CASE REPORT

Superior Vena Cava Syndrome in End Stage Renal Disease Patients on Long Term Central Venous Catheters: A Report of Two Cases

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ABSTRACT

Background: Central venous catheters are increasingly becoming the most common access at initiation of hemodialysis. They are associated with short term complications such as infections and long term problems resulting in stenosis of the central venous systems.

We report two patients with end stage renal disease, who developed stenosis of the superior vena cava following long term placement of internal jugular catheters for maintenance hemodialysis.

Key words: Superior vena cava syndrome, central venous catheters, end stage renal disease, dialysis

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Introduction

Internal Jugular veins and occasionally subclavian veins are increasingly catheterized for vascular access in hemodialysis patients. In Nigeria, 90% of ESRD patients present late with life threatening features of uremia, giving their care givers very little time for placement of arteriovenous fistulas[1]. This has necessitated the use of temporary access for haemodialysis. Femoral catheters have been the most commonly used ranging from 48 to 70%[2,3].

However, the trend has been changing towards using tunnelled and non-tunneled jugular and subclavian catheters for haemodialysis[2]. Central venous catheters have both short and long term complications associated with their use.

Acute complications such as infections, pneumothorax, hemothorax and injury to the adjacent arteries are frequently encountered. Thrombus formation in the superior vena cava and strictures occur after prolonged use of CVC[4]. CVCs are often associated with adverse outcomes and higher risk of death among ESRD patients when compared with AV fistulae[3].

Superior vena cava syndrome is a long term complication of CVC use and it often results from obstruction to blood flow in the superior vena cava and/or its tributaries. Superior vena syndrome complicates 40% of subclavian access and 20% of internal jugular vein access[5]. Majority are asymptomatic presenting after AV fistula placement with arm swelling or prolong bleeding after hemodialysis. Others present with swelling of

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the upper limbs, head and neck, followed by engorgement of the superficial veins of the face, upper chest and abdomen. Several imaging investigations are required to confirm the diagnosis and exclude other causes such as mediastinal masses. Treatment may range from percutaneous balloon venoplasty to invasive surgical procedures[6]. Such treatment options are often not available in developing countries such as Nigeria and they add to the cost of care for patients and their caregivers.

Patients who develop SVC stenosis develop complications when AV fistulae are eventually created and subsequently worsen their quality of life and increase their cost of care. Prevention of SVC stenosis through early placement of AV fistula and recognition of this complication in its earliest stage will reduce the morbidity and mortality in hemodialysis population[7].

Case Summary

Case 1

A 38year old female civil servant diagnosed with end stage renal disease secondary to chronic glomerulonephritis. She presented with progressive swelling of her upper limbs, face and neck of 8 weeks' duration. She had no associated history of pain or shortness of her breath and no history of change in voice. She had not had neck surgery in the past. She had left brachiocephalic fistula placement 3 months prior to onset of symptoms. The arm swelling has been progressing following every dialysis session. The patient had been on hemodialysis for the 30 months, initially using CVC inserted in IJV, and both subclavian veins.

Physical examination revealed an anxious young woman not in painful or respiratory distress. She was pale, anicteric, acyanosed with oedema of the face, upper limbs and upper chest wall. Her blood pressure was 154/98mmHg and heart sounds were normal. Other systemic examinations were unremarkable. A non-contrast chest CT showed stenosis of both SVCs. Patient was referred for percutaneous balloon venoplasty but could not travel due to lack of funds. She continued using femoral vein access and she died 6 months later from uremic complications.

