Haemodialysis access by inferior vena cava catheterisation

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To the Editor: Progress in haemodialysis (HD) has made it increasingly accessible to patients, who often are able to perform their own dialysis at home.[1] We report our experience with 7 patients who were dialysed via inferior vena cava (IVC) catheters inserted after failure to obtain a functioning arteriovenous (AV) fistula or a femoral, subclavian or jugular catheterisation. IVC catheterisation is useful to gain vascular access for haemodialysis when conventional routes are impossible, and helped to prolong the life of 7 end-stage renal disease (ESRD) patients, with minimal side-effects.

Background

Dialysis membranes are becoming more biocompatible, and dialysis machines safer and easier to operate,[2] while also contributing to improved care of patients with non-renal disease, including end-stage liver disease and cardiac surgery bridging.[3] But vascular access can limit haemodialysis, especially in patients with poor veins, and may cause death in patients with ESRD. AV fistulas may thrombose and lose their patency. Subclavian, jugular or femoral catheters may be used but are often associated with thrombosis or stenosis.

Patients with ESRD can be kept alive for decades by dialysis or kidney transplantation. However, the use of catheters exposes patients to complications such as venous thrombosis, which affects blood flow and the adequacy of dialysis. Haemodialysis via IVC catheters has not been widely practised.[4-6] Vascular access remains a cause of morbidity and mortality in patients with ESRD,[7] and expertise in its use may be lacking. IVC access for haemodialysis may not need to be continued indefinitely as other means of access may become available through collaterals developing or resolution of occlusion. Other venous accesses such as the common femoral vein are prone to infection.[6]

Methods

Using the Seldinger technique, a double-lumen IVC catheter set was inserted.[8] The IVC was punctured via a translumbar approach with an 18-gauge Cheeba needle (Fig. 1); a 14 French dual-lumen tunnel dialysis catheter primed with heparin was introduced co-axially over the guide wire. Haemodialysis was performed 24 hours later and continued regularly 3 times a week. All patients who underwent the procedure were included in this retrospective study. The indication for this method was occlusion of all conventional haemodialysis vascular accesses. Outcomes and complications related to IVC catheters were recorded.

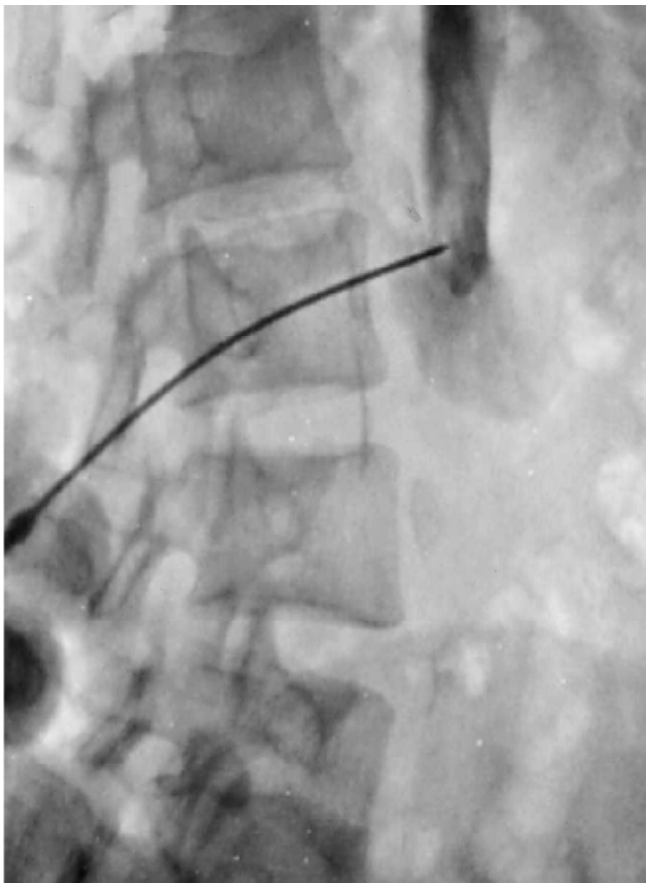

Fig. 1. Fluoroscopy showing puncture of inferior vena cava.

