Summary of reported cases of pancreatic paraganglioma from1974 to 2022

No.	Reference	Year of publication	Sex	Age y	Signs/symptoms	Inspection Methods	Features	FNA/FS	Location in the pancreas/size, cm	Preoperative diagnosis	Treatment	Functional	Perioperative medication
1	Cope C et al. (10)	1974	F	72	Physical findings	US	Low echo	-	Head; 13*11*7	PCN	TLR	no	no
2	Fujino Y et al. (11)	1998	M	61	Abdominal pain	CT MRI	A solid mass T1 and T2 equal signals	-	Uncinate process; 2.5*4.2*1.8	pNEN	PD	no	no
3	Parithivel VS et al. (12)	2000	M	85	Physical findings	CT	Shadow of a blood-rich, cystic solid mass	FS: NET	Head; 6.0	pNEN	TLR	no	no
4	Ohkawara T et	2005	F	72	Abdominal pain	CT	A solid-cystic	-	Head; 4.0	pNEN	RPH	no	no

	al. (13)						tumor rich in blood supply, no dilation of either biliary or pancreatic ducts						
5	Kim SY et al. (14)	2008	F	57	Lumbar discomfort	US EUS CT	A hypervascular tumor Echogenic mass with several anechoic portions Marked enhancement in the arterial phase, still well-enhancing	-	Head; 6.5*6.6	Pancreatic islet cell tumor	PPPD	no	no

							in the portal venous phase, non-enhancing tubular-shaped portions could be seen inside						
6	Tsukada A et al. (15)	2008	F	57	Physical findings	US CT MRI	Low echo Significantly stronger clumping shadow T1 and T2 low signal	-	Uncinate process; 2.5*2.0	pNEN	TLR	no	no
7	Sangster G et al. (16)	2010	M	50	Abdominal pain	CT PET	Abundant blood supply; Strong uptake;	FNA: poorly differentiated carcinoma	Uncinate proces	Pancreatic cancer	Surgery; radiotherapy	no	no
8	He J et al. (17)	2011	F	40	Physical findings	CT	A firm arteriovenous phase	-	Head; 4.5*4.2	-	RPH	no	no

							markedly enhanced and well-defined mass shadow						
9	Lightfoot N et al. (18)	2011	M	66	Abdominal pain	CT PET	Cystic solid Mild metabolic elevation	-	Head and uncinate process; 6.0	-	PD	no	no
10	Singhi AD et al. (19)	2011	F	61	Abdominal pain	-	-	FNA: pseudocyst	Tail; 14.0	PCN	DP	no	no
11	Singhi AD et al. (19)	2011	F	52	Abdominal pain	-	-	FNA: PGL	Body; 14.0	PGL	-	no	no
12	Singhi AD et al. (19)	2011	F	54	Abdominal pain	-	-	FNA: PGL	Head; 6.5	PGL	DP	no	no
13	Singhi AD et al. (19)	2011	M	40	Physical findings	-	-	FNA: NET	Body; 5.1	pNEN	TLR	no	no

14	Singhi AD et al. (19)	2011	F	78	Abdominal pain	-	-	FNA: spindle cell neoplasm	Body; 17.0	-	-	no	no
15	Singhi AD et al. (19)	2011	M	44	Physical findings	-	-	FNA: PGL	Head; 5.5	PGL	-	no	no
16	Singhi AD et al. (19)	2011	M	38	Abdominal pain	-	-	-	Body; 15.0	-	-	no	no
17	Singhi AD et al. (19)	2011	M	47	Abdominal pain	-	-	-	Body; 7.5	pNEN	-	no	no
18	Singhi AD et al. (19)	2011	F	37	Abdominal pain	-		-	Tail; 5.7	pNEN	-	no	no
19	Higa B et al. (20)	2012	F	65	Physical findings	CT	A pancreatic mass with enhancement and	-	Uncinate process; 2.0	-	PD	no	no

							mixed attenuation						
20	Ganc RL et al. (21)	2012	F	37	Physical findings	EUS	Low echo	FNA: NET	Head; 4.8*3.2*4.3	pNEN	PD	no	no
21	Al-Jiffry BO et al. (22)	2013	F	19	Abdominal pain	CT	Marked enhancement in the arterial phase and washed out in the venous phas	FNA: NET	Head and neck; 9*5*9.5	pNEN	PD	yes	Intraoperative α and β blockers were injected continuously
22	Borgohain M et al. (23)	2013	F	55	Abdominal pain	US CT	Highly vascular A multi-cystic tumor	-	Tail; 17*19	Pancreatic sarcoma	PD	no	no
23	Straka M et al. (24)	2014	F	53	Abdominal discomfort	US CT	Abundant blood supply An extremely hypervascu	-	Head; 8.1*8.5	-	PPPD	no	no

