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Case Report Open Access

Bare Metal Stent Infection: Case Report and Literature Review

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Abstract

A 75 year old female who previously underwent subclavian artery bare metal stenting presented with hemoptysis, left chest, neck and back pain. A computed tomography angiogram revealed a dissected left subclavian artery with migration and perforation of previously placed bare metal stents and hemopneumothorax, which suggested a large abscess formation. Stabilization of the dissected subclavian artery was done with placement of an 8×38 mm covered endovascular stent. Ultimately, a thoracotomy was done for investigation of a suspected abscess and infected stents. Cultures taken from both free fluid and center of abscess cultivated *Staphylococus aureus* and *Peptostreotpcoccus prevotii*. Perioperative bronchoscopy and esophagogastroduodenoscopy ruled out a Broncial fistula formation. The patient was ultimately transferred to a tertiary care facility for evaluation of subclavian bypass and removal of the infected devices. Given the large increase in percutaneous procedures, it would be expected that endovascular device infection would also rise; however, few cases have been reported as research on this topic is difficult to undertake. High clinical suspicion is usually needed to make the diagnosis of infected endovascular devices. The detection of infected endovascular devices is often found with incidental imaging procedures. The most commonly cultivated bacterium in infected stents has been Staphylococcus species. Treatment of endovascular device infections mirrors that of traditional surgical graft infections with removal of infected hardware. This case report adds to the body of evidence in regards to infected endovascular devices, which are relatively uncommon, seldom researched, and hard to diagnose without significant suspicion or incidental findings on imaging.

Keywords: Infection; Bare Metal; Stent; Endovascular; Device

Case Description

A 75 year old female who recently had proximal subclavian stenting with two bare metal stents to alleviate severe debilitating left upper extremity claudication. One-week post procedure, the patient began to have left chest, neck and back pain. After developing scant hemoptysis, she presented to the emergency department severely anemic and hypotensive. An immediate computed tomography angiogram was done to evaluate the status of her previously placed subclavian stents. The computed tomography angiogram revealed 6 mm gap between the two stents within the left subclavian artery (Figure 1 and 2). There was also a pooling of contrast-enhanced blood at the level of the gap with a small extravasation of contrast along the lateral aspect, indicating an active bleed. Furthermore, a large mixture of blood and gas was noted in the left upper mediastinum. No clear communication existed between the tracheo-bronchial tree or esophagus and the fluid collection. A left subclavian artery dissection was noted that began at the distal aspect of the distal stent and extended through the left axillary artery into the left brachial artery.

Interventional cardiology was contacted and the patient was transferred to the catheterization lab. Angiography confirmed left subclavian dissection with distal stent migration and 8×38 mm covered stent was subsequently placed (Figure 3). The patient's hemodynamics slowly improved with stabilization of the leaking artery, fluids, blood transfusions, and vasopressors. All vasopressors were ultimately weaned within 24 hours of placement of the covered stent.

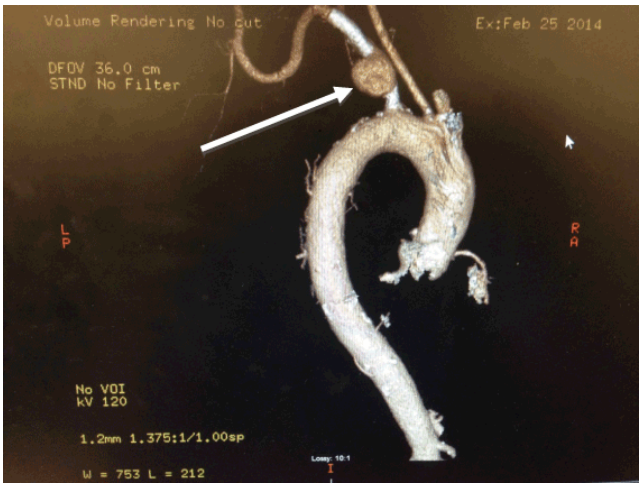

Figure 1: Computed tomography angiography of the chest with and without intravenous contrast with multi-planar reconstructions revealing a 2.7 cm×2.5 cm round focus possibly a hematoma and/or abscess of the left subclavian. There are two left subclavian artery stents, which are not in continuation with a measured gap of 6 mm.

