Bitubular graft as an adjunct for laparoscopic hybrid repair of an abdominal aortic aneurysm

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Laparoscopic repair (LR) of abdominal aortic aneurysms (AAAs) has been developed as a less invasive alternative to open repair. LR in the setting of diseased (ectatic, aneurysmal, calcified) aortic bifurcation or common iliac arteries (CIAs) is more challenging than LR of AAAs limited to the infrarenal aorta. In such cases, a bifurcated graft is necessary with an increased procedural time, more blood loss, and challenging distal anastomoses. We here present a new surgical technique using a custom-made bitubular graft (BTG), which allows LR of AAAs with diseased aortic bifurcation or CIAs while performing an aorto-aortic LR. During the same or a later intervention, covered stent grafts can be distally mated with the BTG using percutaneous femoral accesses to treat an extension of the disease to the aortic bifurcation and/or the CIAs. The BTG represents an interesting option for patients subjected to LR and presenting with an AAA associated with ectatic/aneurysmal proximal CIAs or heavily calcified aortic bifurcation. (J Vasc Surg 2013;58:254-7.)

Despite technical improvements of endovascular aneurysm repair, conventional repair (CR) remains the most durable treatment for abdominal aortic aneurysms (AAAs).[1] In the current period, two main types of CR can be performed depending on aortic anatomy, (1) straight aorto-aortic tube graft and (2) bifurcated aorto-bi-iliac or bifemoral repairs. Laparoscopic repair (LR) of AAAs has been described as a less invasive technique of CR[2,3] with long-term results comparable to open repair.[3] Although straight tube graft is considered the simplest option,[2-6] a bifurcated graft is usually needed in cases of AAAs extended to the aortic bifurcation and/or common iliac arteries (CIAs), combined aortoiliac occlusive disease, or failed distal aortic anastomosis. Hybrid repairs associating a tube graft with an endograft in such challenging cases have been reported,[7] but imply additional costs and insertion of large sheaths through the femoral arteries. We here present a new technique of LR for AAAs using a custom-made bitubular graft (BTG), which allows a larger use of aorto-aortic repair.

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TECHNIQUE

The purpose of this technique is to create a custom-made tube graft including two proximal sealing zones for covered stents intended to land distally in the iliac arteries (Fig 1).

Two bifurcated surgical grafts are necessary. In our practice, we use bifurcated Dacron grafts (Gelsoft Plus; Vascutek-Terumo, Inchinnan, Scotland), but polytetrafluoroethylene grafts (W. L. Gore and Assoc., Flagstaff, Ariz) can also be used. The two grafts can be slightly different in diameter (±2 mm difference between iliac limbs) if there is a need to accommodate graft diameter between the proximal and the distal aortic necks. The two iliac limbs of both surgical grafts are cut 1 or 2 cm below the bifurcation of the main body, depending on the length of the infrarenal aorta. One graft is then inverted upside-down, and both grafts are connected together ex vivo, one limb with another, using 4-0 polypropylene running sutures (Prolene; Ethicon, Brussels, Belgium). Both main bodies are cut in a way to obtain a graft whose total length would be at least as long as the aortic segment intended to be replaced. We elect to keep a proximal main body long enough to facilitate later insertion of a proximal stent graft in case of proximal late failure.[8] In contrast, the distal main body is cut short. Finally, a tube graft including two tubular segments within its mid-part is created, namely the BTG. These two tubular segments constitute proximal landing zones to allow later insertion of two covered stents (one on each side).

The surgical procedure includes two main steps. The first step is an aorto-aortic tube graft LR using the BTG. Our technique of laparoscopic aorto-aortic tube graft repair

