

HYBRID SURGERY FOR COMPLEX AORTIC DISSECTING ANEURYSMS

Nguyen Thai An¹, Tran Quyet Tien¹

ABSTRACT

Objective: Estimate the safety and results of TEVAR combined with open surgery for extensive aortic dissecting aneurysms.

Methods: Observational, prospective study from August 2013 to May 2017. Patients with extensive aortic dissecting aneurysms are treated with open replacement of the ascending aorta and arch, then TEVAR which was landing on the prosthesis to cover the descending disease.

The oversize rate is 20-30%, and the length of landing zone is ≥ 5 cm.

The patients are followed by contrasted CT scan at 1, 3 and every 12 months post-operatively.

Results: N=22 patients, male: female= 17:5. Average of age was 60.8 ± 10.7 years. Concomitant procedures were 1 case of CABG, 1 case of valve-sparing root replacement. Average number of stent is 1.83. 30-day mortality was 4.5%. No endoleak type 1 and survival rate was 21/22.

Conclusions: TEVAR and open surgery is useful and safe for treatment of complex aortic dissecting aneurysms.

Key words: TEVAR, aortic dissecting aneurysms.

I. BACKGROUNDS

Aortic dissecting aneurysm is a lethal disease with an increased incidence to 35/100 000 year-patient in old population aged 65 to 70 [1]. Another point is that, the aortic aneurysm is not usually localised and combined with coronary arterial disease. The below image is an example case of complexity of the disease.

A 65 years-old man admitted to hospital with a diagnosis of cardiogenic shock due to acute MI, and an impending ruptured saccular aortic arch aneurysm which is sized 4 cm in diameter. The patient was operated urgently using central ECMO to do 2 coronary grafts, total debranching of the supra-aortic branches of aorta and aortic stentgrafting of the arch to cover the aneurysm. The stent graft was

landing on the native ascending aorta. However, the complexity of the disease may be the extension of the aneurysm or dissection from the roof of the aorta to the aorto-iliac bifurcation. The aorta maybe ruptured at two points anteriorly and posteriorly. This is the challenge of the surgeon. So we do this study to solve this challenge by the combination of open surgery with aortic stentgrafting – the hybrid operations.

Objective: Estimate the safety and results of TEVAR combined with open surgery for extensive aortic dissecting aneurysms.

II. METHODS

This is a descriptive prospective study. Indications for the hybrid procedures are the extensive aortic

1. Department of Cardiac Surgery,
Cho Ray Hospital, Ho Chi Minh City,
Viet Nam

Corresponding author: Nguyen Thai An
Email: nthaian@yahoo.com
Received: 20/5/2017; **Revised:** 8/6/2017;
Accepted: 19/6/2017

aneurysm and/ or dissection at more than two different segments of the aorta: ascending, arch, descending.

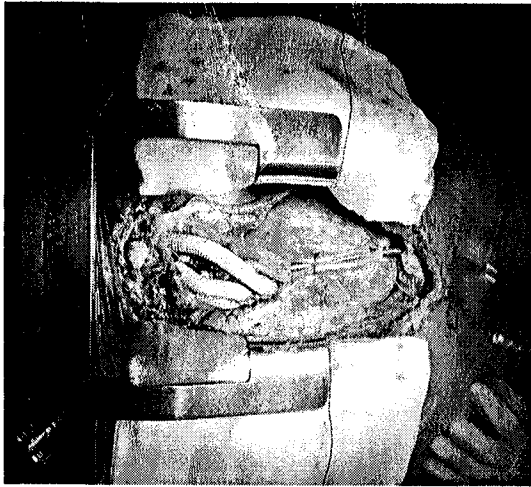


Figure 1. A case of extensive disease: coronary arterial disease and saccular arch aneurysm, treated with 2 by pass grafts, total debranching of arch and stent grafting the lesion of the arch.

Operative procedures:

- The first phase: open surgery.

The patient is supine. Incision is median full sternotomy or J-shape upper hemisternotomy. Conventional CPB is established and the patient is cooled down to 25°C esophageal temperature. The heart is stopped by blood cardioplegia or custodial. Circulation is arrested and elective bilateral antegrade cerebral perfusion is established while the right radial pressure is maintained 50-60 mmHg. The ascending and the arch is excised and the distal aortic anastomosis is performed. Conventional elephant trunk is used in case of this acute aortic dissection. Next, the proximal end is estimated a supra coronary aortic anastomosis or valve-replacement – root replacement or valve sparing – root replacement can be done based on the extension of the disease. Next is the implantation of the supra-aortic branches to the prosthesis. The aortic clamp is opened and rewarming is started and CPB is weaning as usual. The origin of the left subclavian artery is marked by a large metal clip.



Figure 2: Skin incision with upper hemisternotomy

- The second phase: aortic stentgrafting

The endograft is done under C-arm mobile X-ray. The landing zone length is 5 cm or more. The oversize ratio is 20-30% of the surgical prosthesis. The distal oversize ratio is less than 30%. The length of the endograft is based on the extension of the disease.

Follow up:

The patient is followed up by CT-scanning/Scan at 1 month, 3 months, 6 months postoperatively and yearly.

III. RESULTS

N=22pts, male:female= 17:5. Average of age was 60.8±10.7 years. Concomittent procedures were 1 case of CABG, 1 case of valve-sparing root replacement. Average number of stent was 1.83. 30-day mortality was 4.5%. No endoleak type 1 and survival rate was 21/22.

