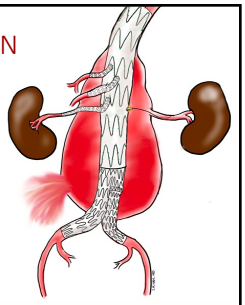
IN SITU LASER FENESTRATION FOR URGENT TAAA REPAIRS:
How I Do It and Results



Sukgu M. Han, MD, MS, DFSVS
Professor of Surgery and Neurological Surgery
Chief, Division of Vascular Surgery and Endovascular Therapy
Co-director, Keck USC Aortic Center
Program Director, Vascular Surgery Residency/Fellowship
Keck Medical Center of University of Southern California

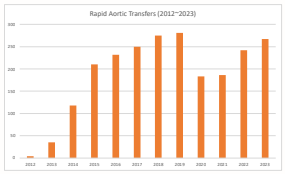
DISCLOSURES

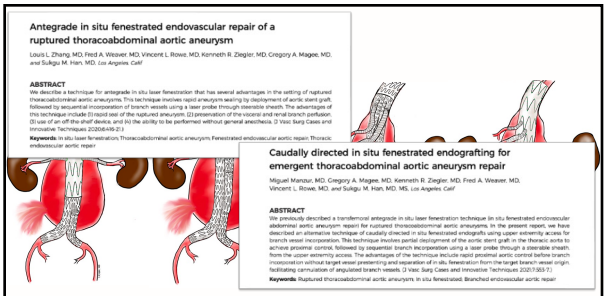
- Consultant: W.L. Gore & Associates, Cook Medical, Terumo Aortic, Medtronic
- Research Support: W.L. Gore & Associates
- Scientific Advisory Board: W.L. Gore & Associates, Vestek

- *Off-Label Procedures: In-Situ Fenestration*

BACKGROUND

- **EVAR** has been adopted as the **treatment of choice** for **ruptured infrarenal AAA**
- FBEVAR for cAAA, TAAA associated with lower perioperative mortality and morbidity, compared to open repair
- **Ruptured** cAAA/TAAA carry **high mortality**
  - Visceral renal branch involvement
  - Time constraint
  - Lack of dedicated devices





Antegrade in situ fenestrated endovascular repair of a ruptured thoracoabdominal aortic aneurysm

Louis L. Zhang, MD, Fred A. Weaver, MD, Vincent L. Rowe, MD, Kenneth R. Ziegler, MD, Gregory A. Magee, MD, and Sukgu M. Han, MD, *Los Angeles, Calif*

ABSTRACT

We describe a technique for antegrade in situ laser fenestration that has several advantages in the setting of ruptured thoracoabdominal aortic aneurysms. This technique involves rapid aneurysm sealing by deployment of aortic stent graft, followed by sequential incorporation of branch vessels using a laser probe through steerable sheath. The advantages of this technique include (1) rapid seal of the ruptured aneurysm, (2) preservation of the visceral and renal branch perfusion, (3) use of an off-the-shelf device, and (4) the ability to be performed without general anesthesia. (J Vasc Surg Cases and Innovative Techniques 2020;6:416-21.)

Keywords: In situ laser fenestration; Thoracoabdominal aortic aneurysm; Fenestrated endovascular aortic repair; Thoracic endovascular aortic repair

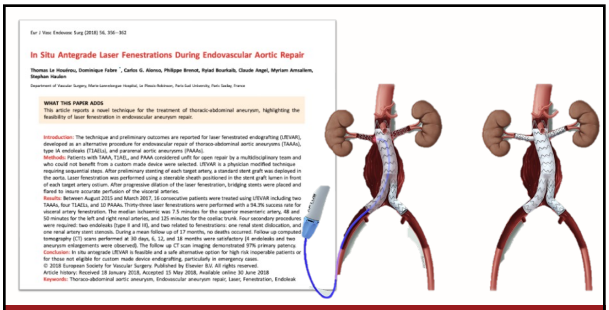
Caudally directed in situ fenestrated endografting for emergent thoracoabdominal aortic aneurysm repair

