EndoEx: An Updated Bench Model Testing For An EVAR Explantation Tool

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Objectives

- Endovascular Aortic Repair (EVAR) reduces mortality and morbidity compared to open repair. However, it is associated with long term complication including graft infection (10%) and endoleaks (68%)[1]
- Failed management of complications leads to increased morbidity and mortality.
- This study outlines a novel device that can perform explantation which reduce morbidity and mortality associated with this technique.

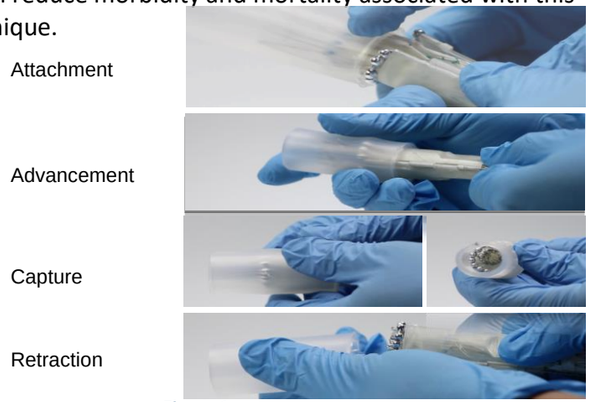

Figure 1. EndoEx Device in Action

Methods

- Tested the effectiveness of the device on agarose gel, porcine aorta, and cadaveric aorta tissue, which were used to simulate endothelium in human aorta tissue
- Surface area calculations by ImageJ compare the shaved area of the EndoEx device versus the syringe
- Reviewed the mean difference in area shaved, with standard error calculations and conducted a t-test to compare the device to the syringe (current industry standard)

Experiment

Porcine Aorta Testing

Porcine abdominal aorta samples were implemented in place of gels for simulation.

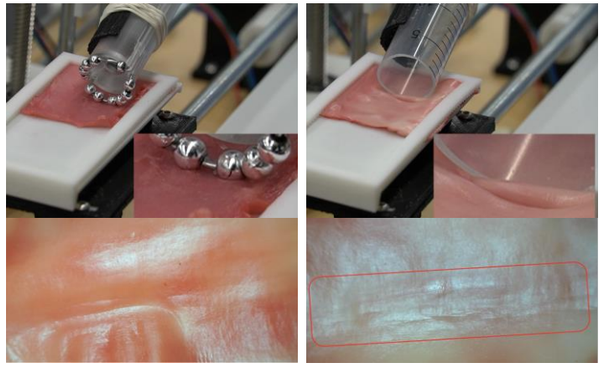

Figure 2. Porcine Tissue Test. EndoEx device testing and microscopic examination of damage (left). Syringe testing and microscopic examination of damage (right).

Cadaveric Testing

We implanted a stent graft into an abdominal aorta, explanted, and compared results using EndoEx and a syringe.

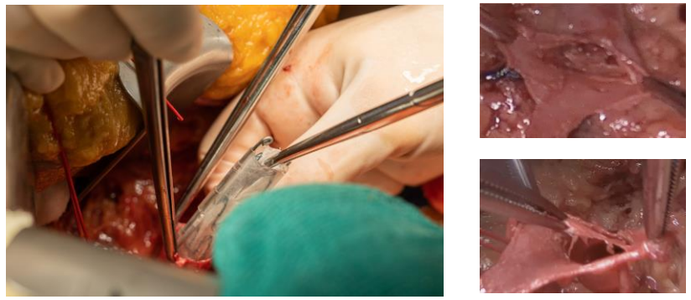

Figure 3. EndoEx explanted (left side) and EndoEx endothelium (top right) versus Syringe endothelium with tear (bottom right).

Results

The agar testing yielded a t-test of 1E-31, which indicates our device drastically reduced the amount of shavings compared to the syringe. Results from cadaveric and porcine aorta testing showed similar results.

-	EndoEx	Syringe
Mean Surface Area Lost (cm2)	0	3.97
Standard Deviation	0	0.20

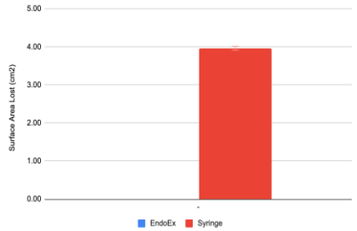

Figure 4. The graph (left) and chart (right) compare the mean and standard error of EndoEx versus syringe in surface area shaved

Conclusion

Discussion

- EndoEx reduced aortic dissection (dissection into visceral aortic branch) as compared to the syringe method
- This device addressed the risk of catastrophic bleeding due to suprarenal fixation hooks tearing the aorta and reduction of mesenteric ischemia and/or renal failure due to dissection caused by syringe technique

Conclusions

- Benchtop agar, cadaveric, and porcine aorta tissue testing support the efficacy of this device in endograft removal.
- EndoEx dramatically reduced aortic dissection and tears in tissue testing and gel shavings in agar testing.

REFERENCES

1. de Boer, M., Qasabian, R., Dubenec, S. & Shiraev, T. The failing endograft-A systematic review of aortic graft explants and associated outcomes. *Vascular*, 17085381221082370 (2022).

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