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Case Report
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Thrombophlebitis in Central Vein Caused by Indwelling Catheter for Total Parenteral Nutrition : A Case Report and Venous Angiographic Study of 27 Cases with Central Vein Catheterization

Masahiko Yamaguchi, M.D., Yoshihiro Yamamura, M.D., Takashi Okuyama, M.D.,
Makoto Kojima, M.D., Tetsuro Nakamura, M.D.

Department of Surgery, Dokkyo University School of Medicine, Koshigaya Hospital, Koshigaya, Saitama, 343 - 8555 Japan

SUMMARY

A fifty-three-year-old man developed thrombophlebitis in the left subclavian and jugular vein after 16-days total parenteral nutrition (TPN) with a catheter indwelling in the central vein via the left subclavian vein for nutritional management during perioperative period of distal gastrectomy. We herein report the case with a venous angiographic study of 27 cases that underwent central vein catheterization for TPN

Key Words : central vein catheterization, total parenteral nutrition, central vein thrombophlebitis

INTRODUCTION

It is of great use to perform central venous catheterization for total parenteral nutrition (TPN) on patients complicated with malnutrition and/or the major organ diseases in perioperative period of abdominal surgery. Nevertheless, this procedure can lead to serious and sometimes life-threatening complications, whether mechanical, infectious, or thrombotic¹⁾. We have experienced a case that developed thrombophlebitis in the left subclavian and jugular vein after 16-days TPN with a catheter indwelling in the superior vena cava via the left subclavian vein for nutritional management during perioperative period of distal gastrectomy. We herein report the case with a venous angiographic study of 27 cases that underwent central vein catheterization for TPN.

CASE REPORT

A fifty-three-year-old well-nourished man had undergone central vein catheterization via the left subclavian vein for TPN during perioperative period of distal gastrectomy which was performed 2 days later for early gastric cancer. The catheter was withdrawn 14 days after gastrectomy when the patient recovered almost preoperative levels of oral intake and bowel habit. He began to complain of pain and swelling in the left shoulder, and pyrexia of 38.1 °C 4 days after the catheter was withdrawn. An enhanced computed tomography (CT) and magnetic resonance (MR) angiography revealed occlusion by thrombophlebitis in the left subclavian and jugular vein (Fig. 1). Venous scintigraphy demonstrated collateral circulation which drained from the left axillary vein into the right atrium, but no apparent pulmonary emboli (Fig. 2). There were no abnormalities in the serum levels of coagulation factors including S protein, C protein, and anticardiolipin antibodies. The patient was hospitalized without special anticoagulant medication, and discharged on the 41st postoperative day when serum levels of C

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Reprint requests to : Masahiko Yamaguchi

Department of Surgery, Dokkyo University
School of Medicine, Koshigaya Hospital,
Koshigaya, Saitama, 343 - 8555, Japan



Fig. 1 An enhanced CT (upper) and MR angiography (lower) showing occlusion (arrow) by thrombophlebitis in the left subclavian and jugular vein

reactive protein decreased to the normal range with disappearance of the left shoulder swelling. Four months later, venous scintigraphy showed a new collateral vein which drained from the left axillary vein to the left pulmonary artery, but not the patent left subclavian artery (Fig. 3).

PATIENTS AND METHODS

Twenty-seven patients who underwent intra-abdominal surgery with perioperative TPN for more than 10 days through the catheter (made of polyvinyl chloride, Bioline catheter kit, NIPRO Co. Osaka, Japan) indwelling in the superior vena cava via the subclavian or the jugular vein, were subjected to the venous angiography to investigate whether the venous drainage flow were disturbed by the events the catheter made. The angiographic study was performed using a digital subtraction image system when TPN was no more necessary and the catheter was about to be withdrawn. Iopamilon™ (Nippon Schering K. K. Osaka, Japan) was used as a contrast medium. Twenty

