Indian Journal of
Applied Radiology

Open Science Publications

Volume 9, Issue 1 - 2023
© Naukarkar V, et al. 2023
www.opensciencepublications.com

A Curious Case of Left Subclavian Vein Stent Fracture

Case Report

Naukarkar V, Rajpal K and Shetty D

Department of Radiodiagnosis, Nair Hospital, Mumbai, India

***Corresponding author:** Naukarkar V, Department of Radiodiagnosis, Nair Hospital, Mumbai 400008, India, Phone: +918767207597; E-mail: naukarkarvikrant@gmail.com

Copyright: © 2023 Naukarkar V, et al. This is an open access article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

Article Information: **Submission: 27/02/2023; Accepted: 24/04/2023; Published: 28/04/2023**

Abstract

Percutaneous transluminal interventions have become the method of choice for treating symptomatic and significant vascular occlusions. Stenting is one such method with high success and fewer complication rates. To reduce complications like stent fracture care should be taken to choose the appropriate material and design of the stent and attention should be given to eliminating factors causing external stent compression. Stent fractures in the arterial system are well described in the literature. Very few reports are available for central venous stent fracture. We discuss an interesting case of a stent fracture in the left subclavian vein due to extrinsic compression.

Keywords: Subclavian Vein; Stent Fracture; Radiology; Case Report

Introduction

Chronic kidney disease patients on hemodialysis are prone to central venous occlusions due to repeated procedures for vascular access and altered hemodynamics [1,2]. Here we describe a middle-aged adult presenting with central venous occlusion, treated twice with stenting, and suffered stent fractures.

Case Presentation

42 years old male patient suffering from chronic kidney disease on hemodialysis via left brachial arteriovenous fistula was admitted with complaints of swelling of the left upper limb. CT angiography study revealed complete occlusion of the left proximal subclavian and distal brachiocephalic vein with multiple collateral venous channels draining into the superior vena cava. Angioplasty was done across the occluded segment using 12 mm × 60 mm and 16 mm × 80 mm balloon angioplasty catheters. A 20 mm × 80 mm self-expanding metallic stent (Boston Scientific WALLSTENT-Uni™ Endoprosthesis) was placed across the central venous stenosis from the left subclavian vein to the superior vena cava. After the procedure, a good flow was noted across the stent from the left subclavian vein to the brachiocephalic into the superior vena cava. The patient had a dramatic improvement in symptoms.

Eighteen months later the same patient presented with swelling of bilateral upper limbs. CT venography study revealed partial occlusion of the right proximal internal jugular, subclavian and brachiocephalic vein, and complete occlusion of left proximal internal jugular, subclavian and brachiocephalic vein with multiple venous collaterals draining into superior vena cava and femoral veins. The stent was seen in the superior vena cava, left brachiocephalic, and subclavian veins. What caught our attention the most was 95% of stent restenosis in the distal third part with stent fracture. Angioplasty of the restenosis was done with 12 mm × 40 mm and 14 mm × 40 mm balloon angioplasty catheters. A 14 mm × 60 mm (*Cordis* S.M.A.R.T. CONTROL™ NITINOL) stent was placed across the restenosis inside the farmer stent. A good flow was noted across the stents from the left subclavian vein to the brachiocephalic vein into the superior vena cava. The patient was put on aspirin, warfarin, and apixaban and discharged.

ISSN: 2581-3919

Six months later patient again presented with a recurrence of symptoms with worsening bilateral upper limb swelling and multiple dilated tortuous subcutaneous vessels. CT venography revealed complete occlusion of bilateral proximal internal jugular, subclavian and brachiocephalic veins. To our surprise, both the stents placed in the left subclavian and brachiocephalic veins showed fractures in the distal third part with the medial end of the former stent indenting the lateral wall of the superior vena cava and complete thrombosis of the stents. The patient was due on the renal transplant list and the ipsilateral brachial fistula was closed for hemodialysis access. It was decided to manage the patient conservatively. He was started on temporary peritoneal dialysis until the transplant and continued anticoagulants and antithrombotic medications (Figures 1-4).

Figure 1: Chest radiograph posterior-anterior projection showing the fractured stent in the left subclavian vein extending viathe left brachiocephalic vein into the superior vena cava.

