



Early abdominal CT after the Whipple procedure, allows timely diagnosis of complications, even in patients without clinical or laboratory findings

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Purpose

- Pancreaticoduodenectomy, also referred to as the “Whipple” or “Kausch-Whipple” procedure, is the most common surgical procedure for the resection of tumors in the pancreatic head, uncinate process, and neck as well as lesions of the ampulla, extrahepatic bile duct, and duodenum.
- This procedure is associated with numerous complications.
- Timely diagnosis of these complications is associated with improved outcomes.
- We hypothesized that an early (i.e. 5-7 days) CT scan would allow earlier detection of postoperative complications, even in patients without relevant clinical or laboratory findings.



Material & Methods

- All consecutive patients with pancreaticoduodenectomy during a 2-years period (2015-2017) had routinely an abdominal CT scan 5-7 days after pancreatic surgery, or earlier if immediate postoperative complications were suspected.
- The CT examinations were performed with a MDCT system (Siemens Somatom Definition 128+AS™) before and after IV administration of iodinated contrast medium.
- Abdominal CT scans were reviewed prospectively, by 2 independent blinded radiologists.
- Independent chart and pathology report reviews were used to determine the patients' final diagnoses.

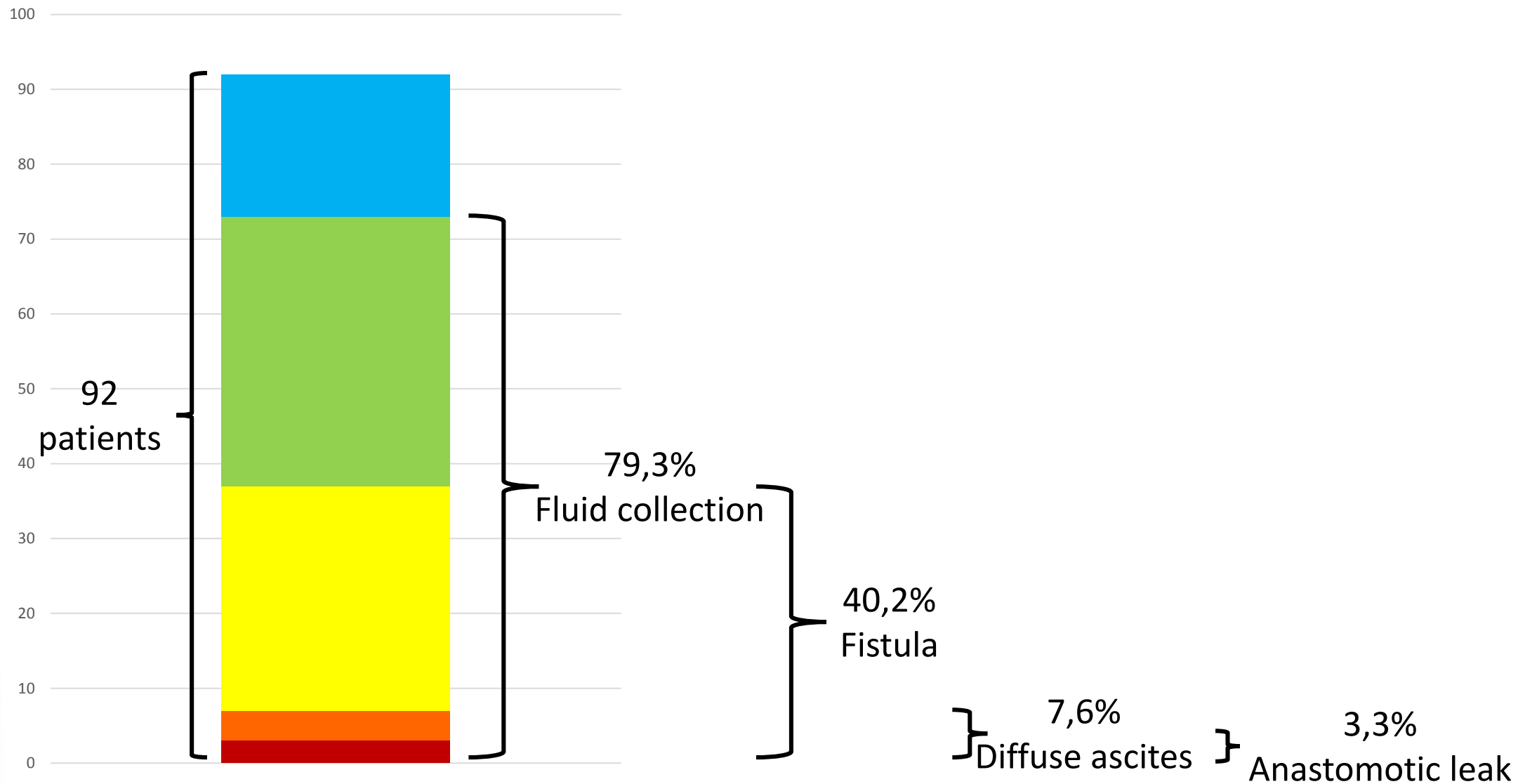


Results

- A total of 92 patients, who undergone the Whipple procedure and had an early abdominal CT, have been included in the study.
- The majority (61/92, 66.3%) had no clinical suspicion of complications.



