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Letter to the Editor

An Alternative Option for Catheterization at End-stage Central Venous Access in Children with Intestinal Failure

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Introduction

Intestinal failure (IF) has been defined as "the reduction of functional gut mass below the minimal amount necessary for digestion and absorption adequate to satisfy the nutrient and fluid requirements for growth in children" (1). Children with IF are dependent on intravenous fluids and parenteral nutrition (PN) (2,3). A functional central venous catheter (CVC) is essential for their survival until intestinal adaptation occurs. End-stage central venous access is defined as a critical restriction in the patency of the superior vena cava (SVC) or the major vessels draining into it, with or without inferior vena cava (IVC) occlusion (2). It has been reported that direct intra-atrial catheters may be used in children with end-stage central venous access (2).

In this case report, we present two patients who were candidates for ITx with end-stage central venous access where direct intra-atrial catheter was inserted.

Case 1

A 9-month-old girl who was diagnosed with microvillus inclusion disease was referred to our centre for ITx. Thrombosis of the left and right subclavian veins, internal jugular veins, and femoral veins were observed via radiological imagings. A direct intra-atrial 5-French (Fr) implantable port catheter was inserted (Figure 1a). Heparin was administered via a line lock to 1/1000 with taurolidine to prevent catheter-related bloodstream infections (CRBSI). A cadaveric ITx was performed when the patient was 14 months old. A catheter infection related to Candida

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parapsilosis (C. parapsilosis) was observed during the fifth month in a direct intra-atrial catheter. Only the port catheter chamber was changed for revision purposes. The direct intra-atrial catheter was used for 11 months with only one CRBSI without the need for replacement until the patient died due to sepsis at 21 months of age.

Case 2

A 9-month-old boy with short bowel syndrome was referred to our centre. He had end-stage central venous access. A direct intra-atrial 4-Fr implantable port catheter was inserted. The distal tip of the catheter was observed as being outside of the atrium with inspiration due to the short line of the catheter on the ninth day (Figure 1b). The catheter was removed and a direct intra atrial 5-Fr implantable port catheter was inserted again (Figure 1c). The port of the catheter was changed because of recurrent catheter infections related to Staphylococcus spp. in the fifth month of the direct intra-atrial catheter. CRBSI with C. parapsilosis was observed. This direct intra-atrial catheter was replaced with a new one at the seventh month. The patient was monitored with an intra-atrial catheter for nine months until the time of writing.

Discussion

Technique, mechanical complications, the risk of thrombotic and infective complications, the duration of the anticipated central venous access and the physician's experience affect the choice of vein for CVC placement. Femoral insertion is associated with higher risks of catheter colonization and thrombotic complications (4). Therefore, a femoral CVC is not recommended, especially in children who are candidates for ITx. An alternative but more invasive access for CVC placement in children with IF who have end-stage central venous access is a direct right atrial insertion through a sternotomy. We preferred venous access which was either transhepatic or direct intra-atrial in our patients who had end-stage central venous access, and we opted for direct intra-atrial catheters. A direct intra-atrial implantable port catheter was inserted via midline sternotomy in our patients. The surgical procedure was the same in both patients: the thorax was entered through the fourth intercostal space with a right anterolateral mini-thoracotomy. The pericardium was incised from the anterior of the phrenic nerve. A bladder-mouth suture was placed in the right atrial appendix, and the catheter was inserted into the inferior vena cava through the incision made in this area. The catheter was thrust from the thorax to the subcutaneous tissues through the third intercostal space. The port chamber was inserted in the pocket which was opened at the level of the second intercostal space on the right side. Rodrigues et al. (2) reported four children who had a double-lumen CVC which went directly to the right atrium through a sternotomy before ITx. They also reported complications from a serous pleural effusion requiring drainage which developed within 24 hours in one patient. This line was inadvertently dislodged on the third day and at 15 months in two patients after receiving direct intra-atrial catheters via midline sternotomy (2). We observed that the distal tip of the catheter not in the atrium due to the short line of the catheter on the ninth day after insertion in our Case 2 patient.

Rodrigues et al. (2) reported that in one patient, a direct intra-atrial tunnelled CVC was removed and replaced by a subcutaneous port at 12 months; unfortunately, the patient died of bacterial endocarditis 6.5 years after transplantation. The other three transplant recipients who had a direct intra-atrial catheter all had their CVCs removed within three months of the transplant operation (2). They found that these catheters were adequate for the perioperative management of an uncomplicated transplantation (2). In one of our patients, a direct intra-atrial implantable port catheter was used in the perioperative and postoperative periods of ITx.

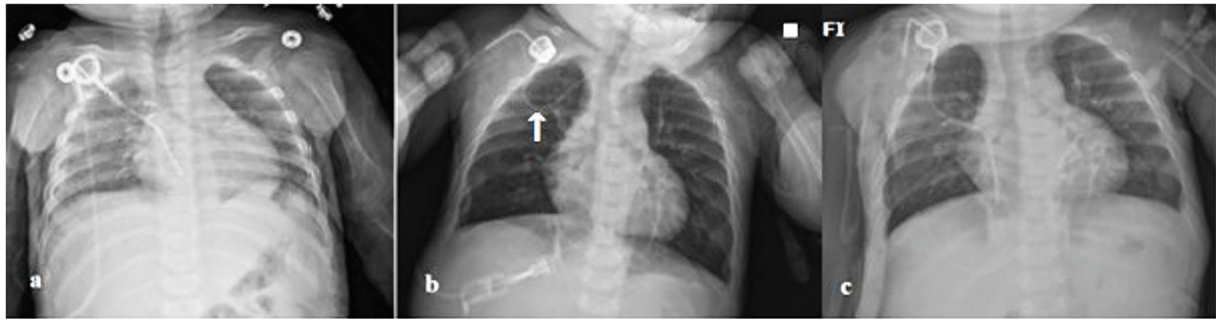

Figure 1. a) A direct intra-atrial catheter in Case 1. b) The distal tip of the catheter was not in the atrium in Case 2. c) The direct intra-atrial catheter was reinserted in Case 2

Taurolidine is effective in preventing CVC–related sepsis and should be used during long-term catheter use in children with IF (5). We used taurolidine with heparin as a line lock in order to prevent thrombosis and CRBSI in patients with direct intra-atrial implantable port catheters. CRBSIs were observed at 11 and 9 months in Cases 1 and 2, respectively. Changing the port of the catheter alone with a minimally invasive technique was effective for the treatment of CRBSI in our patients.

In conclusion, a direct intra-atrial implantable port catheter can be used for prolonged periods in children with IF who have end-stage central venous access. It is adequate for the management of the perioperative and postoperative periods of ITx. Changing the port of the catheter can be an efficient method for the treatment of CRBSI.

Footnotes

Authorship Contributions

Surgical and Medical Practices: O.I., M.A., İ.M., C.T., Concept: B.A., M.B., Design: B.A., M.B., Y.Ç.A., Data Collection or Processing: S.K., Analysis or Interpretation: Ş.O.K., Literature Search: S.G., Writing: B.A., M.B.

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