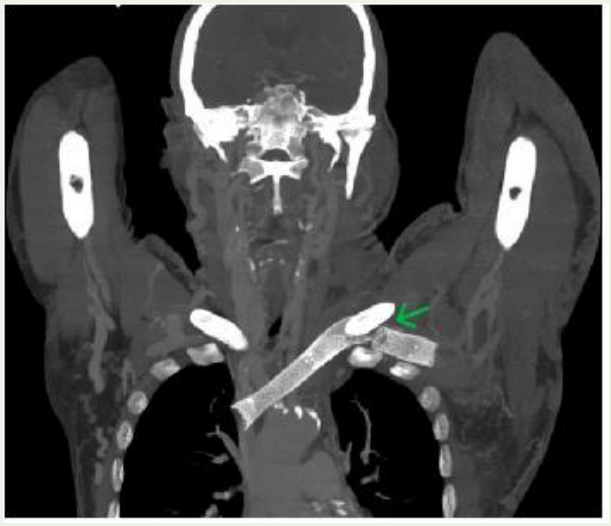

Figure 2: Computed tomography venography of thorax coronal reformatted maximum intensity projection mediastinal window image shows the fractured stents in the left subclavian vein, brachiocephalic vein, extending up to superior vena cava. The extensive collateral formation is noted because of the thrombosis of bilateral subclavian, brachiocephalic, and internal jugular veins.

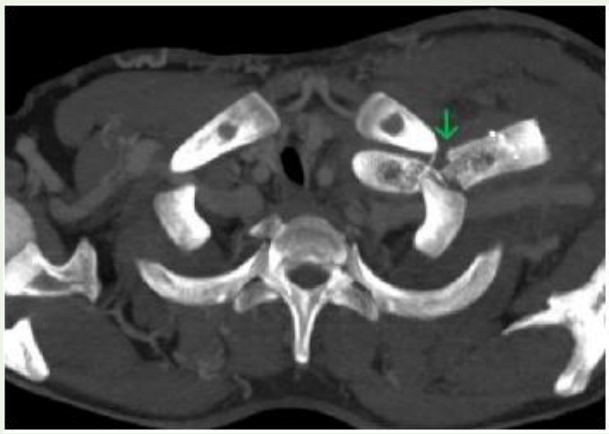

Figure 3: Computed tomography venography of thorax axial reformatted maximum intensity projection mediastinal window image shows broken stents in the left subclavian vein.

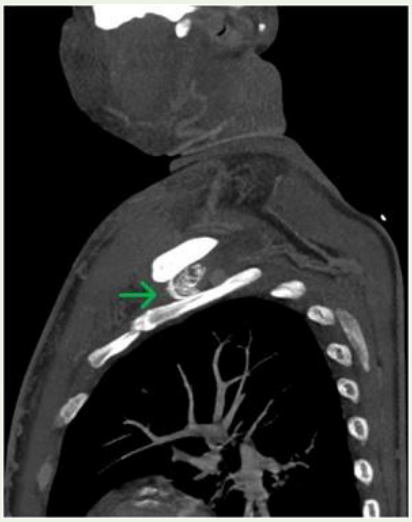

Figure 4: Computed tomography venography of thorax sagittal reformatted maximum intensity projection mediastinal window image shows stents getting compressed between the clavicle and first rib.

Discussion

Central venous occlusion is one of the very well-known complications in chronic kidney disease patients on hemodialysis. Incidence varies from 14-17%. If the occlusion is on the same side as that of access for dialysis it needs to be treated either by surgical or percutaneous transluminal interventions. Surgical methods carry high morbidity and mortality and are difficult due to the position of central veins deep in the thorax. Now a day's intravascular interventions are the procedure of choice for central venous thrombosis. It includes balloon angioplasty and stent angioplasty. Both these methods carry high success rates. Balloon angioplasty is associated with comparatively higher recurrence. Stents are better than angioplasty alone. However, both methods require secondary interventions most of the time. Stenting-related complications include stent thrombosis, stent migration, fracture, infection, and restenosis [1,2].

Citation: Naukarkar V, Rajpal K, Shetty D. A Curious Case of Left Subclavian Vein Stent Fracture. Indian J Appl Radiol. 2023;9(1): 182.

