NewsLetter
Scientific Newsletter · Year 6 · November 2015 · # 39

LINUS

STENT-GRAFT ENDOPROSTHESIS

Treatment of Abdominal Aorta Aneurysm

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ABDOMINAL AORTA ANEURYSM

The aorta, the largest and main artery of the organism, may suffer dilations in its wall reaching 50% or more of its original diameter. These dilations are known as aneurysms and are classified according to the region where they occur: the one that passes through the thorax is called thoracic aorta aneurysm, and the one that occurs in the segment that passes through the abdomen, the abdominal aorta aneurysm. However, the abdominal aorta aneurysm is more common than the thoracic aneurysm. It is important that there is a proper follow-up of patients due to the high risk of complications, such as embolization and rupture, which could be fatal[(1)].

The main risk factors are smoking, male gender, systemic arterial hypertension (SAH), dyslipidemia, atherosclerosis and family history. Age is also an important risk factor, and the incidence increases in men with age above 55, and women, above 70 years old[(1)].

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CLINICAL SIGNS

Most patients do not present symptoms, therefore, the disease is typically detected in imaging exams or routine physical exams. If the aneurysm is ruptured, there is development of pain, with a sudden, constant, and very intense onset, in the dorsum or lower abdomen region in 80% of the cases rupture occurs in the retroperitoneum and, when the rupture is in the abdominal cavity, there is incontrollable hemorrhage and circulatory collapse. In 1/3 of the cases there are symptoms such as: abdominal or dorsum pain, presence of a palpable mass and hypotension. In the rupture to the abdominal cavity there may be distension, and in the rupture to the duodena there is massive gastrointestinal hemorrhage[2,3].
Under a physical exam, it is difficult to distinguish a tortuous and ectasia aneurysm aorta. There may be occlusive arterial disease, with pulse reduction in lower limbs, in addition to the occurrence of an arteriovenous fistula by a spontaneous rupture in the vena cava, iliac vein or renal vein, with hemodynamic collapse and acute cardiac insufficiency with high output[4].

NATURAL HISTORY OF THE DISEASE

In the cases of rupture there is high mortality, at around 25% before arriving at the hospital and 51% after arriving at the hospital. In order to avoid this mortality, surgery is the preferred treatment for patients with risk of rupture [2].
The risk of rupture increases according to the size of the aneurysm:

<4 cm: 0.3%
4-4.9 cm: 1.5%
5-5.9 cm: 6.5%
6-6.9 cm: 10%
>7 cm: 33%

In women, there is higher chance of rupture, and it may also occur in smaller diameters, being more common in smoking and SAH patients. Eighty percent of the aneurysms increase with time, with 15-20% occurring rapidly (more than 0.5 cm per year)[3]. A rapid expansion also predicts the risk of rupture, mainly in abdominal aneurysms with >5cm in diameter[4].

