Unique Technique for Treatment of Critical Hand Ischemia

Abdul Bahro, MD, FACC, FSCAI\textsuperscript{1},
Connie Williams, AGACNP-BC\textsuperscript{1}, Zsuzsanna Igyarto, PhD\textsuperscript{2},
Brad Martinsen, PhD\textsuperscript{2}

\textsuperscript{1}Merit Health Central, Jackson, MS
\textsuperscript{2}Cardiovascular Systems Inc., St. Paul, MN
Disclosure

Speaker name: Abdul Bahro

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)

☐ I do not have any potential conflict of interest
Critical hand ischemia is under-recognized and undertreated.
Critical Hand Ischemia

- Critical hand ischemia (CHI), although accounts for less than 5% of patients with limb ischemia\(^1\), is a serious condition with a high risk of amputation.\(^2\)
- CHI can be caused by acute vascular injury, chronic vasospastic disease, or occlusive arterial disease of the above- or below-the-elbow (BTE) arteries.\(^3\)
- BTE artery disease is more prevalent in diabetics and/or in patients with end-stage renal disease (ESRD) on hemodialysis\(^4,5\)

Diabetes

- Approx. 425 million people had diabetes worldwide in 2017 with an estimate of a 48% increase to 629 million people for the year 2045.\(^1\)

- In 2015, 30.3 million Americans, or 9.4% of the population, had diabetes.\(^2\)

---


End-Stage Renal Disease

- 10% of the population worldwide is affected by chronic kidney disease\(^1\)
- Over 2 million people worldwide currently receive treatment with dialysis to stay alive, yet this number may only represent 10% of people who actually need treatment to live.\(^2\)

- ESRD affects almost 750,000 people per year in the USA.\(^3\)
  - African Americans are 3.5 times more likely to have ESRD.
  - Native Americans are 1.5 times more likely to have ESRD.
  - Hispanics are 1.5 times more likely to have ESRD.

---

Considering the increasing number of diabetic & ESRD patients worldwide, CHI is an emerging problem to be recognized.
Calcification

- Diabetes and ESRD are the main risk factors for peripheral artery calcification\(^1\) – a major factor in causing CHI.\(^2,3\)

- Calcified lesions are technically challenging, they respond poorly to angioplasty, they are difficult to completely dilate, and prone to dissection during balloon angioplasty.\(^4-6\)

- Lesion preparation before balloon angioplasty with atherectomy is essential in complex calcified lesions.\(^5,6\)

Treatment

- Atherectomy devices in the upper extremity arteries are not commonly used due to the small vessel size.
- The Diamondback 360® Peripheral Orbital Atherectomy System (OAS) (Cardiovascular Systems, Inc.) is one of the atherectomy devices that can access treatment areas with a reference vessel diameter of 2.0 mm.
- Data from a small single-center study\(^1\) and 3 case reports\(^2-4\) suggest that OA treatment for calcified BTE arteries is feasible and safe.

Case Example

- 65-year old African-American male
- History of:
  - HTN, DM, ESRD, and PAD
Angiography
Treatment
Outcome after BA
Next-Day
6-Week Follow-Up
Tips

- Make sure ACT is therapeutic, ~250
- Very gentle wire manipulation
- Use a small Diamondback crown (1.25 mm)
- Be aggressive with vasodilators and give it through the exchange catheters
- Balloon...
  - Same size as the vessel
  - Long and low inflation
  - If a small area does not respond, use a smaller balloon with higher atmosphere inflation pressure

Conclusions

- Critical hand ischemia can be treated with endovascular techniques.

- Obtaining good outflow to the fingers is critical for wound healing and preventing amputation.

- Orbital atherectomy is a useful tool in treating small-diameter vessels, particularly in cases where calcification is present.
Thank you!
Unique Technique for Treatment of Critical Hand Ischemia

Abdul Bahro, MD, FACC, FSCAI\textsuperscript{1},
Connie Williams, AGACNP-BC\textsuperscript{1}, Zsuzsanna Igyarto, PhD\textsuperscript{2},
Brad Martinsen, PhD\textsuperscript{2}

\textsuperscript{1}Merit Health Central, Jackson, MS
\textsuperscript{2}Cardiovascular Systems Inc., St. Paul, MN