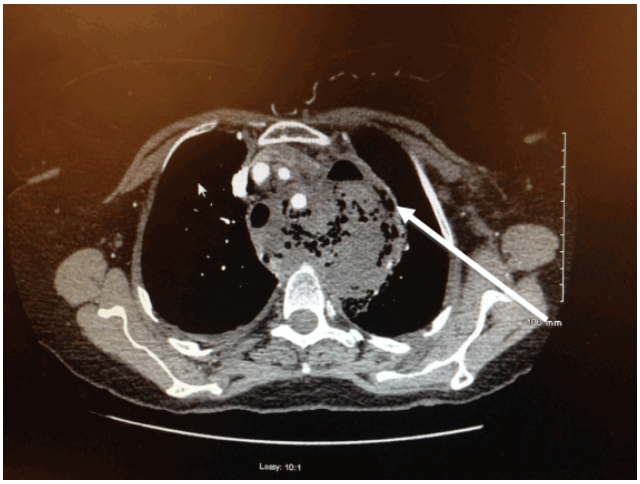

Figure 2: Computed tomography angiography of the chest with and without intravenous contrast. Imaging procedure revealing a large collection of gas and blood products within the upper mediastinum to the left of midline. At its largest point, the collection measures 7.9 cm×9.0 cm×8.2 cm.

Once stable, cardiothoracic surgery evaluated the patient's left hemopneumothorax and fluid collection in mediastinum by performing a left thoracotomy (Figure 4 and 5). Infected hardware with associated peri-vascular abscess formation was confirmed. The abscess was unroofed and cultured, so that the previously placed stent could be visualized. Cultures take during surgery grew two organisms: *Staphylococcus aureus* and *Peptostreotpcoccus prevotii*. Broad-spectrum antibiotics initiated on admission were continued. A bronchial fistula formation was ruled out with a perioperative bronchoscopy and esophagogastroduodenoscopy.

The patient continued to improve daily and was transferred to a tertiary care center for subclavian artery bypass grafting and removal of infected stents.

Literature review/Discussion

The first case report published in regard to suspected infection in an endovascular device was done in 1993 by Charlmers et al. [1]. The first confirmed case of an endograft device infection was documented and published in 1999 by Heikkinen et al. [2]. Despite a large increase in percutaneous procedures worldwide, little research in the pathogenesis of infection or cases can be found. In fact, no other documented cases of endovascular stent infections were seen at our facility. Though incidence of infection is relatively rare, it is associated with high morbidity and mortality [3]. Detection of infections remains difficult because of the primary presentation of nonspecific symptoms. Common presenting symptoms noted by Fiorini et al. were light fever, malaise, chills, leukocytosis, pain in the area of stent placement, high inflammatory markers, weight loss, nausea, and anemia [4,5].

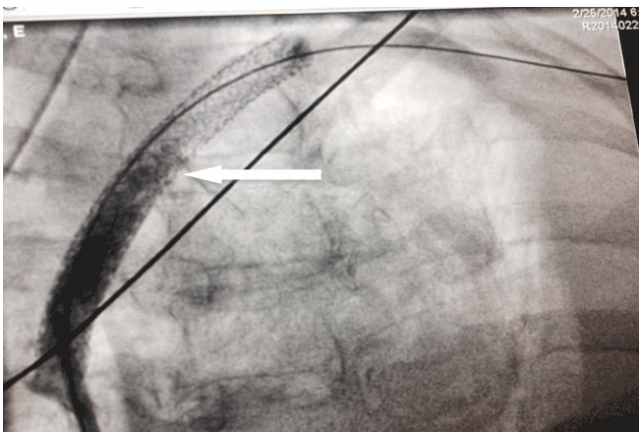

Figure 3: Fluoroscopic anterior posterior view showing percutaneous placement of covered stent-resolving the leakage of the dissected subclavian artery

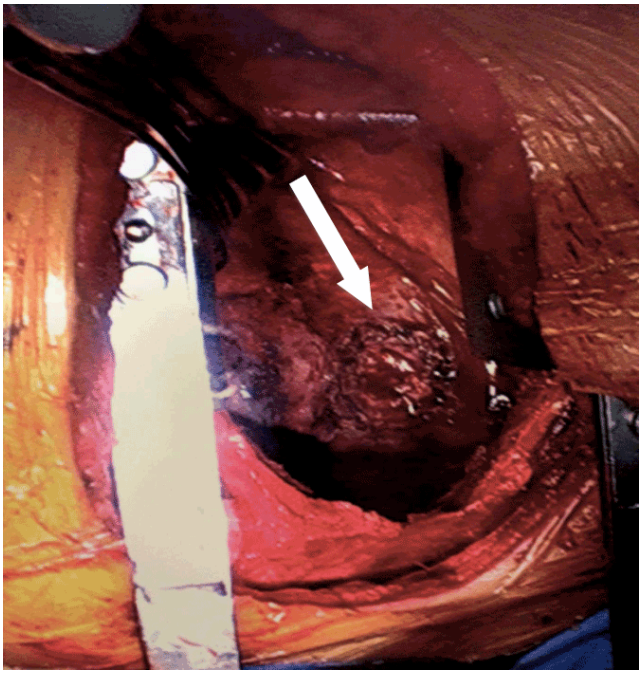

Figure 4: Opening of thoractomy revealing underlying abscess and fluid

Fiorini et al. stated that most cases of endograft infection usually occur after more than four months post procedure [5]. This case is unique in that the patient presented seven days after stent placement with neck and back pain and mild hemoptysis. With non-specific symptoms, imaging procedures, such as the computed tomography scans done in our case, usually makes many diagnoses of complication of endovascular device placement and/or infection.

