Early experience with the new 'megacoupler' ring-pins for microvascular anastomoses.

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Published In/Presented At

Hallock, G. G., & Rice, D. C. (2008). Early experience with the new 'megacoupler' ring-pins for microvascular anastomoses. *Journal of plastic, reconstructive & aesthetic surgery : JPRAS*, *61*(8), 974–976. https://doi.org/10.1016/j.bjps.2007.11.077

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doi:10.1016/j.bjps.2007.09.050

Early experience with the new 'megacoupler' ring-pins for microvascular anastomoses

Traditional microsurgical suturing techniques may be an impediment for achieving the ultimate goal of expedient yet perfect anastomotic patency rates, as they are tedious, time-consuming, and require continual laboratory training and skills maintenance.[1] Non-suture alternatives date back to the late 19th century.[1] Variants of everting ring-pin devices[2–4] have proven to be the most successful option.

Nakayama, et al[2] as early as 1962 had developed a system of 2 metal rings with 12 interlocking pins and holes for anastomoses of vessels up to 4 mm. in diameter, but this was limited to thoracic and abdominal surgery. Ostrup and Berggren[3] adapted this same concept as the UNILINK instrument system for even smaller vessels ranging from 0.8–2.0 mm. in caliber. We began using the 3 M microvascular anastomotic coupling device [3 M Healthcare, St. Paul, Minn.] around 1990,[4] and this is presently available as the GEM Microvascular Anastomotic Coupler System [Synovis Micro Companies Alliance, Inc., Birmingham, Alabama]. This basic system comprises mirror image polyethylene rings with stainless steel pins that conveniently come prepackaged as a unit in a winged-jaw assembly that then mounts on a separate titanium-tipped anastomotic instrument. Available coupler sizes previously ranged from 1.0 to 3.0 mm. in 0.5 mm. increments, where the stated size corresponds to the outer diameter of the vessel to be approximated. As of December 15, 2005, this vender released now even larger 3.5 and 4.0 mm. couplers. These differ in that each polyethylene ring has 8 pins and corresponding holes instead of 6, and a slightly more ellipsoid opening through which the vessel lumen must be drawn (Figure 1).

The new 3.5 and 4.0 mm. 'megacouplers' [Synovis Micro Companies Alliance, Inc., Birmingham, Alabama] first became available to us in January, 2006. A prospective study was initiated to determine the method of anastomosis in all our microvascular tissue transfers for the ensuing year, January 1, to December 31, 2006. This included 45 free flaps and 1 'supercharged' local flap. Overall frequency and size of coupler selection by body region was recorded (Table 1.). Characteristics tabulated when a 'megacoupler' was used included the choice of donor or recipient vein, whether this was a critical anastomosis, and if any anastomotic complications occurred (Table 2). In all cases, a coupler was used only for venous anastomoses in an end-to-end fashion.

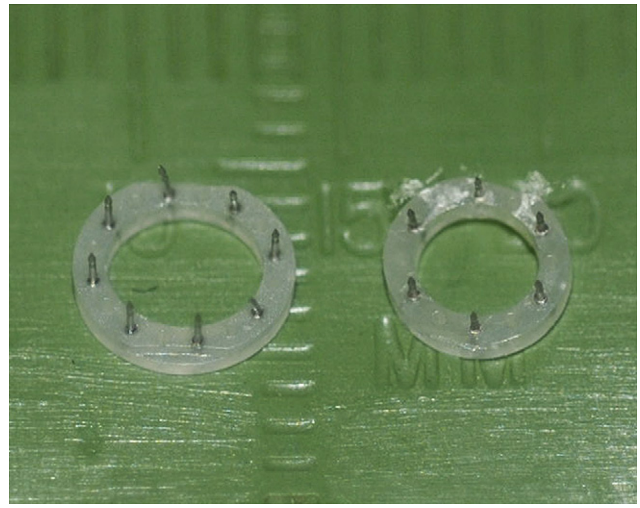

Figure 1 The new 3.5 mm. 'megacoupler' polyethylene ring with 8 pins [left] has a more oval lumen when compared with the circular lumen of its predecessors, typified by this 3.0 mm ring with 6 pins [right].

After appropriate preparation of both the recipient and donor veins, the outer diameter of the lumen of each was measured. The coupler size chosen always corresponded to the smaller value. When using a 'megacoupler,' the winged-jaw assembly must be popped into the anastomotic instrument with a loud click. With one ring-pin device held perpendicular to usually the more mobile vessel (Figure 2A), using a standard curved jeweler's forcep, the vessel is grasped without twisting and brought through the ring opening.

Unlike the smaller sized couplers where the intima and vessel wall are everted and fixated by triangulation over

Table 1 Frequency of Coupler Size Selected by Body Region

Location:	1.0*	1.5	2.0	2.5	3.0	3.5	4.0#	Total
Head & Neck:	–	1	4	5	5	1	3	19
Upper Extremity:	–	1	2	4	1	1	–	9
Trunk:	–	–	–	4	1	–	1	6
Lower Extremity:	–	2	9	6	4	–	–	21
Total by size:	0	4	15	19	11	2	4	55

* none of this size used.
\# coupler diameter in mm.

