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Reflecting on the Past Year



The normally full parking lots around the Inova Mount Vernon Hospital where AORI is located were nearly empty in April 2020.

In the current era of uncertainty, we hope this newsletter finds you in good health and spirits. To say that much has changed over the last year would be an understatement. When 2020 began, few people could have anticipated the challenges the future would bring. Like much of the world, we heard a new virus had emerged but never imagined how dramatically it would alter our way of life. We began to understand how things would change when the Anderson Clinic temporarily closed its Mount Vernon office not long after the Inova Health System suspended elective surgeries in March. While enrollment for AORI's prospective studies was briefly put on hold and follow-up visits had to be rescheduled, we are deeply grateful that many patients have continued to participate in AORI's prospective research studies and complete questionnaires about the status of their joints. Like many other organizations, AORI's staff transitioned to working remotely while trying to ensure the continuity of all research projects. Despite the challenges of working remotely, the Institute's findings have continued to be published during 2020, and we are grateful for the opportunity to share some

background about what motivates our research as well as a few of our recent findings in this edition of the Joint Journal newsletter.

When new technologies are introduced, they are expected to improve outcomes but it takes research to quantify the actual benefits. Over the past four decades, AORI has accumulated data on a variety of different hip replacement implants. Pooling the data from 1,707 total hip arthroplasties (THAs) done between 1982

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Carolyn Walkup, Back in the Saddle and Loving Life with Two Hip Replacements

By Renée Burkett

Carolyn Walkup was born in Norfolk, Virginia, grew up in Hampton, and now lives in Williamsburg. The native Virginian and her husband, Ron, live near the York River. “We both have children from previous marriages. I have a son, and my husband has two daughters. Between our three children, we have 10 grandchildren. One of our daughters is very prolific, she has five of the 10!”

Carolyn and Ron live with their six-year-old English cream golden retriever, Chester, and a puppy of the same breed, named Sheldon. “But,” says Carolyn, “it’s our 20-year-old kitty, Lucy, who rules the roost!” As Carolyn talks about her family and house pets, her conversation shifts to horses. “Growing up I learned how to ride. To this day, riding horses while chasing things through the woods comes quite naturally to me. It’s all because of my grandfather.” Carolyn giggles into the phone continuing, “Granddaddy was a member of the American Field Trial Association (AFTA, a pointing-dog club for amateurs and professionals). He had German pointers and English setters. When he had a field trial he wanted all of his granddaughters to accompany him. My dad went too. Granddaddy rented horses for all of us. He was the world’s best!” During those days, Carolyn and one of her three sisters, Dianne, developed a passion for horseback riding sports



Carolyn Walkup and Trumbanick Charlie (photo courtesy of Taunya Tae Taylor)

including fox hunting. “I rode often during my youth, but when I grew up, I quit riding in exchange for dating and working.”

Carolyn’s career took her on a weekly commute from Williamsburg to Washington, DC. “I’d drive to DC on Monday and drive back on Friday. During that time, I hoped to ride again someday.” But, it was years later when she began to ride on weekends borrowing friends’ horses to fox hunt. “I remembered how much fun it was.” One day Carolyn’s sister, Dianne, said, “I see how much fun you are having riding again. If you want to keep it up, don’t you think you should have your own horse?” Carolyn laughed and said, “What a great idea!” That inspired Carolyn to walk over to the nearby boarding stable and see if they had any horses for sale. “There was a

horse named Charlie for sale and I bought him,” Carolyn reminisces.

“Charlie was an off-track thoroughbred, a retired racing horse. Luckily he was sold to someone who trained Charlie to be a hunter/jumper. I helped him adapt to fox hunting. He became a great hunting horse, but the race track never got out of his system. When the hunt started, Charlie took off! We had a great time, had our accidents, too, but he was my very good friend. I was devastated when Charlie passed away on April 1, 2016. I had him for eight years.” As Carolyn reflects on her memories of Charlie, there is a lump in her throat, but then she cheerily recalls, “Charlie’s registered race name was Trumbanick Charlie. I was curious about the meaning of Trumbanick. I learned it is a Yiddish word for a

jokester; i.e., “Good Time Charlie”. His name fit him perfectly.”

Despite her sadness over the loss of Charlie, Carolyn searched websites throughout the United States for another horse. “I found Bella, my mare, 10 miles from my home. I bought her on June 5, 2016.” Carolyn saw Bella’s potential, but Bella had much to learn. “Bella hadn’t been ridden much outside of a ring. She had to learn how to walk independently on and off the trailer and go trail riding with other horses.” More challenging was teaching Bella how to get comfortable in a crowd of horses and riders galloping to sudden stops with periods of standing still while hounds bayed, and horns blew. “All of that is pretty stressful for a horse and Bella expressed her fear and confusion by balking, shying, and nervous ‘dancing’ in place. But, now she is comfortable and enjoys being in the hunt field.”

