

Self-expandable Graft Stenting in an Iatrogenic Fistula between Common Carotid Artery and Internal Jugular Vein

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A 47-year-old woman with stage IV chronic kidney disease developed a fistula between common carotid artery (CCA) and internal jugular vein (IJV) during central catheterization of the right IJV. The patient was treated with a self-expandable graft stent, which achieved successful closure of the carotid-jugular fistula. As demonstrated in our case, self-expandable graft stents could be a feasible treatment option for CCA-IJV fistulas without additional interventional procedures such as balloon angioplasty.

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Keywords Carotid-jugular, Fistula, Self-expandable, Grafted stent

INTRODUCTION

The right internal jugular vein (IJV) is widely used as an initial site of central catheter insertion and a temporary route for hemodialysis catheter placement. The IJV is favored over the subclavian vein due to its easier accessibility and lower incidence of pneumothorax and stenosis.^{2,3)} However, several fatal complications have also been reported.²⁾ Unexpected injury of the carotid artery is a procedural complication that may lead to airway obstruction secondary to hematoma formation or the development of a carotid-jugular fistula. We recently treated a patient with a developed an iatrogenic fistula between common carotid artery (CCA) and IJV using a self-expandable graft stent. Together with a review of the relevant literature, we will discuss the feasibility of this technique

for the treatment of this rare complication.

CASE REPORT

A 47-year-old woman with stage IV chronic kidney disease was admitted to our hospital for the management of dyspnea, anuria and systemic edema. Despite intensive medical treatment, the patient's symptoms did not improve, and emergent hemodialysis was necessary. Using ultrasound guidance, we attempted to place a perm catheter in the right IJV. Although the blood flow was poor and the right IJV was not visible, we navigated the perm catheter into the right jugular vein. Because the catheter did not function, we changed the insertion site of the perm catheter to the right femoral vein. A sudden hematoma immediately developed on the patient's neck after the removal of

the perm catheter from the right jugular vein. The neck hematoma did not further increase after manual compression of the puncture site. However, the patient went into respiratory arrest one day later as a result of upper airway obstruction due to the mass effect of the hematoma. After an emergency tracheostomy with

evacuation of the hematoma and right percutaneous pleural drainage, the patient's vital signs stabilized. A computed tomography (CT) neck angiography showed a right carotid artery-jugular fistula (Fig. 1). We treated the patient with an endovascular graft stent rather than open neck surgery because of the risk to the pa-

