Gerbault, O., Arrouvel, C., Servant, J.-M., Revol, M., Banzet, P.  
**VCS® microclip anastomosis of vessels less than 2 millimetres in diameter.**  
Preliminary experimental study in rats [Anastomoses par microagrafes VCS® sur des vaisseaux de diametre inferieur a 2 millimetres. Etude experimentale preliminaire chez le rat]  

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**Abstract**

The aim of this work was to study the possibilities and limits of the vascular microanastomoses with VCS® microclips. VCS® Microclips are a new mechanical anastomotic device, allowing a single operator to perform anastomoses without microsutures. The two arcuate limbs of the titanium microclips do not penetrate the vascular intima. The microclip anastomosis technique is based on symmetric eversion of the vessel walls, facilitated by everting forceps. We studied the medium and small Autosuture VCS® microclips on different vessels ranging from 0.3 to 2 millimeters in diameter: aorta, carotid artery, femoral artery and femoral vein. Thirty nine end-to-end or end-to-side anastomoses were performed on Wistar rats. These anastomoses were performed by a single operator without the use of sutures. Patency was studied by the 'empty and refill' test immediately and at two months. Histologic analysis of the anastomosis was performed at two months (hematein- eosin and orcein stains on longitudinal sections). Four out of thirty nine anastomoses were occluded during the 15 minutes following clamp release. Failure was always due to a technical error and occurred during the first trials. The thirty five other anastomoses were patent immediately and at two months post-operatively, except for the by-pass which was not viable. These anastomoses were still patent 30 minutes postoperatively. Light microscopy analysis confirmed that the microclip extremities did not penetrate the lumen, although the internal media was usually very thin at the level of the microclip jaws, especially for the smallest vessels. For vessels larger than 1 mm in diameter, the microclip extremities were usually outside the internal elastic lamina. No anastomotic aneurysm was found. Vascular healing was comparable with microsutures at 2 months. Microvascular anastomoses performed with microclips have numerous advantages, compared to usual microsutures: they are two to three times quicker, they can be performed step by step without turning the clamp and they can be performed with the right or left hand. There is theoretically no thrombogenic risk. The drawbacks are the need for complementary training and the cost of microclips which is five to six times that of sutures. End-to-side anastomoses of small vessels are more difficult than end-to-end anastomoses. The recipient vessels must be larger than 1.5 mm in diameter, otherwise the anastomosis may become stenosed. Microclips are especially useful to save time, i.e. for multiple anastomoses and for anastomoses of vessels larger than 1 millimeter in diameter. Some modifications of the material could allow vascular or hollow organ anastomoses with endoscopic assistance.

**Author Keywords**

Experimental surgery; Microstaples; Microsurgery; Vascular anastomoses

**Index Keywords**

absorbable suture, titanium; animal experiment, animal tissue, article, blood vessel shunt, end to end anastomosis, end to side anastomosis, microsurgery, nonhuman, rat, stapler, surgical technique, suturing method, anastomosis, animal, blood vessel, equipment design, histology, instrumentation, male, methodology, surgical instrument, vascular surgery, Wistar rat; Anastomosis, Surgical, Animals, Blood Vessels, Equipment Design, Male, Microsurgery, Rats, Rats, Wistar, Surgical Instruments, Vascular Surgical Procedures