Success in BTK/BTA Intervention: Disease Characteristics, Anatomy & Advanced Techniques

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Disclosure

Speaker name:

I have the following potential conflicts of interest to report:

- [ ] Consulting
- [ ] Employment in industry
- [ ] Stockholder of a healthcare company
- [ ] Owner of a healthcare company
- [ ] Other(s)

- [x] I do not have any potential conflict of interest
Questions for the Real World

• How to increase technical/clinical success?
  • CLI -> wound-healing and no major amputation
• Do certain patient characteristics and anatomy drive success below the knee and ankle?
• *Who should I intervene upon (or NOT)?*
Questions for the Real World

• Data?
  • Dr. Biamino asked ~ 976x @ LINC 2018 re: BTA intvn
  • Dr. Manzi noted >5000 BTK patients, but BTA <500

• Why does it matter?
  • Pedal plantar loop UNFORGIVING final flow pathway

• Restenosis rates below the ankle?
  • No one really knows
  • Does it matter in CLI???
Factors – The pedal inflow

- Fernandez et al 2009 *J Vasc Surg*
- Retrospective, n = 111 patients (83% tissue loss)
  - Majority - DM and/or CKI
- Tibial angioplasty (14% laser atherectomy)
- Popliteal runoff and ABI improved (p < 0.01)
- 1 yr limb salvage -> 75%
- 1 yr re-intervention -> 50%
Factors – The pedal inflow

- Factors associated with wound healing
  - Multilevel intervention (HR = 2.1; P = 0.009)
  - Tibial laser atherectomy (HR = 3.1; P = 0.01)

- Factors associated with impaired limb salvage
  - Renal insufficiency (HR = 5.7; P = .03)
  - Need for pedal intervention (HR = 13.75; P = .04)
  - Isolated peroneal intervention (OR = 7.80; P = .01)

- DM, smoking, statin therapy and revascularization of >1 tibial vessel - *no impact* on limb salvage or wound healing
Factors – What about the pedal outflow and angiosome?

- Rashid et al. 2013 *J Vasc Surg*
- N= 154 patients (141 RC5/6) w/ distal bypass
  - DM 76%, CKI 28%
- Direct vs indirect angiosomal revascularization
- Pedal arch quality
  - Complete (CPA), Incomplete (IPA) or no arch (NPA)
- Primary end points
  - Patency rates, amputation-free survival (AFS) & rate of healing and time to healing
Factors – What about the pedal outflow and angiosome?

- $1^\circ/2^\circ$ patency, AFS not different despite angiosomal vs nonangiosomal revasc
  - Quoted by Azuma also 2012
- *Better* overall healing and rate of healing between the CPA vs IPA vs NPA groups ($P = .0264$)
Factors – What about the pedal outflow and angiosome?

  - Degree of renal disease -> direct effect on outcome
  - ESRD pts had significantly lower healing and limb salvage

- 2° poor quality of pedal arch in these patients? Medial calcification? Small vessel caliber? Long segment occlusion?
Factors – Outcomes in patients after technically success revascularization

- Kawarada et al 2012 *Catheter Cardiovasc Interv*
- N=85 patients, 106 limbs
- Evaluate wound healing and adverse outcomes *despite* successful infrapopliteal intervention
- Reintervention, AFS, salvage and healing rates on par with prior studies
Factors – Outcomes in patients after technically success revascularization

• Infectious wound -> predictor of major amputation *despite* successful intervention

• DM and pedal arch quality-> predictors of wound healing

• ESRD on hemodialysis -> predictor of death
Factors – Who should be fixed?

- Santema et al 2017 *Eur J Vasc Endovasc Surg*
- Retrospective analysis of 144 CLI patients
- Compared intervention to conservative care in terms of AFS and overall survival
  - Conservative tx: Analgesia & “optimal wound care”
Factors – Who should be fixed?

- No statistical difference in AFS or OS
- CV mortality biggest driver of AFS -> lethal nature of CLI
- Majority > 1 endovascular procedure
Summary of Reviewed Studies

- Tibiopedal intervention effective and salvage high
- Re-intervention rates are high -> cost, risk
- Pedal arch quality & patency (completeness, calcification) does matter to expeditious wound healing; may not matter to patency, OS or AFS
Summary of Reviewed Studies

• Poor prognostic indicators
  • Renal failure is a bad player, extensive calcium & long-segment occlusion
  • ESRD = early death -> leave alone?
  • Pedal-predominant disease and DM
  • Peroneal-only runoff -> poorer outcomes
  • Infected wounds
Summary of Reviewed Studies

• Not all patients may need interventions for CLI
  • We still have not affected AFS or OS
• Medical management also improved over time
  • Prospective study (like CREST II) needed
Subjective -> Objective Algorithm for BTA (alla Biamino)

- Objective criteria yet to be written – #CLIfighters time to #stopthechop

- In my practice
  - Non-healing surgical wounds after intervention

- Successful intervention depends on a successful plan and excellent imaging
Algorithm for BTA Intervention

- 68 y/o M with left 5th ray amputation and site osteomyelitis 1 month-post op
Anatomy

- Manzi (Radiographics 2011)
- Lateral -> arch/plantar bifurcation
- AP -> 1st IM space
- “Desert leg/foot” -> “dancing (or crossing) in the dark”
- Confidence in course by fluoro/EVUS ↑ success
Variant Anatomy is *Common*

- Recent 82 y/o F DM lateral heel wound (suspect peroneal distribution)
- Pedal-plantar loop recan -> AT/PT
Variant Anatomy is *Common*

- Recanalization demonstrates common tibioperoneal artery
- Two vessel runoff and intact loop
- Lateral heel blush
Technique – Crossing and Recanalization Strategies

• Be flexible
  • Alternative points of entry; consider staging
  • US-guided recanalization of occluded vessel
• Pedal-plantar loop
  • Manzi et al 2009 *J Cardiovasc Surg (Torino)*
• TAMI
  • Mustapha/Saab 2014 *Catheter & Cardiov Interv*
• SAFARI, CART, re-entry, tibiopedal access, trans-collateral, PIERCE
• Final therapy limited to angioplasty +/- atherectomy
Technique – Perfusion Goals

• Taylor and Attinger et al
  • Angiosominal reperfusion
• Manzi, Ferraresi, Palena, Mauri
  • Complete vs. wound-related artery revasc
• Rundback et al
  • Angiosomal vs. Angiographosomal
  • True angiographic wound-directed revasc

Utsunomiya et al 2012 J Vasc Surg
Conclusions - A Strategy For Success

• Know your patient, their disease and the bad players
  • ESRD, peroneal runoff, DM with pedal-only disease and infected wounds
• Pedal arch integrity matters - unforgiving endplate
• Understanding of anatomy is key
• Post-procedural perfusion is crucial; study needed
• Technical success -> not always clinical success; sometimes saying “no” is the right option
Thank you

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• Get in touch anytime you are in Miami
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