

# 가 8

## Pseudoaneurysm after Pancreaticoduodenectomy Related with Delayed Massive Hemorrhages

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**Purpose:** Recently, hemorrhages has been accepted the most serious complication with a high mortality after a pancreaticoduodenectomy. In particular, delayed massive hemorrhages that occur from a pseudoaneurysmal rupture at the peri-pancreatic large arteries are quite formidable. In most patient with pseudoaneurysmal bleeding, sentinel hemorrhages can be observed. Early angiography and transcatheter arterial embolization can be used effectively as initial diagnostic and treatment modalities for a pseudoaneurysm. The authors reviewed the hemorrhagic complications from pseudoaneurysms after a pancreaticoduodenectomy and present the clinical features and treatment modalities

**Methods:** Four hundred-fifty-four consecutive patients who underwent a pancreaticoduodenectomy between October 1994 and April 2002 were reviewed by a retrospective evaluation of their medical records. In 8 cases with hemorrhagic complications, pseudoaneurysms were determined by angiography to be the main cause of hemorrhage. The clinical characteristics, pre-hemorrhagic symptoms, treatments and outcomes were analyzed.

**Results:** Hemorrhagic complications occurred in 35 (7.7%) out of 454 cases of pancreaticoduodenectomy. In 8 (22.8%) out of 35 cases, the hemorrhage burst from the pseudoaneurysms. In 1 out of 8 cases, the hemorrhage originated from a pseudoaneurysm on the proper hepatic artery, 1 case on the right hepatic artery, 1 case on the inferior pancreatoduodenal artery and on ligated gastroduodenal artery-stump in the remainder. Three cases had intra-abdominal

complications such as a pancreatic fistula. Sentinel bleeding were observed in 7 cases, bleeding from the surgical drains in 4 cases, hematemesis in 5 cases and melena in 1 case. In all cases, arterial embolization was attempted and 6 cases were successful. Two cases required surgery. There was 1 mortality from hepatic failure after the embolization.

**Conclusion:** Delayed massive hemorrhages after a pancreaticoduodenectomy should be ruled out when determining whether they are associated with an arterial pseudoaneurysmal rupture. Sentinel bleeding, which can be used as a warning sign of pseudoaneurysmal rupture, can be detected with close observation. Transcatheter arterial embolization is an effective modality to control bleeding from an arterial pseudoaneurysm initially. (*J Korean Surg Soc* 2002; 63:326-332)

**Key Words:** Pseudoaneurysm, Pancreatoduodenectomy, Hemorrhage, Transcatheter arterial embolization  
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Table 1 . 1

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Table 1. Clinical characteristics I

Case No.	Age	Sex	Diagnosis	Operation
1*	55	M	Gall bladder cancer with Ampulla of Vater cancer	Whipple's operation with Rt. hepatectomy
2	63	F	Ampulla of Vater cancer	Whipple's operation
3	55	M	Ampulla of Vater cancer	Whipple's operation
4	63	M	Pancreatic head cancer with liver metastasis	Whipple's operation with left lateral sectionectomy
5	56	M	Pancreatic head cancer	Whipple's operation
6	54	M	Common bile duct cancer	PPPD <sup>†</sup>
7	69	M	Adenoma of ampulla of Vater	PPPD <sup>†</sup>
8	57	M	Pancreatic head cancer	Whipple's operation

\*Neurofibromatosis, <sup>†</sup>pylorus preserving pancreaticoduodenectomy

Table 2. Clinical characteristic II

Case No.	Onset*	Prior complication	Symptoms <sup>†</sup>
1	13	Wound infection	Bleeding from drains, Hematemesis
2	16 <sup>‡</sup>	None	Bleeding from drains, Hematemesis
3	20	Wound infection	Back pain, Hematemesis
4	30	Pancreatic leakage	Melena, Hematemesis
5	31	Intraabdominal abscess	Bleeding from drains, Hematemesis
6	25	None	Melena
7	4	None	Decreasing Hemoglobin level
8	32	Pancreatic leakage	Bleeding from drains, Melena

