Presentation Number: KC15

Publishing Title: Retrograde pedal access for patients with critical limb ischemia: Feasibility and outcomes over a three-year period

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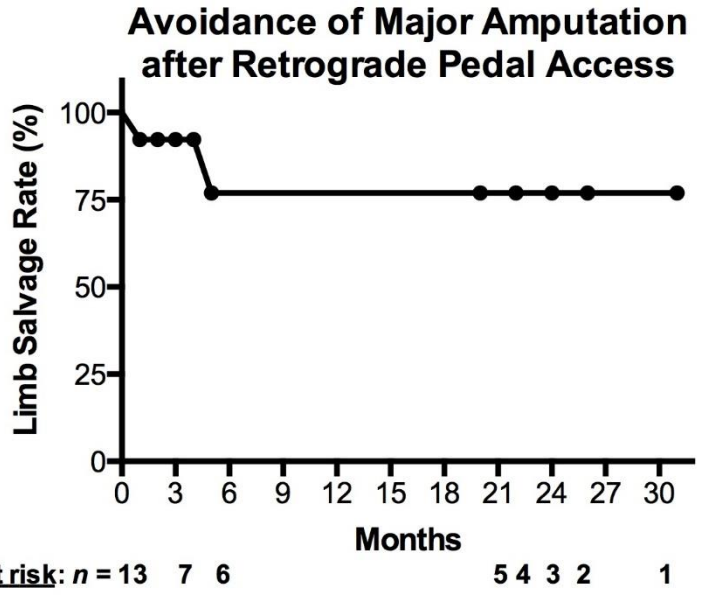
Abstract Body:

BACKGROUND: Retrograde pedal access allows the treatment of tibial occlusive lesions when standard techniques fail. We report outcomes in patients with Rutherford class IV and V limb ischemia, who were otherwise not candidates for revascularization thru an antegrade access or tibial bypass.

METHODS: A retrograde pedal access was selectively chosen when a popliteal or tibial lesion could not be crossed via an antegrade approach. Retrograde pedal access was performed under ultrasound-guidance using a 4-Fr micropuncture sheath. All interventions were performed in a sheathless fashion using a 0.014" 'bareback' wire as support for a 2 mm balloon catheter to cross tibial chronic total occlusions. Routine anticoagulation and dual-antiplatelet therapy was used peri-procedurally. Antegrade access was used to treat any lesion that required a stent placement, after snaring the retrograde through an antegrade catheter. Outcomes analyzed were limb salvage rate, periprocedural complications and mortality.

RESULTS: From July 2010 thru August 2013, 764 lower extremity angiograms were done; of these, 13 cases were retrograde pedal access (mean age was 71.4 +/- 12.4 years, 9 men). There was high prevalence of diabetes (77%; 10/13), chronic renal insufficiency (stages III - V; 69%, 9/13), and previous contralateral major amputation (38%; 5/13). Indications for a retrograde pedal revascularization were Rutherford chronic limb ischemia class IV (15%; 2/13) and class V (85%; 11/13). Technical success rate was 69% (9/13); popliteal (2/13) and tibial (13/13) vessels were intervened with angioplasty alone (10/13) via a retrograde approach and with angioplasty/stent placement (3/13). Peri-procedurally, there was one myocardial infarction, no local complications, worsening renal insufficiency or deaths. At a mean follow-up of 13.4 +/- 10.3 months, the limb salvage rate was 77% (10/13) [Figure]. There was a high mortality rate on follow-up (23%; 3/13) occurring at median 6 +/-4 months.

CONCLUSIONS: Retrograde pedal access for limb salvage in high-risk patients is feasible and safe with acceptable limb salvage rates at intermediate follow-up. Appropriate candidates are those who have failed an antegrade intervention and are poor candidates for a tibial bypass. Future studies should test whether this mode of revascularization has favorable limb salvage rates in larger patient populations.



Presentation Number: KC16

Publishing Title: Femoropopliteal TASC Classification Does Not Influence Primary Patency Rate or Limb Salvage Rates at One Year Following Combined Tibial and Proximal Endovascular Interventions.