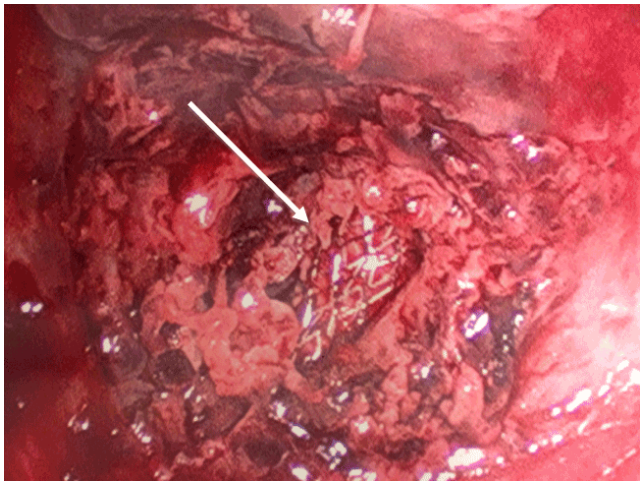

Figure 5: Visualization of unroofed abscess during thoractomy revealing exposed subclavian stent and perforation of subclavian artery with surrounding tissue

Pseudoaneurysms were correlated to be an important radiological indicator of possible infection. No pseudoaneurysm was present in our case; however, Bosman et al. found 77.9% of infected endovascular stents had pseudoaneuyrsms [4]. Common organisms cultured in endovascular device infections were noted to be *Staphylococcus aureus* at 54.4% [3,4]. Furthermore, Fiorini et al., found that *Staphylococcus aureus* accounted for 70% of early infections and 30% of later diagnosed infections [5]. Bosman et al. discovered that 76.6% of infected endovascular devices were caused by *Staphylococcus aureus* [4].

Lichtenfels et al. suggest the main factors associated with development of infection in endovascular devices are found with immunodepression, specific site of endovascular procedure, previous pseudo and mycotic aneurysms, presence of neoplasm, and use of corticosteroids [6,7]. There was no known infection in our patient prior to the placement of the original subclavian artery bare metal stent. Hog et al., reported that percutaneous stent infectious complications may not directly involve the stent location, but the access site, which most often is the common femoral artery [3]. Other risk factors found in review of literature for endovascular device infections were noted to be breaks in sterile technique; occult glove perforation; inadequate skin preparation of the catheterization site; repeat puncture of the arterial access site; prolonged use or reuse of indwelling catheters; lengthy procedure times; puncture site hematoma formation; lack of sterility of angiography suites; longer wires and catheters; passing wires or catheters through previously deployed stents; and deployment of multiple stents or interventions in the same site or closely adjacent sites [3]. One could postulate that drug-eluting stents should, in theory, carry a higher incidence of infection than bare metal stents resulting from the immunomodulatory effects and delayed endothelialization caused by the elution of the drugs [8]. However, few cases are reported in literature. Unlike drug eluting stents, bare metal stents are commonly used throughout the body. Given the variety of applications of bare metal stents, they are likely to be utilized often, resulting in more documented cases of infection.

Treatment of infected endovascular material typically follows that of traditional surgical graft infections with removal of the endovascular material, debridement, and revascularization [7,9]. However, some successful conservative treatment with antibiotics had been described, as noted by Bosman et al. though conservative treatment alone was associated with high mortality outcomes up to 50% [4]. The mortality rate of the surgical treatment group was 27.6% [4]. Finally, the overall mortality rate of an infected endovascular device was quite high at 32.5%, regardless of treatment type [4]. Ultimately, the basis of conservative treatment versus surgery was dependent on location, severity, and stability of the patient. With this case, conservative treatment was not an option given the severity of vascular compromise.

Conclusion

Percutaneous vascular interventions have revolutionized how vascular disease is treated. These procedures have less perioperative mortality and significantly reduced recovery time compared to traditional surgical procedures. Infections of these devices remain uncommon, likely because of the strict sterilization protocols both in the catheterization lab and device manufacturing plants. Infected endovascular devices, though rare, are associated with significant morbidity and mortality. It is important to educate patients of infection risks, as well as, other complications of the procedure. This case serves as an example of the devastating vascular consequences that can occur when endovascular hardware becomes infected.

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