The Anaconda™ stent graft for Abdominal Aortic Aneurysm repair. Ongoing developments to treat complex situations.

Initial experience
The Anaconda™ is a bifurcated stent graft of woven polyester with nitinol ring stents. The name was chosen because of the similarity between the shape of the proximal ring stents and a snake’s mouth. It was the first true reproducible stent graft and it features a magnet wire contralateral limb cannulation system. Initial results show technical success rates of 99% and low secondary intervention rates in the mid-term with straightforward anatomy.1-2 Recent studies with the Anaconda™ stent graft have focused on more challenging cases.

Angulated infrarenal necks
Specific attention to flexibility, proximal fit, and sealing may decrease the chance of type I endoleak and graft migration. The Multicenter Angulated Neck Study with the Anaconda™ (MANS) showed that treating AAA with a severe angulated neck (>60 degrees) is feasible with acceptable mid-term results.3 Primary technical success was 83% and there were four type I endoleaks at the end of implantation. Three of these type I endoleaks resolved before discharge, probably due to adaptability of the saddle-shaped proximal stent rings. The shape of these ring stents and the unsupported fabric contribute to a more flexible main body which appears to expand the use for EVAR in angulated necks.

Ruptured infrarenal AAA
The single centre prospective non-randomised Ruptured Aneurysm Study with the Anaconda™ (RASA) observed a mortality rate at 30 days of 17% and after a mean follow-up of 3.4 years of 34%.4 Over 30% of the RASA study patients were considered haemodynamically unstable or having challenging anatomy (infrarenal neck <15 mm or angulation >60 degrees). Challenging AAA anatomy did not influence long-term outcome.

Fenestrated stent graft for juxta-renal AAA
Fenestrated stent grafts have been developed for treatment in more complex anatomy lacking adequate sealing zone in the infrarenal aorta. Potential advantages of the Fenestrated Anaconda™ stent graft include the ability to reposition the body, the ability to position the superior mesenteric or celiac artery in an anterior augmented scallop, the ability to cannulate target vessels using axillary access and the lack of stent material compromising the position of the fenestrations. Recent studies show that the Fenestrated Anaconda™ stent graft can be used safely and effectively in the treatment of short-necked infrarenal and juxtarenal AAAs.5,6 In 64% of the patients the stent graft was repositioned and this feature of the Anaconda™ stent graft seems relevant as accurate placement with alignment between the fenestration and the target vessel origin is important for success. However, a limitation of the repositionability of the stent graft is the risk of thromboembolic events, and should therefore only be used when necessary. Axillary access was required in 16% of the patients due to steep downward angulated target vessels.

Future developments
The next generation of the Anaconda™ stent graft will be delivered on a lower profile platform to expand the patient population that can be treated with this device.

References:

Figure 1. A 72-year-old male patient with an infrarenal AAA. Inferior neck length is over 15mm without any severe angulation. The proximal ring stent is anchored in an infrarenal position by hooks to prevent migration. The body is unstented, resulting in zero columnar strength, comparable to traditional bifurcated prosthesis design. The iliac legs are supported by independent nitinol ring stents, which provide flexibility.

Figure 2. An 80-year-old male patient with an infrarenal AAA. The infrarenal neck has an infrarenal angulation above 60 degrees and a suprarenal angulation above 70 degrees. The main body in this case is rotated 90 degrees to prevent kinking of the iliac legs. The proximal markers of the iliac legs are positioned just below the saddle shape ring stents to prevent collapse of the body. Extra overlapping of the stent graft compared to straight forward cases is important as the stent graft does not seem to position itself perpendicular to the aortic vessel wall.

Figure 3. A 73-year-old male patient with a juxta-renal AAA and a history of chronic obstructive pulmonary disease. The distance between the celiac artery (CA) and the superior mesenteric artery (SMA) is only 6mm. The distance between the SMA and the right renal artery is less than 3mm. Therefore a triple Fenestrated Anaconda™ stent graft was used with an augmented valley below the CA with fenestrations for the SMA in renal arteries. In Fenestrated Anaconda™ stent grafts, the main body is positioned in a 90 degree rotation to enable the valleys of the saddle shape to be positioned just around the origin of the mesenteric arteries when needed. The SMA fenestration was cannulated by axillary access in this case.