Author Block: **Francis Cuozzo, MD**
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Abstract Body:
OBJECTIVE: TransAtlantic Inter-Society consensus (TASC) II femoropopliteal classification has been shown to influence the patency of isolated femoropoliteal interventions. The outcomes of simultaneous treatment of proximal arterial disease during tibial intervention and the impact of femoropopliteal TASC classification on these interventions has not been well defined. The purpose of this study was to determine the impact of multisegment disease and femoropopliteal TASC classification on tibial intervention outcomes.

METHODS: We performed a retrospective review of all tibial interventions completed between 2008- 2011 at 8 hospitals. Outcomes evaluated were primary patency, assisted primary patency, secondary patency, amputation free survival (AFS) and mortality. Statistical analysis was carried out using Kaplan-Meier survival curves Fisher exact and $\chi(2)$ tests.

RESULTS: In our cohort, 671 limbs in 600 patients underwent tibial intervention. Of these, 290 had isolated tibial interventions (ITI), while 381 had simultaneous tibial and proximal femoropopliteal interventions, what we term multisegment interventions (MSI). The primary patency and AFS for the MSI subset was 57% and 86% at 1year and 49% and 80% at 2 years (p=.41 and p=.07) . The primary patency and AFS for the ITI subset was 54% and 77% at 1year and 48% and 72% at 2 years (p=.41 and p=.07) . Univariate analysis demonstrated that TASC classification had no significant impact on primary patency (A=46.7% , B=56.6%, C=43.6%, D=52.1%) and amputation free survival (A=90% , B=81.1%, C=78.7%, D=80.7%). While, proximal stenting had no impact on primary patency or major amputation, our analysis showed that the placement of a proximal stent negatively impacted secondary patency at 12 and 24 months (hazard ratio 2.55, p=.03), however this did not translate into worse AFS (P=.76) or lengthen time to bypass (P=0.5). The final factor of significance we identified was the presence of tissue loss, which had a negative impact on primary patency (58.7% vs 46.7% p=0.04) at one year.

CONCLUSIONS: Neither femoropopliteal TASC classification, nor the presence of a femoropopliteal stent had a significant impact on primary patency or AFS within multisegment interventions. Stents placed in the femoralpopliteal segment did not worsen primary patency or AFS in these patients. We believe that treatement of multilevel disease provides similar outcomes to those with isolated tibial vessel treatment.

Presentation Number: KC17

Publishing Title: **Dual Incision Remote Endarterectomy: A Novel Treatment Option for Long Segment Superficial Femoral-Popliteal Artery Occlusive Disease**

Author Block: **Richard E. Redlinger, Jr., MD**, Kedar S. Lavingia, MD, F. Noel Parent, III, MD
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Abstract Body:

OBJECTIVES: Remote Endarterectomy (RE) is a hybrid procedure conceived as an alternative to a bypass constructed with less than ideal conduit. We present a case series of modified RE enhanced by the addition of a distal leg incision to complete the endarterectomy utilizing a "flossing" technique that permits long segment plaque excision.

METHODS: A retrospective chart review identified RE procedures performed from May 2010 through March 2012. All patients had a prior failed subintimal angioplasty attempt for Rutherford class 3-5 ischemic indications. The technique involved femoral artery exposure, plus a distal incision exposing the popliteal artery either above or below the knee. The Vollmar ring dissector was utilized to extract plaque from the femoropopliteal arterial segment via each arteriotomy. Adjunctive patch angioplasty was used to close the arteriotomies. Demographics, lesion characteristics, procedural details and outcome data were collected. Study endpoints were death, occlusion, reoperation, or last office follow-up visit.

RESULTS: RE was performed in 11 patients (5 men; mean age of 68 years, 3 diabetics, 11 tobacco users). Indication for operation was severe claudication in 6, rest pain in 3 and gangrene in 2. RE was technically successful in all patients. Distal arterial exposure was above knee in 7 (64%), below knee in 2 (18%), and combined above and below knee exposures in 2 (18%) patients. Two patients underwent concomitant balloon angioplasty in either the popliteal or anterior tibial vessels. Mean post-operative ABI increase was .43 (P=.001). Operative complication of above knee popliteal artery perforation occurred in 1 patient, but was successfully repaired with covered stent deployment. Average procedure duration was 162 minutes ± 69 minutes (SD) and average hospital stay was 4 days. All patients reported rest pain resolution; both patients with tissue ulceration healed. During the twelve month follow up time period, a femoropopliteal re-occlusion developed in 4 patients resulting in 1 patient who will require bypass, which is pending. Limb salvage rate was 100%.