Compilations

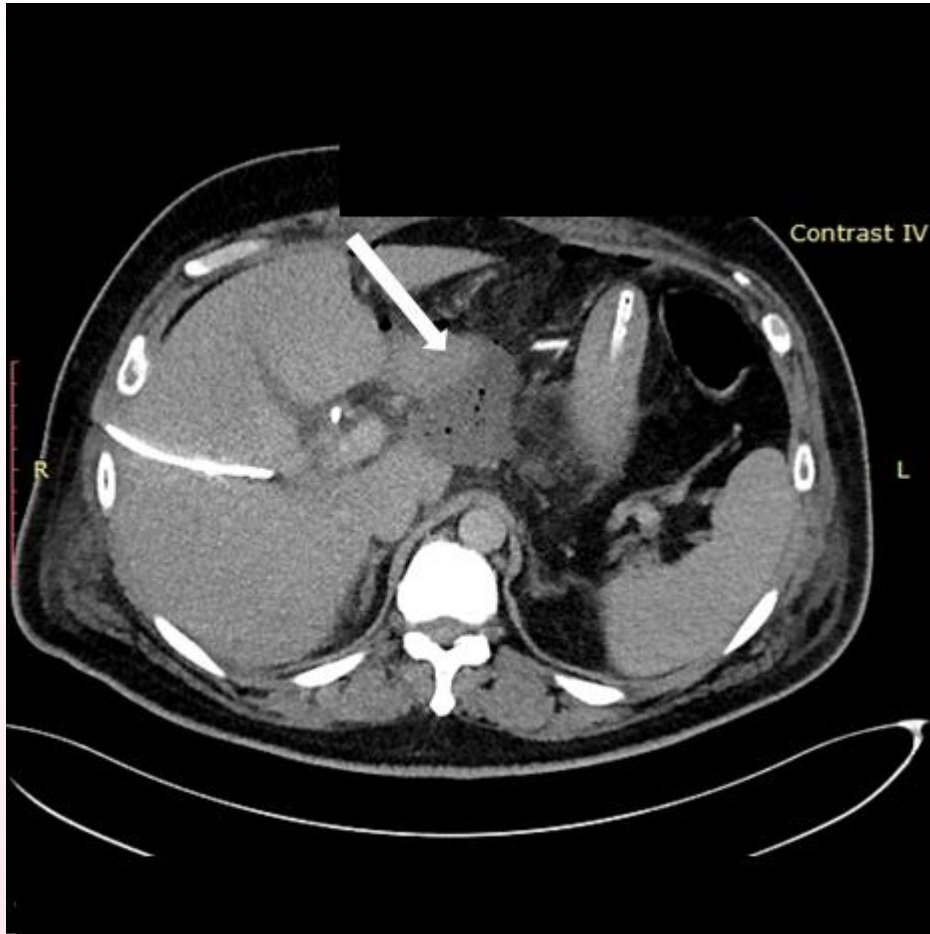




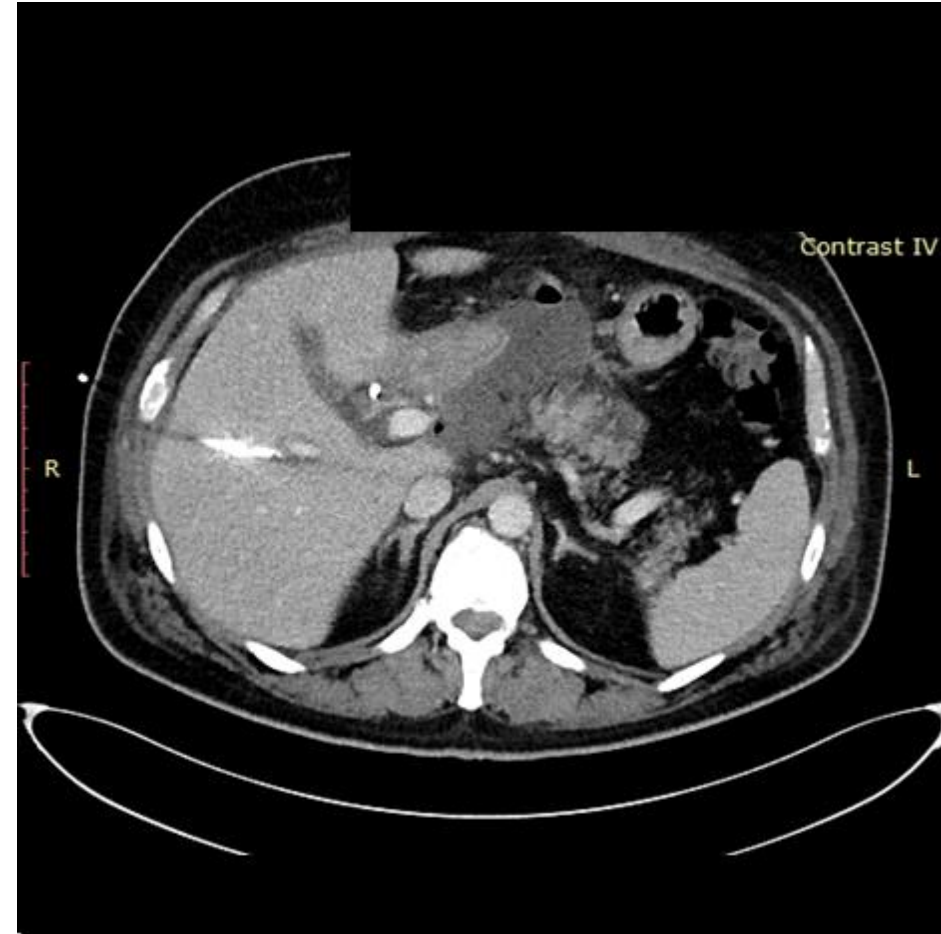
Compilations

- In 42 patients (45.6%) mesenteric perivascular stranding was shown, revealing increased attenuation of the fat around vascular structures.
- In 28 patients (30,4%) air in the biliary tree was noted.
- In 5 patients (5,4%) abscess was visualized.
- In 2 patients (2,2%) hemorrhage was detected, one of them with formation of an aneurysm of the pancreaticoduodenal artery.

Fluid collection



Axial contrast-enhanced CT image obtained immediately after surgery shows fluid collection (*arrow*) anteriorly and to the right of the superior mesenteric artery-vein, extending anteriorly to the pancreaticojejunostomy.