							lar tumor with abundant collateral vessels from the superior mesenteric artery						
24	Zhang L et al. (25)	2014	F	50	Intermittent hypertension, headache, sweating, palpitations	CT	A solid tumour with abundant blood vessels and multiple liver metastases	FNA: PGL	Head; 6.0	PGL	-	yes	Postoperative 5-fluorouracil chemotherapy, mithramycin and adriamycin treatment
25	Zhang L et al. (25)	2014	M	63	Hypertension	CT PET	Well-vascularized tumor Abnormaluptake	-	Head; 4.0	PGL	surgery	yes	Preoperative basal blood pressure lowering
2	Meng	201	F	5	Abdomin	US	An ill-	-	Head; 3*2.5	-	surgery	no	no

6	L et al. (26)	5		4	al pain		defined hypoechoic mass with abundant blood flow signal						
						CT	A poor-defined isodense mass with marked heterogeneous enhancement in arterial phase and homogeneous enhancement in venous phase respectively						
2	Meng	201	F	4	Physical	US	A well-	-	Head; 6*5	-	surgery	no	no

7	L et al. (26)	5		1	findings		demarcated hypoechoic mass with some blood flow signals can be seen						
						CT	A hypodense, heterogeneous and poorly defined mass with marked enhancement.						
28	Misumi Y et al. (27)	2015	F	47	Physical findings	US and EUS	Ow-density inhomogeneous echo; blood flow signal	-	Head; 1.5*1.2	pNEN	PD	no	no
						CT	A well demarcate						

							d tumor, strongly enhanced in the arterial phase and still faintly enhanced in the portal vein phase. no dilation of either biliary or pancreatic ducts						
2	Ünver	201	F	4	Loss of	US	Pancreatic	-	Tail; 8*7*8	-	TLR	no	no
9	M et al. (28)	5		1	appetite, weight loss,		tail and splenic hilum mass						
					weakness, difficulty breathing during exercise	MRI	Mass invading splenic hilum						
3	Gines	201	M	5	Lumbar	CEUS	Arterial	-	Uncinate	pNE	PPPD	no	no

0	u GC et al. (29)	6		5	pain	and CT	phase hypervascularity and slow wash-out		process; 1.3	N			
31	Tumuluru S et al. (30)	2016	F	62	Physical findings	CT	Well-defined margin and avid homogeneous enhancement. No lymphadenopathy or metastasis	-	Body; 2.8*2.8*2.7	pNEN	PD	no	no
32	Lin S et al. (31)	2016	F	42	Abdominal pain	CT	A solid, low-density, arterial-phase-enhancing mass	-	Body; 5.2*6.3	pNEN	MP	no	no
33	Liang W, Xu S (32)	2016	M	41	Physical findings	CT	Arterioven ous phase enhanceme	-	Uncinate process;4*6	pNEN	PD	no	no

							nt (low attenuation)					
						MRI	T1 low signal; T2 slightly high signal; inhomo-geneous enhancement					
34	Furcea L et al. (33)	2017	F	53	Dyspepsia	US	Inhomogeneous low echo	-	Isthmus; 3.5*2.5*2.5	pNEN	MP	no	no
						CEUS	Intense arterial enhancement, rich arterial vascularization					
35	Nonaka K et al. (34)	2017	F	68	Physical findings	EUS	Low-echoic nodule. No dilation of either biliary or	-	Head; 2.2*2.2*1.7	pNEN	PPPD	no	no

							pancreatic ducts.						
						CT	Enhanced during the arterial phase, weakly enhanced during the portal phase						
						PET	High intake; malignant possibility						
36	Zeng J et al. (35)	2017	F	58	Abdominal pain	EUS	Hypoechoic and well-defined mass	FNA: NET	Body; 6.5*6.1*4.4	pNEN	TLR	no	no
						MRI	Inho-mogeneous signa						
37	Zeng J et al. (35)	2017	F	53	Abdominal pain	CT	Soft tissue mass	FNA: NET	Head; 2.5*1.7*1.8	pNEN	Surgery	no	no
38	Nguy	201	F	7	Constipat	EUS	Low echo	FNA:	Tail; 3.6*5*4.5	pNE	TLR	no	no