Miguel Manzur, MD, Gregory A. Magee, MD, Kenneth R. Ziegler, MD, Fred A. Weaver, MD, Vincent L. Rowe, MD, *and* Sukgu M. Han, MD, MS, *Los Angeles, Calif*

ABSTRACT

We previously described a transfemoral antegrade in situ laser fenestration technique (in situ fenestrated endovascular abdominal aortic aneurysm repair) for ruptured thoracoabdominal aortic aneurysms. In the present report, we have described an alternative technique of caudally directed in situ fenestrated endografts using upper extremity access for branch vessel incorporation. This technique involves partial deployment of the aortic stent graft in the thoracic aorta to achieve proximal control, followed by sequential branch incorporation using a laser probe through a steerable sheath from the upper extremity access. The advantages of the technique include rapid proximal aortic control before branch incorporation without target vessel prestenting and separation of in situ fenestration from the target branch vessel origin, facilitating cannulation of angulated branch vessels. (J Vasc Surg Cases and Innovative Techniques 2021;7:369-7.)

Keywords: Ruptured thoracoabdominal aortic aneurysm; In situ fenestrated; Branched endovascular aortic repair



In Situ Antegrade Laser Fenestrations During Endovascular Aortic Repair

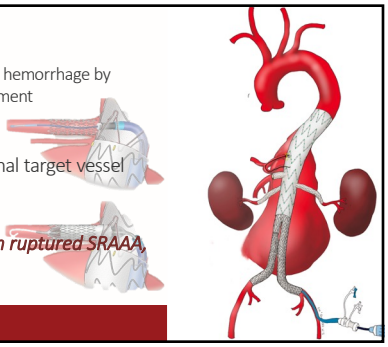
Thomas Le Houérou, Dominique Fabre *, Carlos G. Alonso, Philippe Brenot, Ryland Bourkaib, Claude Angel, Myriam Amsellem, Stephan Haulon

WHAT THIS PAPER ADDS

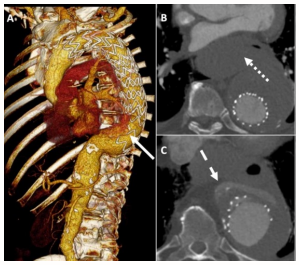
This article reports a novel technique for the treatment of thoracic-abdominal aneurysm, highlighting the feasibility of laser fenestration in endovascular aneurysm repair.

IN-SITU FEVAR

- ISF allows rapid control of hemorrhage by aortic component deployment
- Sequential visceral renal target vessel incorporation
- *Possible advantage in ruptured SRAAA, TAAA*



TRANSFEMORAL IN SITU FEVAR



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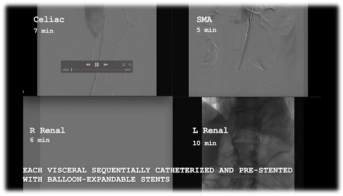
STEP 1. PRE-STENT VISCERAL RENAL ARTERIES



- Percutaneous Femoral Access(es)
- Local Anesthesia/Sedation
- Balloon Expandable Stent
- Deployment Flush at Orifice
  - Avoid Stent Placement into the Aortic Lumen

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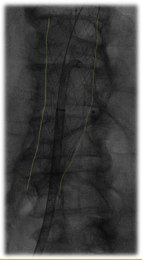
STEP 2. AORTIC STENT GRAFT DEPLOYMENT



- Thoracic Stent Graft +/- Bifurcated Stent Graft
- Hemorrhage Control
  - General Anesthesia Induction if needed
- Beginning of Warm Ischemia Time
  - Have Spectranetics 2.3mm (0.035") Laser probe, calibrated
  - Steerable Sheath (7Fr x 55cm Tourguide)

