Hyperbaric Oxygen Acutely Increases Wound Circulation as Assessed by Fluorescent Angiography

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Table cited for choosing academic practice | Women, % | Men, %
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Research opportunities | 47.9 | 32.4
Mentorship | 54.2 | 32.4
Teaching opportunities | 58.3 | 39.2
Diversity/complexity of case load | 52.1 | 36.5
Ability to subspecialize | 4.2 | 8.8
Larger call pool | 8.3 | 16.9
Other | 2.1 | 2

Author Disclosures: A. E. Allen: Nothing to disclose; J. G. Carson: Nothing to disclose; J. A. Freischlag: Nothing to disclose; N. Hedayati: Nothing to disclose; M. Kwong: Nothing to disclose.

IP147.

Modern Fixed Imaging Systems Reduce Radiation Exposure to Patients and Providers

Lars Stangenberg, MD, PhD¹, Fahad Shuja, MD², Martijn van der Bom, PhD³, Martine H.G. van Alfen, MSc¹, Allen D. Hamdan, MD⁴, Mark C. Wyers, MD⁵, Raoul J. Guzman, MD⁶, Marc L. Schermerhorn, MD⁷. ¹Kantonsspital Baselland Liestal, Basel, Switzerland; ²Beth Israel Deaconess Medical Center, Boston, Mass; ³Philips Healthcare, Andover, Mass; ⁴Philips Healthcare, Boston, Mass

Objectsives: Endovascular therapy for aortic and peripheral interventions is increasingly becoming the first-line treatment modality for a wide array of disease processes. High-definition fluoroscopic imaging is required to perform these procedures, which are furthermore growing in complexity, resulting in high radiation exposure to patient and providers. This is of particular importance for training institutions as residents and fellows, despite instruction in ALARA principles tend, to have high radiation exposures. Recently, there was an upgrade of the fixed imaging system at our institution. We used this opportunity to compare radiation exposure to patients and providers before and after the upgrade.

Methods: We performed a retrospective analysis of consecutive EVAR and SFA interventions at our institution in the years 2013 to 2014 and created two cohorts: pre and post upgrade. We analyzed body mass index (BMI), fluoroscopy times (FT) and air kerma (AK), and then matched BMI matched, FT matched, and AK matched, 1:1 based on fluoroscopy times as well as BMI. We also analyzed individual surgeons’ badge readings. The fixed imaging system was Allura Xper FD20 and was upgraded to Allura Clarity FD20 (both Philips Healthcare).

Results: We identified a total of 76 EVARs (53 pre, 23 post) and 123 SFA interventions (99 pre, 24 post) yielding cohorts of 23 patients each for EVAR analysis and of 24 patients each for SFA analysis. Complete data are shown in the Table. There was a 52% reduction in AK for EVAR and 72% for SFA interventions, respectively (P < 0.001 for both). Five of six surgeons experienced a reduction in their average monthly badge readings after system upgrade (Fig), most notably the fellow from SFA to EVAR, mean SD Pre 23 25.9 ± 3.5 38.1 ± 11.8 1984 ± 776 P value < 0.001 SFA, mean ± SD Pre 24 28.9 ± 6.0 22.3 ± 11.6 460 ± 369 EVAR, mean ± SD Post 23 25.7 ± 4.6 38.5 ± 11.9 767 ± 649 P value < 0.0001 SFA, mean ± SD Post 24 29.0 ± 6.0 31.1 ± 6.2 127 ± 72 Radiation dose in [mrem] 1193 162 798 776 649 369

Conclusions: Aortic and peripheral endovascular interventions can be performed with reduced radiation exposure to patients and providers using modern fixed imaging systems. This is of particular importance in light of more complex procedures such as fenestrated and branched endografting that will require substantial fluoroscopy to perform.


IP149.

Hyperbaric Oxygen Acutely Increases Wound Circulation as Assessed by Fluorescent Angiography

Sarah Cecilia Sorice, MD¹, Torbjörn Lundh, PhD², Geoffrey C. Gurtner, MD³, Shannon Meyer, BS³, Subhro Sen, MD¹, Robert Robertson, RN⁴, Jeanie Parsley, PT⁵, Venita Chandra, MD⁶. ¹Stanford University School of Medicine, Palo Alto, Calif; ²Stanford University Hospital and Clinics, Stanford, Calif; ³Stanford University Hospital and Clinics, Redwood City, Calif

Objectsives: The efficacy of hyperbaric oxygen therapy (HBOT) to facilitate wound healing in diabetic lower

Table.

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<th>No.</th>
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<th>FT</th>
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<tr>
<td>EVAR, mean ± SD Pre 23</td>
<td>25.8 ± 4.7</td>
<td>36.0 ± 19.3</td>
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BMI: Body mass index; EVAR, endovascular aneurysm repair; FT, fluoroscopy time; SFA, superficial femoral artery.

Radiation dose in [mrem] 1193 162 798 776 649 369

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extremity ulcers is well established. The exact mechanism of HBOT-mediated wound healing is unclear but is thought to relate to increased reactive oxygen species and reactive nitrogen species (ROS and RNS). ROS and RNS lead to many downstream effects that impact wound healing, including increased growth factors, diminished inflammatory responses, and improved neovascularization. The impact of HBOT, however, on tissue perfusion and flow is not known. The purpose of this pilot study was to ascertain the immediate effects of HBOT on the microvasculature of chronic wounds as assessed by fluorescent angiography.

Methods: Patients underwent fluorescent angiography at 4 different time points: immediately prior and immediately after the first and second HBOT treatments. Photo imaging with infrared camera began concurrently with the initiation of the IC-Green injection and lasted for 2.5 minutes. All videos were analyzed via MATLAB using a reference image at 65 seconds. The wound bed and the periwound area were then outlined as masks for the image analysis. The first and second derivatives were subsequently taken to define 4 time points of interest: the onset of inflow, the time of maximal inflow, the time of peak intensity, and the time of maximal outflow.

Results: Immediately after HBOT, there was evidence of increased flow. The time at which the maximum rate of arterial inflow and venous outflow was achieved occurred increasingly earlier in response to each HBOT. In addition, the difference in time at which the maximum rate of arterial inflow and venous outflow occurred was shortened in response to cumulative treatments of HBOT, suggesting decreased overall time in the capillary bed.

Conclusions: This pilot study demonstrates that HBOT appears to immediately impact the microcirculation both on an inflow (arterial) and outflow (venous) level, and this effect also appears to be cumulative. If such a tissue response is in fact verified to be sustained in future study, this may better explain the benefit of HBOT and may expand the repertoire of diseases that may serve to benefit from this modality.

Author Disclosures: V. Chandra: Nothing to disclose; G. C. Gurtner: Nothing to disclose; T. Lundh: Nothing to disclose; S. Meyer: Nothing to disclose; J. Parsley: Nothing to disclose; R. Robertson: Nothing to disclose; S. Sen: Nothing to disclose; S. Cecilia Sorice: Nothing to disclose.

Fig. Sample masks (region of interest in black) used for image analysis. A, Unmarked wound. B, Periwound mask. C, Wound-bed mask.