

Bilateral Retroperitoneal Approach to Repairing a Ruptured Right Iliac Artery Aneurysm in a Patient Who Has Undergone Transperitoneal Abdominal Surgery

Hiroshi Yamamoto, MD, Fumio Yamamoto, MD, Yoshiaki Fukuhiro, MD, Gembu Yamaura, MD, Kazuyuki Ishibashi, MD, Mamika Motokawa, MD, and Fuminobu Tanaka, MD

An 84-year-old woman with a history of surgery for cholangiocarcinoma presented to Akita University Hospital with severe right lower abdominal pain, respiratory distress, and hypotension. Computed tomography scanning revealed a ruptured right common iliac artery aneurysm with a massive right retroperitoneal hematoma and a right internal iliac artery aneurysm. Under the bilateral retroperitoneal approach, we performed an in-situ repair of an aneurysm rupture from the aorta to the left common and right external iliac arteries using a bifurcated knitted Dacron graft, and then we ligated the right internal iliac artery. The postoperative course of the patient was uneventful. The patient was discharged from hospital 52 days after surgery. In conclusion, a bilateral retroperitoneal approach may be a safe and useful strategy for in-situ repair of a right iliac artery aneurysm rupture in patients with peritoneal adhesions after transperitoneal abdominal surgery.

Key words: iliac aneurysm rupture, bilateral retroperitoneal approach

Introduction

A retroperitoneal approach in surgery for the aorta or iliac arteries is thought to be advantageous in patients with suprarenal abdominal aortic aneurysms, a horseshoe kidney, inflammatory aneurysms, or previous transperitoneal laparotomy. With transperitoneal abdominal surgery, there is the possibility of postoperative peritonitis complications causing severe intestinal adhesion or infected fluid collection, which during vascular surgery, could result in intestinal injury in dissecting the adhesion

or graft infection. Although a left retroperitoneal approach is the standard for extraperitoneal aortic exposure,¹⁾ difficulties exist in repairing the right-side iliac artery aneurysm because of limited operative space. Here, we describe the use of a bilateral retroperitoneal approach for an in-situ graft replacement of a ruptured right iliac artery aneurysm in a patient with a history of bile duct surgery.

Case Report

An 84-year-old woman presented with severe right lower abdominal pain. Two days later she developed respiratory distress and hypotension and was transferred to Akita University Hospital. Contrast computed tomography (CT) scanning on admission revealed a ruptured right common iliac artery aneurysm (**Fig. 1B**) with a massive right retroperitoneal hematoma (**Fig. 1A**), bilateral common iliac artery aneurysms (**Fig. 1C**) and a right internal iliac artery aneurysm (**Fig. 1D**). Five years

Department of Cardiovascular Surgery, Akita University School of Medicine, Akita, Akita, Japan

Received: February 16, 2010; Accepted: February 23, 2010
Corresponding author: Fumio Yamamoto, MD. Department of Cardiovascular Surgery, Akita University School of Medicine, Hondo 1-1-1, Akita, Akita 010-8543, Japan
Email: f-yama@cvs.med.akita-u.ac.jp
©2011 The Editorial Committee of *Annals of Thoracic and Cardiovascular Surgery*. All rights reserved.