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STEP 3. SEQUENTIAL IN-SITU ANTEGRADE FENESTRATION

- Renals → SMA +/- Celiac
- 2.3mm Laser fenestration

↓

Glidewire/Quickcross, Rosen exchange

↓

4mm Pre-dilation

↓

Bridging stents into the pre-stents, flared to 10mm

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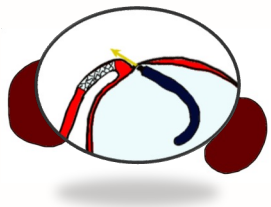
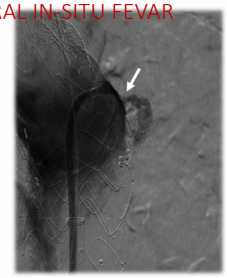
LIMITATIONS OF TRANSFEMORAL IN SITU FEVAR





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CAUDALLY DIRECTED IN SITU FEVAR
STEP 1. PARTIAL DEPLOYMENT OF THORACIC ENDOGRAFT

- Percutaneous Femoral Access
- Local Anesthesia/Sedation
- No Pre-stenting of target vessels needed
- Hemorrhage Control
- Beginning of Warm Ischemia Time

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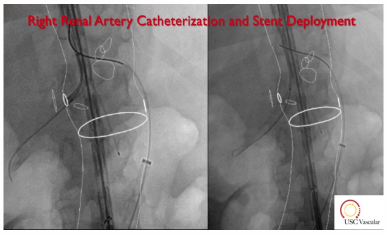
STEP 2. SEQUENTIAL IN-SITU FENESTRATION, BRANCH STENT PLACEMENT



- Upper extr access
- Steerable sheath
  - 8.5Fr x 90cm Tourguide
  - 8.8 Fr x 90cm Nagare
- 2.3mm Spectranetics Laser
- Higher Renal→ Celiac→ SMA→ Lower Renal
- Avoid crossing midline with wire

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3. COMPLETE DEPLOYMENT+ EVAR + CUFF

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	TRANSFEMORAL IN-SITU FEVAR	CAUDALLY DIRECTED IN-SITU FEVAR
Pre-stenting	Yes	No
Precise Laser In-situ Fenestration	Yes	No
Upper Extremity Access	No	Yes
Rapid Hemorrhage Control	Yes	Yes
Prolonged Warm Ischemia Time	?	?
Suitable Anatomy	Non-angulated pararenal, paravisceral aortic segment,	Down going visceral and renal arteries
	Aortic stent graft apposition at the pararenal segment	Angulated pararenal, paravisceral aortic segment

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From the Western Vascular Society

Check for updates

Comparative early results of in situ fenestrated endovascular aortic repair and other emergent complex endovascular aortic repair techniques for ruptured suprarenal and thoracoabdominal aortic aneurysms at a regional aortic center

Alyssa J. Pyun, MD, Helen A. Potter, MD, Gregory A. Magee, MD, MSc, Miguel F. Manzur, MD, Fred A. Weaver, MD, MMM, Kenneth R. Ziegler, MD, Jacquelyn K. Paige, MSN, NP, *and* Sukgu M. Han, MD, MS, *Los Angeles, CA*

ABSTRACT

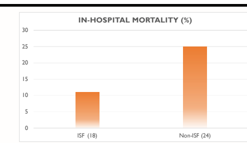
Introduction: Emergent endovascular repair of suprarenal (SRAAAs) and thoracoabdominal aortic aneurysms (TAAAs) poses a significant challenge due to the need for branch vessel incorporation, time constraints, and lack of dedicated devices. Techniques to incorporate branch vessels have included parallel grafting, physician-modified endografts, double-barrel/reversed iliac branch device, and in situ fenestration (ISF). This study describes a single-center experience and the associated outcomes when using these techniques for ruptured SRAAAs and TAAAs.

