Malposition of a Central Venous Catheter Causing Intracranial Septic Thrombophlebitis

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A one-year-old baby with short bowel syndrome and malrotation had received parenteral nutrition via a central venous catheter for eight months. She had had repeated episodes of sepsis. A gallium scan showed abnormal tracer uptake in the right temporal and occipital areas adjacent to the venous catheter. Temporal bone CT revealed the curved tip of the catheter inside the right jugular foramen and an extra-axial elongated calcified lesion. Reactive thickening of the right transverse sinus wall indicated septic thrombophlebitis.

Key words: Central Venous catheter; Intracranial; Thrombophlebitis

Congenital short small bowel associated with malrotation is a disorder of intestinal neuronal dysplasia with a high mortality. It can be treated with long-term total parenteral nutrition until the child’s intestinal absorptive function develops [1, 2]. However, septic complication is a major problem of parenteral nutrition. Thrombus formation around a catheter is a predisposing factor [3]. Although septic thrombophlebitis in peripheral vessels adjacent to an indwelling catheter is quite common, intracranial thrombophlebitis has rarely been reported. Two cases of intracranial complications associated with malpositioned catheters resulting in perforation of vessels have been published [4]. We describe a patient who developed intracranial septic thrombophlebitis associated with a malpositioned central venous catheter.

CASE REPORT

A one-year-old female baby was born to a G2P2 mother by a normal spontaneous delivery. Prenatal examination had been normal. The baby was born at 38 weeks of gestation, weight 2682 gm. Labor and delivery were uncomplicated. At 10 weeks of gestation, the mother had had acute pyelonephritis which was treated with antibiotics for 2 weeks. The baby developed bilious postprandial vomiting and persistent abdominal distension at the age of 2 weeks. Congenital short bowel syndrome associated with malrotation was diagnosed and peripheral parenteral nutrition began at one month of age. At 4 months of age, a central venous catheter was placed in the right internal jugular vein for long-term parenteral nutrition. The catheter had to be replaced several times because of recurrent methicillin-resistant Staphylococcus aureus infection or malfunction of the central line. The patient was readmitted at the age of one year just after having been discharged after another replacement of the catheter. She had a complicated 3-month hospital course with failure to thrive, malnutrition, and poor feeding. At first she
had positive blood cultures for Candida albicans and was treated with fluconazole. Subsequently, she had a persistent fever but there was no obvious site of infection. Blood and stool cultures were negative. A gallium scan revealed abnormal tracer uptake in the bony right temporal and occipital areas, a finding confirmed by a TC-99M MDP bone scan. The tentative diagnostic impression was mastoiditis. A brain magnetic resonance imaging (MRI)(1.5 T, Signa, General Electric) with and without contrast enhancement demonstrated an elongated thromboembolism along the course of right sigmoid sinus on T1 Fluid Attenuated Inversion Recovery (FLAIR) (Fig. 1a), T2 FLAIR (Fig. 1b) and contrast enhanced axial T1 weighted image (Fig. 1c). The thromboembolism appeared to be associated with a reactive thickening of the sinus wall (Fig. 1d) that was presumptively related to a round, low-intensity areas within the right jugular vein in all pulse sequences (Fig. 1e). A chest radiograph showed that the central line was malpositioned, being directed upward. The catheter tip was not visible on that film (Fig. 2a). A film of the right mastoid bone showed that the catheter tip superimposed on the mastoid cells (Fig. 2b). There was an elongated lesion with marginal calcification and containing air (mean: -321 Hounsfield.

**Figure 1.** Brain magnetic resonance imaging at the level of medulla oblongata: a. On axial T1 FLAIR (TR/TE/TI/excitations = 2407/22.3/862/2) there is a small central high-signal area (white arrow), indicating static blood flow, surrounded by a low-signal area that is the thromboembolism. b. On axial T2 FLAIR (TR/TE/TI/excitations = 9002/138/2200/2) the pattern was reversed, i.e. low-signal area (white arrow, static blood flow) surrounded by high-signal area (thromboembolism). c. On contrast enhanced axial T1WI (TR/TE/excitations = 516/10/2), a filling defect is noted inside the right sigmoid sinus, which contained small central high signal intensity (white arrow) that indicates the static blood flow. d. The wall of the thromboembolised sigmoid sinus is enhanced and thickened. e. A round, low-intensity signal is seen in the right jugular vein in all pulse sequences, indicating the presence of catheter (white arrow head).
units) in the right sigmoid sinus toward the distal right transverse sinus on noncontrast CT (Fig. 3). CT of the temporal bone demonstrated a tube-like density with a curved tip inside the right jugular foramen (Fig. 4). This was consistent with a diagnosis of catheter-related intracranial septic thrombo-phlebitis. After removal of the central venous catheter, her fever subsided.

**DISCUSSION**

Central venous catheters are widely used in children receiving long-term parenteral nutrition. However, catheter-related blood-stream infection is a serious and potentially life-threatening complication. One predisposing factor for such infections is thrombus around a catheter [3]. Septic deep vein thrombosis is a major complication associated with central venous catheterization. The most common causative organisms are S. aureus, gram-negative bacilli and Candida species [3]. Malpositioning of the catheter risks development of thrombosis and obstruction in the venous system [5]. As some patients such as ours require a central catheter for survival, great care must be taken in its insertion. The position of the catheter should be confirmed by

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**Figure 2.**

*a.* Chest x-ray shows a central line along the right internal jugular vein, while the catheter tip is not visible.  
*b.* A skull film shows the central line with curved tip superimposed on the right mastoid cells (white arrows).

**Figure 3.** Noncontrast CT at the level of pons shows an ovoid-shaped low attenuating lesion with air-containing bubble (black arrow head) and peripheral calcification within the right sigmoid sinus, indicating calcified thromboembolism.

**Figure 4.** A temporal bone CT at the level of jugular foramen reveals a round radio-opacity in right jugular vein, indicating the presence of catheter.
x-ray, making sure that the entire course of the catheter is visualized. In pediatric patients, a catheter of appropriate size must be inserted particularly carefully to avoid perforation of the child’s thin-walled vascular structures [4].

Infection of a central venous thrombus is a serious but rarely recognized complication of applying central venous catheters in children. Central venous thrombosis should be suspected in patients with persistent catheter-related bacteremia [6]. Ultrasound and magnetic resonance venography can be used for diagnosis of venous thromboembolism [7].

Intracranial infection is a rare sequela of central venous catheter placement, thus the possibility may not be considered as one of the differential diagnosis of fever in a febrile patient with an indwelling catheter. Careful radiographic examination of the catheter is mandatory when there is persistent fever, and that the position of a central catheter should be checked as soon as it is inserted.

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我們報告一合併有短腸症及腸旋轉失常的幼兒病例，因中央靜脈營養管異位至頸靜脈孔所引發的顱內血栓靜脈炎。顱內感染在留置中央靜脈管的病人並不常發生，影像追蹤留置管的位置，並小心警覺中央靜脈管為可能感染源，在這類需長期留置中央靜脈管的病人，是需要特別留心以免發生嚴重的後遺症。

關鍵詞：中央靜脈管；血栓靜脈炎；顱內