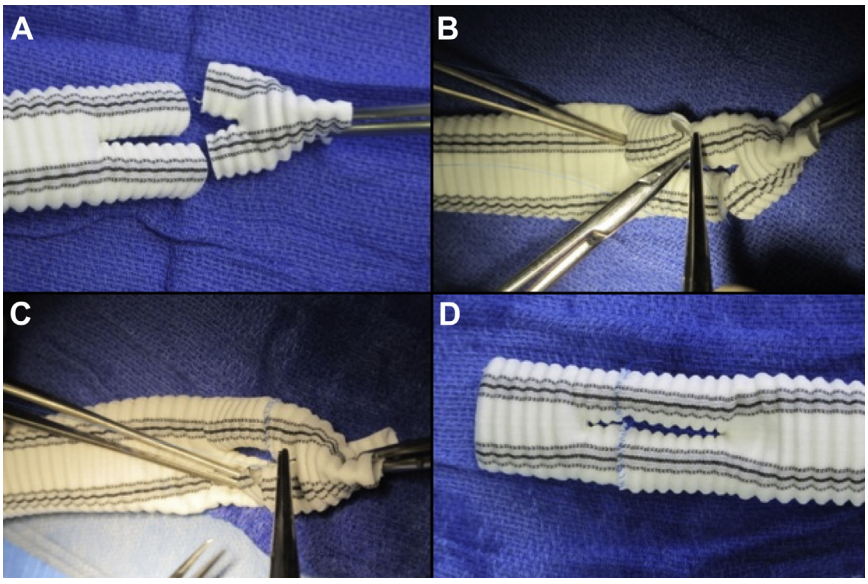

Fig 1. Ex-vivo preparation of the bitubular graft (BTG). Two Dacron bifurcated surgical grafts (one 18- × 9-mm graft and one 20- × 10-mm graft) are cut 1 to 2 cm below the bifurcation and one graft is inverted upside-down **(A)**. Both grafts are connected together ex-vivo, one limb with another, using running sutures **(B** and **C)**. The final BTG includes two proximal sealing zones for covered stent grafts **(D)**.

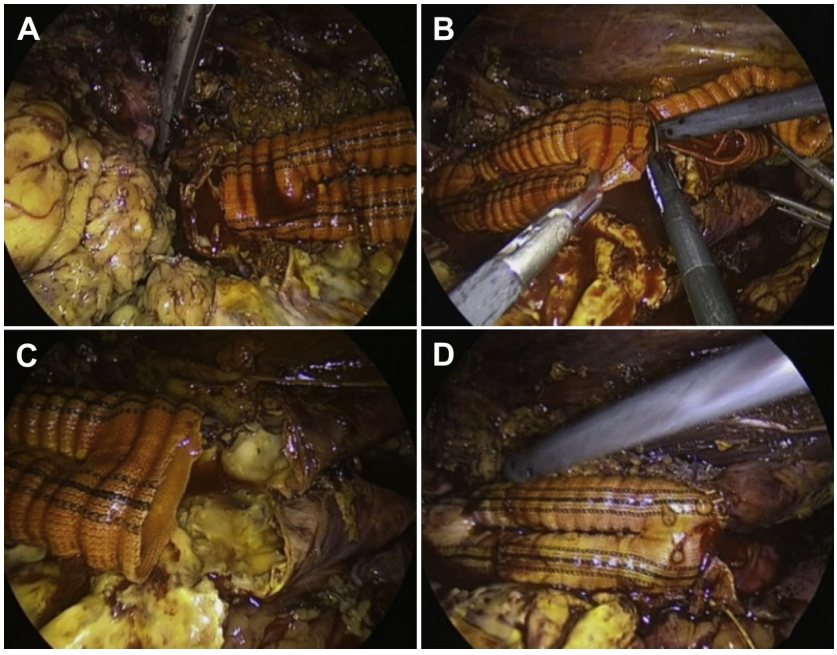

Fig 2. Intraoperative view of laparoscopic abdominal aortic aneurysm (AAA) repair using a bitubular graft (BTG). Following the proximal anastomosis **(A)**, the BTG is cut at the level of the main body of the distal bifurcated graft **(B)**. The distal anastomosis is performed **(C)**, and the final aspect of the bitubular repair is shown **(D)**.

has been previously described.[2] The graft is implanted in a usual fashion by performing end-to-end proximal and distal aortic anastomoses (Fig 2).

The second step consists of implanting distal covered stents between the tubular portions of the BTG and the CIAs. During the same or a later intervention, both common femoral arteries are percutaneously punctured in a retrograde fashion. A 10F introducer is placed in each femoral artery. A 0.035-inch 180-cm-long hydrophilic guidewire (Terumo Europe, Leuven, Belgium) is pushed