

Inadvertent vascular injury of the aorta or vena cava caused by acupuncture

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Major visceral vascular injury after acupuncture is a rare but serious complication. We recently treated two patients with an inferior vena cava or an abdominal aorta injury caused by acupuncture. Although both patients underwent successful surgical repair, the highly invasive nature of the operations led to complications, including infection and chyle leakage. Vascular surgeons should be aware that acupuncture can cause serious damage to the vena cava or aorta due to direct injury or subsequent infection. (*J Vasc Surg Cases* 2015;1:13-5.)

Acupuncture is an old, widely used traditional therapy, especially in Asia, and because it has been used for thousands of years and is a relatively simple procedure, it is generally considered to be safe. Furthermore, although several reports have described successful experiences, many of the studies on acupuncture have relied on uncontrolled data and have been based on personal experiences or even mystic beliefs.¹ In fact, only a few reports have systematically reviewed and analyzed the complications of acupuncture. Bergqvist^{2,3} reported on vascular injuries caused by acupuncture in a systematic review, and acupuncture was occasionally found to cause cardiac tamponade, venous thrombosis, compartment syndrome, bleeding (including central nervous system bleeding), and even death. In particular, injury to major vessels can cause serious and sometimes fatal complications. Here, we report our experiences of treating major vascular injuries caused by acupuncture.

The patients gave their consent for publication of patient-related data, including images.

CASE REPORT

Case 1. A 64-year-old woman presented with right flank pain of 1 day's duration. She reported that she had undergone acupuncture on the back and flank 4 days ago. The patient had no underlying medical disorder, and physical examination revealed no abdominal or rebound tenderness. Computed tomography (CT)

demonstrated a 2-cm linear high-density foreign body penetrating the juxtarenal inferior vena cava (IVC) without abscess formation (*Fig 1, a*). Emergency surgery was performed to remove the foreign body, to treat the possible IVC injury, and to prevent foreign body-related infection and embolization. Through a midline incision, a metallic foreign body at the confluence of the posterior wall of the right renal vein and IVC was removed. Because there was no active bleeding after removal of the needle, simple bleeding control with a commercial hemostatic agent was performed. The retrieved foreign body was a 2.5-cm-long metallic needle (*Fig 1, b*), and it was confirmed to be an acupuncture needle by an acupuncture professional. Broad-spectrum antibiotic therapy with vancomycin, ceftriaxone, and metronidazole was administered for 7 days. Follow-up CT on the sixth postoperative day revealed nonocclusive focal thrombus in the IVC at the renal-IVC confluence level. Accordingly, anticoagulation therapy was initiated with low-molecular-weight-heparin (enoxaparin [Clexane]; Sanofi-Aventis, Paris, France), and this was followed by warfarin for 3 months. The thrombus had completely resolved at 3 months postoperatively on follow-up CT.

Case 2. A 57-year-old man presented with back pain, fever, and general malaise for 3 days. He had a history of acupuncture on the back 2 weeks ago. There was no history of an underlying medical condition except for hypertension. CT revealed a gas-forming retroperitoneal abscess posterior to the abdominal aorta (*Fig 2*). Emergency surgery was performed to drain the abscess and to débride any infected tissue. We used a transperitoneal approach to evaluate both pararenal areas and to expose the aorta for assessing the possibility of clamping. During abscess drainage in the retro-aortic space, the posterior wall of the abdominal aorta ruptured abruptly, and therefore the infrarenal aorta was cross-clamped and excised down to the distal aorta. After wide débridement, the aorta was replaced in situ with a 20-mm-diameter Dacron (Hemashield; Maquet, Rastatt, Germany) tube graft, and the graft was fully covered by retrocolic omentopexy to prevent recurrent infection. After the initial empirical use of vancomycin and meropenem for 5 days, a microbiologic study identified *Salmonella* (group D, resistant to nalidixic acid) in the pus culture. Ceftriaxone was administered for 22 days, and then, because of liver dysfunction, it was replaced with ciprofloxacin, which was maintained for the next 3 months. Chylous ascites developed 2 weeks after the operation, and treatment was attempted with octreotide (Sandostatin; Novartis

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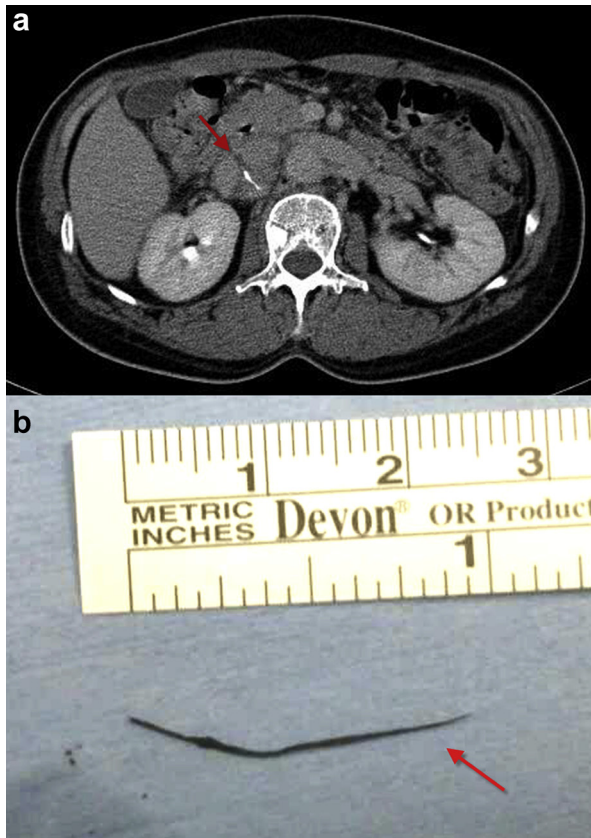


Fig 1. a, Computed tomography (CT) showing a linear, high-density material penetrating the juxtarenal inferior vena cava (IVC). b, A metallic foreign body was retrieved from the confluence of the posterior wall of the right renal vein and IVC. It was later confirmed to be a part of an acupuncture needle.