Sometimes a stent may get fractured. In the arterial system, it is because of intrinsic factors like vascular pulsations. On the venous side external compression is the main contributing factor. A stent fracture in the left common iliac vein due to compression between the spine and the right common iliac artery is described in the literature. In our case, external compression between the clavicle and first rib during arm movement may have led to repeated microtrauma and stent fracture. Respiratory chest wall motion and aortic vascular pulsations are contributory factors. Neointimal hyperplasia had an additive effect and led to in-stent thrombosis. Similar findings are also described for left brachiocephalic vein stent fracture due to compression between the aorta and manubrium. In thoracic outlet syndrome, Resection of the first rib is recommended before subclavian arterial stenting for a better outcome. Whether the same can be tried in patients with chronic kidney diseases needs to be found out [3,4].

While stenting veins over sizing is done to avoid stent migration. Protrusion into the superior vena cava and the contra lateral venous system should be avoided to preserve future access to hemodialysis [5,6].

Various other factors that decide the chances of stent fracture are design, the material of the stent, the site, and the length of the occlusion. Wall stents are made of biomedical super alloy and have a comparatively higher risk of recurrence of stenosis. Newer nitinol-based stents are made up of nickel and titanium and carry a lower risk of restenosis. The design of the stent like an open cell stent allows more neointimal proliferation leading to in-stent thrombosis and fracture. Closed cell stent resists this phenomenon. Self-expandable stents offer low resistance and are more prone to collapse. Stent which offers high radial force, for example nitinol-based stent resists compression more as compared to Wallstent. Site of stenosis if more proximal to the heart is more prone to stent fracture because of cardiac pulsations. Larger the length of occlusion increase the chance of stent collapse, kinking, and fracture. More stable venous stents that can withstand external compression are being developed and studied with randomized trials [7,8].

In our case, the double stent fracture was managed conservatively because of extensive in-stent thrombosis, and closure of the ipsilateral fistula, and the patient was on a renal transplant list. In such cases, the chances of infection and further stent migration are very less. The extensive collateral formation will eventually reduce the symptoms [9,10].

Conclusion

Stents are safe in central venous occlusions in patients with chronic kidney disease. Although associated with few complications they show fewer recurrence rates. Rare complications like stent fractures should be kept in mind while choosing the design and material of stents and whether something can be done to avoid external compression should be considered. Anticoagulation should be started and continued lifelong for better outcomes.

References

1. Hammer F, Becker D, Goffette P, Mathurin P (2000) Crushed stents in benign left brachiocephalic vein stenoses. J Vasc Surg 32: 392-396.
2. Ozyer U, Harman A, Yildirim E, Aytekin C, Karakayali F, et al. (2009) Long-term results of angioplasty and stent placement for treatment of central venous obstruction in 126 hemodialysis patients: a 10-year single-center experience. AJR Am J Roentgenol 193: 1672-1679.
3. Wada M, Yamamoto M, Shiba M, Tsuji T, Iijima R, et al. (2007) Stent fracture in the left brachiocephalic vein. Cardiovasc Revasc Med 8: 103-106.
4. Kapoor B, Lockhart M, Sharma D, Maya ID (2010) Brachiocephalic vein stent fracture: case series and literature review. Semin Dial 23: 110-113.
5. Verstandig AG, Berelowitz D, Zaghal I, Goldin I, Olsha O, et al. (2013) Stent grafts for central venous occlusive disease in patients with ipsilateral hemodialysis access. J VascIntervRadiol 24: 1280-1287.
6. Yadav MK, Sharma M, Lal A, Gupta V, Sharma A, et al. (2015) Endovascular treatment of central venous obstruction as a complication of prolonged hemodialysis - Preliminary experience in a tertiary care center. Indian J Radiol Imaging 25: 368-374.
7. Molinelli LB, Allende JN (2018) Right Subclavian Venous Stent Fracture. Eur J Vasc Endovasc Surg 55: 292.
8. Eguchi D, Honma K (2020) Results of Stenting for Central Venous Occlusions and Stenoses in the Hemodialysis Patients. Ann Vasc Dis 13: 235-239.
9. Mallios A, Taubman K, Claiborne P, Blebea J (2015) Subclavian Vein Stent Fracture and Venous Motion. Ann Vasc Surg 29: 1451.
10. Aj A, Razak Uk A, R P, Pai U, M S (2018) Percutaneous intervention for symptomatic central vein stenosis in patients with upper limb arteriovenous dialysis access. Indian Heart J 70: 690-698.

Citation: Naukarkar V, Rajpal K, Shetty D. A Curious Case of Left Subclavian Vein Stent Fracture. Indian J Appl Radiol. 2023;9(1): 182.