Gut and Gastroenterology

CASE REPORT

Usefulness of Hydrogel-Coated Coil in Balloon Assisted Coil Embolization (BACE) With Thoracic Endovascular Aortic Aneurysm Repair

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Abstract

Since 2009, thoracic aortic stent graft treatment (TEVAR) using a less invasive catheter has been available in Japan for thoracic aortic aneurysms created in the descending aorta. However, how to preserve some of the celiac arteries in the descending aorta is an important issue. If the arcade from the superior mesenteric artery can be preserved, the hepatic artery and splenic artery can be preserved by embolizing only the origin of the celiac artery. Here, we report a case in which the origin of the celiac artery was completely embolized with hydrogel-coated coil in balloon assisted coil embolization (BACE) with thoracic endovascular aortic aneurysm repair.

Keywords: hydrogel-coated coil, balloon assisted coil embolization, thoracic endovascular aortic aneurysm repair

Abbreviations: TEVAR: Thoracic endovascular aortic repair; BACE: balloon assisted coil embolization; CA: celiac artery; SMA: and superior mesenteric artery; CT: computed tomography; DSA: digital substract angiography; CAG: celiac arteriography.

Introduction

Initially, the hydrogel-coated coil, which was introduced for the purpose of reducing recanalization and improving long-term results in intra-aneurysm embolization of cerebral aneurysms [1, 2], has become available in the trunk region. In Japan, the hydrogel-coated coil (AZUR™, Terumo Corporation, Tokyo, Japan) has been available in the trunk area since 2012. Since this product has a product concept that combines the advantages of a detachable coil that is embolization effect of fiber and repositionable, the further development of coil embolization is expected by the introduction of this product. Also, the interesting point of hydrogel-coated coil is that in the coil embolization, the swelling of the gel improves the filling rate, thereby suppressing recanalization after coil treatment. Furthermore, the volume embolization rate is physically improved due to the differentiated product characteristics such as outer swelling or inner swelling. That is, it is considered that the hydrogel-coated coil is suitable for efficient blood flow suppression by tight packing. Thoracic endovascular aortic repair (TEVAR) is well tolerated given sufficient collateralization from the superior mesenteric artery (SMA) [3, 4]. This report presents the embolization of celiac artery origin cases for thoracic endovascular aortic repair, in which the product performance of the hydrogel-coated coil was maximized by coil embolization combined with blood flow blockage using a balloon catheter.

Case Report

An 81-year old man was referred to our hospital with a history of back pain. He was diagnosed DeBakey type IIIB dissection, no organ ischemia, dissociation and thrombotic occlusion by computed tomography. He was waiting for thoracic endovascular aortic repair (TEVAR) for thoracic aortic aneurysm. In this case, we planned TEVAR with celiac artery coverage. The existence of collaterals between celiac artery (CA) and superior mesenteric artery (SMA) was confirmed by preoperative computed tomography (CT) or digital substract angiography (DSA). On the celiac arteriography (CAG), the origin is narrowed (Figure 1A). We placed 5.2Fr balloon catheter (Selecon MP Catheter II, diameter 9mm; Terumo Corporation, Tokyo, Japan) at the origin of celiac artery. During balloon occlusion, celiac artery coverage including left gastric artery using hydro-coated coil was performed (Figure 1B). Only the celiac artery is coiled by aortography, and the blood flow of the hepatic artery and the splenic artery is maintained by a collateral circulation of SMA. Aortography after stenting shows both hepatic artery (HA) and splenic artery (SPA) from collateralization from superior mesenteric artery (SMA) to gastroduodenal artery (GDA) filled at the celiac artery (CA) origin. (Figure 1C).

