AN INTERVIEW WITH...

Ripal T. Gandhi, MD, FSVM

Dr. Gandhi discusses his current research efforts in peripheral artery disease, venous disease, and interventional oncology and offers his best advice for radiation safety practices.

Can you tell us about the recent expansion at the Miami Cardiac and Vascular Institute at Baptist Hospital?

We just had our grand opening of the newly expanded Miami Cardiac and Vascular Institute (MCVI) in March. Following a 3-year expansion, the $120 million project has added 150,000 square feet and is the largest and most comprehensive cardiovascular facility in the region. There is an additional wing of new endovascular suites as well as North America's first installation of the Azurion image-guided therapy system (Royal Philips), a state-of-the-art system designed for advanced interventions. Education is one of our missions, and so several of the new suites have theater-style seating with the ability to control what is being viewed with the use of an iPad.

As a part of the expansion, there is now a National Center of Aneurysm Therapy, Center for Structural Heart Therapy, Center for Critical Limb Ischemia, and Advanced Arrhythmia Therapy Center. Also new to Baptist Hospital this year is the 395,000 square foot Miami Cancer Institute (MCI), which opened in January. MCI is a part of the Memorial Sloan-Kettering Cancer Alliance. MCVI and MCI are primary destination sites for cardiovascular and cancer patients from the southeastern United States, the Caribbean, and Latin America.

What are some of your research interests?

My clinical and research interests are diverse and include peripheral artery disease, aortic and peripheral aneurysmal disease, venous disease/inferior vena cava (IVC) filters, embolization, and interventional oncology. We have participated in multiple clinical trials. Some of the more recent trials in the vascular space include BEST-CLI, IMPERIAL, LIBERTY 360°, SYMPLICITY HTN-3, IN.PACT SFA, and several IVC filter trials. In the aortic space, we are currently a trial site for the EVAS FORWARD-IDE trial, NTACT trial, ANCHOR registry, as well as the upcoming evaluation of the Excluder conformable abdominal aortic aneurysm (AAA) device (Gore & Associates). In the interventional oncology arena, we are a site for the RESIN study for yttrium-90 (Y-90) radioembolization and are looking to evaluate LC Bead Lumi (BTG International) for embolization of hepatic malignancies. We recently published a paper on the effect of statins for restenosis in superficial femoral artery (SFA) disease, as well as the influence of statins and β-blockers on AAA sac behavior after endovascular aneurysm repair.

What are some of the most interesting recent developments in the interventional oncology space?

Many important clinical trials have been performed in the interventional oncology arena in the last several years, but I would like to highlight two of them in particular. The CLOCC trial randomized patients with unresectable metastatic colorectal cancer of the liver to chemotherapy alone versus radiofrequency ablation in combination with chemotherapy.[1] This trial is important because it provides level 1 clinical data showing improved overall survival with the addition of ablation. Median overall survival was improved by 5 months, and 8-year overall survival was 35.9% in the combined group versus 8.9% in the chemotherapy alone group.

The randomized phase 3 SIRFLOX trial evaluated first-line chemotherapy versus chemotherapy plus Y-90 radioembolization in patients with unresectable liver dominant metastatic colorectal cancer.[2] The addition of radioembolization did not improve progression-free survival (PFS) at any site, but did significantly delay hepatic disease progression by 7.9 months. The absence of improvement in overall PFS may be secondary to the fact that 40% of patients had extrahepatic disease at time of enrollment.

One of the most eagerly awaited trial results of 2017 is the overall survival results for the use of radioembolization

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in patients with metastatic colorectal cancer of the liver from the combined data from the SIRFLOX, FOXFIRE, and FOXFIRE global studies. These results will be released at the American Society of Clinical Oncology meeting later this year. A positive outcome could significantly change the management of these patients.

What are the most exciting areas for future research in interventional oncology?

One of the hottest areas in cancer therapy in the modern-day is immuno-oncology. Although in its infancy, the addition of novel immune checkpoint inhibitors to targeted minimally invasive locoregional therapies has the potential to function in a synergistic manner. There has been galvanized interest in immunomodulation, which has the promise to induce a therapeutic response at tumor sites distant from the treated area, a phenomenon known as the *abscopal response.* Much research is needed to further our knowledge and advance therapies in this new and exciting field.

At the Symposium of Clinical Interventional Oncology 2017, you and Charles Ray Jr, MD, had an interesting discussion on the everyday challenges of interventional decision making for patients who are actively undergoing chemotherapy. What factors do you consider when planning your Y-90 approach in a patient who is undergoing chemotherapy?