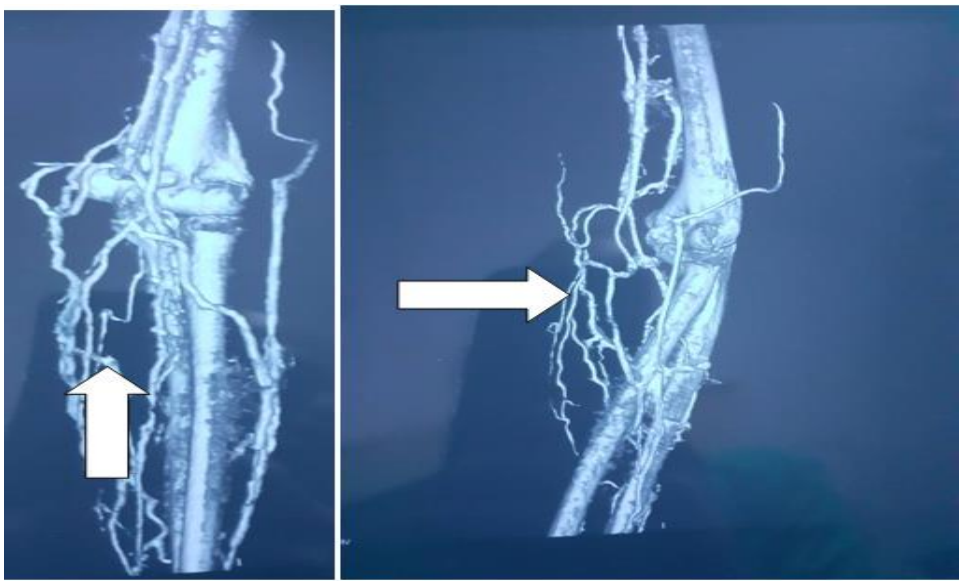

Figure 1: CT venogram showing multiple collaterals of forearm veins (arrows)

Case 2

A 78year old male trader, who developed end stage renal disease secondary to hypertension and was commenced on haemodialysis using non-cuffed internal jugular vein catheter. Ateriovenous fistula was created on the right median bacilic vein and brachial artery six months after commencing maintenance haemodialysis. He presented with progressive swelling of the right upper limb, face and neck. He subsequently developed progressive shortness of breath, orthopnoea and paroxysmal nocturnal dyspnoea. Examination revealed anxious elderly man in respiratory distress, pale and oedema involving the upper chest wall and limbs. He had a regular pulse rate of 84/minute Blood pressure was 164/88mmHg, heart sounds were S_4, S_1 and S_2 There was no audible murmur. Other systemic features were unremarkable.

Computerized tomography venography of the right upper limb vein showed long segment stenosis of terminal segment of the left subclavian vein. The AV fistula was also visualized.

A diagnosis of left subclavian stenosis was made. He continued hemodialysis using femoral vein access.

