst. Differentiating ECIPAS from other pancreatic cystic neoplasms remains a challenging task.

Radiological imaging such as MRI will reveal low signal intensity on T1-weighted images and high signal intensity on T2-weighted images. Spencer et al. suggested that MRI with ferumoxides may be useful as it demonstrates preferential uptake in hepatic and splenic tissues and nuclear imaging may be considered to diagnose ECIPAS [43]. In the two cases reviewed, radiology investigations were of limited use in achieving a pre-operative diagnosis. A non-contrast CT was performed for case 1 due to acute kidney injury whereas there was the presence of heterogenous solid cystic components in the second case which prompted the decision for surgery.

Of note, in case 1, fluid carcinoembryonic antigen had been obtained via EUS-guided FNA with the intent of using it to distinguish between mucinous and non-mucinous cystic neoplasms. Yet, the fluid carcinoembryonic antigen levels (458 UG/L) were much higher than various proposed cut-off values in other studies [44–46]. However, in addition, in both cases, the fine needle aspiration cytology was inconclusive, highlighting the difficulty in establishing a diagnosis.

Histology will reveal a unilocular or multilocular cyst lined by stratified squamous epithelium, keratinizing, or otherwise, and surrounded by normal splenic tissue [7]. Immunohistochemical examinations of lining epithelium will show positivity for CA 19-9 and CEA [6].

The review of the above cases prompted us to look into the potential for pre-operative diagnosis, in order to avoid an unnecessary surgery. The symptoms of ECIPAS have proven to be non-specific or absent. The literature has suggested alternative modalities of achieving a diagnosis including nuclear imaging and MRI with ferumoxides which should be considered in future [43]. Although, given the rare nature of ECIPAS, employing such imaging modalities may prove costly and of little yield. More studies are required to study on

how to accurately diagnose this rare entity and avoid unnecessary surgery.

## Conclusion

In conclusion, ECIPAS is a rare entity and obtaining a definitive diagnosis prior to surgery proved to be challenging. In a tail of the pancreas lesion with non-dilated pancreatic duct and normal tumor markers, ECIPAS can be considered as a differential diagnosis. We hope that our case will highlight ECIPAS as a differential diagnosis of pancreatic cystic neoplasm particularly if the lesion is found in the tail of the pancreas. Further studies regarding fluid analysis and radiological imaging may be required to diagnose ECIPAS pre-operatively.

## Compliance with Ethical Standards

**Conflict of Interest** The authors declare that they have no conflicts of interest.

**Informed Consent** Informed consent was obtained from all patients involved in this case series.

## References

1. Mortelé KJ, Mortelé B, Silverman SG. CT features of the accessory spleen. *AJR*. 2004;183:1653–7.
2. Halpert B, Gyorkey F. Lesions observed in accessory spleens of 311 patients. *Am J Clin Pathol*. 1959;32:165–8.
3. Davidson ED, Campbell WG, Hersh T. Epidermoid splenic cyst occurring in an intrapancreatic accessory spleen. *Dig Dis Sci*. 1980;25:964–7. <https://doi.org/10.1007/BF01308048>.
4. Hanada M, Kimura M, Kitada M, Nakajima T, Yamada K, Yoshii M. Epidermoid cyst of accessory spleen. *Acta Pathol Jpn*. 1981;31:863–71.
5. Nakkae Y, Hayakawa T, Kondo T, Shibata T, Kitagawa M, Sakai Y, et al. Epidermoid cyst occurring in a pancreatic accessory spleen. *J Clin Gastroenterol*. 1991;13:362–5. <https://doi.org/10.1097/00004836-199106000-00024>.
6. Morohoshi T, Hamamoto T, Kunimura T, Yoshida E, Kanda M, Funo K, et al. Epidermoid cyst derived from an accessory spleen in the pancreas. *Acta Pathol Jpn*. 1991;41:916–21. <https://doi.org/10.1111/j.1440-1827.1991.tb01639.x>.
7. Tang X, Tanaka Y, Tsutsumi Y. Epithelial inclusion cysts in an intrapancreatic accessory spleen. *Pathol Int*. 1994;44:652–4. <https://doi.org/10.1111/j.1440-1827.1994.tb01726.x>.
8. Higaki K, Jimi A, Watanabe J, Kusaba A, Kojiro M. Epidermoid cyst of the spleen with CA19-9 or carcinoembryonic antigen productions: report of three cases. *Am J Surg Pathol*. 1998;22:704–8.
9. Furukawa H, Kosuge T, Kanai Y, Mukai K. Epidermoid cyst in an intrapancreatic accessory spleen. *AJR Am J Roentgenol*. 1998;171:271.
10. Tateyama H, Tada T, Murase T, Fujitake S, Eimoto T. Lymphoepithelial cyst and epidermoid cyst of the accessory spleen in the pancreas. *Mod Pathol*. 1998;11:1171–7.
11. Sasou S, Nakamura S, Inomata M. Epithelial splenic cyst in an intrapancreatic accessory spleen and spleen. *Pathol Int*. 1999;49:1078–83. <https://doi.org/10.1046/j.1440-1827.1999.00983.x>.

