

Comparative Evaluation of VasoCollar Arterial Coupling Device against Hand-Sewn Anastomosis of Medium- and Large-Vessel Injuries

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INTRODUCTION

- Hand-sewn anastomosis is the standard of care for medium and large arterial repair
- Vascular coupling devices have been used in microvascular surgery with repeated success
 - Lower rates of thrombosis
 - Decreased anastomotic time
 - Improved patency in venous anastomoses
- Currently, no approved devices for medium and large arterial coupling
- Future near-peer conflicts may prevent prompt evacuation of casualties
 - More general surgeons will need to be comfortable with management of vascular injury

OBJECTIVES

- Assess the efficacy of the VasoCollar arterial coupling device
- Compare the VasoCollar device to the gold-standard of hand-sewn anastomosis in medium-to-large vessels in a large animal model

METHODS

- 6 swine with 3 paired anastomoses
 - Carotid arteries
 - Iliac arteries
 - Femoral arteries
- Bilateral, paired arteries served as control (hand-sewn) and experimental (VasoCollar)
- VasoCollar system consists of coupling rings, eversion forceps, and pairing forceps



Figure 1. VasoCollar arterial coupler in situ



Figure 2. Tissue everter (A) and coupling forceps (B)

METHODS

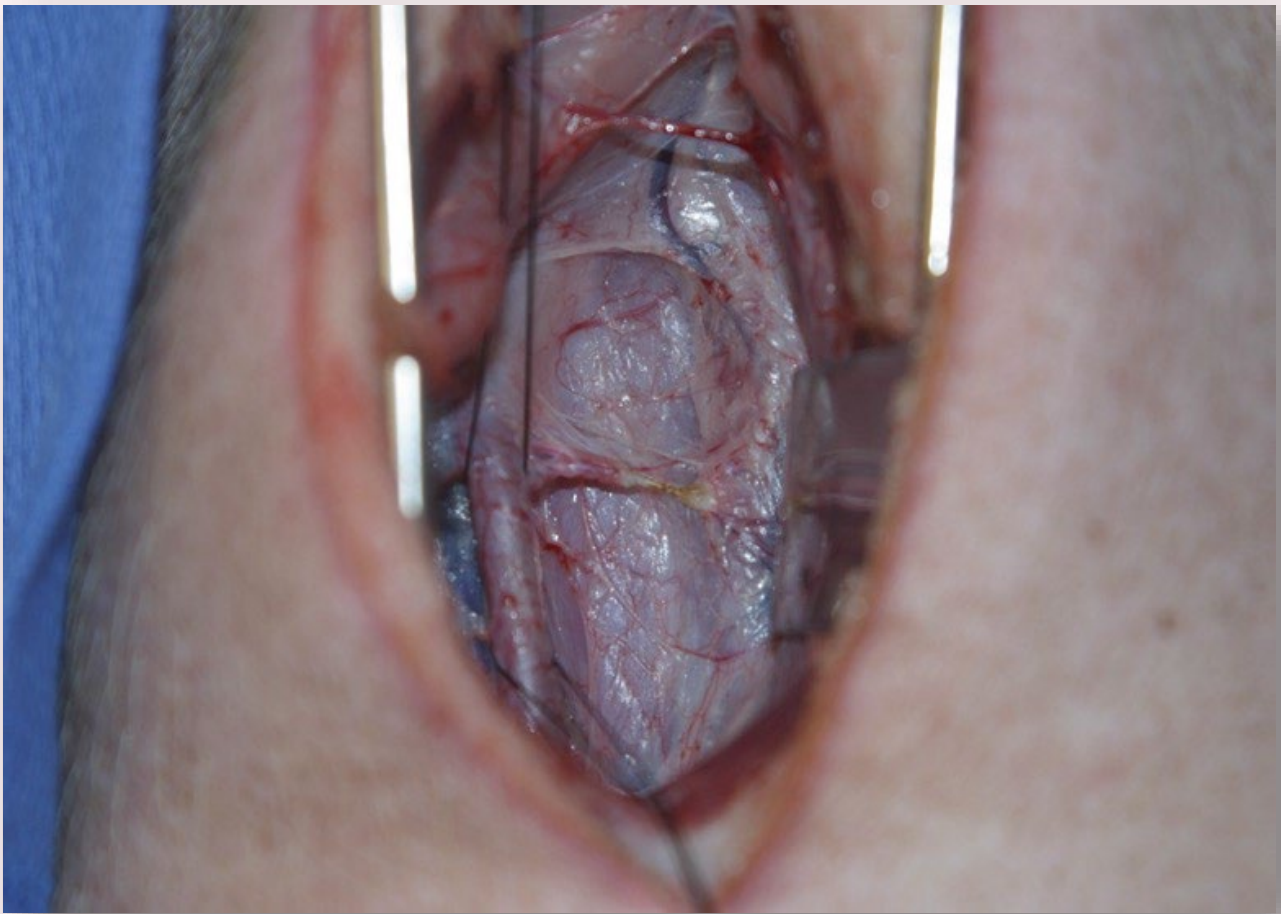


