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Distal Arch Aneurysm Repair: Hybrid TEVAR a Novel Approach

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ABSTRACT: Thoracic endovascular aortic reconstruction (TEVAR) is increasingly used in the management of descending aortic pathology including aneurysms, dissections and transaction. When treating aortic arch pathology, hybrid procedures have been devised, in which major arch vessels are bypassed using a variety of techniques. Here we present a case of 48 years male, presented with shortness of breath and chest pain for 2 months. The Contrast enhanced computerized tomogram of chest showed multiple saccular outpouching at distal arch and mid descending aorta. He underwent hybrid procedure bypassing Innominate artery to left carotid and left subclavian artery followed by TEVAR covering the entire saccular aneurysm. His postoperative period was uneventful and is doing well till date.

KEYWORDS: Hybrid surgery, Saccular aneurysm, Thoracic aortic aneurysm

INTRODUCTION

Aneurysm is abnormal dilatation of part of vessel. Aneurysm in its course may thrombose, rupture, enlarge in size and lead to morbidity and mortality.[1] Hybrid aortic arch replacement comprises translocation of the supra-aortic arteries and endovascular stent deployment across the transverse aortic arch may offer an alternative to open arch replacement.[2] Thoracic aortic aneurysm is one of the most complicated topic of cardiovascular surgery. It has a dismal progressive course where 40% will rupture. No effective medical therapy exists so the standard treatment involves open surgical replacement of the aneurysmal aorta.[3] Its management is challenging as the surgery is complicated. In the recent years with the technological development endovascular surgery has been implemented as an alternate option to open surgery. However endovascular treatment cannot completely surpass the open surgery.

CASE

A 48 years male presented with complaint of chest pain for 2 months and shortness of breath for 1 week. On physical examination, his blood pressure, pulse rate, respiratory rate were within normal limit. His systemic examination was found to be inconclusive. The patient underwent cardiorespiratory workup which was within normal limit for his age. On the basis of initial complaint and high suspicion the patient underwent Contrast Enhanced Computerized tomogram (CECT) of chest which showed multiple saccular outpouching at distal arch and mid descending aorta (Saccular aneurysm). The size of aneurysm at distal arch was 4cm×3 cm and the aneurysm at mid descending aorta was 7cm×6cm. (Figure 1) There was no contrast leak from the aneurysm hence, he was planned for aneurysmorraphy electively. Under general anesthesia, he underwent carotico-carotid and left carotico-subclavian bypass using ringed PTFE 7mm tube graft (Figure 2) followed by Thoracic Endovascular Aortic Repair (TEVAR) (Vailant Captivia© 34mm X34mm X 167mm). The stent graft landed proximally on zone 1 just distal to innominate artery covering left carotid and left subclavian artery and distally in the mid thoracic aorta. The left subclavian artery stump was plugged using 8mm amplatz device. After the procedure he was extubated without inotropic support. His postoperative period was uneventful and was discharged on 5th postoperative day without undue complications. Till his last follow up, no complication per se stent graft and bypass has been noted.

DISCUSSION

Aortic aneurysm may present with vast clinical settings and as a complication may rupture in due course of time. After rupture it is associated with high mortality and morbidity. In the past open surgery was the only option for the treatment of thoracic