As Carolyn explains fox hunting, she assures, “Once in a while we see a fox, but we do not kill them. I guess you could say it is a fox chase. We give them a workout. They give us a workout. There are gray and red foxes here. We know the type of fox we are chasing by the patterns they run. Gray foxes run in wide circles, while red foxes run in zig zags.” Carolyn shares her enthusiasm, “Riding in a chase is an incredible leg workout. It’s not about holding onto the reins as much as having strong legs and hips or, in my case, good hip replacements!”

Carolyn’s need for hip replacements came as a result of inheriting her mom’s osteoarthritis. “My left hip really started bothering me while



Carolyn Walkup and her horse, Bella, wait for the hunt to begin.

I was commuting back and forth to DC, but my career kept me busy. I didn’t want to take time off.” To keep going, Carolyn had frequent cortisone injections. “I’d tell myself, ‘I don’t have time for a hip replacement.’ But, one of my hunting friends who was very happy with his hip replacement experience

told me if I ever decided to have surgery, I must go to Dr. Andy Engh. I tucked the information away in case I needed it.”

After a few years of cortisone shots, “Nothing was helping. Because fox hunting can be a dangerous and

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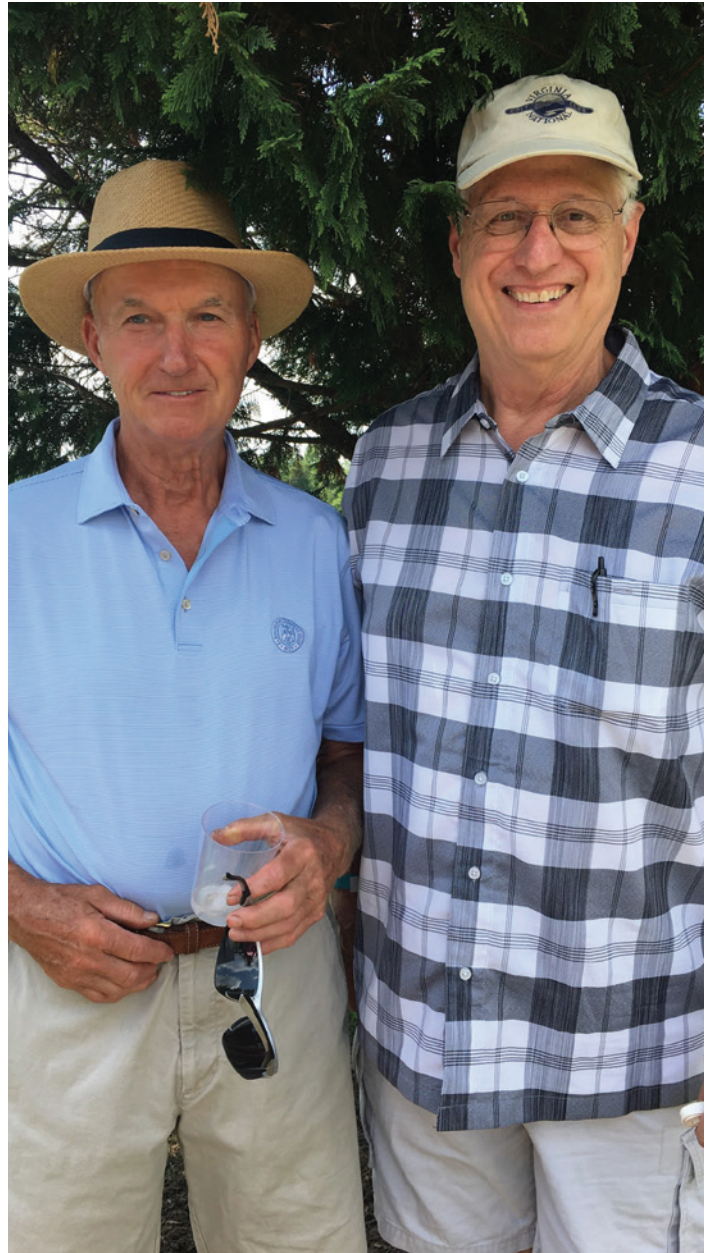
The Many Runs of Sonny Hoeltzel

By Renée Burkett

Sonny Hoeltzel hasn't ever run a marathon or even a 10k but he is grateful for his knee replacements that have allowed him to remain active. Sonny ran frequently as a small child, but after a series of knee injuries that began in his early 20s, Sonny's runs changed over time. When he was a toddler, Sonny was often seen running through his Mount Airy neighborhood in Maryland. "Every chance I got, I'd run out the door of our house and down the street as fast as my legs could carry me to explore my neighborhood." Fortunately for Sonny and his parents, it was a time when neighbors looked out for each other. "Everyone in the neighborhood knew me so when they saw me running down the road, they'd pick me up and carry me home."

Indeed, it was an era where neighbors were friends. Sonny was born on August 13, 1947, in Baltimore, Maryland. His parents named him Edwin Frederick Hoeltzel, Jr., but, "When I was a baby, my grandmother nicknamed me Sonny. That name stuck." Sonny's runs out of his house and into his neighborhood were so frequent, his father spent a weekend building a fence around their yard to keep Sonny safe. "But, the next day," Sonny admits, "I climbed over the fence and took off!"

