

CT scan the key to unmasking a solid pseudopapillary pancreatic neoplasm in blunt abdominal trauma

RD Marshall,  JE van Schalkwyk,  S Hofmeyr,  W Conradie 

Division of Surgery, Tygerberg Academic Hospital, and Faculty of Medicine and Health Sciences, Stellenbosch University, South Africa

Corresponding author, email: ricsmarshall@gmail.com

Summary

We present a previously healthy 13-year-old male, who sustained a handlebar injury after falling from his bicycle. The computerised tomography (CT) scan indicated a probable pancreatic neoplasm associated with a retroperitoneal haematoma which was, following resection, confirmed histologically to be a solid pseudopapillary neoplasm of the pancreas. These are rare tumours of the pancreas, especially in young males. The rarity of this neoplasm and the mechanism that led to its presentation make this an interesting and unique case.

Keywords: pancreatic neoplasm, solid pseudopapillary neoplasm, handlebar injury, abdominal trauma, child

Case report

A 13-year-old male presented with severe abdominal pain after falling from his bicycle and sustaining a handlebar injury. His mother reported finding him at home, curled up on the floor, vomiting clear gastric content.

On presentation he was awake and responsive. His vitals were stable, with a heart rate of 87 bpm, blood pressure of 107/69 mmHg, respiratory rate of 22/min and temperature of 35.3°C. On clinical examination, his abdomen was soft, but with guarding and maximal tenderness over the epigastrium. The ward haemoglobin was low for age at 10.9 g/dl, and the urine showed three plus ketones. Ultrasound examination revealed fluid in the hepatorenal angle.

After administering intravenous fluids and analgesia, a CT scan was performed. The scan showed a significant amount of perisplenic free fluid with a heterogeneous soft tissue mass in the tail of the pancreas measuring 64 mm AP x 73 mm TV x 75 mm CC (Figure 1). The mass displaced the bowel and stomach and was associated with a predominantly left retroperitoneal haematoma extending into the pelvis. The splenic artery was displaced superiorly by the mass. Although the splenic vein was poorly visualised numerous coronary collateral vessels could be seen in addition to gastro-oesophageal varices along the greater curvature of the stomach. There was no involvement of the liver, gallbladder, spleen, kidneys, stomach, or small or large bowel.

At laparotomy, minimal blood was present in the peritoneal cavity and around the pancreas, matching the CT scan findings. The pancreatic mass was not ruptured macroscopically. A distal pancreatectomy with en bloc splenectomy was performed with an uneventful postoperative course (Figures 2a and b).

The pathology report showed a solid pseudopapillary neoplasm (SPN) extending through the pseudocapsule and

into the peripancreatic fat with vascular invasion and clear microscopic margins.

The specimen contained 5 lymph nodes, which showed no involvement.

Rupture or metastasis of a solid SPN are the most common factors associated with recurrence. Fortunately both were absent in this case.¹

Discussion

This case is of particular interest due to the rarity, the atypical demographic, and the unusual clinical presentation. SPNs of the pancreas are rare solid-cystic tumours of the pancreas.² First described by Frantz in 1959,² they are classified as cystic exocrine pancreatic tumours and predominantly occur in females in their second and third decades of life.^{3,4} SPN most commonly presents with abdominal pain or an abdominal mass, different from other pancreatic malignancies, where jaundice, weight loss and pancreatitis are more common. When these tumours do occur in males, they usually present at a later age.³

Incidental findings in trauma-related CT scans are more common than previously thought, being present in up to 70% of cases, however only 24% of these being clinically significant in the < 65-year group.⁵ Incidental cystic lesions of the pancreas are often found on CT scan, magnetic resonance imaging (MRI), or ultrasound.⁴ They appear as mixed solid-cystic tumours (solid or cystic predominance) with internal necrosis and haemorrhage.^{2,3,6} A radiological diagnosis is usually sufficient, especially in young female patients, indicating surgical resection without the need for preoperative biopsy.⁷ In the case of equivocal imaging or atypical demographics, preoperative fine needle aspiration/ biopsy (FNA) with endoscopic ultrasound (EUS) can be considered with a successful diagnosis in 75% of cases.⁸