aneurysm. However, the trend is moving towards endovascular surgery which is safer in properly selected patient.[4] Use of endovascular treatment is ever increasing with higher technical success rates with reduced mortality and morbidity. With new technique and methods, the mortality of open surgery has also decreased to 2-3%.[5] However open surgery with associated morbidity is more present in old age and patient with comorbidities. In case of contraindication to surgery, the option can always be either endovascular or hybrid procedure. Indication for both TEVAR and open surgery is similar when aneurysm involves the distal arch there is chance of occlusion of left subclavian artery and left carotid artery if landing zones are not clear. Limitation of both open surgery and TEVAR is felt when there in involvement of left subclavian artery by aneurysm. Involvement of upto 40% left subclavian artery in case of TEVAR performed for thoracic artery aneurysm, the reported incidence of arm, spinal cord and vertebrobasilar ischemia was 6%, 4% and 2%, respectively.[6] Those patients also had 5% risk for anterior circulation stroke and 6% for death. So revascularization of left subclavian is important, however some surgeons selectively perform Left subclavian artery revascularization only when there is a dominant left vertebral artery (60%), a previous left internal mammary coronary artery bypass graft or when the distal right vertebral segment is absent.[7] In addition to this, when both left subclavian artery and left common carotid artery is involved, an additional complementary surgery is to be performed for the revascularization of the same, this is when hybrid surgery comes into play. With staged hybrid approach for extensive Thoracic abdominal aneurysm combining proximal TEVAR with open surgery for distal thoracic aortic aneurysm is safe and appears to be more effective than the traditional repair with 100 percent success and 0 percent mortality.[8] It is believed that in some cases TEVAR is better than open surgery in terms of low morbidity and mortality, in this case we performed open surgery in order to provide adequate blood supply to the brain and left arm, there was no additional surgery for the left upper limb in the follow up period with good pulse and function however no definite evidence shows endovascular or hybrid procedure is superior to open surgery. This topic is yet to be explored by the means of randomized controlled trial.

CONCLUSION

The hybrid approach for the treatment of distal arch aneurysm tends to evolve with increasing role in old patients and patients with comorbidities. These procedures can be performed without the use of cardiopulmonary bypass and with minimal complications. Hybrid procedure can be safely performed with no delayed stroke or endoleak in midterm followup for distal arch aneurysm. Thus these procedures can be opted in selective patients with good immediate and midterm results.

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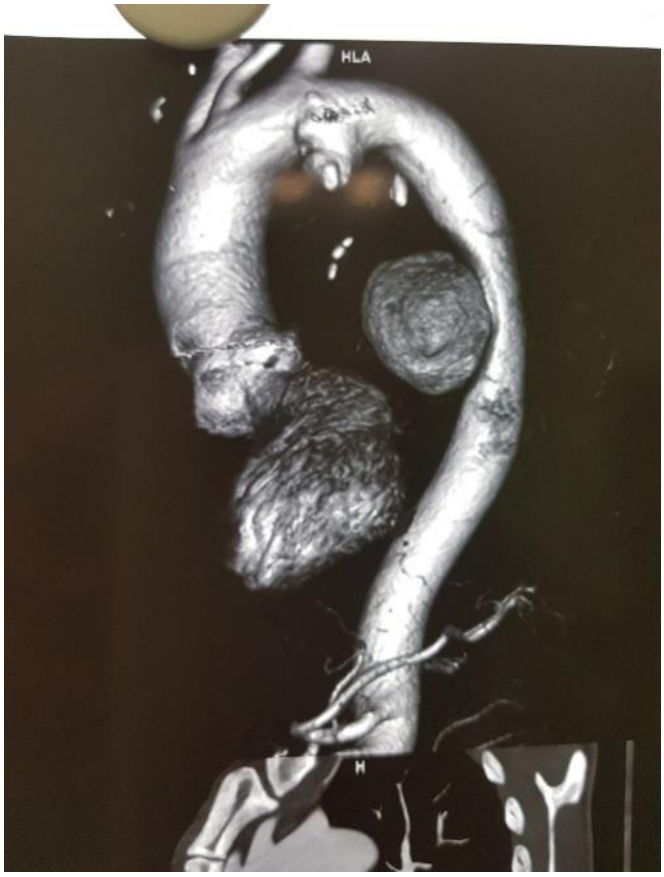

