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Case Report

Inferior Vena Cava Syndrome Caused by Port Site Hemorrhage as a Complication of Laparoscopic Adrenalectomy

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Inferior vena cava (IVC) syndrome results from obstruction of the IVC. Occlusion of the IVC caused by external pressure is a well-recognized complication of malignancy; meanwhile, benign causes of IVC obstruction are not frequently encountered without deep vein thrombosis. There have been a few reports of benign external compression of the IVC. We here show a rare and unique case of benign IVC syndrome in a 47-year-old woman, which was caused by hemorrhage as a complication of laparoscopic adrenalectomy on postoperative day 1. She had undergone laparoscopic adrenalectomy, performed successfully for primary aldosteronism, but she lost consciousness for about 10 seconds on postoperative day 1. After emergency medical care, her sinus rhythm and stable hemodynamic status were restored. At that time, computed tomography showed retroperitoneal hematoma caused by port site bleeding with the IVC compressed excessively, and we considered that drastic IVC syndrome may have occurred. Hemostatics and complete rest improved her general condition gradually, and she left the hospital on postoperative day 20. Laparoscopic adrenalectomy is technically feasible and has several advantages over open adrenalectomy, such as less intraoperative blood loss and a shorter hospital stay. However, surgeons must be careful of potential critical complications.

Key words: IVC syndrome – Laparoscopic adrenalectomy – Complication – Postoperative bleeding

Inferior vena cava (IVC) syndrome results from obstruction of the IVC. It can be caused by invasion or compression of a pathologic process, obstruction by deep vein thrombosis or tumors, or compression through external pressure by neighboring structures or tumors (either by significantly

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Fig. 1 Preoperative CT scan shows small right adrenal tumor (arrow).

Table 1 Preoperative laboratory data

	Value
WBC count, $\times 10^3/\mu L$	4.7
RBC count, $\times 10^6/\mu L$	4.36
Hb, g/dL	14.7
Hct, %	41.8
Plt count, $\times 10^4/\mu L$	11.7
TB, mg/dL	0.69
AST/ALT, U/L	46/51
ALP, U/L	342
γ-GTP, U/L	30
BUN/Cre, mg/dL	11.9/0.68
Na/K/Cl, mmol/L	144/2.8/105
HbA1c, %	5.9
PT, s	12.1
PT, %	96.8
PT-INR, ratio	0.94
APTT, s	30.9
Bleeding time, min	2
Blood aldosterone, ng/dL	37.2
Blood renin activity, ng/mL/h	0.4

ALP, alkaline phosphatase; ALT, alanine aminotransferase; APTT, activated prothrombin time; AST, aspartate aminotransferase; BUN, blood urea nitrogen; Cre, creatinine; Hb, hemoglobin; Hct, hematocrit; γ-GTP, γ-glutamyl transpeptidase; INR, international normalized ratio; Plt, platelet; PT, prothrombin time; RBC, red blood cell; TB, total bilirubin; WBC, white blood cell.

compressing the vein or by promoting thrombosis and causing turbulence by disturbing the blood flow). This is quite common during the third trimester of pregnancy, when the uterus compresses the vein in the right side position.

Occlusion of the IVC caused by external pressure is a well-recognized complication of malignancy; meanwhile, benign causes of IVC obstruction are less frequently encountered without deep vein thrombosis. There have been a few reports of benign external compression of the IVC, in which some uncommon causes, such as hydatid cyst,[1] hematoma due to blunt liver trauma,[2] and ruptured abdominal aortic aneurysm,[3] have been described, with no thrombotic complications. We report here a rare case of a patient who presented with benign temporary IVC syndrome caused by port site bleeding as a complication of laparoscopic adrenalectomy.

Case Report

A 47-year-old woman was referred to our hospital by a physician in another hospital so that she could undergo surgical treatment for primary aldosteronism. The computed tomography (CT) scan and preoperative laboratory data are shown in Fig. 1 and Table 1. The patient had never had a coagulation disorder. An experienced endocrine surgeon performed laparoscopic right adrenalectomy successfully without complications. During the surgical procedure, 4 ports were used, including a 5-mm port for the liver retractor (Fig. 2). On postoperative day 1, the patient was bleeding from the port site wound on the right side (Fig. 2, No. 4 port), and we were called and asked to suture the wound. In order to suture the wound, we had her lie on her left side. After suturing, she lost consciousness for about 10 seconds as she was getting up from the bed. We responded quickly with high-density oxygen and a rapid transfusion, and, placing her in a shock posture state, immediately performed cardiopulmonary resuscitation with chest compressions for about 10 seconds. Her sinus rhythm and stable hemodynamic status were restored. After she regained consciousness we studied the CT scan, which clearly showed that hematoma resulting from the port site bleeding on the right side compressed the IVC (Figs. 3 and 4).