Table 2 Characteristics of 'Megacoupler' Flaps

Flap	Donor Vein	Recipient Site	Recipient Vein	Coupler Size[+]	Additional Anastomoses	Anastomotic Complications
1.DIEAP	DIEV	breast	IMV	4.0	no	none
2.Fibula	peroneal	mandible	external jugular	4.0	e-s IJ[*]	none
3.Jejunum	jejunal	esophagus	superior thyroid	4.0	no	none
4.LCFAP-*vl*	LCF descending	cheek	superior thyroid	3.5	e-s IJ[*]	none
5.MCFAP	MCF	elbow	basilic branch	3.5	e-s basilic[*]	none
6.Radial Forearm	cephalic	chin	external jugular	4.0	e-e anterior cervical[$]	none

e-e = end-to-end, e-s = end-to-side.
DIEAP = deep inferior epigastric artery perforator, DIEV = deep inferior epigastric vein, IMV = internal mammary vein, IJ = internal jugular, LCFAP-*vl* = lateral circumflex femoral artery perforator-vastus lateralis, LCF = lateral circumflex femoral, MCFAP = medial circumflex femoral artery perforator, MCF = medial circumflex femoral.
[+] mm.
[*] sutured.
[$] 2.0 mm. coupler.

alternate pins, a different approach is imperative as the larger 'megacoupler' ring has 8 pins. The vessel must first be everted over the pins at either end of the major axis of the lumen ellipse (Figure 2B.). Next, the pins at either side of the minor axis are impaled (Figure 2C). The remaining pins are then inserted in the easiest order (Figure 2D). The same process is repeated for the more immobile vessel. Once properly attached without any visible foreign material inside the lumens, the anastomotic instrument is rotated clockwise until just about to push off the coupler. A final check insures that the pins are lined up to meet the corresponding hole in its counterpart. Their penetration is completed by a hemostat used to further crimp the 2 wings together to insure the friction fit of the pins into the holes. Further rotation of the anastomotic device shaft releases the finished anastomosis, whose integrity is inspected in the usual fashion (Figure 2E).

During the past year, 55 microanastomotic couplers [Synovis Micro Companies Alliance, Inc., Birmingham, Alabama] were utilized in 38 free flaps and one 'supercharged'