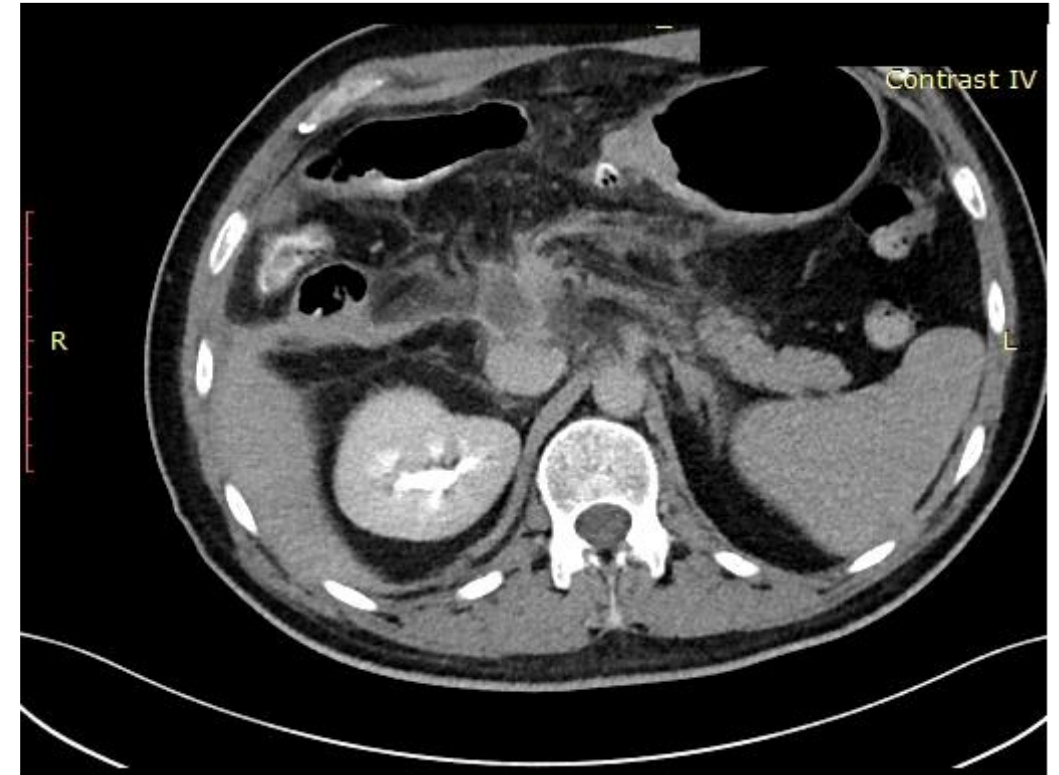


After 10 days, the collection failed to resolve, and is noted with increased volume.

