

CASE REPORT

Carotid–Jugular Arteriovenous Fistula–A Rare Complication of Central Venous Cannulation: Early Diagnosis And Management Can Prevent Further Complications

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ABSTRACT

Iatrogenic carotid jugular arteriovenous fistula formation after failed attempt to access internal jugular vein for haemodialysis catheter placement is a known but rare complication. If, not diagnosed and treated timely can lead to dreadful consequences like high output heart failure and systemic embolization.

Keywords- Arteriovenous Fistula, Carotid-Jugular Fistula, Central Venous Cannulation, Haemodialysis Catheter.

INTRODUCTION

Double lumen catheters are commonly used as temporary vascular access in patients requiring acute haemodialysis (HD). Internal jugular vein (IJV), considering its relative lesser complication rates as compared to subclavian or femoral cannulation, has become the preferred site for temporary haemodialysis catheter placement¹. Arterial puncture is a known complication of IJV cannulation with an incidence of 29.9%^{2,3} which can lead to life threatening bleeding, hematoma formation, pseudo aneurysm, stroke due to thromboembolism and arterio-venous fistula (AVF) formation. Formation of fistula between carotid artery and internal jugular vein after internal jugular vein cannulation is a rare complication with probably only one case reported in India⁴. Central venous cannulation has been carried out traditionally using the landmark technique. Use of ultrasound is advisable for central venous cannulation, whenever available⁵. In India the landmark technique is still being widely used.

Here, we report a case of acquired carotid- internal jugular arteriovenous fistula after multiple failed attempts to access internal jugular vein as an access for haemodialysis.

CASE HISTORY

A 26 year old female presented to our centre with complains of abnormal sensation in right side of her neck. She also gave history of failed venepuncture in the neck two months back. The patient was asymptomatic two months ago when she developed multiple episodes of loose stools and vomiting. Two days later her urine output decreased and she started having shortness of breath. The patient was then admitted at a hospital and was started on intravenous medication. Over the next 24 hours, she became anuric and her creatinine was found to be 7.1mg/dl. Haemodialysis catheter insertion was attempted at right internal jugular vein, which failed after multiple attempts. The patient was initiated on haemodialysis via the right femoral vein on the next day. She received eight sessions of haemodialysis over the next twenty days. Renal biopsy was done to assess the cause of Acute Kidney Injury, which revealed diffuse renal cortical necrosis of the sampled cortical area. The patient noticed a palpable thrill over the right lateral cervical region. Over the course of the next week, she had a partial renal recovery. Her urine out improved to more than 1500ml/day and she was discharged and referred to our centre for further management.

On clinical evaluation a continuous thrill was palpable at the right cervical region. The patient was normotensive with no other significant findings. Her creatinine was 4.5 mg/dl and urine output was 1600ml/day. Doppler evaluation revealed an abnormal fistulous communication of size 11 x 6 mm between the lower one third of right common carotid artery and lower one third of right internal jugular vein, at the level of lower pole of right thyroid lobe. Origin of the fistulous opening in right common carotid was 16mm distal to the

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bifurcation of the right brachiocephalic artery. The patient was at a high risk for contrast induced nephropathy, so neither angiography nor endovascular repair could be considered. An open surgical repair under general anaesthesia was planned. Anterior cervical thyroid incision was given. Platysma and sternal end of the sternocleidomastoid were cut. The common carotid artery-internal jugular fistula was exposed. The common carotid artery, subclavian artery and internal jugular vein were looped. Fistulous tract was found between common carotid artery and internal jugular vein. The tract was divided, both ends were closed with 6-0 prolene suture. The continuous thrill disappeared. The patient developed accelerated hypertension, in the immediate post-operative period with her blood pressure reaching 240/150mm Hg. She was started on injection nitro glycerine infusion and sublingual nifedipine for blood pressure control. This was tapered over the next 5 days. The patient made a full recovery with no cardiovascular or neurological deficit after 25 days of hospital stay. Post-operative Doppler revealed normal anatomy and flow. Assessment in the nephrology clinic at 6 months after discharge, showed no complication.

DISCUSSION

A carotid-jugular arteriovenous fistula is a direct communication between the carotid artery and the jugular vein. It can be either congenital or acquired. Acquired fistulae are most frequently caused by penetrating trauma or are iatrogenic⁶. Ortiz et al.⁷ in 1976, first reported the arteriovenous fistula from an internal jugular vein catheter placement, a fistula between the inferior thyroid artery and the internal jugular vein.

Clinical features depend on time of presentation, size of fistula and its proximity to heart, left to right shunting of blood and the distensibility of the vessels involved. Carotid artery –internal jugular vein fistula can present as pulsatile neck swelling, presence of distended veins, thrill on palpation, and continuous murmur with systolic accentuation, or it may be incidentally detected on the neck evaluation for a different purpose⁸. AVF results in certain physiological changes such as increased venous return, with simultaneous fall in total peripheral resistance: resulting in immediate rise in heart rate, stroke volume, cardiac output, and cardiac work as a physiologic response to the overload, and the course is towards irreversible high output cardiac failure. Heart failure is a

late presentation of undiagnosed, untreated large AVF (diameter >8mm).

Colour flow Doppler is a sensitive modality for diagnosing AV fistula⁹. Computed Tomography Angiography (CTA) provides the best spatial resolution of catheter angiography and offers the best three-dimensional localization of the AVF within the tissues if surgical repair is planned. Magnetic resonance angiography spatial resolution is good though inferior to CTA. Conventional catheter angiography still being the gold standard⁸.

Untreated fistulae can lead to serious complications including systemic embolization, high output cardiac failure and infections. Though rare, but neurological deficits in the form of visual disturbance, tinnitus, or hemiparesis either from steal phenomenon or from venous congestion in the dural venous sinuses may occur¹⁰.

Timely diagnosis and intervention can prevent these dreadful complications, even in large sized fistulae, as in our case (11mm × 6mm).

Being minimally invasive, endovascular treatment by stent grafts and coils is gaining favour today but, the final approach is to be decided on case to case basis, as was done in our case.

Droll et al¹¹ in 2004 recommended certain measures to prevent inadvertent arterial puncture during internal jugular vein catheterisation such as limiting the head rotation to 40 degrees, using smaller gauge needle as introducer needle and ultrasound guided catheterisation wherever available.

Carotid artery-internal jugular vein arteriovenous fistula, though rare is a dreadful complication of venous puncture for haemodialysis catheter insertion. All precautions should be taken to prevent arterial puncture during IJV cannulation. In such patients, the physician should be vigilant for any sign and symptoms of carotid jugular fistula and prompt correction should be considered. Use of ultrasound is recommended for central venous access to prevent inadvertent arterial injuries.

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