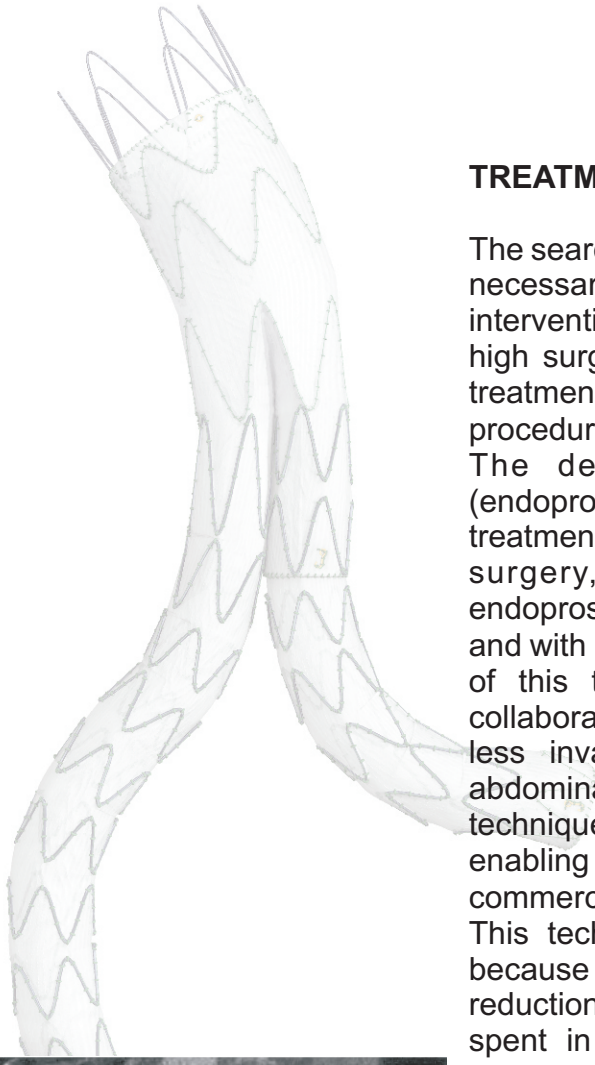
FOLLOW-UP

Aneurysms >4 cm should be monitored to evaluate the growth of >5.5 cm or 0.5 cm/year, which are the surgical indications. Computed tomography (CT) should be performed every six months or every three months in high risk patients. For monitoring purposes, CT is better than ultrasonography (USG)[3,4].

DIAGNOSIS

Abdomen USG analyzes the aneurysm in the transverse and longitudinal planes, defining its size in ±0.3 cm, being insufficient for surgery planning[3]. Abdomen CT is extremely accurate for diagnosis and measurement, with a ±0,2 cm variation; it better defines the shape and extension of the aneurysm, as well as the anatomic relationship with the viscera and renal vessels (Figure 1). Magnetic resonance, in turn, is extremely accurate in determining the size, defining the proximal extension of the disease and iliofemoral involvement[5].
Aortography can underestimate the aneurysm's size due to intramural thrombi, but it is a good exam to define the aneurysm's suprarenal extension and the associated disease in renal, mesenteric and iliofemoral arteries, being used only in selected cases[3,5].

Figure 1: Pre-procedure tomography[5].



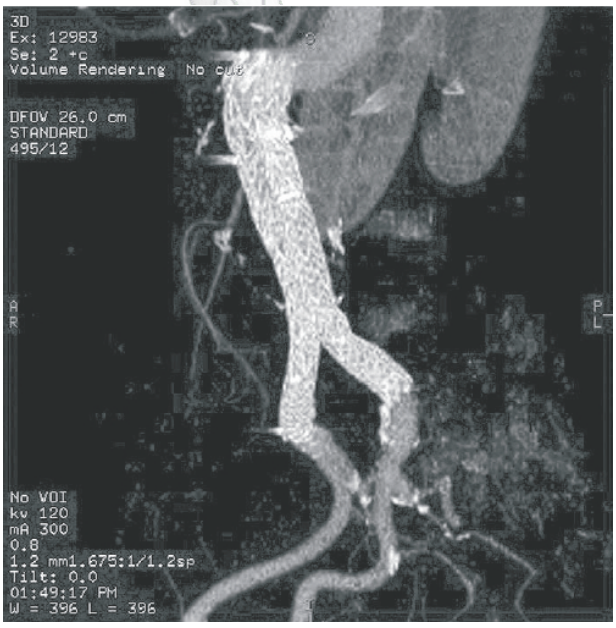


Figure 2: Post-procedural angiotomography[5].

TREATMENT

The search for alternatives to open chest surgery became necessary due to the complications brought up by this intervention. Patients with comorbidities, considered at high surgical risk, in general remained with no specific treatment or were otherwise subjected to the surgical procedure with very high morbimortality[6,7].

The development of an endovascular device (endoprosthesis) enabled an alternative to conventional treatment, establishing a less invasive closed implantation surgery, consisting in the implantation of an endoprosthesis, with no need for an open chest surgery and with lower morbimortality (Figure 2)[5,8]. The precursor of this technique was Parodi, who, along with his collaborators in the beginning of the 1990s, developed a less invasive device, with the objective of treating abdominal aorta aneurysm. With time, the devices and the techniques employed in this treatment were perfected, enabling the successful repair of aorta aneurysms and the commercial availability of these materials [9].

This technique has many clinical advantages, mainly because of its less invasive nature, among them: reduction of the surgical time, the blood loss, the time spent in intensive care units, hospitalization, and, in general, reduction of perioperative morbimortality[10].