Pharmaceuticals, Basel, Switzerland), but it failed. Therapeutic intranodal lymphangiography was performed with Lipiodol on postoperative day 18, and chyle leak was obliterated in the next 2 weeks. After being admitted for 7 weeks, the patient was discharged and followed up in an outpatient clinic with prophylactic oral ciprofloxacin for recurrent ascites without any signs of infection.

DISCUSSION

Acupuncture can cause serious damage to the vena cava or aorta by various mechanisms, such as direct injury to the vessel wall, massive compression bleeding, compression by a hematoma, venous thrombosis, infectious sequelae, or embolization of a broken needle.

Kim et al⁴ described a case of pseudoaneurysm of the abdominal aorta caused by a 100-mm-long acupuncture needle. There are descriptions of long acupuncture needles >10 cm in length in the most ancient book of Chinese medicine, *Huang Di Nei Jing*.⁵ Such long acupuncture needles are sometimes used for the treatment of deep-seated disorders, including herniated lumbar disk, although this therapy is not proven to be effective. When a long acupuncture needle is used, as in Case 1, the needle can

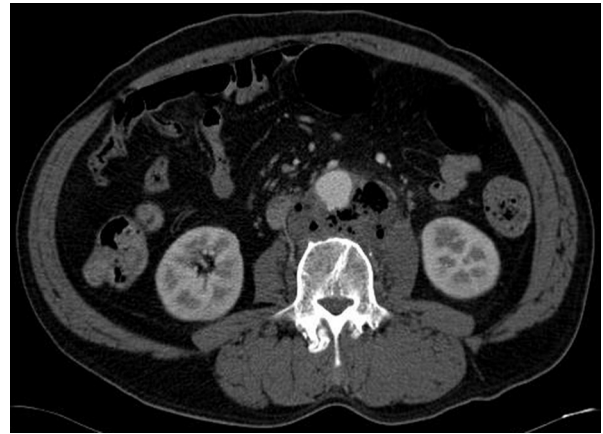


Fig 2. Computed tomography (CT) showed a 7-cm, gas-forming retroperitoneal abscess in the posterior aspect of the abdominal aorta at the level of the L3 vertebral body. A small outpouching lesion in the posterior wall of the abdominal aorta was observed, which ruptured during abscess drainage.

break inside the body. Certain parts of acupuncture needles are sometimes allowed to remain in situ intentionally for continuous acupuncture stimulation.⁶ However, in Case 1, the needle seemed to have broken accidentally.

Acupuncture may induce deep venous thrombosis when the needle punctures the venous system.⁷ Intimal injury to a vein from direct needle penetration, as in Case 1, can be sufficient to produce local thrombosis. Furthermore, bleeding resulting from needle penetration may compress a vein, with resultant stasis and thrombosis. In addition, foreign body-related infections can cause thrombophlebitis of the affected vein. A suitable option for the treatment of acupuncture-related deep venous thrombosis is anticoagulation and antibiotic therapy, but the anticoagulation agent must be used cautiously because of the increased risk of bleeding.

Cases of vascular injuries caused by acupuncture that required surgical intervention have been rarely reported. Kao and Chang⁸ reported a case of popliteal artery pseudoaneurysm caused by acupuncture, and although this patient responded to direct simple repair of the arterial defect, acupuncture can cause serious complications when there is accompanying ischemia or infection is added. Karst et al⁹ reported a case of gangrene due to thrombotic occlusion of the brachial artery after acupuncture. In this patient, emergent thromboembolectomy was performed, but it failed to prevent arm amputation. When acupuncture is performed under less sterile conditions and the appropriate treatment is delayed, it can cause embarrassing infectious complications like impending aortic rupture, as in Case 2. In such cases, it would be prudent to achieve proximal and distal aortic control before abscess drainage. Many attempts have been made to perform in situ aorta replacement in cases of infection. The important point to bear in mind is that an infection-resistant graft should be used, such as a rifampicin-soaked Dacron graft,¹⁰⁻¹⁴

a silver-coated graft,^{15,16} a cryopreserved allograft,¹⁷ or an autologous vein of the neoortoiliac system.¹⁸

CONCLUSIONS

Acupuncture is considered a safe procedure, but it can cause serious complications that lead to major morbidity or mortality. Vascular surgeons should be aware of the possibility of injury to the deep-seated vena cava or aorta by acupuncture needles because acupuncture-related injury is often accompanied by infectious complications that cause phlebitis or an arterial pseudoaneurysm with abscess formation. In addition, surgeons should also prepare appropriate treatment plans, including possible aortic cross-clamping and use of proper infection-resistant graft material.

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