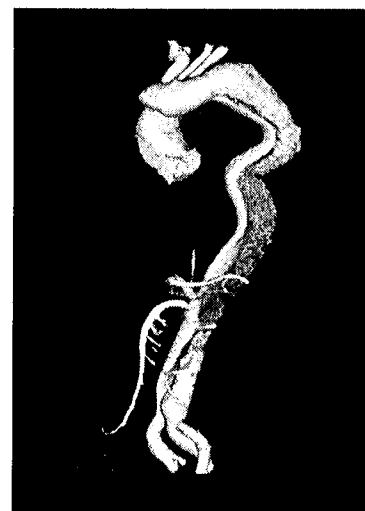


Figure 3a: Pre-op aorta

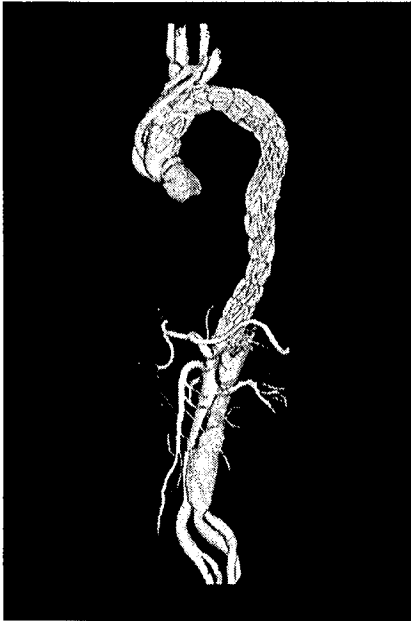


Figure 3b: Post-op aorta

IV. DISCUSSION

The incidence of aortic dissections and thoracic aortic aneurysm is increasing. McClure's study presented at AATS centennial 2017 meeting shows that aortic dissection and thoracic aneurysm happen with the incidence 4.6/100000 and 7.6/100000 respectively. The increase is significant [4].

The average age of McClure's study in the period from 2002 to 2014 is 66 ± 17 , which is over 60 and similar to our study. However, the Chinese study from Li-Zhong Sun, presented at the AATS Centennial 2017 meeting, has the younger age, 46.4 ± 10.7 [3].

These are some strategies to treat extensive aortic dissecting aneurysm. Recently, at AATS Centennial 2017 meeting, some surgeons present their experience. Kouchoukos treated 80 extensive chronic thoracic aortic dissection patients with I stage open surgery. He used bilateral anterior thoracotomy incision (clamp shell). Hospital mortality is 2.5% [2].

Another method of treating extensive aortic disease is the application of frozen elephant trunk. The hospital mortality is quite different from study to study. The two studies presented this year at AATS

meeting are from China and from two European Institutes. The one from China, Li – Zhong Sun team's, was done for 10 years (2003 – 2013) with 7.2% early mortality. The Bartolomeo's and Shrestha's study was done from Jan 2007 to March 2016, with 14.2% in-hospital mortality [5]. Our study with smaller number of patients and shorter period (from 2013 to 2017) has a 30-day mortality. It is acceptable. We don't use FET because of some reasons. Firstly, FET is not "protect" the distal anastomosis which is a great difficulty if the anastomosis is bleeding. Our method uses a neo-landing zone which "protect" the anastomosis out of the bleeding. Secondly, the conventional elephant trunk can help the aorta healing by itself as the image below. The image taken 6 months post-oply is from a patient who was operated with total arch replacement and conventional elephant trunk after an attack of Debaquey I acute aortic dissection. The whole thoracic aorta was healed spontaneously without any stenting.

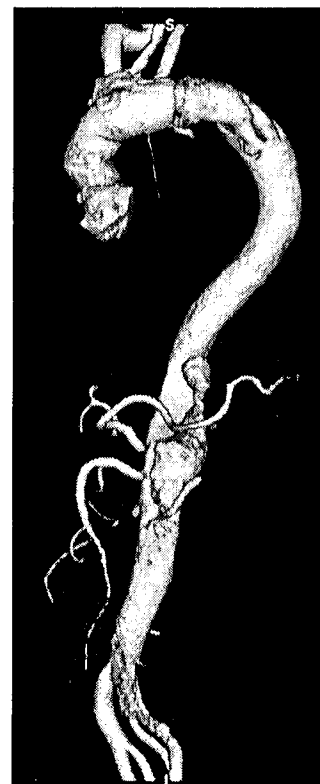


Figure 4: Post-op conventional elephant trunk. Thoracic aorta is healed

Limitation:

Our study is small in number and for a short time. It's necessary further study to estimate the effect of this technique.

V. CONCLUSION

TEVAR and open surgery is useful and safe for treatment of complex aortic dissecting aneurysms.

REFERENCES

1. Aortic dissection, *Nienaber*, Nature reviews, doi: 10.1038/nrdp.2016.53
2. Nicholas T. Kouchonkos. Clinical outcomes and Rates of Aortic Reoperation Following 1-stage Repair of Extensive Chronic Thoracic Aortic Dissection, Presented at AATS Centennial 1917 – 2017 meeting, Boston, USA.
3. Wei – Guo Ma, John Elefteriades, Li – Zhong Sun, et.al. Frozen Elephant Trunk and Total Arch Replacement for type A Aortic Dissection: Competing Risk Analysis of Long-term outcomes in 1063 patients, Presented at AATS Centennial 1917 – 2017 meeting, Boston, USA.
4. R. Scott McClure, Ana P. Johnson, et.al. Epidemiologic Analysis and Descriptive Assessment of Management Strategies for Thoracic Aortic Dissection and Thoracic Aortic Aneurysm – A Population Based Study, Presented at AATS Centennial 1917 – 2017 meeting, Boston, USA.
5. Dande Paconi, Roberto Di Bartolomeo, Malakh Shrestha, et.al. Total Aortic Arch Replacement with Frozen Elephant Trunk Technique – Results from two European Institutes, Presented at AATS Centennial 1917 – 2017 meeting, Boston, USA.