The **LINUS Stent-Graft Endoprosthesis** (Figure 3) was developed specially for the endovascular treatment of the abdominal aorta aneurysm. It is composed by an arterial intraluminal support prosthesis (Stent-Graft) and by the Release Device (Figure 4). The product developed by Braile Biomédica is made of Nitinol with polyester coating. They are self-expansible prostheses with high radial resistance and carefully compressed and inserted in catheters that enable the use of a guidewire of up to 0.035". The **LINUS Stent-Graft Endoprosthesis** is commercially available in the models Bifurcated, Aortoiliac (tapered), Iliac extension (straight or tapered) or Occlusor.

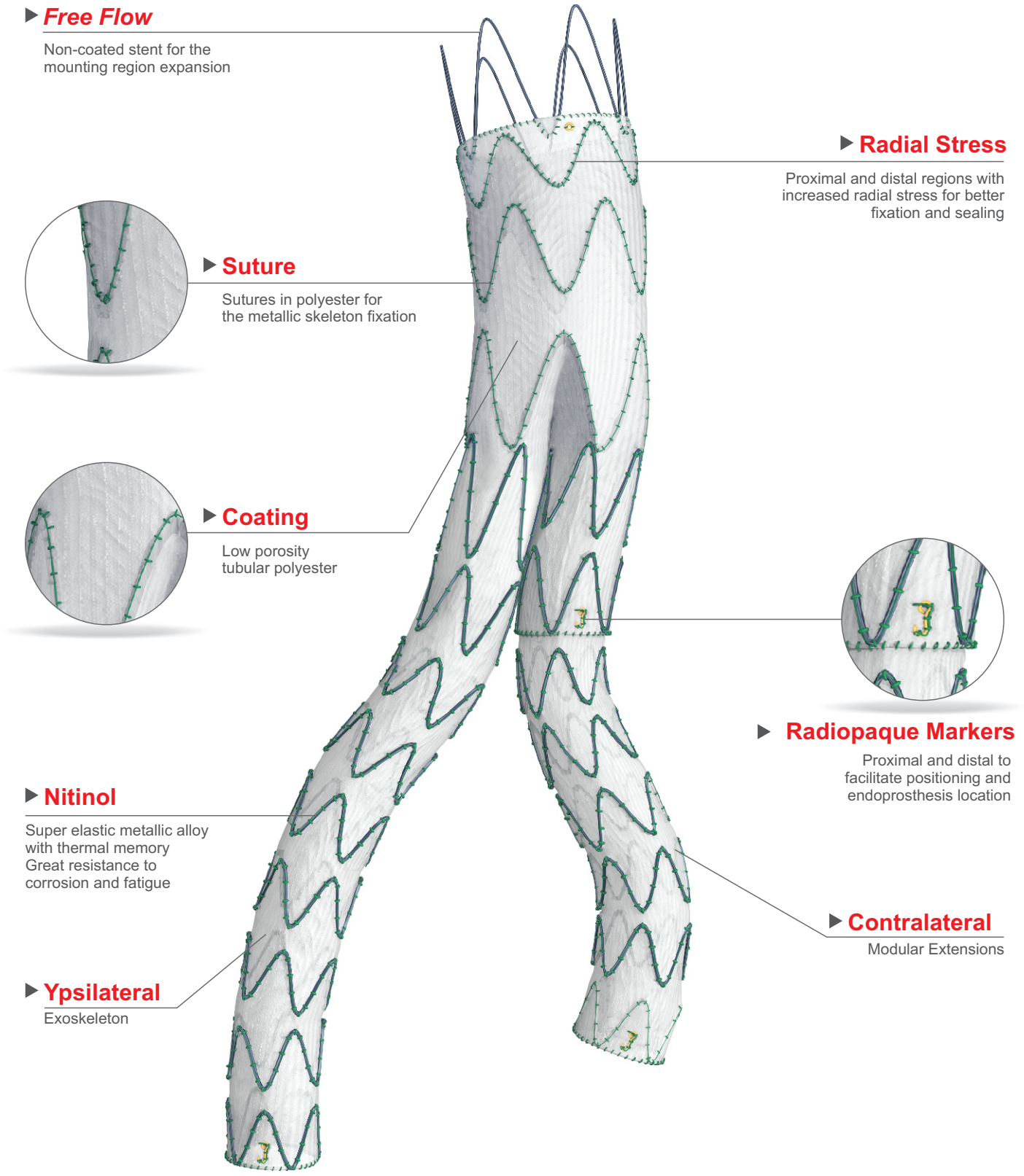


Figure 3: **LINUS Stent-Graft Endoprosthesis**.