12. Choi SK, Ahn SI, Hong SK, Kim SJ, Won ZH, Shin SH. A case of epidermoid cyst of the intrapancreatic accessory spleen. *J Korean Med Sci.* 2000;15:589–92.
13. Tsutsumi S, Kojima T, Fukai Y, Kanoh K, Shimura T, Mochiki E, et al. Epidermoid cyst of an intrapancreatic accessory spleen: a case report. *Hepagastroenterology.* 2000;47:1462–4.
14. Horibe Y, Murakami M, Yamao K, Imaeda Y, Tashiro K, Kasahara M. Epithelial inclusion cyst (epidermoid cyst) formation with epithelioid cell granuloma in an intrapancreatic accessory spleen. *Pathol Int.* 2001;51:50–4. <https://doi.org/10.1046/j.1440-1827.2001.01155.x>.
15. Sonomura T, Kataoka T, Chicugo T, Hirooka T, Nakamoto T, Sato M. Epidermoid cyst of an intrapancreatic accessory spleen. *Abdom Imaging.* 2002;27:560–2. <https://doi.org/10.1007/s00261-001-0145-1>.
16. Yokomizo H, Hifumi M, Yamane T, Hirata T, Terakura T, Murata K, et al. Epidermoid cyst of an accessory spleen at the pancreatic tail: the diagnostic value of MRI. *Abdom Imaging.* 2002;27:557–9. <https://doi.org/10.1007/s00261-001-0055-2>.
17. Fink AM, Kulkarni S, Cramen JA. Epidermoid cyst in a pancreatic accessory spleen mimicking an infected abdominal cyst in a child. *AJR.* 2002;179:206–8. <https://doi.org/10.2214/ajr.179.1.1790206>.
18. Watanabe H, Yamaguchi Y, Ohtsubo K, Mouri H, Motoo Y, Yamashita K, et al. Epidermoid cyst of the intrapancreatic accessory spleen producing CA 19-9. *Dig Endosc.* 2004;16:244–8. <https://doi.org/10.1111/j.1443-1661.2004.00347.x>.
19. Kanazawa H, Kamiya J, Nagino M, Uesaka K, Yuasa N, Oda K, et al. Epidermoid cyst in an intrapancreatic accessory spleen. *J Hepatobil Pancreas Surg.* 2004;11:61–3. <https://doi.org/10.1007/s00534-003-0844-9>.
20. Won JK, Lee YJ, Kang GH. Epithelial cysts in the intrapancreatic accessory spleen that clinically mimic pancreatic cystic tumor. *Korean J Pathol.* 2005;39:437–41.
21. Ru K, Kalra A, Ucci A. Epidermoid cyst of intrapancreatic accessory spleen. *Dig Dis Sci.* 2007;52:1229–32. <https://doi.org/10.1007/s10620-006-9376-x>.
22. Gleeson FC, Kendrick ML, Chari ST, Zhang L, Levy MJ. Epidermoid accessory splenic cyst masquerading as a pancreatic mucinous cystic neoplasm. *Endoscopy.* 2008;40:e141–2. <https://doi.org/10.1055/s-2007-995735>.
23. Servais EL, Sarkaria IS, Solomon GJ, Gumpeni P, Lieberman M. Giant epidermoid cyst within an intrapancreatic accessory spleen mimicking a cystic neoplasm of the pancreas: case report a review of the literature. *Pancreas.* 2008;36:98–100. <https://doi.org/10.1097/MPA.0b013e3181359e36>.
24. Itano O, Shiraga N, Kouta E, Iri H, Tanaka K, Suzuki F, et al. Epidermoid cyst originating from an intrapancreatic accessory spleen. *J Hepatobil Pancreas Surg.* 2008;15:436–9. <https://doi.org/10.1007/s00534-007-1243-4>.
25. Zhang Z, Wang JW. An epithelial splenic cyst in an intrapancreatic accessory spleen. A case report. *JOP.* 2009;10:664–6.
26. Reiss G, Sickel JZ, Tho-See K, Ramrakhini S. Intrapaneatic splenic cyst mimicking cystic neoplasm diagnosed by EUS-FNA. *Gastrointest Endosc.* 2009;70:557–8. <https://doi.org/10.1016/j.gie.2009.04.050>.
27. Kadota K, Kushida Y, Miyai Y, Katsuki N, Hayashi T, Mando K, et al. Epidermoid cyst in an intrapancreatic accessory spleen: three case reports and review of the literature. *Pathol Oncol Res.* 2010;16:435–42. <https://doi.org/10.1007/s12253-009-9229-y>.
28. Itano O, Chiba N, Wada T, Yuasa Y, Sato T, Ishikawa H, et al. Laparoscopic resection of an epidermoid cyst originating from intrapancreatic accessory spleen: report of a case. *Surg Today.* 2010;40:72–5. <https://doi.org/10.1007/s00595-009-4006-9>.
29. Horn AJ, Lele SM. Epidermoid cyst occurring within an intrapancreatic accessory spleen. A case report and review of the literature. *J Pancreas.* 2011;12:279–82.
