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Morisaki, Koichi

Department of Surgery and Science, Graduate School of Medical Sciences, Kyushu University

Matsumoto, Takuya

Department of Surgery and Science, Graduate School of Medical Sciences, Kyushu University

Matsubara, Yutaka

Department of Surgery and Science, Graduate School of Medical Sciences, Kyushu University

Inoue, Kentaro

Department of Surgery and Science, Graduate School of Medical Sciences, Kyushu University

他

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Case Report

Late Type III Endoleak of a Powerlink Stent Graft : Report of a Case

Koichi MORISAKI, Takuya MATSUMOTO, Yutaka MATSUBARA, Kentaro INOUE,
Yukihiko AOYAGI, Daisuke MATSUDA, Shinichi TANAKA,
Jun OKADOME and Yoshihiko MAEHARA

*Department of Surgery and Science, Graduate School of Medical Sciences,
Kyushu University, Fukuoka, Japan.*

Abstract

We herein report a case of a late type III endoleak caused by disconnection of the aorta extension and main body of a Powerlink four years after implantation. Migration of the main body caused a disconnection of the main body and extension despite the fact that the size of the aneurysm had been decreasing. The endoleak was successfully repaired using the interpolation of an Endurant aortic extender. In case of necessity of implantation of the extension, first implantation of extension before deploying the main body may help to prevent type III endoleaks caused by disconnection of the stentgraft in patients treated with the Powerlink system. To our knowledge, this is the first reported case of a late type III endoleak caused by a Powerlink device.

Key Words : Abdominal aortic aneurysm · EVAR · Endoleak

Introduction

Commercial stent grafts became available in Japan in July 2006, and endovascular aneurysm repair (EVAR) has since become widespread. Compared to open surgery, EVAR has the benefit of being less invasive¹⁾; however, its disadvantages include the possible need for reintervention due to the development of an endoleak or limb occlusion²⁾³⁾. Type III endoleaks originate from fabric tears in the stent graft, an inadequate seal or disconnection of the modular graft components⁴⁾. We herein report the first case of a type III endoleak resulting from the disconnection of the modular graft components of a Powerlink stent graft four years after implantation.

Case Report

A 56-year-old man underwent endovascular aneurysm repair of a 51×62-mm abdominal aortic aneurysm with implantation of a Powerlink bifurcated stent graft (Endologix, Irvine, CA, USA). The proximal neck measured 23–24 mm in diameter and 30 mm in length with no angulation. The length from renal artery to aorta bifurcation was measured 114mm. According to preoperative thin slice computed tomography (CT), a bifurcated stent graft (28-16-155BL) was deployed. However, actual proximal sealing zone was shortened against preoperative planning. No findings of an endoleak were observed by intraoperative angiography. However, an extension stent graft (28-28-75) was additionally implanted in the

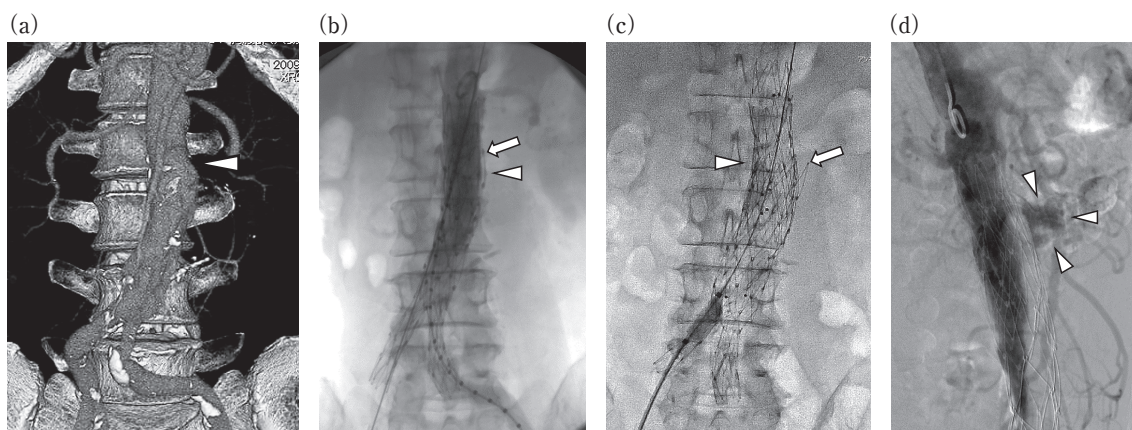


Fig. 1

- (a) Arrow head represented the origin of aneurysm in 3D-CT.
 (b) At the first treatment, completion angiography showed no findings. Arrow head represented origin of aneurysm and arrow represented proximal end of main body of Powerlink.
 (c) X-ray fluoroscopy revealed a gap between the extension and main body. Arrow head represented origin of aneurysm and arrow represented proximal end of main body of Powerlink. Arrow head represented origin of aneurysm and arrow represented proximal end of main body of Powerlink.
 (d) Angiography showed a type III endoleak from the junctional zone (arrow head).

infrarenal abdominal aorta considering the future risk of a type IA endoleak (Fig. 1a, 1b).

Postoperative CT showed no findings of an endoleak. Follow-up was later performed with ultrasound (US) and plain CT due to renal dysfunction. A follow-up examination performed three years later showed a decrease in the size of the aneurysm to 47×59 mm in diameter. US and CT performed at four years of follow-up showed an endoleak and increase in the size of the aneurysm to 55×66 mm. Angio-CT disclosed findings suspicious of a type I or type III endoleak; therefore, angiography was performed. X-ray fluoroscopy revealed a gap between the extension and main body, while angiography showed a type III endoleak from the junctional zone (Fig. 1c, 1d).