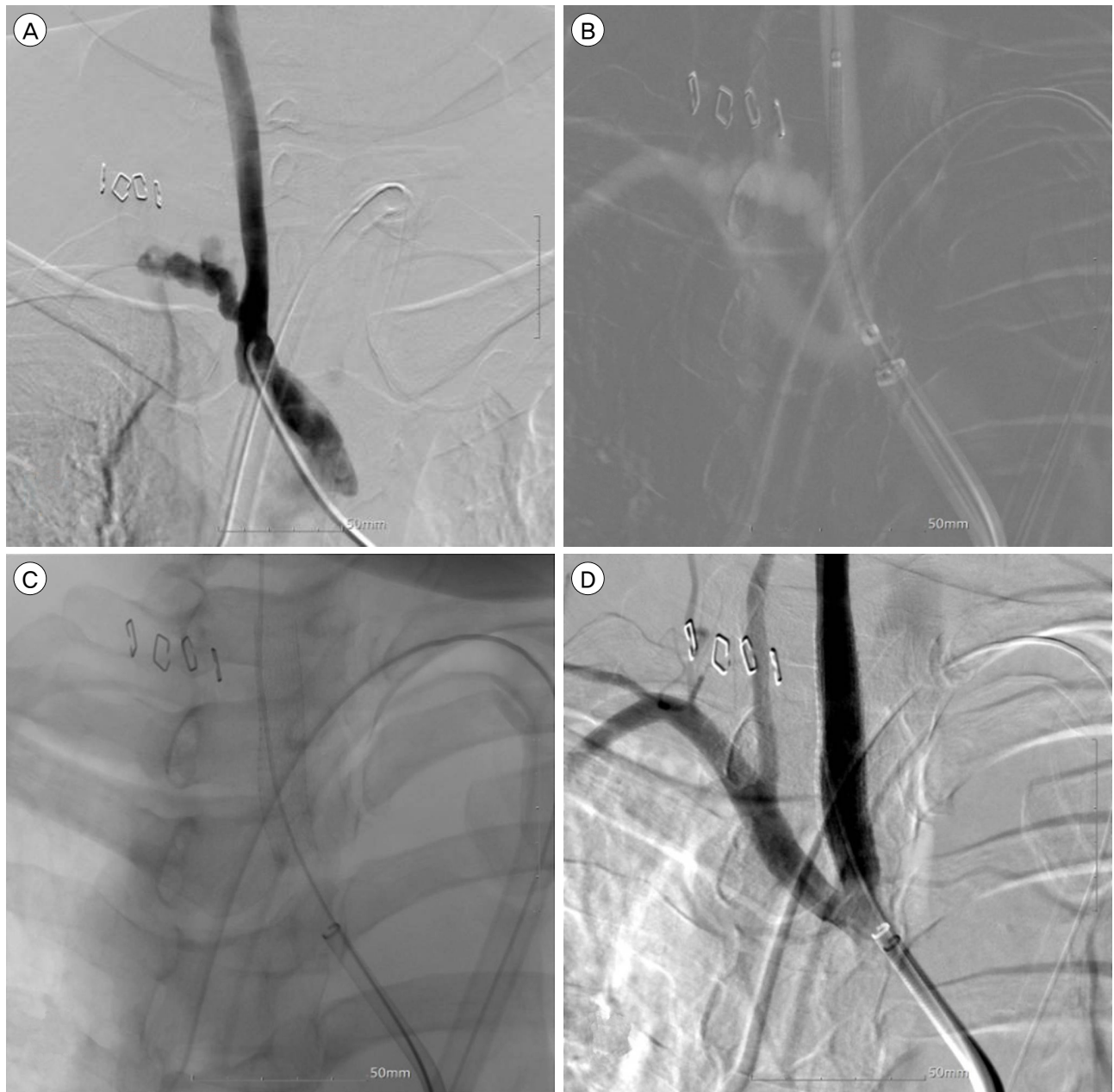


Fig. 1. Serial digital subtraction angiography (DSA) showing the stent deployment procedure. (A) A 6 French envoy guiding catheter was inserted in common carotid artery (CCA), revealing a fistula between CCA and internal jugular vein (IJV). (B) A graft stent was introduced in CCA. The origin of right subclavian artery was preserved. (C) The grafted stent were deployed. (D) The final control angiography showed complete occlusion of the fistula and patency of the right subclavian artery.

tient from general anesthesia during surgery. A right carotid artery angiography confirmed a fistula between CCA and IJV. To avoid unexpected occlusion of the right subclavian artery, a self-expandable Viabahn graft stent (W.L. Gore and Associates, Flagstaff, AZ, USA) was deployed above the origin of the right subclavian artery with the aid of the road map image. The final control angiography showed complete occlusion of the fistula without requiring balloon angioplasty as well as patency of the right subclavian artery (Fig. 1).

DISCUSSION

The IJV is a reliable and effective route to secure immediate temporary access for the initiation of hemodialysis. Arteriovenous fistulas occur in 0.58% of all temporary hemodialysis patients and may lead to congestive heart failure, systemic embolization, and infection.⁶⁾ Prompt surgical treatment should be considered to avoid the development of these complications. Surgical options for carotid-jugular fistulas include ligation of the fistula and arterial repair. However, these surgical treatments incur a mortality rate of 0% to 22% and a rate of postoperative progression of neurologic deficits of 0% to 21%.³⁾⁸⁻¹²⁾¹⁴⁾

Studies have reported that endovascular carotid repair has a significantly lower mortality rate than open surgical options.⁵⁾ Endovascular methods have demonstrated efficacy in treating many complications from traumatic arterial damage.¹⁾⁷⁾¹³⁾ Graft stenting may make it possible to occlude the branches originating from the artery covered by the stent. Because the common carotid artery has no significant branch proximal to the carotid bifurcation, graft stenting can be used to treat common carotid artery injuries or carotid jugular fistulas.