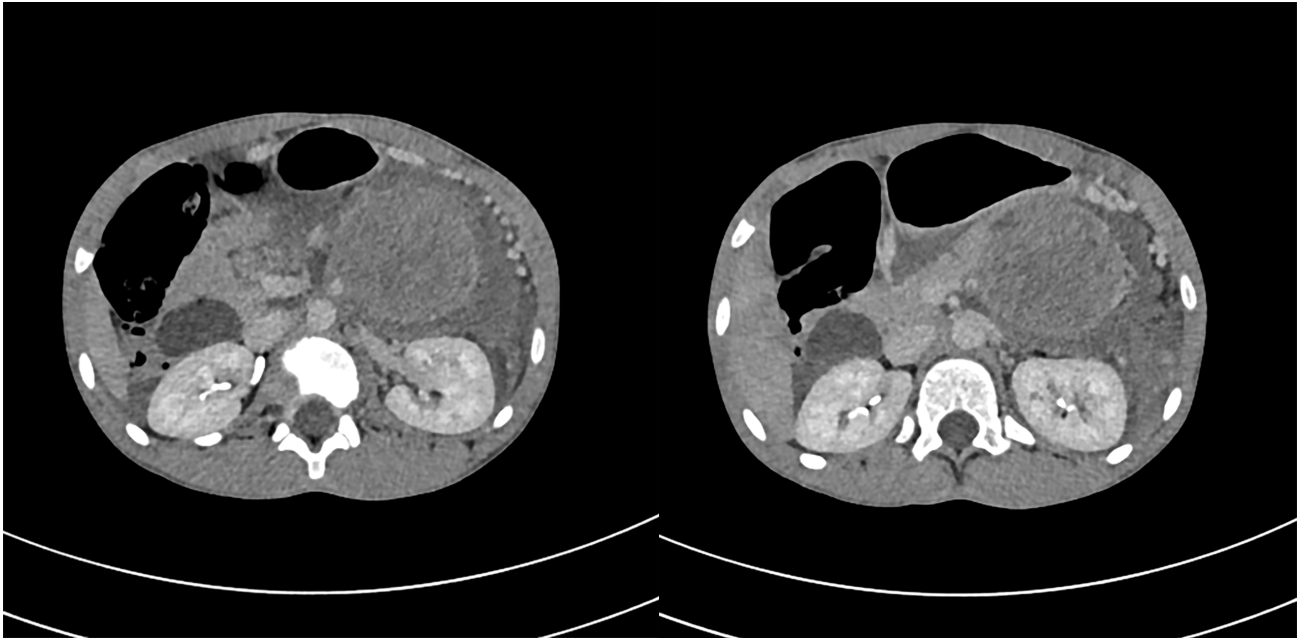


Figure 1: Axial views of the abdominal CT scan showing the pancreatic tumour, peri-pancreatic haematoma and limited varices in the periphery of the tumour