One must consider several factors when treating a patient who is undergoing systemic chemotherapy with radioembolization, including the patient's ECOG performance status, liver function tests, extent of disease, as well as previous history of therapies. In general, if a patient has a good performance status and has maintained liver function, we will perform radioembolization concurrently with systemic chemotherapy. It is our practice to hold antiangiogenic agents (eg, bevacizumab and ziv-aflibercept) for at least 1 month prior to angiography given the risk of vasospasm, dissection, and an inability to adequately deliver the intended dose. Patients on radiosensitizing chemotherapy (ie, gemcitabine) should be managed with temporary withholding of these medications for several weeks before and after Y-90 administration to minimize the risk of radioembolization-induced liver disease. We tend to be more cautious in patients who have undergone hepatic resection, external beam radiation, or previous Y-90 administration and will consider periprocedural temporary cessation of systemic chemotherapy.

At ISET 2016 and in subsequent congresses, radiation safety was a major part of the program. MCVI has made reducing exposure to operators, staff, and patients a priority with new initiatives in recent years. Could you speak to some measures that could relatively easily improve exposure rates at any center?

There is mounting evidence linking occupational radiation exposure to various adverse health effects, including cataracts, thyroid disease, reproductive health effects, and malignancy. The three key principles to reduce exposure are (1) time (less time = less exposure), (2) distance (as the distance from the radiation source doubles, the exposure drops by 25%), and (3) shielding (lead aprons, glasses, and shields absorb > 90% of radiation when used appropriately).

Basic practices such as collimation, utilization of filters, decreased frame rate, and minimized use of magnification, steep angulations, and digital subtraction angiography can significantly reduce radiation. Use of lead shielding below the table, hanging glass shields, and reducing the air gap between the image intensifier and the patient are also helpful. Newer technology and strategies to decrease radiation exposure include utilizing newer imaging technology that emits less radiation; use of systems such as DoseAware (Philips Healthcare) that provide real-time feedback on scattered x-ray dose; three-dimensional road mapping and image fusion; and novel radiation protection systems such as Zero-Gravity (CFI Medical, distributed by Biotronik) that provide better protection while minimizing body strain.

What is one new technology, whether medical or nonmedical, that has recently caught your eye that others might not have seen yet?

I am intrigued by the innovative technology by PQ Bypass that allows for a completely percutaneous femoropopliteal artery bypass. This novel approach allows placement of stent grafts from the popliteal artery into the femoral vein and subsequently from the femoral vein into the SFA. Recent data from the multicenter DETOUR I trial presented at LINC and at ISET by Sean Lyden, MD, demonstrates a primary patency rate of 84.7% at 6 months. What is particularly impressive about these results is that the average lesion length was 28.6 cm, which is significantly longer than most studies performed for treatment of femoropopliteal disease in the endovascular space. Of note, 93% of the treated lesions were categorized as TASC D and 95% were chronic total occlusions. Although more data are needed, there is a lot of optimism here in treating patients with long-segment

disease, those who fail conventional endovascular techniques, and patients requiring bypass who are not surgical candidates.

Along the same lines, percutaneous arteriovenous fistula creation for hemodialysis has the potential to be a disruptive technology that may transform the vascular access arena. The future of this technology is extremely bright.

What is the best advice you have received from a mentor, whether in the cath lab or regarding your career, that you know you'll repeat throughout your career as you mentor others?

I have been fortunate to have some fantastic mentors throughout my education and training, and several pieces of advice and wisdom come to mind. First, do what you love. I am very fortunate to have chosen a field in which every day is unique, technology is rapidly advancing, and patient care is continuously being improved. The ability to participate in clinical trials and advance patient care is particularly rewarding, as there are many uncharted areas that are ripe for research and innovation. Second, hard work is absolutely essential. In the book *Outliers: The Story of Success,* Malcolm Gladwell states that the magic number for true expertise is 10,000 hours.[3] If you love what you do, hard work will not be a chore. I would like to quote Gladwell: "Hard work is a prison sentence only if it does not have meaning. Once it does, it becomes the kind of thing that makes you grab your wife around the waist and dance a jig."

Third, always remember that you are taking care of a human being and care of the patient should supersede all else. Pride should not prevent you from seeking help from others when it is in the best interest of the patient. Fourth, remember the three A's, which are indispensable to building a robust practice: availability, affability, and ability. While all of them are very important, being available at all times is a key to success. Finally, be persistent and never, ever give up!

1. Ruers T, Punt CJ, Coevorden FV, et al. Radiofrequency ablation (RFA) combined with chemotherapy for unresectable colorectal liver metastases (CRC LM): long-term survival results of a randomized phase ii study of the EORTC-NCRI CCSG-ALM Intergroup 40004 (CLOCC). Ann Oncol. 2015;26(suppl 4):iv108-iv116.
2. van Hazel GA, Heinemann V, Sharma NK, et al. SIRFLOX: randomized phase iii trial comparing first-line mFOLFOX6 (plus or minus bevacizumab) versus mFOLFOX6 (plus or minus bevacizumab) plus selective internal radiation therapy in patients with metastatic colorectal cancer. J Clin Oncol. 2016;34:1723–1731.
3. Gladwell M. Outliers: The Story of Success. 1st ed. New York, NY: Little, Brown and Company; 2008.

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