8	en E et al. (36)	8		0	ion; early satiety	CT	Cystic solid	NET?		N			
39	Fite JJ, Malek i Z. (37)	2018	M	40	Lumbar pain; haematuria	Radiologic impress	Abundant blood supply with necrosis	FNA: NET	Peripancreatic; 5.1	pNEN	Surgery	no	no
40	Fite JJ, Malek i Z. (37)	2018	F	23	Palpitations	Radiologic impress	Heterogeneous mass	FNA: NET	Peripancreatic; 7.0	pNEN	Surgery	no	no
41	Chattoraj AK et al. (38)	2019	F	36	Abdominal pain	CT	No enhancement	-	Peripancreatic; 7*4	GIST	TLR	no	no
42	Zongo N et al. (39)	2019	M	52	Abdominal pain	CT	Inhomogeneous density	-	Tail; 8.6*8.3	-	DP	yes	Intraoperative use of nimodipine
43	Abbasi A et al. (40)	2020	F	61	Physical findings	MRI	T2 hyperintense; arterial phase enhanceme	FNA: NET	Head and uncinate process; 7.2*6.5	pNEN	PD	yes	no

							nt					
44	Jiang CN et al. (41)	2021	M	41	Physical findings	EUS CT	Low echo Solid; inhomogeneous	FNA: malignant pos-sibility; FS: NET	Body; 4.0*3.9	pNEN	DP	no	no
45	Lanke G et al. (42)	2021	F	73	Physical findings	EUS	Low echo	FNA: PGL	Head; 2.0*1.1	PGL	-	no	no
46	Park, J et al. (43)	2021	M	46	Abdominal discomfort	EUS CT MRI	A well-defined hypoechoic mass An irregular solid mass with marked enhancement in the arterial and portal phases Uneven	FNA: NET or PGL?	Head; 2.8*2.6*3.2	pNEN	PPPD	no	no

							enhancement in the arterial phase, gradual and weak enhancement in the portal and migratory phases, ‘pepper appearance’ in T1WI and T2WI.						
47	Wang W et al. (44)	2021	F	75	Abdominal discomfort	CT MRI	Abundant blood supply; arterial phase enhancement T1WI low or equal signal; T2WI high	-	Neck; 3.1*3.8	PGL; Castleman; pNEN	TLR	no	no

							signal; obvious enhancement					
48	Kim M et al. (45)	2022	M	64	Hip pain	CT	Ovoid, solid, enhanced visualisation;	FNA: Atypical epithelioid and spindle cell tumours	Head; 11	Atypical epithelioid and spindle cell tumours	TLR	yes	no
						Genetic testing	A RET gene variant of unknown significance [c.731C>T (p.T244I)]						
49	Li T et al. (46)	2022	F	26	Abdominal pain	CT MRI	Mixed density Low signal	-	Body and tail; 8.0*5.0*4.0	pNEN	DP	no	no

							in T1WI, slightly high signal in T2WI						
50	Zhao Z et al. (47)	2022	F	49	Abdominal pain	CT	Low-density mass with marked enhancement in the arterial and portal venous phases;	-	Body and neck; 5.0*3.2*4.7	PGL	TLR	no	Preoperative use of Phenoxybenzamine
						MRCP	T1 and T2 irregular signal shadows, strong signal on DWI, inhomogeneous enhancement scans						

–: not available or unknown.

Abbreviations: F: female; M: male; CT: computed tomography; CEUS: contrast-enhanced ultrasound; EUS: Endoscopic Ultrasonography; US: ultrasound; CDFI: Color Doppler Flow Imaging; MRCP: Magnetic Resonance Cholangiopancreatography; FNA: fine needle aspiration; FS: frozen section; NET: neuroendocrine tumour; PCN: pancreatic cystadenoma; PNEN: Pancreatic Neuroendocrine Neoplasm; GIST: gastrointestinal stromal tumour;TLR: tumour local resection; PD: pancreaticoduodenectomy; RPH: resection of the pancreas head; PPPD: pylorus preserving pancreaticoduodenectomy; DP: distal pancreatectomy; MP: Middle Pancreatectomy