\*Postoperative day, <sup>†</sup>In order, <sup>‡</sup>Rebleeding on 46th postoperative day

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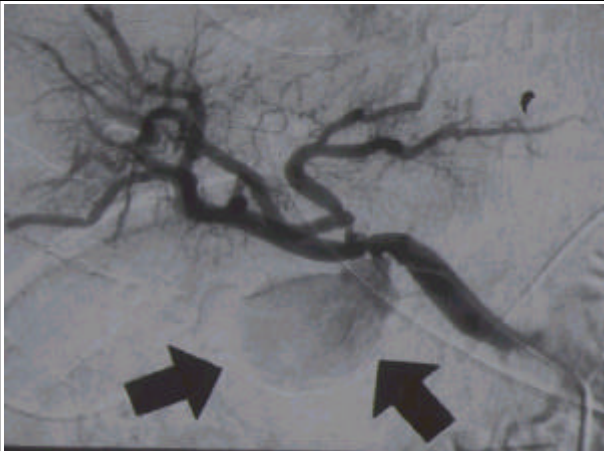


Fig. 1. Angiogram revealed the gastroduodenal artery pseudoaneurysm.

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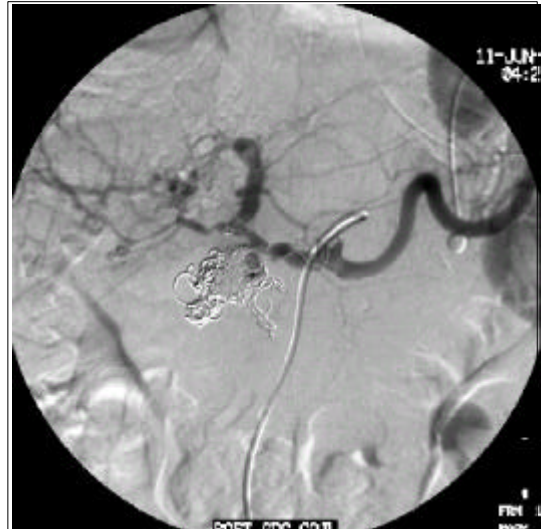
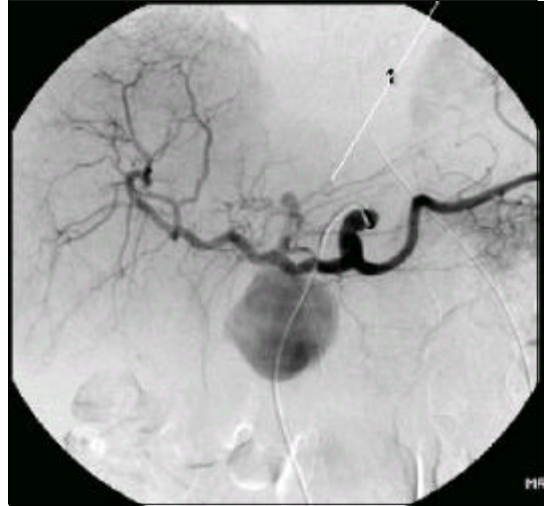


Fig. 2. Selective pseudoaneurysmal embolization using microcoils.

**Table 3.** Treatments and results of pseudoaneurysms

Case No.	Location	Treatment	Embolization materials	Outcome
1	Gastroduodenal artery stump	TAE	Coil*	Survived
2	Gastroduodenal artery stump	TAE	Coil	Survived
3	Gastroduodenal artery stump	TAE	Coil	Survived with hypoxic brain damage
4	Gastroduodenal artery stump	TAE	Coil	Died of hepatic failure
5	Gastroduodenal artery stump	TAE	Coil	Survived
6	Right hepatic artery	TAE	Coil	Survived
7	Inferior pancreaticoduodenal artery	Relaparotomy		survived
8	Gastroduodenal artery stump	TAE, Relaparotomy	Gelfoam <sup>†</sup>	Survived

\*Metallic microcoil, <sup>†</sup> Gelatin powder

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