CONCLUSIONS: When endovascular therapies are exhausted, and should autologous saphenous vein be unavailable, the dual incision RE technique of long segment femoropopliteal occlusive lesions accomplishes effective revascularization. Limb salvage was achieved in all patients; the need for a subsequent bypass was rare and not adversely affected by having undergone the dual incision RE.

Presentation Number: KC18
Publishing Title: WITHDRAWN

Presentation Number:	KC19
Publishing Title:	Practical Application of Bedside Diagnostics in Determining Limb Viability
Author Block:	Sheila Coogan, MD[1], **Anahita Dua, MD**[2], Sapan S. Desai, MD, PhD, MBA[1], Kristofer Charlton-Ouw, MD[1], Ali Azizzadeh, MD[1]. [1]University of Texas at Houston, Houston, TX, [2]Center for Translational Injury Research (CeTIR), University of Texas at Houston, Houston, TX
Abstract Body:	**OBJECTIVES:** The ankle-brachial index (ABI) is regarded as a bedside test for objectively documenting the presence of lower-extremity perfusion. It is a simple, reproducible, and cost-effective assessment that can be used to identify patients at increased risk for lower-extremity arterial injury after penetrating or blunt trauma. Currently, patients with complicated lower extremity injuries undergo CTA of the lower extremity prior to orthopedic repair. Toe-brachial index (TBI) and ankle waveforms are occasionally utilized in conjunction with ABIs to determine adequacy of blood flow to the lower limb. This study aimed to determine the practical application and impact of formal ABIs, TBIs and/or ankle waveforms in patients with a concerning clinical exam in guiding vascular surgeons decision-making at a level I trauma center. **METHODS:** A retrospective review of the trauma registry at a level I center was conducted from January 2009 to June 2013. All patients >16 years of age who sustained a lower limb arterial injury and had an ABI, TBI or ankle waveform study were included. Data-points included demographics, type and location of injury, absolute toe pressure, ABI, TBI, ankle waveforms and procedure type. Statistical analysis included descriptive statistics. **RESULTS:** Over a 5 year period, 181 patients with lower extremity arterial injury presented to our institution. From this cohort, 13 trauma patients with documented arterial injury had ABIs, TBIs or ankle-wave forms. All 13 patients had concomitant long bone orthopedic injury to the affected extremity. 5 patients required revascularization with postoperative ABIs used to determine graft patency. 6 patients had ABIs after abnormal CT scans or clinical exam but were not intervened on if ABIs, TBIs, or waveforms were normal. 2 patients had angiography without additional intervention if bedside diagnostics were normal. None of these patients required an amputation. **CONCLUSIONS:** ABI in conjunction with TBI and ankle waveforms objectively document limb viability. ABI and other bedside flow tests assess the need for intervention and/or lower limb bypass sufficiency.

Presentation Number: KC20

Publishing Title: **Direct Angiosome Imaging Using Laser-Assisted Fluorescent Angiography in Patients with Critical Limb Ischemia**