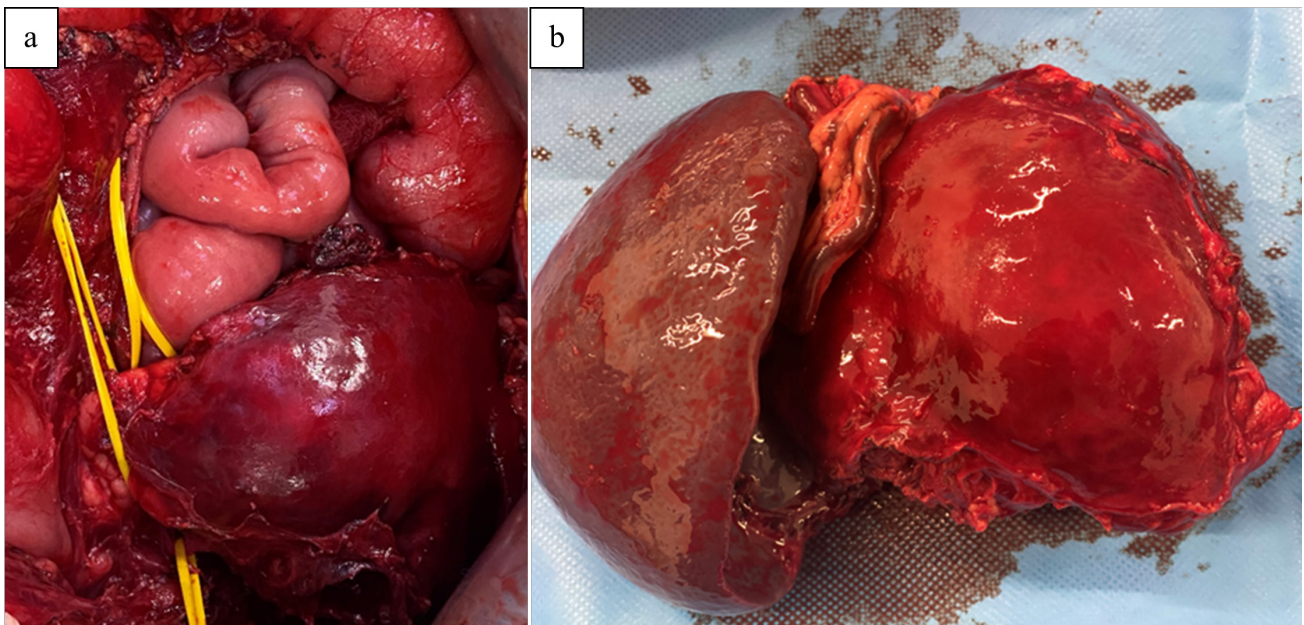


Figure 2a: SPN in situ; Figure 2b: En bloc specimen with spleen to the left of the image, SPN on the right

SPN is considered to have a low-grade malignant potential,⁶ but this cannot be determined by radiological or clinical criteria.⁹ Surgical resection with pancreaticoduodenectomy or distal pancreatectomy is the management of choice for localised disease and may require en bloc resection of nearby structures.¹⁰ Surgical decision-making is individualised in patients with metastatic disease.⁹ Histopathological features suggestive of a more aggressive tumour include nuclear pleomorphism with vascular- or perineural invasion.^{9,11}

Our patient was a young male who was asymptomatic before the blunt injury to his abdomen, which contrasts with the typical presentation of SPNs. Without the blunt force trauma, it is reasonable to assume that this neoplasm would not have been diagnosed until it became symptomatic at a more advanced stage, where surgical treatment may have been more challenging. Identifying and correctly diagnosing

retroperitoneal injuries following blunt polytrauma or isolated blunt trauma to the abdomen can be challenging due to the non-specific nature of the symptoms and other distracting injuries.¹² Additionally, these injuries may initially have falsely reassuring abdominal examinations and require a high index of suspicion, especially considering specific mechanisms of injury.¹³

The pancreas is the fourth most common organ injured in blunt abdominal trauma, following the spleen, liver, and kidneys.¹² With reference to handlebar injuries, possible affected organs include the pancreas, small bowel, mesentery, liver, and spleen.¹⁴ Pancreatic injuries in general are rare, and studies have shown that they account for only 0.3% of all injuries in children.¹⁵ Bicycle injuries, however, account for 42–75% of these cases, making it the most common cause of pancreatic injuries in children.¹³ It is important to note

that children are more prone to pancreatic injury following blunt abdominal trauma, which is attributed to anatomical differences from adults, including flatter diaphragms, thinner abdominal walls, and higher costal margins.¹²

The imaging of choice for suspected intra-abdominal injury is a CT scan, which is reported to have a sensitivity of 60–88% and specificity of 97–99% for intra-abdominal injury.¹⁴ Concerning pancreatic trauma, literature on the specificity and sensitivity of CT scans has been variable, with an overall sensitivity of around 80% reported to detect all grades of pancreatic injury.¹⁶

In our case, there weren't any direct signs of pancreatic injury. The only findings were a heterogenous mass in the tail of the pancreas, together with a retroperitoneal haematoma and free fluid in the pelvis, suggesting underlying pathology as the cause of haemorrhage. Additional findings of gastric and perisplenic varices suggested long-standing pathology.

The increased risk of pancreatic injury in blunt abdominal trauma in a child, alongside the relatively non-specific presentation of said pancreatic injury, could lead to diagnostic uncertainty. Hence, we suggest a low threshold for performing early abdominal CT in these children, especially in the setting of persistent abdominal pain or pain radiating to the back. The low threshold for CT scan will assist in early recognition and accurate diagnosis of incidental pancreatic pathology, resulting in optimal and timeous management.

Conflict of interest

The authors declare no conflict of interest.

Funding source

No funding was required.

Ethical approval

Ethical approval was obtained from the Health Research Ethics Committee (HREC) of Stellenbosch University (C22/11/034).