We gave the patient hemostatics immediately and prescribed complete rest for her. After we confirmed no symptoms of fainting for 3 days, we ended her rest and permitted her oral intake. Her physical condition was restored gradually after the series of events, and the hematoma was decreased remarkably 6 days after the event (Fig. 5). She left our

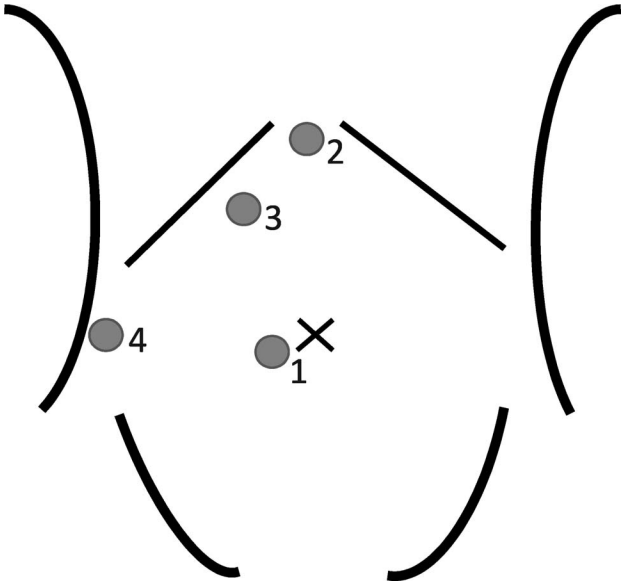

Fig. 2 Four ports (circles), including a 5-mm port (No. 2) for the liver retractor, were used in the surgical procedure. No. 4 port was placed on the right side (the port site shows the wound with postoperative bleeding).

hospital 20 days after the operation, and we observed her condition and the hematoma carefully during outpatient visits (Fig. 6).

Discussion

Laparoscopic adrenalectomy was first reported in 1992.[4] With the procedure there is virtually no blood loss or lower extremity postoperative pain. Moreover, faster return to normal activities and better cosmetic results in comparison with open surgery have established laparoscopy as the current gold standard approach when the adrenal gland must be removed.[5]

Although the procedure is very useful for the reasons mentioned above, one must be wary of such critical complications. In this case, subcutaneous bleeding happened 1 day after the surgery, and the hemorrhage was accumulated around subcutaneous tissue, muscle, and intra-abdominal space (Figs. 3

Fig. 4 CT of the abdomen, clearly showing retroperitoneal hematoma compressed on the IVC near the total occlusion (arrow). The hemostasis clip for the adrenal vein was seen at the end of the IVC (triangle).

Fig. 3 CT of the abdomen, showing the postoperative hemorrhage from the port site wound occurring on the right side (arrow, subcutaneous bleeding).

Fig. 5 Postoperative day 7. CT of the abdomen showing retroperitoneal hematoma decreasing gradually (arrow).

Fig. 6 Postoperative day 40. CT of the abdomen showing retroperitoneal hematoma clearly decreasing (arrow).

and 4). Because blood was flowing out of the wound on the right side, we sutured it to stop the bleeding. We presumed that hematoma formed at that time had moved into the retroperitoneal space and compressed the IVC directly and rapidly because we had made her lie on her left side to suture the wound.

Why did the IVC compression by hemorrhage of the port site result in temporary fainting? We hypothesized that one reason could be the direct compression on the IVC by hematoma, because the adrenal gland is a small and retroperitoneal organ; the other possible reason was the narrowness of the retroperitoneal free space after right adrenalectomy, which compressed the IVC excessively and directly. Of course, no warning signs could be identified for this particular complication from preoperative laboratory data (Table 1), and she never had a coagulation disorder.

We also presumed that if the compression had existed for so long, a thrombus might have been formed in the IVC. Compression of the lumen of a vein results in decreased flow, which, with time, may predispose it to thrombus formation. In our case, although it is reasonable to postulate that the marked narrowing of the IVC with resultant flow disturbance allowed for a predisposition to thrombosis, the compression of the IVC was, fortunately, temporary, and no thrombus was formed.

Many complications have been reported with laparoscopic procedures, and we encounter minor bleeding at the postoperative port site. Usually we observe a few hours of minor bleeding, and the bleeding almost always stops without intensive treatment. Therefore, if a hemorrhage were increasing, we would have to perform an open reoperation to stop the bleeding, but we had never experienced a case like the current one.

We report an extremely rare and life-threatening complication associated with laparoscopic adrenalectomy, a case of mechanical occlusion of the IVC from port site bleeding. To our knowledge, this is the first reported case of such a complication. In conclusion, laparoscopic adrenalectomy is technically feasible and has several advantages over open adrenalectomy, such as less intraoperative blood loss and shorter hospital stay. However, we herein showed a critical complication of which surgeons must be very careful.

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