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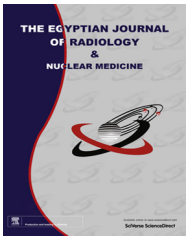

ORIGINAL ARTICLE

Transhepatic venous catheters for hemodialysis

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KEYWORDS

Transhepatic;
Hemodialysis;
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Abstract *Purpose:* To describe our experience with the technique of transhepatic venous access for hemodialysis and to evaluate its functionality and complications.

Patients and methods: From March 2012 till October 2012, 23 patients with age ranging from 12 to 71 years old having end-stage renal disease (ESRD) were included in our study and were subjected to transhepatic venous catheter insertion. In 21 patients there were not any remaining patent peripheral venous accesses. In 2 patients there were only a last one venous access needed to be preserved. Thus, it was decided to make THVA. In all the 23 patients the indication was palliative due to inoperability which was because of inability to insert an arterio-venous graft or making another arterio-venous fistula. Complications were evaluated and calculated in terms of number of procedures, infection, dislodgement and outcome; in terms of disfunctionality of the catheter.

Follow-up was performed by monitoring the catheter dialysis rate in each session, abdominal ultrasonography, fluoroscopy or CT. Mean survival time and median survival time from the start of treatment were calculated using Kaplan–Meier method.

Results: Twenty-three patients required a single transhepatic access procedure. Because of catheter dislodgment, two patients required a second access placement procedure, which resulted in a total of 25 separate transhepatic access sites in 23 patients. Technical success was achieved in 22 procedures. Functionality success was achieved in 20 patients. Functionality failure occurred in 3 patients.

The trans-hepatic catheters stayed in place between 90 and 300 days. Complications occurred in 14 patients.

Conclusion: Based on our findings, transhepatic hemodialysis catheters have proven to achieve good long-term functionality. A high level of maintenance is required to preserve patency, although this approach provides remarkably durable access for patients who have otherwise exhausted access options.

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1. Introduction

Many patients who undergo hemodialysis and have sustained multiple failed attempts to obtain vascular access, it is often difficult to achieve access to the central venous system, and success in achieving such access is often life-saving (1).

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Tunneled central venous catheters are a common and highly effective means of administering temporary venous access for dialysis for periods longer than 3 weeks (2).

They are also effective for those who have exhausted other possibilities, such as arteriovenous fistulas or grafts (3). Tunneled transhepatic catheters have become a moderate-term to long-term mode of dialysis in some patients who have exhausted traditional access sites because of widespread central venous occlusions, including the femoral veins, collateral neck veins, and renal veins, through previous catheter placements and surgeries. As a result, alternative sites have begun to be explored in patients who have become catheter-dependent, including translumbar and transhepatic approaches to the inferior vena cava (IVC) (4).

Transhepatic venous access for dialysis was described by Po et al. in a case report in 1994 (5). Although considered a viable approach, the transhepatic dialysis catheter is believed to carry substantial risks, including bleeding, thrombotic occlusion, infection, hepatic dysfunction, and dislodgment (6).

The aim of this work is to describe our experience with the technique of transhepatic venous access for hemodialysis and to evaluate its functionality and complications.

2. Patients and methods

From March 2012 till October 2012, 23 patients (3 males, 20 females) with age ranging from 12 to 71 years old (mean age was 48.4 years old) having end-stage renal disease (ESRD) were included in our study and were subjected to transhepatic venous catheter insertion.

All procedures as well as the pre- and post-interventional assessment and follow-up clinical, radiological & lab. studies were performed in Vascular & Interventional radiology Unit and the department of nephrology.

The patients were partly recruited through the interdisciplinary Interventional Radiology-Nephrology conference of the university hospital, in which all cases of ESRD referred or admitted to our hospital would be discussed by the nephrologists, surgeons, interventionists, and any other specialists who happen to be associated with those patients. Cases were mostly referred to our interventional radiology unit through several clinics mainly nephrologic.

If, in any of the cases, THVA insertion was justified, and the case met the inclusion criteria of our study the possibility was discussed with the colleagues in the conference to reach a decision about the line of treatment to be pursued, THVA insertion or otherwise.

The inclusion criteria of our interventional unit were: Patients having ESRD on long term hemodialysis and having no remaining patent peripheral venous access or those who have only one last venous access needed to be preserved for permanent access making.

The exclusion criteria were: abnormal bleeding profile, ascites, and allergy to contrast materials.

The causes of ESRD in our patient population were SLE, hypertension, DM, obstructive nephropathy & others (Table 1).

In 21 patients there were not any remaining patent peripheral venous accesses. In 2 patients there were only a last one venous access needed to be preserved. Thus, it was decided to make THVA. In the all 23 patients the indication was palliative due to inoperability which was because of inability to insert an arterio-venous graft or making another arterio-venous fistula.

The equipment required included:

- A 15-cm 21-gauge needle.
- A 6–9-F coaxial system (Accustick II Introducer System; Boston Scientific, Watertown, Mass)
- Guidewire, "J"Tip with Straightener, 0.97 mm (0.038 inch.) 50 cm Length.
- Introducer, peel-apart with vessel dilator, 14 Fr.
- Tunneler.
- Hickman hemodialysis/apheresis 13.5-Fr., round dual-lumen radiopaque silicone catheter, luer lock adapters, and SureCuff® tissue in growth cuff, 2.0 mm lumens, 36 cm overall length, 19 cm tip-to-cuff length (Bard Access Systems, Salt Lake City, Utah) (Fig. 1) or Ash Split Cath (Medcomp, Harleyville, Pa) in different lengths (Fig. 2).
- Injection caps.
- Suture wings.

3. Technique of THV catheter insertion

Twenty-three patients required a single transhepatic access procedure. Because of catheter dislodgment, two patients required a second access placement procedure, which resulted in a total of 25 separate transhepatic access sites in 23 patients.

Eight patients received the Ash Split Cath (Medcomp, Harleyville, Pa). One patient received a 28-cm catheter and seven patients received a 32-cm catheter. Fifteen patients received the Hickman Hemodialysis/Apheresis 13.5-F round dual lumen catheter (Bard Access Systems, Salt Lake City, Utah);

Table 1 Patients' age and causes of ESRD.

Patient	Age	Cause(s) of ESRD
1	64	SLE
2	61	Aspirin
3	37	Auto-immunity
4	71	Obstructive nephropathy & cancer bladder
5	29	SLE
6	61	Single kidney with obstructive nephropathy
7	39	Auto-immunity
8	43	DM-1
9	69	End stage vascular disease
10	64	DM-1
11	71	HTN & heart problems
12	53	DM, HTN & heart problems (MS)
13	23	Vasculitis & blood disorder
14	46	Vascular disease
15	63	DM-2
16	55	DM, HTN, heart problem & obstr. nephropathy
17	34	DM, refused kidney allograft & auto-immunity
18	25	Stunted growth, DM & vascular disease
19	39	Obstr. uropathy & single rt. kidney
20	49	Polycystic kidney disease
21	57	HTN, DM & bronchogenic carcinoma
22	12	SLE
23	44	SLE