Pancreatic Fistula

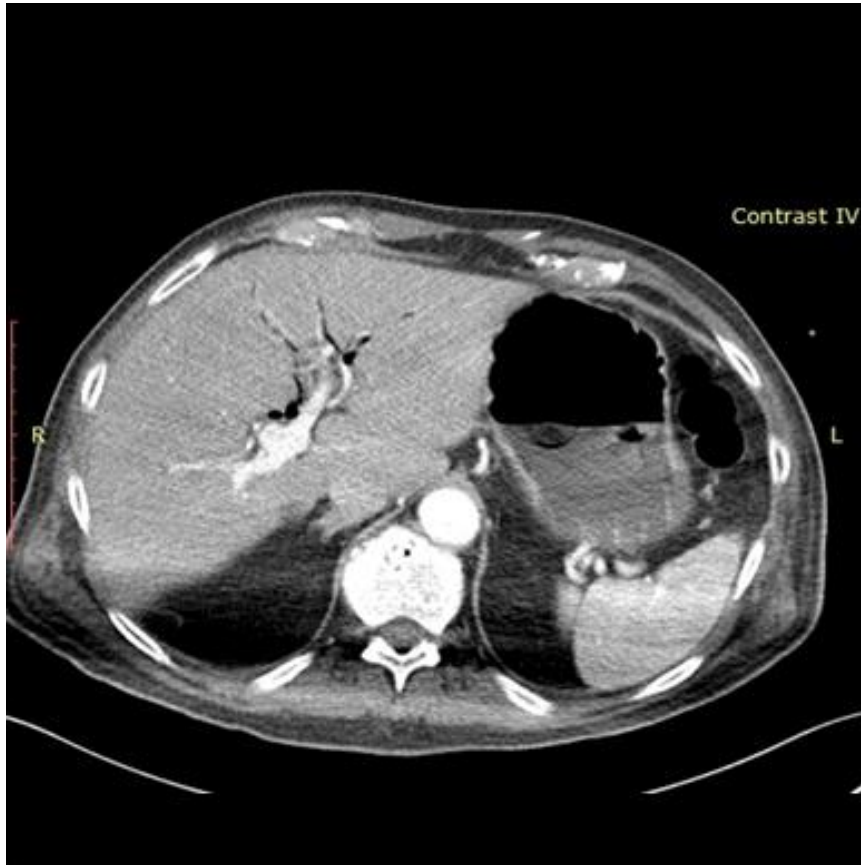


Axial contrast-enhanced CT image obtained 5 days after surgery demonstrates fluid collection at the surgical site (arrow).



CT images obtained after 8 days, demonstrate slightly less fluid collection following the use of a drainage catheter. Pancreatic fistula was suspected consistent with the increased levels of amylase in the fluid.

Air in the biliary tree



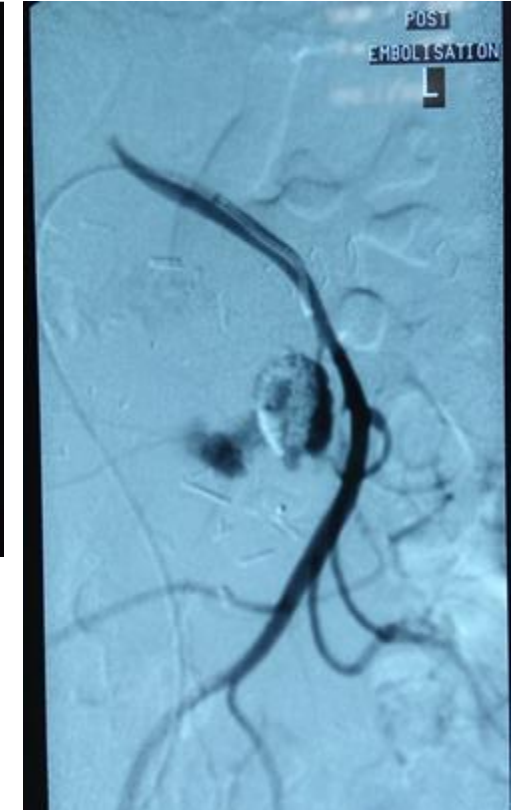
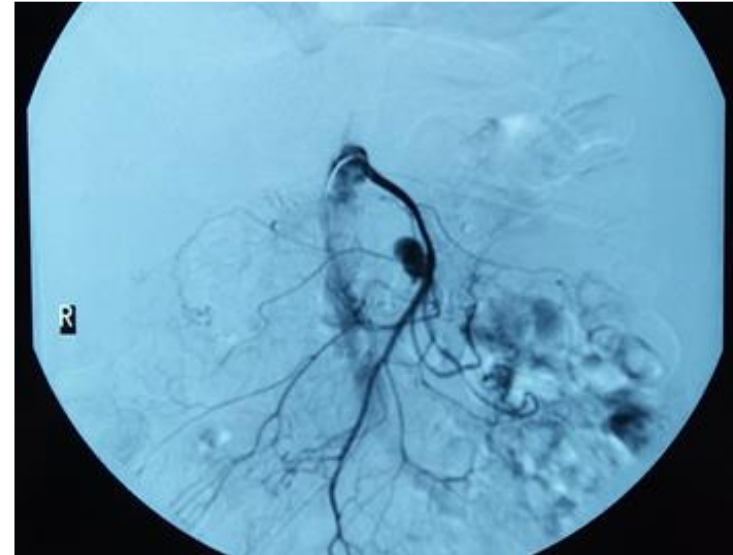
Three different cases with air present in the biliary tree.