ORCID

RD Marshall  <https://orcid.org/0000-0001-9380-817X>
JE van Schalkwyk  <https://orcid.org/0000-0001-5627-9854>
S Hofmeyr  <https://orcid.org/0000-0002-9300-0661>
W Conradie  <https://orcid.org/0000-0002-9220-331X>

REFERENCES

- Hwang J, Kim DY, Kim SC, Namgoong JM, Hong SA. Solid-pseudopapillary neoplasm of the pancreas in children: Can we predict malignancy? *J Paediatr Surg*. 2014;49(12):1730-3. <https://doi.org/10.1016/j.jpedsurg.2014.09.011>.
- Law J, Ahmed A, Singh V, et al. A Systematic review of solid-pseudopapillary neoplasm: Are these rare lesions? *Pancreas*. 2014;43(3):331-7. <https://doi.org/10.1097/MPA.0000000000000061>.
- Romics L, Oláh A, Belágyi T, et al. Solid pseudopapillary neoplasm of the pancreas - proposed algorithms for diagnosis and surgical treatment. *Langenbecks Arch Surg*. 2010;395(6):747-55. <https://doi.org/10.1007/s00423-010-0599-0>. PMID: 20155425. <https://doi.org/10.1007/s00423-010-0599-0>
- Spinelli KS, Fromwiller TE, Daniel RA, et al. Cystic pancreatic neoplasms: Observe or operate. *Ann Surg*. 2004;239(5):651-7. <https://doi.org/10.1097/01.sla.0000124299.57430.ce..>
- Sich N, Rogers A, Bertozzi D, et al. Filling the void: a low-cost, high-yield approach to addressing incidental findings in trauma patients. *Surg*. 2018;163(4):657-60. <https://doi.org/10.1016/j.surg.2017.09.043>.
- Frost M, Krige JEJ, Bornman PC, et al. Solid pseudopapillary epithelial neoplasm: a rare but curable pancreatic tumour in young women. *S Afr J Surg*. 2011;49(2):75-81.
- Guo N, Zhou QB, Chen RF, et al. Diagnosis and surgical treatment of solid pseudopapillary neoplasm of the pancreas: analysis of 24 cases. *Can J Surg*. 2011;54(6):368-74. <https://doi.org/10.1503/cjs.011810>.
- Fasanella K, McGrath K. Cystic lesions and intraductal neoplasms of the pancreas. Best practice and research. *Clin Gastroenterol*. 2009;23(1):35-48. <https://doi.org/10.1016/j.bpg.2008.11.011>.
- Lee S, Jang J, Hwang D. Clinical features and outcome of solid pseudopapillary neoplasm: differences between adults and children. *Arch Surg*. 2008;143(12):1218-21. <https://doi.org/10.1001/archsurg.143.12.1218>.
- Branco C, Vilça S, Falcão J. Solid pseudopapillary neoplasm: case report of a rare pancreatic tumour. *Int J Surg Case Rep*. 2017;33:148-50. <https://doi.org/10.1016/j.ijscr.2017.02.049>.
- Tipton S, Smyrk T, Sarr M, Thompson GB. Malignant potential of solid pseudopapillary neoplasm of the pancreas. *BJS*. 2006;93(6):733-7. <https://doi.org/10.1002/bjs.5334>.
- Maeda K, Ono S, Baba K, Kawahara I. Management of blunt pancreatic trauma in children. *Pediatr Surg Int*. 2013;29(10):1019-22. <https://doi.org/10.1007/s00383-013-3402-9>.
- Lam J, Eunson GJ, Munro F, Orr JD. Delayed presentation of handlebar injuries in children. *BMJ*. 2001;322(7297):1288-9. <https://doi.org/10.1136/bmj.322.7297.1288>.
- Biyyam D, Hwang S, Patel M, et al. CT Findings of paediatric handlebar injuries. *Radiographics*. 2020;40(3):815-26. <https://doi.org/10.1148/rg.2020190126>.
- Antonsen I, Berle V, Søreide K. Blunt pancreatic injury in children. *Tidsskr Nor Lægeforen*. 2017 Sep 18;137(17). <https://doi.org/10.4045/tidsskr.16.0888>.
- Moschetta M, Telegrafo M, Malagnino V, et al. Pancreatic trauma: The role of computed tomography for guiding therapeutic approach. *World J Radiol*. 2015;7(11):415. <https://doi.org/10.4329/wjr.v7.i11.415>.