Results

Of 78 patients haemodialysed at Addington Hospital's haemodialysis unit from 2002 to 2007, 7 patients had a total of 9 IVC catheters following failure to obtain a functioning AV fistula or a femoral, subclavian or jugular catheterisation. The patients were 4 males and 3 females, ages 20 - 41 years, with a mean of 33 years (Table I). Two patients had torn catheters replaced. Infection of the catheters occurred in 4 patients. *Staphylococcus aureus* was cultured in 2 and *Pseudomonas aeruginosa* from another. Three patients died; 1 after 16 months from a cerebral bleed probably related to autosomal dominant

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polycystic kidney disease (ADPKD), 1 from catheter-related sepsis after 14 months, and 1 from further catheter occlusion after 9 months. All 3 patients were continuously dialysed through IVC catheters during the period reported (9, 14 and 16 months). The average lifespan of IVC catheters was 11.1±1.5 months (range 2 - 19 months). Selected cases highlight the course of patients following catheter insertion.

Patient 1

A 41-year-old woman with ESRD secondary to ADPKD was treated by dialysis for 10 years, including continuous ambulatory peritoneal dialysis (CAPD) for 1 year, followed by haemodialysis. Two attempts to fashion an AV fistula were unsuccessful, and she was haemodialysed via subclavian and femoral catheters respectively. Due to occlusion of the subclavian, jugular and femoral veins, she was haemodialysed via an IVC catheter. After 2 months, the catheter cracked at the external tip and was successfully replaced by another that performed very well for 14 months, until she died suddenly following a massive cerebral bleed.

Patient 2

A 28-year-old man with ESRD of unknown origin had been treated by chronic dialysis for 3 years. He was treated by CAPD for 6 months that was stopped due to recurrent peritonitis and a frozen abdomen. An attempt to fashion an arteriovenous fistula failed. Renal transplant surgery was abandoned because of extensive fibrosis which rendered any dissection hazardous. Subsequent haemodialysis was via catheters placed consecutively in subclavian, jugular and femoral veins. Owing to their occlusion, haemodialysis was continued via an IVC permanent catheter that functioned very well for 8 months, when it tore at the exit site. It was successfully replaced and is functioning well with a venous Doppler revealing good venous flow. A subsequent radio-radial AV fistula is functioning well for haemodialysis.

Patient 3

A 40-year-old man with ESRD of unknown aetiology was treated by haemodialysis for 6 years after failure of CAPD. Well-controlled hypertension and diabetes mellitus had been diagnosed 5 years earlier. On ultrasound, the left kidney was not clearly visualised while the right kidney measured 7.2 cm and was echogenic. An AV fistula worked for 6 months but then stopped because of thrombosis, and femoral catheterisation was unsuccessful owing to occlusion. A poorly effective peritoneal dialysis was commenced because of vascular access and pending IVC catheterisation. A permanent IVC catheter was inserted and haemodialysis commenced. A *S. aureus* infection of the IVC catheter was successfully treated with vancomycin (Table I).

Discussion

IVC catheterisation helped to prolong the lives of our 7 ESRD patients. As in previous studies, IVC catheterisation was offered when all other HD accesses failed.[9,10] The technique requires expertise to be developed to improve success and reduce the risk of injury,[11] as well as an experienced radiologist and a vascular suite. If these are not available, a surgical approach can be used.[4]

The state of patients' veins should be regularly reviewed to assess the development of adequate collaterals that may allow use of peripheral vein accesses. Recanalisation of an occluded vein should be considered if no other conventional vascular access is possible.[12-14]

An IVC catheter can be replaced safely.[15] IVC catheter-related thrombosis may be treated using a wallstent or thrombolitic agents.[12,16,17] Despite its usefulness for haemodialysis, IVC thromboses may also occur and other options may need to be considered.[18] Our patient 2 underwent a successful AV fistula after >8 months of IVC catheter use. IVC catheters are used for indications other than haemodialysis, such as in peripheral

Table I. Profile of patients haemodialysed via IVC catheter

Patient	Age/sex	Nephropathy	Indication	Durat. IVC cath.	Complication	Outcome
1	41/F	ADPKD	Occlusive veins	2; 14 months	Torn; nil	Functioning cath. Death (cerebral bleed)
2	28/M	Unk	Vein thrombosis	8; 10 months	Torn; nil	Resolved, AV fistula
3	40/M	Unk	Occlusive vein	19 months	Infection	Functioning cath.
4	20/M	CGN	Vein thrombosis	9 months	Occlusion	Replaced by cath. in collateral femoral vein
5	30/M	CGN	Vein thrombosis	11 months	Recurrent	Functioning infection
6	27/F	CIN	Vein occlusion	13 months	Infection	Functioning
7	32/F	Unk	Vein occlusion	14 months	Infection	Death

ADPKD = autosomal dominant polycystic kidney disease; Unk = unknown; CGN = chronic glomerulonephritis; CIN = chronic interstitial nephritis; cath. = catheter

stem cell apheresis and transplantation.[19] Complications of IVC catheters and other long-term haemodialysis catheters include infection and thrombosis.[20,21] In our series, infection occurred in 4 and thrombosis in 1 out of 7 patients. No significant difference has been found between brands of IVC catheter and the prevalence of stenosis and thrombosis.[18]

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Accepted 30 June 2008.

