

Percutaneous retrieval of a broken umbilical vein catheter from left atrium in a premature newborn case report and literature review

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Abstract

A 28-week-old preterm infant with a birth weight of 1370 g had a broken segment of umbilical vein catheter (UVC) lodged in the left atrium. It was observed that a 10-cm fragment of catheter had migrated to the left atrium appendage through the patent foramen ovale. The catheter was successfully retrieved by fluoroscopically guided percutaneous cardiac catheterization using grasping forceps after failed many trials of snare wire without complication.

Presently described was a case of fractured and embolized UVC in a very low-birth weight preterm infant, and its successful retrieval via percutaneous endovascular approach.

Introduction

Umbilical catheters are often used in preterm infants as central venous access for fluid, drug administration, and blood sampling in intensive care units. When used properly, they are generally safe but there are various complications associated with the UVC, such as infection, arrhythmia, embolization, and catheter fracture [1–3]. Catheter fracture is an uncommon but very challenging complication for clinicians. Fractured Catheter segments can be retrieved by surgical or percutaneous techniques.

Case report

A 28-week-old preterm infant with a birth weight of 1370 g was born by cesarean section. He was admitted to neonatal intensive care unit because of respiratory distress due to meconium aspiration syndrome. He was intubated, mechanically ventilated, A 3.5 Fr UVC was used during initial days of his stay for parenteral nutritional support. After hemodynamic and respiratory stabilization, the UVC was removed on the fourth day of life, but during catheter removal the UVC got divided by a scalpel at the skin level while removing the retaining suture. An attempt to retrieve the fractured portion of UVC was planned by a local exploration but the end had retracted into the lumen of the umbilical vein and it was not visible. During manipulation, the catheter got accidentally transected and embolized into the left atrium with its one end still remaining in the inferior vena cava (IVC) (Figure 1).

Patient was transferred urgently to cardiac catheterization for removal fractured segment by percutaneous technique.

Informed consent was obtained from the patient's parents. Under general anesthesia trans-umbilical vein access was done. Intravenous heparin (100 IU/kg) was administered. Cut down of Umbilical vein was done, then 0.018-in floppy guidewire was cross and advanced into umbilical vein (Figure 2), and floppy guidewire was exchanged with a five French venous sheath. The fractured fragment of UVC was retrieved with fluoroscopically guided, Though we could hold the

catheter very well with the snare, its snared end was making a loop and could not be retrieved back into the 5 F sheath, then small size grasping forceps was cross and catch the distal edge of fractured segment and removal without complications.

Total procedural time was 35 minutes, with 4 minutes of fluoroscopy. Control fluoroscopy demonstrated total removal of the broken UVC (Figure 3). Blood loss during the procedure was minimal.

Discussion

The UVC have contributed a great deal in managing critically ill

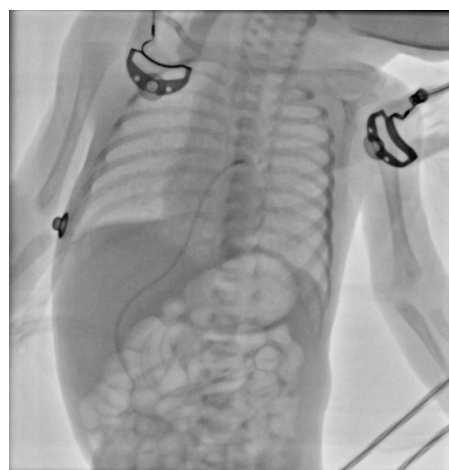


Figure 1. Broken UVC migration via patent foramen oval to left atrial appendage.

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Table 1. Listed of umbilical vein catheter fracture.

No	year	Authors	No. of cases	Gestation al Age	Gestation al Weight	UVCin Umbilical Artery (A) or Vein	Lodged at	Retrieval
1	1972	[6]	1	NA	NA	A	Thoracic aorta	Open
2	1977	[5]	2	32- weeks	1310gms	A	Umbilical artery	Open
				28- weeks	950 gms	A	Thoracic Aorta	Not retrieved
3	1978	[7]	2	33- weeks	1370 gms	A	Femoral artery	Wire loop
				32- weeks	1370 gms	V	Umbilical vein	Loop snare
4	1987	[8]	1	NA	NA	A	Extremity vessel	Open
5	1987	[9]	1	37-weeks	3200 gms	V	One end in left atrial appendage other end in ductus venosus	Endovascular (trans-femoral)
6	1995	[3]	1	30-week	1117 gms	V	Left superior pulmonary vein	Percutaneous pigtail catheter and a snare wire with fluoroscopy
7	1995	[10]	1	NA	NA	A	Umbilical artery	Open (trans- umbilical)
8	1997	[11]	2	29-weeks	815 gms	A	Umbilical artery	Loop snare
				31- weeks	1117 gms	V	Umbilical vein	Pigtail+ Snare
9	1998	[12]	1	26-weeks	870 gms	V	Umbilical vein	Open cutdown + wire loop using fluoroscopy
10	2000	[13]	1	NA	NA	A	Common ilica artery	Open (infra- umbilical)
11	2004	[14]	1	38- weeks	3761 gms	U	Umbilical vein	Open dissection+ endovascular through umbilical vein
12	2007	[15]	1	27- weeks	NA	A	Umbilical artery	Laparotomy
13	2013	[16]	1	26- weeks	NA	V	Umbilical vein	Open (supra-umbilical)
14	2013	[17]	1	37- weeks	1800 gms	V	Across right atrium with one end in SVC other end in IVC	Open (Supra-umbilical) failed then Endovascular (Trans- femoral)
15	2014	[18]	1	38- weeks	970 gms	V	Pulmonary artery	Loop snare
16	2015	[19]	1	40 weeks	4000 gms	V	Umbilical vein	Open
17	2016	[20]	1	38 weeks,	1250 gms	V	Right atrium	Wire loop
18	2017	Our case	1	38 weeks	1400 gms	V	Left atrial appendage	Loop snare failed then grasping forceps