Under general anesthesia, an Endurant aortic extension was deployed inside the Powerlink stent graft. Postoperative CT showed that the type III endoleak had disappeared.

Discussion

In Japan, the Zenith Flex, Excluder, Powerlink, Endurant and Aorfix bifurcated stent graft systems are commercially available. Only the Powerlink bifurcated stent graft system contains

all-in-one components. However, there is a disadvantage to this system in that the length of the main body is fixed at 80 or 100 mm. An extension must to be additionally implanted in cases of residual type IA endoleaks. This case was with in instruction for use, the patient can be treated by other device. In treatment by another device, mainbody was deployed just distal of renal artery. If the patient was treated by another device, type III endoleak would not have occurred. Only Powerlink bifurcated stent graft consists of inner cobalt-chromium alloy stent covered with expanded polytetrafluoroethylene graft, however, there was no previous report in regard to the differences of radial force.

Type III endoleaks are primarily caused by modular disconnection or fabric defects⁴⁾⁻⁶⁾. There are some reports of type III endoleaks in patients treated with other devices, such as the Zenith or Endurant⁵⁾⁶⁾. In the present case, disconnection of the main body and extension caused a type III endoleak. To our knowledge, this is the first report of a case of a type III endoleak associated with a Powerlink endograft. Three years after the first EVAR procedure, the size of the aneurysm was found to have decreased

gradually. However, the aneurysm then increased in size due to the type III endoleak four years after EVAR. In this case, migration of the main body caused a disconnection of the main body and extension. Migration occurred despite the fact that the size of the aneurysm had been decreasing; therefore, the cause of the migration of the main body was unknown.

With respect to preoperative sizing, the length of the renal artery to the aortic bifurcation was 114 mm, and the length of the proximal neck was 30 mm. The 28-16-155BL device was selected, whose length of the main body is 100 mm. Therefore, the length of the proximal landing was 16 mm during preoperative planning, however, actual proximal sealing zone was shortened against preoperative sizing. Perioperative angiography showed no type IA endoleaks; however, an extension was additionally deployed, considering the future risk of a type IA endoleak. Angiography performed at the completion of the surgery showed no findings of a type I or type III endoleak.

In cases in which an extension is used due to a short length of the proximal landing of the main body, surgeons must take the possibility of migration of the main body to the aneurysm sac into consideration. In contrast, an extension may be first implanted in the infrarenal aorta before deploying the main body. This procedure may help to prevent type III endoleaks caused by disconnection of the stentgraft in patients treated with the Powerlink system. By first implantation of aorta extension, the length of junctional zone can become longer. The length of junctional zone was 56 mm by first implantation of aorta extension compared to 16 mm in this case.

Conclusion

This is the first reported case of later type III endoleak from disconnection of main body and extension of a Powerlink system. Type III endoleaks may occur, even in the Powerlink system, in cases involving an extension. In patients with a short length of the proximal landing of the main body, surgeons must be aware of the possibility of a type III endoleak caused by migration of the main body to the aneurysm sac.

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(和文抄録)

Powerlink ステントグラフトによる治療後4年に Type III エンドリークを生じた一例

九州大学消化器・総合外科

森崎 浩一, 松本 拓也, 松原 裕, 井上健太郎, 青柳 幸彦,
松田 大介, 田中 慎一, 岡留 淳, 前原 喜彦

症例は56歳, 男性, CTで51×62mmの腎動脈下の腹部大動脈瘤を認めた。中枢ネック径は23~24mm, ネック長は30mmで屈曲は認めず, 低位腎動脈から大動脈分岐部までの長さは114mmであった。術前CTの計測よりPowerlinkメインボディ28-16-155BLを選択した。計測上, 中枢シーリングゾーンは16mmの予定であったが, 実際に留置すると中枢ネックが短くエクステンションを追加で内挿した。術後, エンドリークは認めず, 瘤径も47×59mmと縮小傾向にあり経過良好であったが, 術後4年の検査でエンドリーク, 瘤径の増大を認めた。メインボディが瘤内へ落ち込んだことにより, エクステンションとの接合部からType III エンドリークが生じていた。Endurantのアオルタエクステンションを内挿することにより, エンドリークは消失した。

日本ではZenith Flex, Excluder, Powerlink, Endurant, Aorfixの5機種が使用できる企業性の腹部ステントグラフトである。この中でPowerlinkのみが1ピース構造のY字型ステントグラフトという特徴がある。しかしながら, Powerlinkはメインボディ長が80mmと100mmに限られるという欠点がある。Type III エンドリークはステントグラフトの破損や接合部からの漏れにより生じる。Zenith FlexやEndurantによるType III エンドリークの報告は散見されるが, Powerlinkによる報告はない。術後3年まではエンドリークの所見はなく瘤径も縮小傾向にあったが, 術後4年目にエンドリークが生じた。その原因としてメインボディが瘤内へ落ち込んだことで接合部からのType III エンドリークが生じたと考えられた。術後3年まではエンドリークの所見はなく瘤径も縮小していたのでメインボディがmigrationを起こした原因は不明である。

Powerlinkによる治療でエクステンションを使用した場合には本症例のようにType III エンドリークが起こる可能性もあることを考慮しておく必要がある。また, 実際の中枢ネックが短くなる可能性が予測される場合には先にエクステンションを腎動脈下に留置し, その後メインボディを留置することで本症例のようなType III エンドリークの予防に役立つ可能性がある。