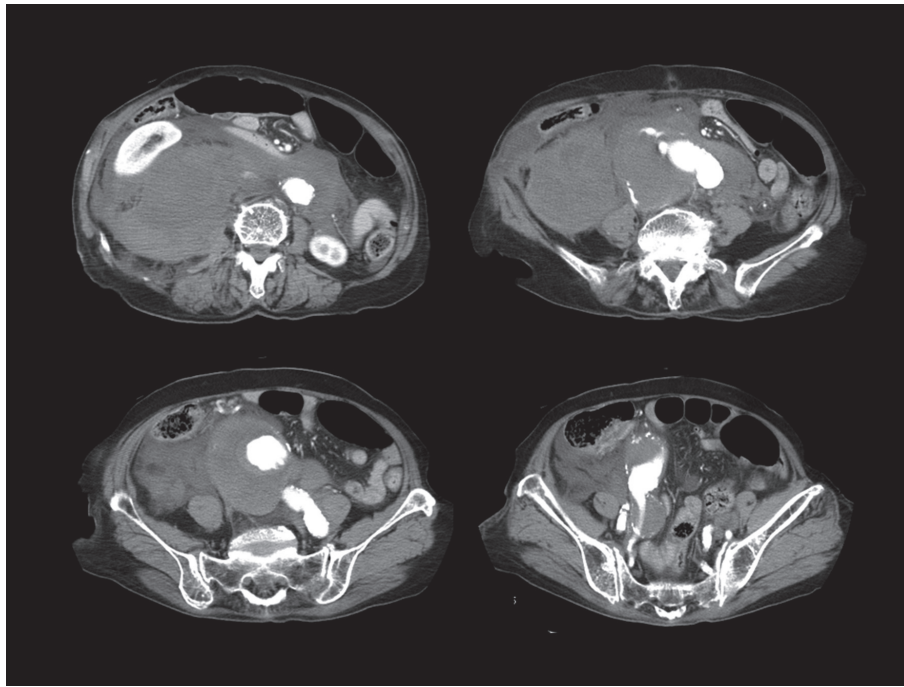


Fig. 1 Preoperative contrasted computed tomographic images showing a rupture of the right common iliac artery aneurysm (**B**) with a massive right retroperitoneal hematoma (**A**), bilateral common iliac artery aneurysms (**C**) and a right internal iliac artery aneurysm (**D**).

A	B
C	D

earlier, the patient had surgery for cholangiocarcinoma, which included bile duct resection and reconstruction (i.e., end-to-side hepaticojejunostomy and Roux-Y jejunostomy). To avoid dissecting peritoneal adhesions with a transperitoneal approach, we took a bilateral retroperitoneal approach for exposures of the aorta and right iliac arteries. The patient was placed in a supine position under general anesthesia. The abdominal incision was made parallel with and about 3 cm left to the midline downwards from the costal margin to the level of the symphysis pubis, which was deepened through subcutaneous tissue and the anterior rectus sheath. Then the parietal peritoneum was exposed by developing the plane between the posterior rectus sheath and peritoneum. Subsequently the retroperitoneal plane was developed to expose and tape the left iliac arteries and abdominal aorta. On the right side, an incision was made which began downwards from the midpoint between the subcostal margin and the iliac crest on the anterior axillary line, parallel with and about 3 cm above the inguinal ligament to the right lateral border of the rectus abdominis as described by Haimovici.²⁾ After the external oblique and its aponeurosis were incised, the internal oblique muscle and the transversalis muscles were transected

while developing the extraperitoneal plane, and then the right external and internal iliac arteries were exposed and taped. After systemic heparinization, the abdominal aorta was clamped below the inferior mesenteric artery and then bilateral external and iliac arteries were clamped. In-situ graft replacement was performed from the aorta to the left common iliac artery and the right external iliac artery using a bifurcated knitted Dacron graft (16 × 9 mm; Hemashield Gold, Boston Scientific, NJ, USA) and the right internal iliac artery was ligated. The right limb of the bifurcated graft was passed through the lumen of aneurysmal right common iliac artery. The operation took 406 minutes, and the intraoperative blood loss was 2268 mL. The patient remained in the intensive care unit (ICU) for 4 days. The postoperative course was uneventful, and the patient was discharged from the hospital 52 days after surgery. The postoperative CT scanning 110 days after the surgery revealed no abnormal graft configuration (**Fig. 2**).

Discussion

A transperitoneal approach is a widely accepted technique for in-situ graft replacement of aneurysms in the



Fig. 2 Postoperative computed tomographic images 110 days after surgery showing no abnormal graft configurations.

abdominal aorta and iliac arteries. If there is no peritoneal adhesion, this approach may be considerably more effective in an emergency operation such as aneurysm rupture, because the time to clamp the proximal aorta or artery to the rupture site can be shorter using the transperitoneal approach than the retroperitoneal approach, which may be a crucial factor determining the patient's prognosis. Dissecting peritoneal adhesions during vascular surgery could be a time-consuming process in patients with a history of previous abdominal surgery. Weibel and Majno demonstrated in a study of 752 consecutive autopsies that peritoneal adhesions were more often associated with a history of laparotomy than without (67 and 28%, respectively).³⁾ In a multinational study of 448 adult patients with intraperitoneal adhesions and a history of one or more abdominal operations, Luijendijk et al. found that the adhesions were in the omentum (68%), small bowel (67%), abdominal wall (45%), colon (41%), female reproductive organs (23%), or retroperitoneum (14%).⁴⁾ Postoperative leakage has been reported in 5%–6% of gastric cases (with lymphadenectomy),⁵⁾ 3.4%–6.0% of colorectal cases,⁶⁾ 7%–16% of pancreatic cases,^{7, 8)} and 7.2% of hepatic cases,⁹⁾ all of which are closely associated with intraabdominal abscess formation. A delayed or repeat occurrence of an abdominal or pelvic abscess has been reported in patients with a history of abdominal surgery.^{10, 11)} These studies suggest that a