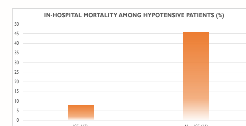
Methods: A retrospective review of patients who underwent endovascular repair of ruptured SRAAAs and TAAAs from July 2014 to March 2021 with branch vessel incorporation was performed. Clinical presentation, intraoperative details, and postoperative outcomes of those who underwent ISF were compared with those who underwent repair using non-ISF techniques. The primary outcome of interest was in-hospital mortality. Secondary outcomes were major adverse events including myocardial infarction, respiratory failure, renal dysfunction, new onset dialysis, bowel ischemia, stroke, and spinal cord ischemia.

Results: Forty-two patients underwent endovascular repair for ruptured SRAAAs and TAAAs, 18 of whom underwent ISF repair. Seventy-two percent of ISF patients were hypotensive before surgery, compared with 46% of the patients who underwent repair using non-ISF techniques (physician-modified endografts, parallel grafting, or double-barrel/reversed iliac branch device). The total procedural and fluoroscopy times were similar between the two groups despite a greater mean number of branch vessels incorporated with the ISF technique (3.1 vs 2.2 per patient, $P = .015$). In-hospital mortality was 19% for all ruptures and 25% for ruptures with hypotension. Compared with the non-ISF group, in-hospital mortality trended lower in the ISF group (11% vs 25%, $P = .233$), reaching statistical significance when comparing patients who presented with hypotension (8% vs 45%, $P = .048$). The rate of major adverse events was 57% across all techniques and did not significantly differ between the ISF and non-ISF groups, with postoperative renal dysfunction being the most frequent complication (48%). Overall, ISF became the most commonly used technique later in the study period.

Conclusions: Although emergent endovascular repair of ruptured SRAAAs/TAAAs remains a challenge, a number of techniques are available for expeditious treatment. In this series, ISF was associated improve survival, including a fivefold reduction in mortality in patients presenting with hypotension, and has now become the dominant technique at our center. Despite these advantages, postoperative complications and reinterventions are common. Further experience and longer-term follow-up are needed to validate these initial results and assess durability. (J Vasc Surg 2022;76:875-83.)

Keywords: Ruputured thoracoabdominal aortic aneurysm; In-situ laser fenestration; FEVAR; Complex EVAR





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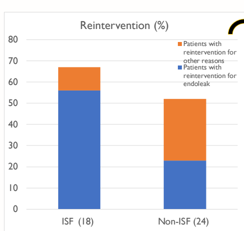
FOLLOW-UP OUTCOMES



	ISF	Non-ISF
Total reinterventions - N	19	18
UE/LE ischemia	2 (11%)	2 (11%)
LE compartment syndrome	2 (11%)	2 (11%)
Branch vessel stenosis	1 (5%)	1 (6%)
Rupture of a 2nd mycotic aortic aneurysm	0	1 (6%)
Ex Lap for RP hematoma evac/ ACS	1 (5%)	3 (17%)
Bowel ischemia/gangrenous gallbladder	0	2 (11%)
Long-term dialysis access	0	1 (6%)
Cardiac tamponade – N (%)	1 (5%)	0

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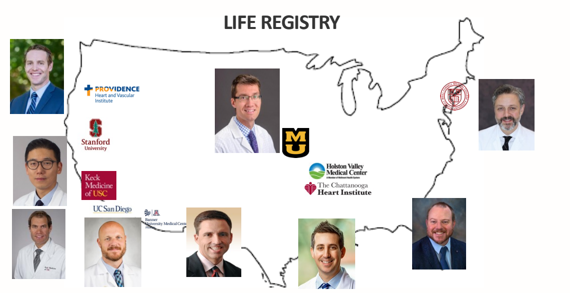
LIFE REGISTRY



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CONCLUSIONS

- Two In-Situ FEVAR techniques complement each other
- Compared to non-ISF endovascular repairs, ISF is associated with decreased in-hospital mortality in patients with ruptured SRAAA, TAAA and hypotension.
- Further experience with longer-follow up is necessary to validate results and assess durability
  - U.S. Laser In-situ Fenestrated EVAR (LIFE) Registry

THANK YOU

Sukgu.han@med.usc.edu