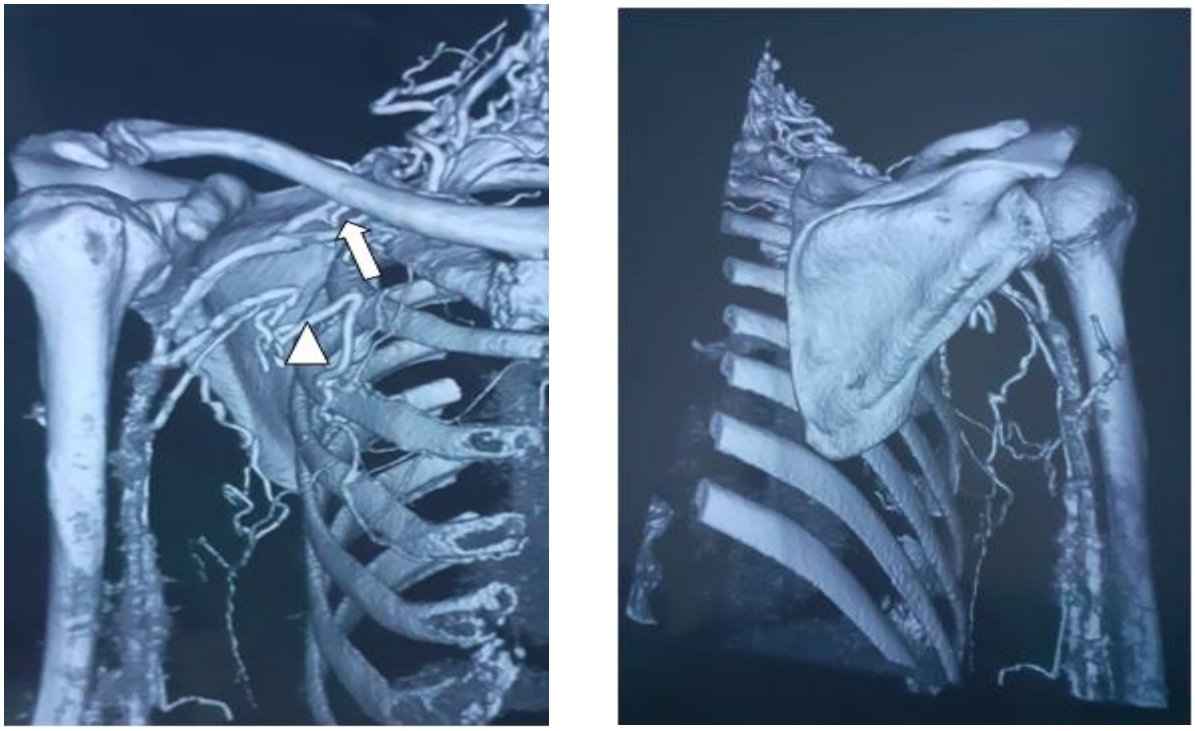

Figure 2: Showing stenotic segment of the right subclavian vein(arrow) with new collaterals(arrow head)

Discussion

The increasing use of central venous catheters for long term haemodialysis has contributed to high rates of complications among ESRD population. These complications are avoidable with timely placement of AV fistula.

Superior vena cava stenosis is thought to be caused by multiple factors during prolonged placement of CVCs[8]. Injury to the intima of the vein during cannulation is thought to provoke inflammation and subsequent stenosis. Thrombus often form on the catheter

tip can also expand to cause narrowing or complete obstruction of vessel lumen. Subclavian catheters are more likely to cause stenosis than internal jugular vein catheters[9].

Risk factors for SVS include repeated cannulations and duration of catheter dwelling. Other factors that promote stenosis are the catheter type, and location of the catheter tip. Catheters made of polyurethane are less associated with stenosis compared with Teflon, polyvinyl chloride and polyethylene catheters[10,11]. The catheter tip causes thrombosis and mechanical injury to the vessel wall. To avoid this complication, the catheter tip should be placed centrally in vein and avoid contact with the vessel wall. It is possible that infection of the catheter and subsequently the vein may have a role in the development stenosis.

Patients present with history of repeated catheterization with long standing catheter placements. They also have progressive swelling of the upper limbs, neck and face. The superficial blood vessels of the neck and upper chest are engorged diverting blood to the lower limbs[12,13].

Superior vena cava obstruction by thrombus can be confirmed by color Doppler studies. It can demonstrate the absence of spontaneous flow pattern in the veins and lack of compressibility of the veins. Computerized tomography scan will rule out compression of the veins by surrounding masses or structures. Contrast enhanced venography can demonstrate stenosis in superior vena cava and enlargement of collaterals in the neck[14]. Treatment depends on the underlying cause of obstruction. In patients with venous thromboses, thrombolysis is the mainstay of treatment restoring flow in obstructed vessels. Patients who have stenosis can have percutaneous balloon venoplasty with or without stent placement and open surgical approach. Long term anticoagulation may be considered in patients who are found to have predisposition to recurrent thrombosis[15].

Alternative renal replacement modalities should be considered such as peritoneal dialysis and/or renal transplant. These still remain theoretical possibilities for most of our patients due to poverty. Timely placement of AV fistula and early presentation for renal care is the most realistic option for prevention of SVC syndrome in our environment[15].

Conclusion

With the increase in CVC for long term dialysis access, many associated complications will be confronting ESRD patients and their clinicians. Majority of the treatment modalities are either not available or very expensive for patients. Therefore, timely placement of AV fistula should be achieved as much as possible to avoid long term catheter placement and prevent SVC syndrome.

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