Figure 1: Saccular aneurysm of distal aortic arch and thoracic abdominal aorta

Figure 2: left Carotico-subclavian bypass

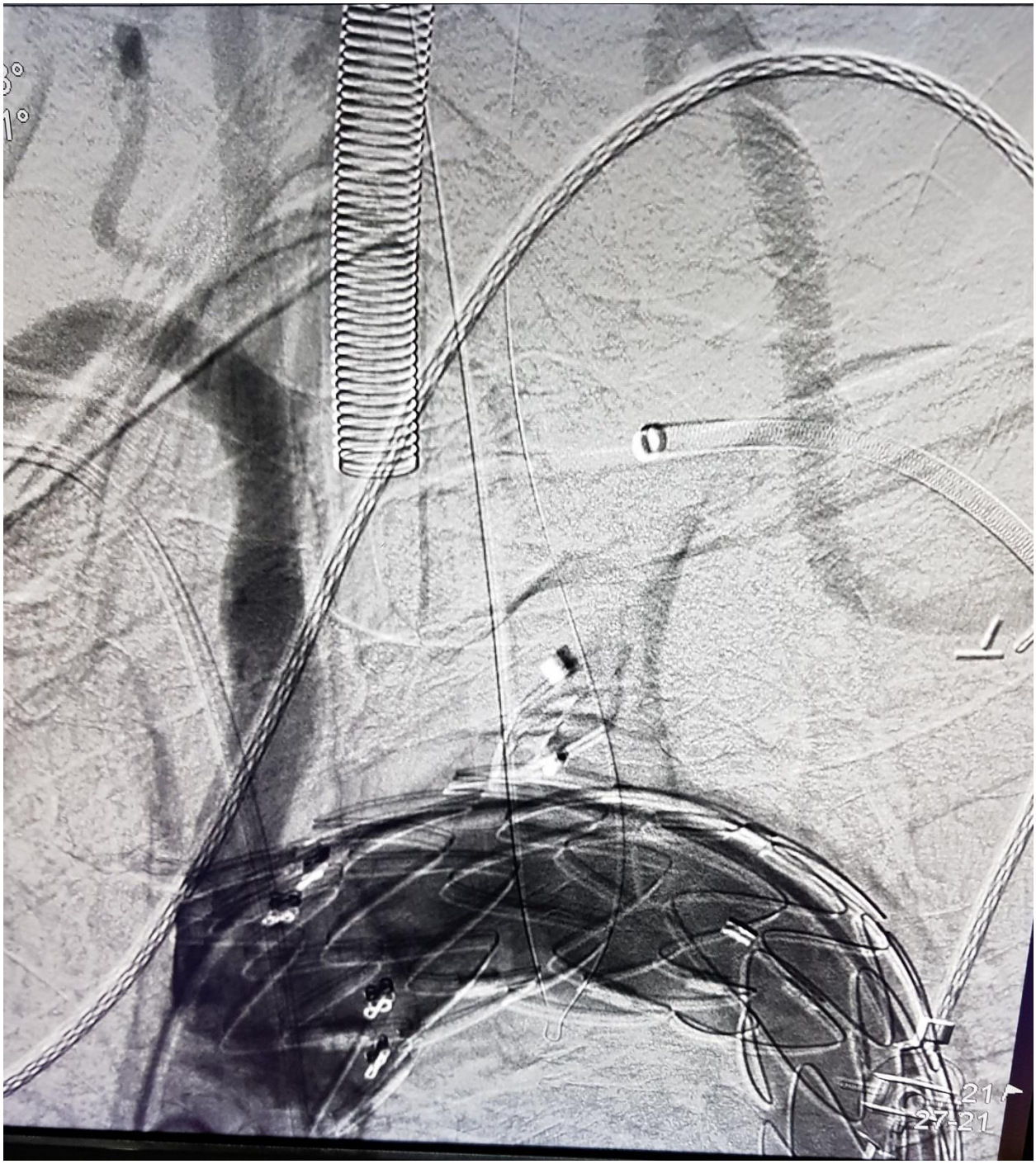

Figure 3: successful deployment of endovascular stent with good flow in left subclavian artery via right common carotid artery