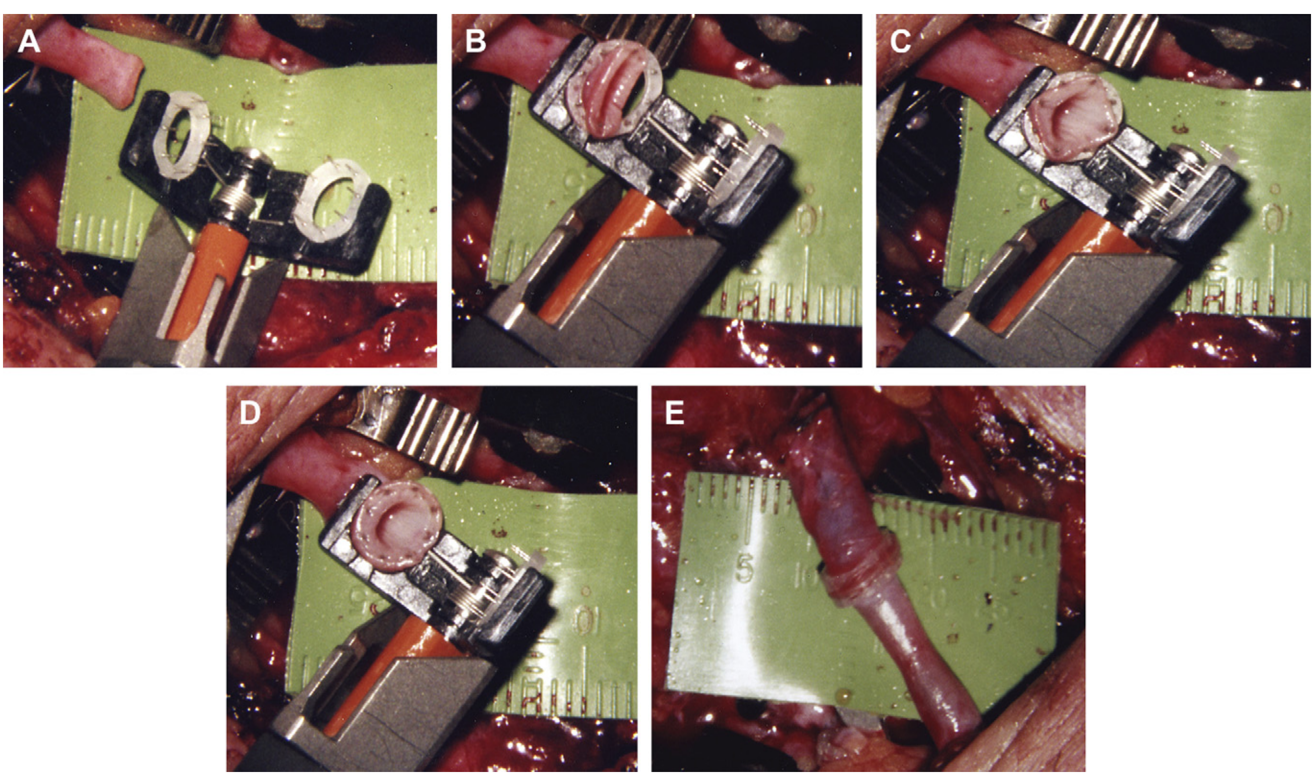

Figure 2 (A) A 4.0 mm. coupler in winged-jaw assembly in anastomotic device, with one ring turned perpendicular to the vessel at left that will be first attached, (B) vein initially impaled over pins at opposite ends of the major axis of the ring, (C) next, vein is everted over the pins opposite the minor axis at the ring midpoint, (D) completed fixation of vein onto all pins, (E) finished anastomosis.

local flap. Couplers were not used at all in 7 free flaps, 14 required two, and one even 3 couplers. Choice of coupler size usually was determined by the caliber of the available recipient vein, as our flap donor sites were intentionally chosen to have larger caliber vessels to insure better success rates.

The new 3.5 and 4.0 mm. 'megacouplers' were used for venous anastomoses in 6 free flaps [13.4% of all flaps, 10.9% of all couplers selected]. The 'megacouplers' required both a large recipient and donor vein, most commonly possible in the head & neck region (Tables 1 and 2). The time necessary to complete a 'megacoupler' anastomosis was commiserate with that of the smaller couplers. A 'strip test' of all 'megacoupler' anastomosis determined that all were patent. No complications attributable to the microvascular component of any of these cases occurred, and all flaps survived as planned.

Patency rates and the associated risk of thrombosis of sutured versus coupled microanastomoses are no different.[4,5] The advantages of the coupler in addition to speed include a precise intima to intima approximation of the donor and recipient vessels, no foreign material is left in the vessel lumen, thin walled or friable veins may be more safely coapted; and the device itself acts as a rigid external splint to theoretically improve patency rates.[5,6]

The new 'megacouplers' further expand the range of acceptable vessel caliber for using ring-pin anastomotic devices. These will be appropriate only if the selected flap has a requisite large caliber vein; but probably more restrictive is finding a recipient vein of large enough size. Thus, these may especially be valuable in the head & neck region (Table 1) where such veins are more plentiful.

If an extreme vein size discrepancy exists, the risk of pleating causing significant lumen obstruction would be less with the 'megacoupler' since the overall lumen is larger to begin with.[6] It is actually technically easier to visualize and then pull the vessel through the 'megacoupler' lumen without twisting. However, it is also easier to slide their more cumbersome rings off the wing grooves. Since the temptation for vessel stretching to fit any size ring can lead to an intimal tear that can propagate into the lumen and cause thrombosis, or pull through a pin site leading to premature dislodging of the vessel from the ring, even more precise estimation of lumen size is essential with the 'megacoupler,' as the distance to traverse is so much greater. In a sense, the 'megacoupler' now allows macrosurgery by the microsurgeon. Its potential versatility may someday allow the converse to also become true.

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doi:10.1016/j.bjps.2007.11.077

Training simulators for sentinel lymph node biopsy in malignant melanoma☆

The concept of sentinel lymph node biopsy (SLNB) for melanoma is well established, and its value in improving the staging and regional treatment of metastatic melanoma has been demonstrated.[1–5]

Optimal identification of the sentinel node requires combined radionuclide and blue dye detection.[6–9] Intraoperative use of a hand-held gamma probe for localisation of sentinel lymph node(s) is a technique unfamiliar to many surgeons. Intradermal, not subdermal or peritumoural, injection of blue dye significantly improves the rate of accurate identification of the SLN and minimises the false negative rate.[6–9] Failure to correctly identify the sentinel node can result from poor technique with the probe or vital blue dye injection.[10] This could lead to under-staging and increased costs.[11]

It has been recommended that surgeons undertake a 55-case learning phase in order to adequately master SLNB, due to the technical challenges and learning curve associated with this procedure.[1,12–15] Furthermore, since SLNB has been reported as a 'standard of care' staging procedure for melanoma,[1] and in the current climate of increasing pressures on time for provision of adequate surgical training, we believe that there is a current and growing demand for supplementary training on the technique of SLNB for malignant

☆ Presented at BAPS Winter meeting 2004. Poster presentation at The 6th World Congress of Melanoma, Vancouver, Sept 2005.