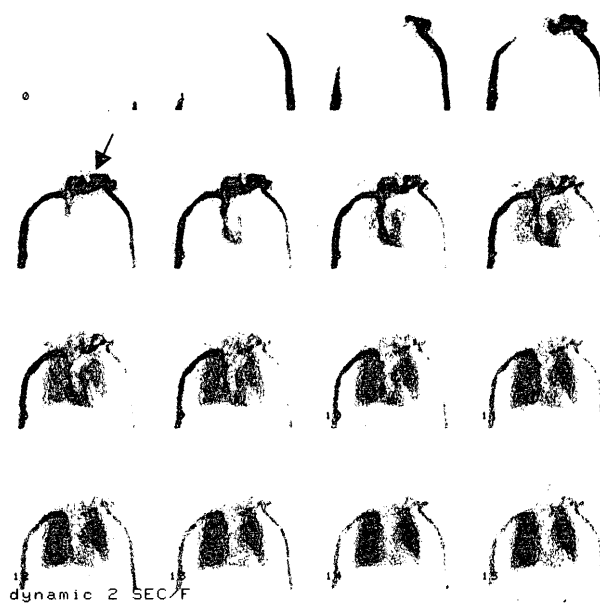


Fig. 2 Venous scintigraphy demonstrating collateral circulation (arrow) which drained from the left axillary vein into the right atrium, but no apparent pulmonary emboli

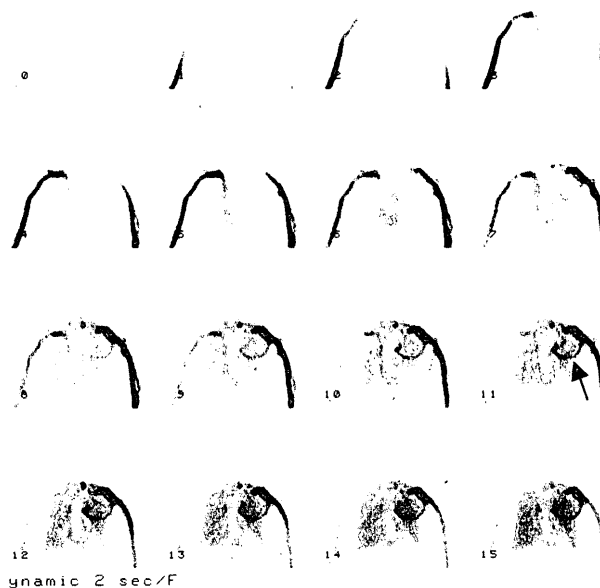


Fig. 3 Venous scintigraphy showing a new collateral vein (arrow) which drained from the left axillary vein to the left pulmonary artery, but not the patent left subclavian vein

milliliters of iopamilon was injected to the cubital vein ipsilateral to the indwelt catheter using an electric injector device at a flow speed of 3ml per second. Venous flow disturbance was evaluated on the aspects of flow stasis and vascular stenosis.

Table 1 Complications and venous angiographic findings in 27 surgical patients who underwent central vein catheterization for TPN

Cannulated vein	Subclavian vein	Jugular vein
No.	22	5
Pneumothorax	1 (4.5%)	0
Infection	2 (9%)	1 (20%)
Thrombophlebitis	0	0
Venous flow stasis	14 (64%)	3 (60%)
Vascular stenosis	15 (68%)	1 (20%)

RESULTS

Average ages of 19 male and 8 female patients were 63. Catheters were inserted to the superior vena cava via the subclavian veins in 22 patients and via the jugular vein in 5 patients. Symptomatic complications caused by catheterization involved pneumothorax in one patient and infection in 3 patients. Subclavian vein catheterization caused pneumothorax in one patient (1/22, 4.5%) and infection in two patients (2/22, 9%). Jugular vein catheterization caused infection in one patient (1/5, 20%). No patients presented any signs or symptoms derived from central vein thrombophlebitis caused by catheterization as the presented case demonstrated. Average periods of catheter indwelling were 24 days. Venous angiography revealed 17 cases (63%) of venous flow stasis, which was demonstrated as stasis of contrast medium, to- and -flow pattern, and visualization of collateral circulation, and 16 cases (59%) of stenosis due to thrombi or fibrin sleeves attaching the catheter or the vascular wall. Flow stasis occurred in three jugular cases (3/5 : 60%) and 14 subclavian cases (14/22 : 64%). Vascular stenosis occurred in one jugular case (1/5 : 20%) and 15 subclavian cases (15/22 : 68%). (Table 1) (Fig. 4)