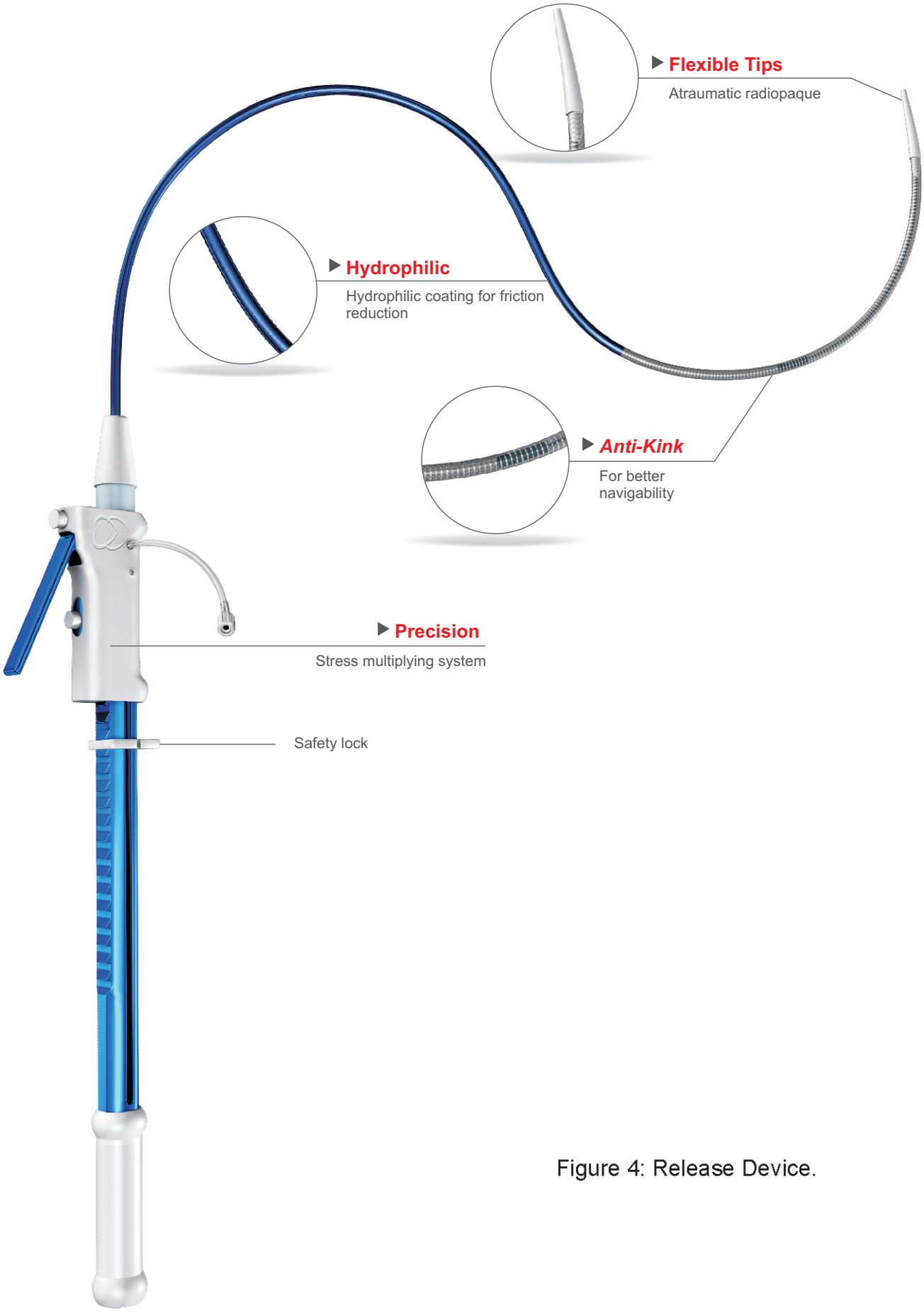


Figure 4: Release Device.

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