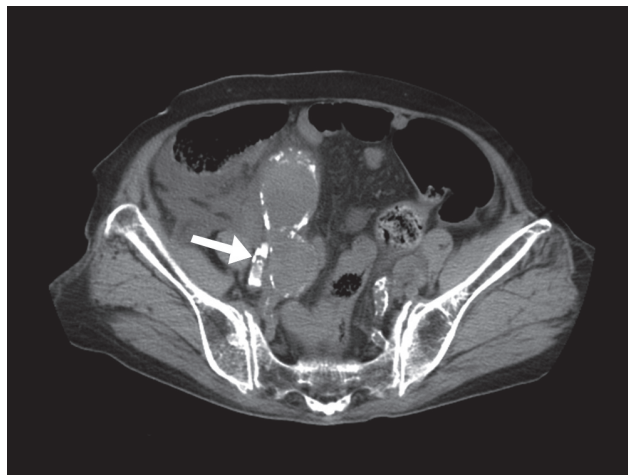


Fig. 3 Preoperative non-contrasted computed tomographic image showing severe calcification of the proximal right external iliac artery (white arrow).

transperitoneal approach for vascular surgery in patients with previous abdominal surgery may increase the risk of encountering a localized abscess during the dissection of adhesions, resulting in postoperative panperitonitis or graft infection.

Endovascular treatment may be a promising alternative to aneurysm repair in patients with previous abdominal surgery because endovascular repair has significantly improved outcomes in patients with abdominal aortic aneurysms^{12, 13)} and can be a first-line treatment for common iliac artery aneurysms.¹⁴⁾ However, internal iliac artery occlusion during endovascular aneurysm repair has been reported to result in impotence and buttock claudication caused by decreased penile and gluteal blood flow.^{15–17)} In patients with calcified, tortuous, and stenotic iliac arteries, a retroperitoneal conduit for delivery of sheaths (e.g., a Dacron tube graft anastomosed to the right external iliac artery) has been recommended.¹⁸⁾ Our patient, however, was not a candidate for sheath delivery and endograft deployment using the retroperitoneal conduit, because her proximal right external iliac artery was severely calcified and presumably stenotic (**Fig. 3**).

Transperitoneal and retroperitoneal approaches have been compared in terms of postoperative results. Kalko et al. studied 153 patients who had undergone aortic surgery for aorta-iliac occlusive disease and concluded that the retroperitoneal approach was associated with significantly fewer postoperative pulmonary complications, rapid recovery of gastrointestinal functions, shorter ICU and hospital stays, and less perioperative blood loss.¹⁹⁾

Wachenfeld-Wahl et al. reported no difference between the two approaches in terms of postoperative complications including gastrointestinal, pulmonary, cerebral or cardiovascular complications in patients with infrarenal abdominal aortic aneurysms.²⁰⁾ These studies suggest that retroperitoneal approaches may not be strategically inferior or have perioperative risks compared to transperitoneal approaches even in patients without peritoneal adhesions. A bilateral retroperitoneal approach is more invasive than a unilateral retroperitoneal approach. Potential risks of this more invasive approach have to be considered on a case-by-case basis because to our knowledge, postoperative results of a bilateral retroperitoneal approach have not been investigated.

In conclusion, rupture of a right iliac artery aneurysm in patients with a history of transperitoneal abdominal surgery is rare, but a bilateral retroperitoneal approach may be a safe and useful strategy for in-situ repair of a right iliac artery aneurysm rupture in patients with predicted peritoneal adhesions or abscess formation.