DISCUSSION

We have presented the patient who developed thrombophlebitis in the left subclavian and jugular vein after 16-days perioperative TPN with a catheter indwelling in the central vein via the left subclavian vein, and also demonstrated that the venous angiography of 27 cases who received perioperative TPN revealed 17 cases of venous flow stasis and 16 cases of vascular stenosis without any cases of symptomatic central vein thrombophlebitis. It is suggested that TPN should be carefully



Fig. 4 Digital subtraction venous angiography showing venous flow stasis (arrow head) and vascular stenosis (arrow) in a case of right subclavian vein cannulation.

employed for perioperative nutritional management because of high incidence rate of venous flow disturbance and vascular stenosis caused by the catheter indwelling in the central vein.

Catheterization for TPN can lead to serious and sometimes life-threatening complications, whether mechanical, infectious, or thrombotic. The choice of insertion site can influence the incidence and type of such complications. The subclavian vein was reported to be more commonly connected with thrombosis than the jugular vein²⁾. Our venous angiographic study also indicated that vascular stenosis occurred more frequently in the subclavian vein (68%) cases than in jugular vein cases (20%). Reported rates of catheter-related thrombosis range from 10 to 50% with subclavian catheterization^{3,4)}. These differences may be related to use of various diagnostic approaches, nonuniform definitions of thrombosis, and different timing of examination¹⁾. Although few cases of symptomatic central vein thrombosis have been reported, incidence of catheter-related thrombosis appears to be higher than it is expected. Presented venographic findings also showed high incidence of vascular stenosis without symptomatic central vein thrombophlebitis, which might require inflammatory events in venous endothelium in addition to thrombosis. There are several factors which may cause vascular wall inflammation, such as mechanical and chemical injury by the catheter⁵⁾. A study showed that heparin-Benzalkonium-bonded plastic catheter appeared to provide the best protection against thrombophlebitis⁶⁾. Another study report-

ed that incidence of clinical thrombophlebitis was significantly higher with silicone elastomer catheters than with the polyurethane catheters⁷⁾. Furthermore, it was reported that some caution must be paid to repeat the percutaneous cannulation of the same vein and the change of the catheter over a guidewire⁸⁾. It is suggested that the indication of TPN should be carefully determined to prevent unnecessary catheterization and its complications. Generally, absolute indications for TPN include severe short bowel syndrome, high-output gastrointestinal fistulas, persistent postoperative ileus, intestinal pseudoobstruction unresponsive to enteral feeding, and nonoperative mechanical intestinal obstruction⁹⁾. Nevertheless, a Japanese national survey in 2001 reported that TPN was employed during perioperative period in 78% of total gastrectomy cases and 26.5% of distal gastrectomy cases¹⁰⁾. There is a tendency for surgeons to prefer parenteral nutrition to enteral nutrition in Japan. The presented case also received catheter insertion into the central vein before distal gastrectomy although he was well-nourished and free to eat before the operation. This should be criticized for unnecessary catheterization.

Perioperative nutritional managements for patients who underwent abdominal surgery include TPN and enteral nutrition with peripheral parenteral nutrition. A randomized, multicenter study which compared the outcome of parenteral nutrition and enteral nutrition in 317 patients who had surgery for gastrointestinal cancer, concluded that early enteral nutrition significantly reduced the postoperative complication rate and duration of postoperative stay compared with parenteral nutrition¹¹⁾. Moreover, it was also reported that perioperative administration of an enteral formula enriched with arginine, RNA, and ω 3 fatty acids significantly reduced postoperative infections and length of stay in patients undergoing abdominal surgery for cancer¹²⁾. However, another study reported that most patients prefer parenteral nutrition to nasal gastric feeding (enteral nutrition)¹³⁾. This patient preference may influence upon making decisions regarding the method of nutrient delivery. Furthermore, recent review regarding the postoperative nutritional management has mentioned that surprisingly little evidence is available to support a significant impact of early nutritional support on postoperative clinical outcomes¹⁴⁾. Based on the information of patients' and surgeons' preference, and absolute indications for TPN, it can not be concluded that enteral nutri-

tion has replaced TPN for nutritional management during perioperative period of abdominal surgery. Therefore, it should be emphasized that the indication of TPN be carefully determined to prevent unnecessary catheterization and its complications.

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