Author Block: **Mohamed A. Zayed, MD PhD**, Elizabeth Hitchner, BS, Venita Chandra, MD, Vinit Varu, MD, Oliver Aalami, MD, Wei Zhou, MD
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Abstract Body:
OBJECTIVES: Angiosomes are three-dimensional anatomical zones that are primarily perfused via specific distributions of cutaneous arteries. The plantar aspect of the foot has four specific angiosomes that are dependent on lower extremity outflow, and are hypothesized to affect foot perfusion and wound healing. We sought to directly evaluate angiosome perfusion pre- and post-revascularization in patients with critical limb ischemia (CLI) using laser-assisted fluorescent angiography (LAFA).
METHODS: Over 14 months, 32 patients with Rutherford Class 4 and 5 CLI were prospectively enrolled into an IRB approved study to determine plantar-pedal angiosome perfusion using LAFA. Angiographic SVS runoff scores and LAFA plantar-pedal angiosome perfusion (SPY Elite; Lifecell Corporation) were evaluated pre- and post-revascularization. Patient demographics and peri-operative ABIs were also collected. Statistical analysis was performed using Student's T-test and Spearman's Rho correlation.
RESULTS: The majority of patients enrolled had diabetes (72%), hypertension (97%), and hyperlipidemia (72%), and a mean age 66. Femoral-popliteal interventions (1 open, 31 endovascular), were performed in 75% of patients. Post-intervention ABIs were improved by 48% (P=0.004), and popliteal runoff scores were improved by 67% (P<0.001). LAFA-perfusion of the medial plantar, lateral plantar, and calcaneal peroneal distribution plantar-pedal angiosomes were increased by 76% (P<0.006), 56% (P=0.01), and 55% (P=0.07), respectively. Popliteal runoff had a mild correlation with ABIs (R^2=0.5;P=0.04), and tibial runoff had mild correlation with calcaneal peroneal angiosome perfusion (R^2=0.4;P=0.008).
CONCLUSIONS: Peri-procedural plantar-pedal angiosome perfusion can be reliably evaluated using LAFA. Angiosome perfusion has mild correlation with conventional vascular non-invasive and angiographic evaluations. Further clinical application of LAFA angiosome evaluations may provide important peri-procedural assessments for patients with CLI.

Presentation Number: KC21

Publishing Title: **The utility of the ABI value as a screening test for disseminated atherosclerosis**

Author Block: **Karan Garg, MD**, Jeffrey S. Berger, MD, Yu Guo, MD, Mark A. Adelman, MD, Glenn R. Jacobowitz, MD, Thomas S. Maldonado, MD, Thomas S. Riles, MD, Caron B. Rockman, MD
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Abstract Body:

OBJECTIVES: Cardiovascular disease is the leading cause of death in the United States; nevertheless, there are no optimal or universally accepted screening tests for disseminated atherosclerosis. Patients with peripheral artery disease (PAD) are at increased risk for having atherosclerosis in additional vascular territories. The goal of this study was to determine the utility of the ABI value to predict coronary artery disease (CAD), cerebrovascular disease (CVD), and carotid artery stenosis (CAS).
METHODS: A database of 3,561,679 subjects who underwent vascular screening was used. PAD was defined as an ABI $\leq$ 0.9. CAS was diagnosed if either artery demonstrated $\geq$ 50% stenosis. CVD and CAD history was obtained from subject questionnaires. Correlation of decreasing ABI values with vascular disease in other territories was performed.
RESULTS: PAD was present in 125,889 subjects (3.5%). PAD subjects were more likely to be >70 years (55.1% vs. 25.9%), male (66.2% vs. 62.2%), to have a smoking history (59.7% vs. 43%), hypertension (62.1% vs. 43.9%), diabetes (20.2% vs. 9.6%), and hypercholesterolemia (56.1% vs. 50.4%) than non-PAD subjects (P<0.001). PAD subjects were more likely to have CAS (17.5% vs. 3.4%), prior strokes (5.4% vs. 1.6%), prior TIA (8.1% vs. 3.2%), prior MI (10.3% vs. 3.6%), and prior coronary revascularization (14.8% vs. 4.9%) than non-PAD subjects (P<0.001). There was a statistically significant correlation between decreasing ABI value and an increased prevalence of CAS, CAD, and CVD (P<0.001) (Figure 1). For example, patients with an ABI between 0.41 and 0.60 had a 26.4% incidence of CAS, which increased to 34.9% for those with an ABI $\leq$ 0.4. Even patients with a minimally decreased ABI (0.81 - 0.9) had significantly increased rates of vascular disease in other territories when compared to patients with normal ABI's.
CONCLUSIONS: The ABI value is directly and significantly associated with the prevalence of CAS, and with a history of CAD and CVD complications. These data support the use of the ABI as a non-invasive, inexpensive, easily reproducible screening tests which can reliably identify patients at increased risk for cerebrovascular and cardiovascular complications.