A balloon-mounted graft stent has complications that include distal migration of the graft stent and endoleaks.⁴⁾¹⁵⁾ In our case, the fistula was proximal to the carotid bifurcation; therefore, self-expandable graft stenting was more favorable than balloon-mounted

graft stenting. In this case, complete occlusion of the fistula and patency of the right subclavian artery was observed. Deploying a self-expandable graft stent to cover the fistula site may be a feasible treatment option for common carotid-jugular fistulas.

CONCLUSION

Our case demonstrates that self-expandable graft stents can be used to treat iatrogenic fistula between CCA and IJV. In this case, complete occlusion of the fistula as well as patency of the right subclavian artery was achieved. Deployment of self-expandable graft stent to cover the fistula site may be a feasible treatment option for CCA-IJV fistulas.

Disclosure

The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

REFERENCES

1. Castelli P, Caronno R, Piffaretti G, Tozzi M, Lagana D, Carrafiello G, et al. Endovascular repair of traumatic injuries of the subclavian and axillary arteries. *Injury*. 2005 Jun;36(6):778-82.
2. Cimochowski GE, Worley E, Rutherford WE, Sartain J, Blondin J, Harter H. Superiority of the internal jugular over the subclavian access for temporary dialysis. *Nephron*. 1990;54(2):154-61.
3. Demetriades D, Skalkides J, Sofianos C, Melissas J, Franklin J. Carotid artery injuries: experience with 124 cases. *J Trauma*. 1989 Jan;29(1):91-4.
4. Din IU, Shaikh U, Fisher RK, McWilliams RG. Renal stent crushed during open aneurysmorrhaphy for endoleak after fenestrated EVAR. *J Endovasc Ther*. 2016 Jun;23(3):533-5.
5. DuBose J, Recinos G, Teixeira PG, Inaba K, Demetriades D. Endovascular stenting for the treatment of traumatic internal carotid injuries: expanding experience. *J Trauma*. 2008 Dec;65(6):1561-6.
6. el-Shahawy MA, Khilnani H. Carotid-jugular arteriovenous fistula: a complication of temporary hemodialysis catheter. *Am J Nephrol*. 1995;15(4):332-6.
7. Kaitzis DG, Balitas AG, Skandalos IK, Hatzibaloglou AK. Carotid artery repair after erroneous insertion of a hemodialysis catheter: case report. *J Vasc Access*. 2006 Jul-Sep;7(3):136-8.
8. Karlin RM, Marks C. Extracranial carotid artery injury.

- Current surgical management. *Am J Surg.* 1983 Aug;146(2):225-7.
9. Khoury G, Hajj H, Khoury SJ, Basil A, Speir R. Penetrating trauma to the carotid vessels. *Eur J Vasc Surg.* 1990 Dec;4(6):607-10.
 10. Ledgerwood AM, Mullins RJ, Lucas CE. Primary repair vs ligation for carotid artery injuries. *Arch Surg.* 1980 Apr;115(4):488-93.
 11. Meyer JP, Walsh J, Barrett J, Schuler JJ, Durham JR, Eldrup-Jorgensen J, et al. Analysis of 18 recent cases of penetrating injuries to the common and internal carotid arteries. *Am J Surg.* 1988 Aug;156(2):96-9.
 12. Navsaria P, Omshoro-Jones J, Nicol A. An analysis of 32 surgically managed penetrating carotid artery injuries. *Eur J Vasc Endovasc Surg.* 2002 Oct;24(4):349-55.
 13. Pikwer A, Acosta S, Kolbel T, Malina M, Sonesson B, Akeson J. Management of inadvertent arterial catheterisation associated with central venous access procedures. *Eur J Vasc Endovasc Surg.* 2009 Dec;38(6):707-14.
 14. Ramadan F, Rutledge R, Oller D, Howell P, Baker C, Keagy B. Carotid artery trauma: a review of contemporary trauma center experiences. *J Vasc Surg.* 1995 Jan;21(1):46-55; discussion 55-6.
 15. Wadhwa R, Toms J, Nanda A, Abreo K, Cuellar H. Angioplasty and stenting of a jugular-carotid fistula resulting from the inadvertent placement of a hemodialysis catheter: case report and review of literature. *Semin Dial.* 2012 Jul;25(4):460-3.