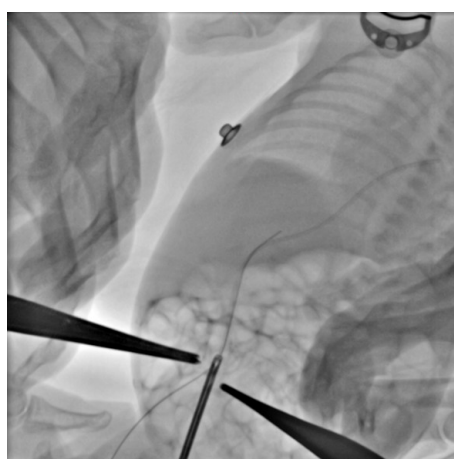


Figure 2. 0.018-in floppy guidewire was cross and advanced into umbilical vein.

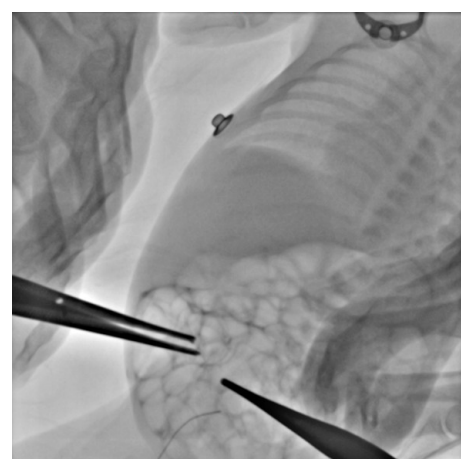


Figure 3. Control fluoroscopy demonstrated total removal of the broken UVC.

patients in NICU. Complications are related to positioning and long duration of catheterization. Lodged fragments of catheter are relatively very rarely reported. These complications include nosocomial sepsis, vasospasm, vascular perforation, thrombosis, emboli (air, thrombus)

and catheter fracture [1-4].

The mechanism of UVC breakage has been proposed and discussed by Choi *et al.* [5]. He reported two cases of broken UVC

and proposed that it is possible that the UVC can get inadvertently damaged by needles or scissors during catheter insertion and fixation many methods of removal have been described, including surgical techniques, percutaneous retrieval via snaring or biopsy forceps.

An exhaustive search of the literature revealed only 17 articles with 20 cases of broken UVC in neonates (Table 1).

Included our case, totally 21 cases were analyzed. Gestational Age were (26-38) weeks. Gestation weight were (970 to 4000) grams. The catheter was placed and broken in umbilical artery in 9 cases and in umbilical vein in 12 cases. Totally 12 cases the broken catheter was removed by surgical techniques, 8 cases was removal by different percutaneous intervention (snaring or biopsy forceps) and in one case the broken catheter was not retrieved.

Gasparis *et al.* [15] described a successful removal of a dislodged UVC through the umbilical vein using endovascular Amplatz loop snare. This minimally invasive route was also used by Ruiz *et al.* [3] who have reported successful retrieval of a broken umbilical vein catheter lodged in the left superior pulmonary vein from a 30 week preterm neonate.

We initially resorted to umbilical vein cut down and exploration as the lower end but this attempt failed. A check radiograph revealed that the broken fragment of UVC had actually migrated higher up and hence its removal was possible only by endovascular method and it was then successfully performed by a trans-umbilical approach by the interventional cardiologist using a goose neck snare but this attempt also failed. In the last we trial to removal a broken umbilical vein catheter by small grasping forceps via umbilical via a 5-F standard snare sheath.

Conclusion

Umbilical venous catheterization is very common in the care of preterm newborn. Complications in such common invasive interventions cannot be avoided. Fracture and embolization of a UVC is a rare but serious complication. Presently reported was the successful retrieval of a fractured and embolized UVC in a preterm infant, via percutaneous endovascular approach, without complication.

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