References

- Ernst CB. Retroperitoneal approach to abdominal aorta. In: Haimovici H, Callow AD, Depalma RG, Ernst CB, Hollier LH, eds.; *Haimovici's Vascular Surgery. Principles and Techniques*. 3rd ed. Norwalk, CT: Appleton&Lange 1989; pp 251–7.
- Haimovici H. Retroperitoneal approach to iliac arteries. In: Haimovici H, Callow AD, Depalma RG, Ernst CB, Hollier LH, eds.; *Haimovici's Vascular Surgery. Principles and Techniques*. 3rd ed. Norwalk, CT: Appleton & Lange 1989; pp 251–7.
- Weibel MA, Majno G. Peritoneal adhesions and their relation to abdominal surgery. A postmortem study. *Am J Surg* 1973; **126**: 345–53.
- Luijendijk RW, de Lange DC, Wauters CC, Hop WC, Duron JJ, et al. Foreign material in postoperative adhesions. *Ann Surg* 1996; **223**: 242–8.
- Marrelli D, Pedrazzani C, Neri A, Corso G, DeStefano A, et al. Complications after extended (D2) and super-extended (D3) lymphadenectomy for gastric cancer: Analysis of potential risk factors. *Ann Surg Oncol* 2007; **14**: 25–33.
- Chambers WM, Mortensen NJ. Postoperative leakage and abscess formation after colorectal surgery. *Best Pract Res Clin Gastroenterol* 2004; **18**: 865–80.
- Kuhlmann KF, de Castro SM, Wesseling JG, ten Kate FJ, Offerhaus GJ, et al. Surgical treatment of pancreatic adenocarcinoma: Actual survival and prognostic factors in 343 patients. *Eur J Cancer* 2004; **40**: 549–58.
- Yang YM, Tian XD, Zhuang Y, Wang WM, Wan YL, et al. Risk factors of pancreatic leakage after pancreaticoduodenectomy. *World J Gastroenterol* 2005; **11**: 2456–61.
- Tanaka S, Hirohashi K, Tanaka H, Shuto T, Lee SH, et al. Incidence and management of bile leakage after hepatic resection for malignant hepatic tumors. *J Am Coll Surg* 2002; **195**: 484–89.
- Tomita H, Osada S, Miya K, Matsuo M. Delayed recurrence of postoperative intra-abdominal abscess: An unusual case and review of the literature. *Surg Inect* 2006; **7**: 551–4.
- Gervais DA, Ho CH, O'Neill MJ, Arellano RS, Hahn PF, et al. Recurrent abdominal and pelvic abscesses: Incidence, results of repeated percutaneous drainage, and underlying causes in 956 drainages. *AJR* 2004; **182**: 463–6.
- Hua HT, Cambria RP, Chuang SK, Stoner MC, Kwolek CJ, et al. Early outcomes of endovascular versus open abdominal aortic aneurysm repair in the National Surgical Quality Improvement Program-Private Sector (NSQIP-PS). *J Vasc Surg* 2005; **41**: 382–9.
- Dillavou ED, Muluk SC, Makaroun MS. Improving aneurysm-related outcomes: Nationwide benefits of endovascular repair. *J Vasc Surg* 2006; **43**: 446–52.
- Huang Y, Gloviczki P, Duncan AA, Kalra M, Hoskin TL, et al. Common iliac artery aneurysm: Expansion rate and results of open surgical and endovascular repair. *J Vasc Surg* 2008; **47**: 1203–11.
- Lee WA, O'Dorisio J, Wolf YG, Hill BB, Fogarty TJ, et al. Outcome after unilateral hypogastric artery occlusion during endovascular aneurysm repair. *J Vasc Surg* 2001; **33**: 921–6.
- Mehta M, Veith FJ, Darling RC, Roddy SP, Ohki T, et al. Effects of bilateral hypogastric artery interruption during endovascular and open aortoiliac aneurysm repair. *J Vasc Surg* 2004; **40**: 698–702.
- Unno N, Inuzuka K, Yamamoto N, Sagara D, Suzuki M, et al. Preservation of pelvic circulation with hypogastric artery bypass in endovascular repair of abdominal aortic aneurysm with bilateral iliac artery aneurysms. *J Vasc Surg* 2006; **44**: 1170–5.
- Diethrich EB, Ramaiah VG, Kpodonu J, et al. Endovascular management of a thoracic aortic aneurysm with small tortuous calcified iliac vessels (retroperitoneal conduit). In: Diethrich EB, Ramaiah VG, Kpodonu J, Rodriguez-Lopez JA, eds.; *Endovascular and Hybrid Management of the Thoracic Aorta. A Case-based Approach*. 1st ed. Chichester, West Sussex: Wiley-Blackwell 2008; pp 45–9.
- Kalko Y, Ugurlucan M, Basaran M, Nargileci E, Banach M, et al. Comparison of transperitoneal and retroperitoneal approaches in abdominal aortic surgery. *Acta Chir Belg* 2008; **108**: 557–65.
- Wachenfeld-Wahl C, Engelhardt M, Gengenbach B, Bruijnen HK, Loeprecht H, et al. Transperitoneal versus retroperitoneal approach for treatment of infrarenal aortic aneurysms: is one superior? *VASA* 2004; **33**: 72–6.