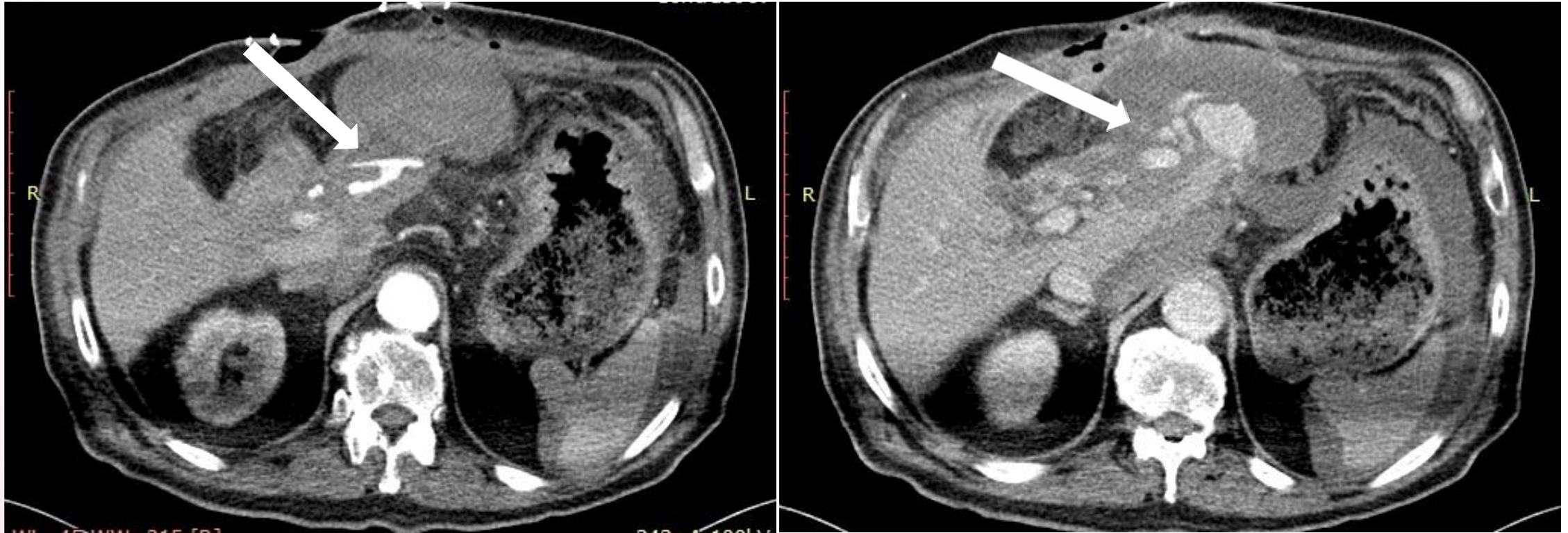
Pseudoaneurysm of the inferior pancreaticoduodenal artery



Axial contrast-enhanced CT image obtained 3 days after surgery shows a pseudoaneurysm of the inferior pancreaticoduodenal artery which was embolized and a stent was inserted after 2 days.



Intra-abdominal hemorrhage



Axial slices with IV CM during arterial (right) and delayed (left) phases of a patient with recent Whipple surgery, demonstrating active hemorrhage of the pancreaticoduodenal artery (arrow). The patient was immediately taken to the operating theatre where radiological findings were confirmed.



Conclusions

The Whipple procedure has unique and specific complications with increased incidence rate.

They include fluid collection, fistula, mesenteric perivascular stranding, air in the biliary tree, anastomotic leak, hemorrhage and abscess.

In conclusion, an early postoperative abdominal CT scan allows for early detection of complications, even in patients without clinical or laboratory findings.



References

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