Figure 3. Exposure of bilateral carotid arteries

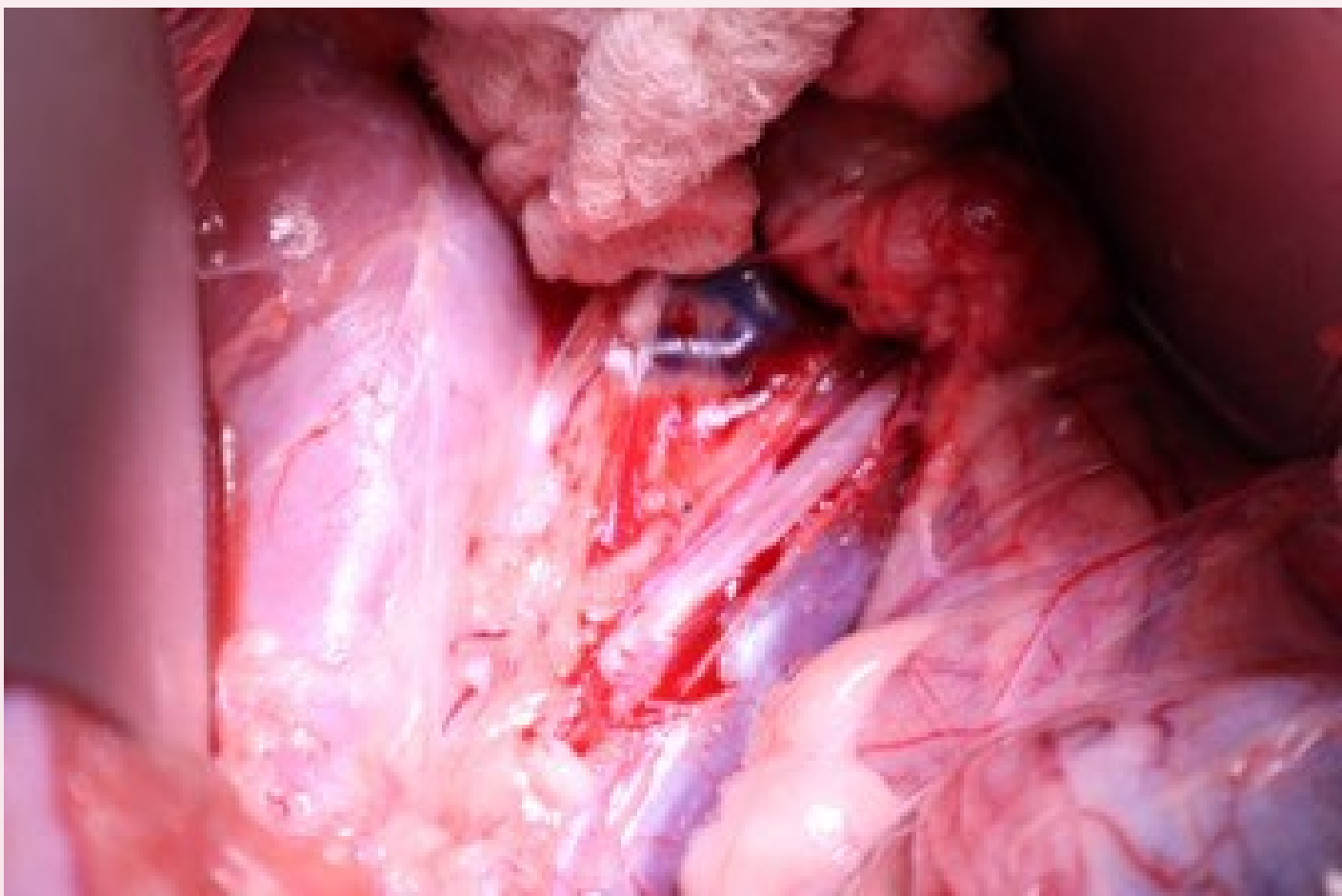


Figure 4. Exposure of iliac artery

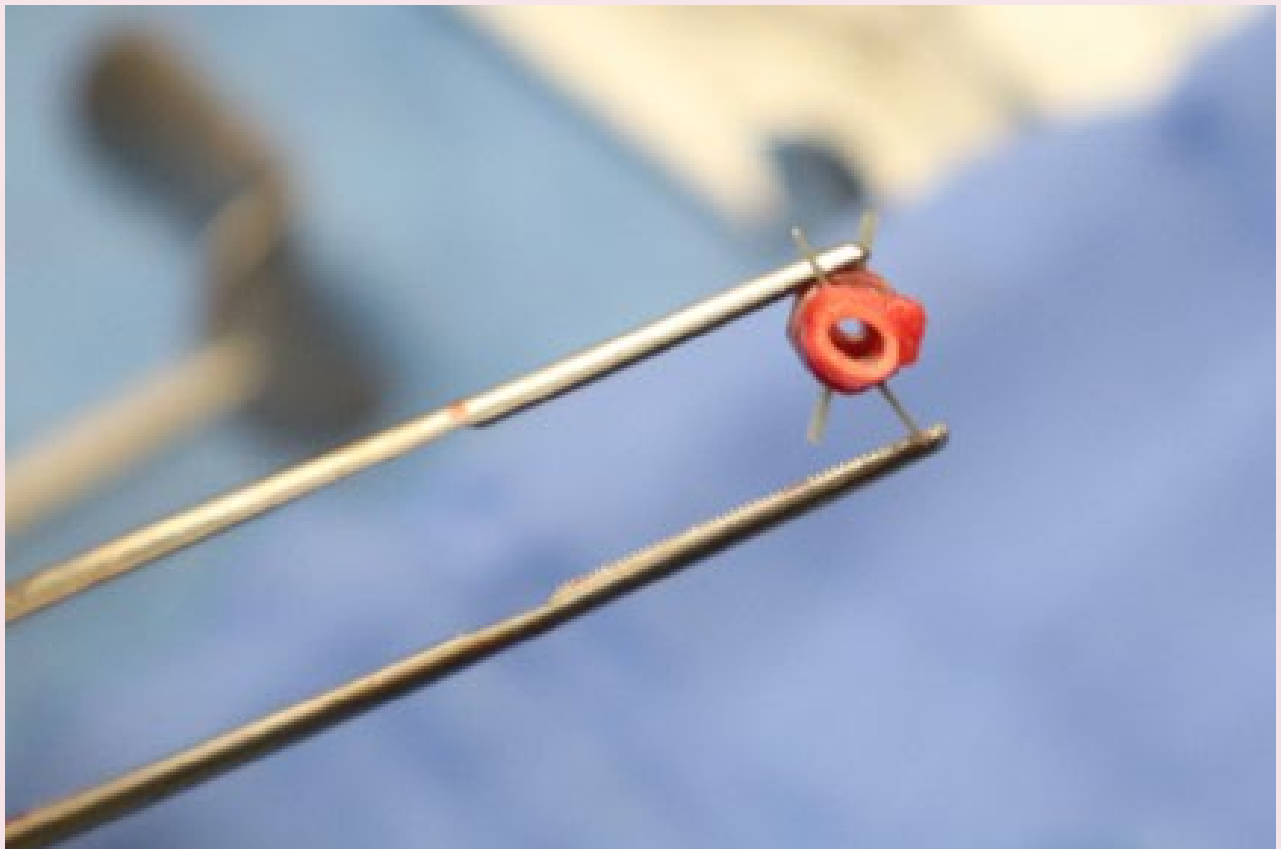


Figure 5. Intraluminal view of carotid artery following VasoCollar coupling

RESULTS

- Pilot study; not powered to detect statistical significance
- Statistical analysis performed with GraphPad using log-transformed data to compare groups using a student's t-test
- Unsuccessful VasoCollar attempts were then re-attempted on the contralateral side to promote user familiarization

	Hand-Sewn	VasoCollar	p-value
Anastomosis	1016 ± 472	572 ± 339	0.005
Exposure	831 ± 354	992 ± 748	0.16

Table 1. Comparison of time to vessel exposure and anastomosis (seconds)

Carotid		Iliac		Femoral	
Hand-Sewn	VasoCollar	Hand-Sewn	VasoCollar	Hand-Sewn	VasoCollar
792 ± 319	725 ± 529	1105 ± 472	517 ± 191	1264 ± 394	542 ± 162
P-value = 0.51		P-value = 0.07		P-value = 0.004	

Table 2. Comparison of time to anastomosis by location sub-groups (seconds)

	Hand-Sewn	VasoCollar
Total Attempted Anastomoses	14	17
Patent immediately after anastomosis (%)	13 (92.86%)	12 (70.59%)
Patent at end of procedure (%)	12 (85.71%)	11 (64.71%)
Requiring Revision	7 (50%)	8 (47.06%)
Anastomotic leak present	N/A	10 (58.82%)

Table 3. Operative outcomes of hand-sewn vs. VasoCollar anastomoses

CONCLUSIONS

- Overall, VasoCollar anastomosis is faster than hand-sewn
- Exposure time did not vary significantly between groups, as expected
 - Exposure does not change much based on technique chosen
- Similar percentage of revisions in each group
- Revision in hand-sewn groups were more successful
- Eversion of tissue in VasoCollar rings requires more length than traditional hand-sewn anastomosis
 - Anastomoses under tension are less likely to be successful or salvageable

NEXT STEPS

- Pair VasoCollar with a synthetic graft to alleviate tension issue
- Survival studies to assess long-term patency of VasoCollar anastomoses
- Histologic examination of VasoCollar anastomoses to evaluate thrombus formation

REFERENCES



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DISCLOSURES

- The views expressed herein are those of the authors and do not reflect the official views or policy of the Department of War or its components. The author does not have any financial interest in the companies whose materials are discussed in this presentation and no federal endorsement of the companies and materials is intended.
- The experiments reported herein were conducted according to the principles set forth in the National Research Council's Guide for the Care and Use of Laboratory Animals (8th ed.), and the Animal Welfare Act of 1966, as amended.
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