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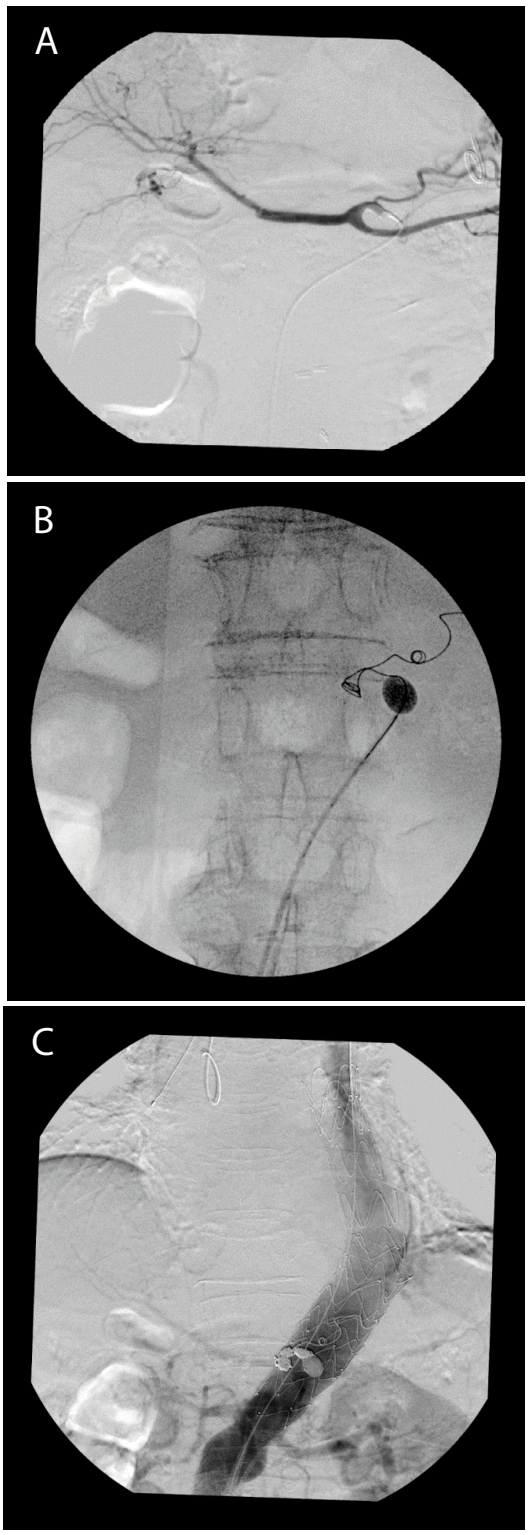

Figure 1: .

Discussion

In a thoraco-abdominal aortic aneurysm, it is not uncommon for the main branch blood vessels of the abdomen such as the celiac artery to be included in the area of the aneurysm or in the sealing area during stent graft placement, and it is necessary to block these blood flows. It is relatively easy to surgically shut off blood vessels peripheral to the superior mesenteric artery, and bypass surgery for debranching is also performed because peripheral blood flow is preserved. Hence, when thoracic aneurysms are extensive and expand beyond the limitations of currently available thoracic endoprosthesis, surgeons and interventionalists are often forced to make improvements that are technically and technologically driven to facilitate repair of these complex and extensive aneurysms that if untreated or treated by surgical reconstruction are associated with a significant morbidity and mortality [5, 6]. A thorough evaluation of the celiac and SMA collaterals via CTA and/or arteriography should be considered essential prior to planning TEVAR and celiac artery coverage. Studies evaluating CTA and standard arteriography have indicated that the accuracy of CTA for depicting visceral arterial anatomy and identifying branches of the gastroduodenal and pancreaticodudenal arteries that are the collateral communications between the celiac and the SMA is 90% [7]. However, it is difficult to approach the celiac artery due to the positional relationship of the origin by the interventional radiology procedure. This is probably because the celiac artery is relatively short and it is difficult to embolize only the celiac artery. Further, the celiac artery has a fast blood flow like the splenic artery, and it often happens that the pushable coil alone deviates. There are many anastomotic branches around the pancreas between the superior mesenteric artery and the celiac artery, and blood flow to the peripheral of the splenic artery is usually maintained, but if good blood flow is considered, After all, it seems good to leave the common hepatic and splenic bifurcations. In consideration of these points, we decided to perform coil embolization (BACE) with blood flow blockage using a balloon catheter. This balloon catheter assisted procedure not only prevents the peripheral movement of the coil but also prevents the microcatheter recoil by the balloon during embolization, so that the coil can be inserted tightly into the short segment. Anchoring is also important for tight insertion, and anchoring around the left gastric artery enabled the hydrogel-coated coil (AZUR™, Terumo Corporation, Tokyo, Japan) to embolize in a short segment. In the case of reliable coil placement in a limited area, a coil that can be repositioned is selected, but this is also the most useful because the hydrogel-coated coil (AZUR™, Terumo Corporation, Tokyo, Japan) can be easily repositioned and a fiber embolic effect is expected. In addition, it is expected that the introduction of the hydrogel-coated coil (AZUR™, Terumo Corporation, Tokyo, Japan) will be effective in reducing the number of procedures and shortening the procedure time in addition to the safety of the procedure. After TEVAR CA coverage by hydro-gel coated coils (AZUR™, Terumo Corporation, Tokyo, Japan), celiac artery was retrogradely imaged with no apparent endoleak.

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