30. Urakami A, Yoshida K, Hirabayashi Y, Kubota H, Yamshita K, Hirai T, et al. Laparoscopic-assisted spleen preserving pancreatic resection for epidermoid cyst in an intrapancreatic accessory spleen. *Asian J End Surg.* 2011;4:185–8. <https://doi.org/10.1111/j.1758-5910.2011.00102.x>.
31. Khashab MA, Canto IM, Singh VK, Hruban RH, Makary MA, Giday S. Endosonographic and elastographic features of a rare epidermoid cyst of an intrapancreatic accessory spleen. *Endoscopy.* 2011;43:E193–4. <https://doi.org/10.1055/s-0030-1256272>.
32. Yamanishi H, Kumagi T, Yokota T, Koizumi M, Azemoto N, Watanabe J, et al. Epithelial cyst arising in an intrapancreatic accessory spleen: a diagnostic dilemma. *Intern Med.* 2011;50:1947–52. <https://doi.org/10.2169/internalmedicine.50.5340>.
33. Iwasaki Y, Tagaya N, Nakagawa A, Kita J, Imura J, Fujimori T, et al. Laparoscopic resection of epidermoid cyst arising from an intrapancreatic accessory spleen: a case report with review of the literature. *Surg Laparosc Endosc Percutan Tech.* 2011;21:e275–9. <https://doi.org/10.1097/SLE.0b013e31822dd14a>.
34. Nikolas P, Metesh A, Raida A, Devinedr B, Long J. Epithelial inclusion cyst arising within an intra-pancreatic splenunculus. *Int J Surg Case Rep.* 2012;3(3):118–20. <https://doi.org/10.1016/j.ijscr.2011.12.005>.
35. Harris CA, Chaudry MA, Menzies A, Conn PC. Laparoscopic resection of an epidermoid cyst within an intrapancreatic accessory spleen: a case report and review of the literature. *Surg Laparosc Endosc Percutan Tech.* 2012;22:e246–9. <https://doi.org/10.1097/SLE.0b013e31825b3761>.
36. Hong R, Choi N, Sun K, Lim S, Han Y. Epidermoid cyst arising from an intrapancreatic accessory spleen: a case report and review of the literature. *Oncol Lett.* 2013;5(2):469–72. <https://doi.org/10.3892/ol.2012.1061>.
37. Lee CL, Yang D, Yong JJ, Chen J, Fu DL. Epidermal cyst of intrapancreatic accessory spleen. A case report and literature review. *World J Surg Proc.* 2013;3(3):54–9.
38. Zavras N, Machairas N, Foukas P, Lazaris A, Patapis P, Machairas A. Epidermoid cyst of an intrapancreatic accessory spleen: a case report and literature review. *World J Surg Oncol.* 2014;12:92. <https://doi.org/10.1186/1477-7819-12-92>.
39. Kwak MK, Lee NK, Kim S, Han GJ, Seo HI, do Park Y, et al. A case of epidermoid cyst in an intrapancreatic accessory spleen mimicking pancreas neoplasms: MRI with DWI. *Clin Imaging.* 2016;40(1):164–6. <https://doi.org/10.1016/j.clinimag.2015.09.004>.
40. Bhutiani N, Egger ME, Doughtie CA, Burkadt ES, Scoggins CR, Martin RC 2nd, et al. Intrapaneatic accessory spleen (IPAS): a single-institution experience and review of literature. *Am J Surg.* 2017;213(4):816–20. <https://doi.org/10.1016/j.amjsurg.2016.11.030>.
41. Van Dijk WPM, Groot VP, Brosens LAA, Hagendoorn J, Rinkes IHMB, Van Leeuwen MS, et al. Rare case of an epithelial cyst in an intrapancreatic accessory spleen treated by robot-assisted spleen preserving distal Pancreatectomy. *Case Rep Gastrointest Med.* 2016;9475897 <https://doi.org/10.1155/2016/9475897>.
42. Kim SH, Lee JM, Han JK, Lee JY, Kim KW, Cho KC, et al. Intrapaneatic accessory spleen: findings on MR imaging, CT, US and scintigraphy, and the pathologic analysis. *Korean J Radiol.* 2008;9(2):162–74.
43. Spencer LA, Spizarny DL, Williams TR. Imaging features of intrapancreatic accessory spleen. *Br J Radiol.* 2010;83:668–73.
44. SH O, Lee JK, Lee KT, Lee KH, Woo YS, Noh DH. The combination of cyst fluid carcinoembryonic antigen, cytology and viscosity increases the diagnostic accuracy of mucinous pancreatic cysts. *Gut Liver.* 2017;11(2):283–89.
45. Brugge WR, Lewandrowski K, Lee-Lewandrowski E, Centeno BA, Szydio T, Regan S, et al. Diagnosis of pancreatic cystic neoplasms: a report of the cooperative pancreatic cyst study. *Gastroenterology.* 2004;126:1330–6.
46. Cizginer S, Turner BG, Bilge AR, Karaca C, Pitman MB, Brugge WR. Cyst fluid carcinoembryonic antigen is an accurate diagnostic marker of pancreatic mucinous cysts. *Pancreas.* 2011;40:1024–8.