Knowledge of post-rape procedures and guidelines among first-year female resident students at the University of the Free State

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To the Editor: Rape is a serious violent crime. In South Africa in 1994, 44 751 rape cases were reported to the police,[1] increasing to 54 926 in 2006.[2] Of the rape victims in South Africa, a third are young girls.[3,4] Investigations strongly emphasise the importance of rape educational programmes.[5] Our investigation was conducted before the amendment of Act 32 of 2007 regarding the legal definition of rape and related sexual offences was accepted and implemented.[6]

We aimed to determine the knowledge of post-rape procedures and guidelines among first-year female students living in a residence on campus at the University of the Free State (UFS), and how/where this information was acquired; evaluate the efficiency of existing educational campaigns and programmes; and, if necessary, outline new programmes that could be implemented.

Our study showed that the distribution of existing rape guidelines is inefficient. Respondents felt strongly that insufficient post-rape guidelines were available, and were eager to obtain adequate information. Since our sample consisted mainly of students who had recently matriculated, we concluded that precise post-rape guidelines should be addressed at school level.

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Methods

A descriptive study was performed in 2006 after a pilot study to test the logistics and questionnaires. Six of the 10 female residences on the UFS campus, which were representative of the general female student population, were included by a simple randomised selection process. First-year students who attended specific house meetings were requested to participate. Ethical considerations, informed consent, anonymity, confidentiality, and secure processing and storage of information were explained to participants. The Ethics Committee of the Faculty of Health Sciences, University of the Free State, granted approval.

Results

Three hundred and fifteen first-year female students, aged 17 - 24 years (mean 18.9 years) participated; 249 (79%) had matriculated in 2005 (range 2001 - 2005). Although 93.3% of respondents indicated that they knew what rape implied, only 71.8% of them could give a technically correct definition of rape.

Of the respondents, 59% (186/315) reported having received guidelines on rape. The sources of information included teachers (56.7%), posters and pamphlets (52.8%), family members (52.2%), invited speakers (37.1%), police (36.5%) and health care workers (30.9%). These respondents completed open-ended questionnaire items to indicate the steps they would take according to their acquired information, in the event of being raped. None indicated that she would go to a safe place, or that no alcohol or medication should be taken; 66.7% indicated that they would go to the police; 29.5% said they would go directly to a hospital; and less than 40% knew that they should not wash or take a bath/shower after having been raped.

Of 129 respondents who had not received information on post-rape guidelines similar to the previously informed group, 65.8% said that they would go to the police, while none indicated that no alcohol or medication should be taken.

Twenty-five per cent of respondents revealed that they knew someone who had been raped, and were asked in an open-ended questionnaire item to indicate what they did or said to help the victim. In 73.5% of cases, their responses were inappropriate or not applicable. None told the rape victim to go to a safe place, not to consume any alcohol or medication, or to place clothes that had been removed in a paper bag. Only 2.9% advised the rape victim not to bath, and to keep their clothes on, while going directly to a hospital was suggested by only 7.4%.

Only 16% of respondents felt that there was sufficient information available on post-rape guidelines, and 91.6% indicated that they would like to receive more information on the matter.

Discussion

None of the respondents was aware that no alcohol or medication should be consumed after having been raped. Consumption of any substances after the incident could influence the outcome of the victim's medical examination.[1] About two-thirds of respondents were convinced that the rape victim should go directly to the police, whereas it is recommended that the victim should go to a hospital first, from where the police would then be summoned.[1] The welfare of the victim could be compromised further by postponing medical treatment and a lack of sufficient co-operation between the police and health care services.

There were no statistically significant differences between the previously informed and uninformed groups. It could therefore be concluded that both had the same level of knowledge on post-rape guidelines, so calling into question whether available guidelines were communicated correctly, and if they were in the best interest of the rape victim.

An unforeseen result was that 84% of respondents indicated that the information available on post-rape guidelines was insufficient. Since rape is of such concern in South Africa, we expected more respondents to feel that adequate information was available to the public.

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Accepted 26 May 2008.