"We lived in Mount Airy until I was 2 years old. Then we moved to Loudoun County, Virginia, where I grew up. Sonny continued to run and jump as children do using his natural athletic ability. Later, all that running and jumping paid off. "During high school I was told I wasn't scholarship material. It was true. English was my nemesis and I finished in the middle of my 1965 Loudoun Valley High School class. But in college, I went into math, learned how to study, and became a much better student!"



Sonny Hoeltzel visiting Dr. Jerry Engh during the summer of 2019

Despite being told he wasn't scholarship material, Sonny ended up with a partial basketball scholarship to Shepherd College (now Shepherd University) in West Virginia. "I got the partial scholarship and played all four years but not because I was a great basketball player. The first time I touched a basketball was in 9th grade." What Sonny did have was speed and a good vertical leap. "I had powerful legs. I could run and really jump. I played good defense and that's why I was able to play at the college level."



Sonny and Mary Hoeltzel celebrated their 50th wedding anniversary in August of 2018 with their children and grandchildren.

Sonny sustained his first knee injury while playing in the West Virginia Intercollegiate Athletic Conference (WVIAC) basketball tournament in Charleston, West Virginia.

While Sonny attended Shepherd College from 1965 through 1969, he met his wife and the love of his life, Mary Cockey, who was a cheerleader and enjoyed supporting athletics. “I was a junior and she was a senior when we met and began dating. We got married on August 17, 1968.” All the world seemed right. But in the early part of 1969, Sonny sustained his first knee injury while playing in the West Virginia Intercollegiate Athletic Conference (WVIAC) basketball tournament in Charleston, West Virginia. “I was leading a fast break, when I heard someone yell, ‘Stop,’ so I did. My feet came to a screeching halt, but my upper right leg kept going over my lower leg. I fell down in a heap. I got up and limped off the floor. After a series of x-rays, the medical staff told me my right knee wasn’t broken. But it was a mess and never fully recovered, although I found a way to keep playing basketball even with my knee problems.” After graduation, Sonny played in a recreational league.

“One night, I went to make a cut with the ball and the bottom of my left leg stopped short, but the top kept moving, similar to my right knee injury. That injury was much worse. I had my left knee operated on two or three times to remove damaged tissues, but, it became a trick-knee and gave me plenty of trouble off and on. With that knee injury, I was told I needed a knee replacement but, in the same breath, I was told I was too young.”

Sonny’s physical running ended but the energy he used for running needed an outlet, leading him to join a rescue squad. “I joined the Hamilton Volunteer Fire Department and Rescue Squad in Loudoun County. Over time I became a certified Emergency Medical Technician.” My wife joined too and for about 15 years, Mary and I were EMTs running calls. We had a dispatch monitor on at all times in our house. If our rescue station was called, the volume was set to blare. Since running calls was strictly volunteer and we had children, a lot of times Mary and I couldn’t respond to the same call, but one of us usually did.”

Originally, Sonny chose teaching as a career. He started teaching high school math at his alma mater in Purcellville, Virginia, but he ended up as an accountant. “I loved teaching and still do, but when my wife and I decided to start a family, somebody had to make more than the then-yearly salary of \$7500.” Sonny’s father owned a car business in Leesburg, so Sonny went to work for him, eventually becoming the comptroller. But, the passion for teaching remains evident in his family. “My wife and I taught, both our daughters teach, and several relatives do too. Most have taught at Loudoun County Schools!” Since Sonny’s family teaches locally, many of the younger children end up with a relative as a teacher. “Between me and my two siblings, we have 15 grandkids.” Sonny pauses and adds, “I’m really blessed.”

During Sonny’s early careers as an accountant and an EMT his knees worsened. “I wasn’t in constant pain, but it wouldn’t take much to aggravate my left knee. The instability would sometimes cause my knee to collapse while I was walking down a hillside. To keep going, I’d wear a brace until it felt okay again. But, soon

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and 2010 that used six different types of bearing surfaces, AORI researchers found that the low wear rates associated with crosslinked polyethylene introduced in 1999 have substantially decreased long-term revision rates compared to conventional liners that were previously used. Although dislocations (when the femoral head of a hip implant pops out of joint and has to be put back in place by a doctor) can still occur, the incidence has been reduced with the introduction of larger diameter heads. These findings confirm that polyethylene wear is now much

training is an essential part of medical education, there have been concerns that training institutions might have higher complication rates when new surgeons begin their programs. At the Anderson Orthopaedic Institute, fellows spend three months with an attending surgeon before rotating to the next service for another quarter. Over the course of a year, each fellow historically trained with four different attending surgeons. To examine how complications varied over the fellowship year, AORI researchers worked with Dr. Jonathan Dattilo, a recent fellow,

of future surgeons. You can read more about this study in the May 2020 edition of the *Journal of Arthroplasty*.²

When a total knee arthroplasty is performed, one of the goals is to straighten the patient's leg if there was any deformity before surgery. When a patient does not need to have their entire knee joint replaced, they can undergo a partial knee replacement, also known as unicondylar knee arthroplasty (UKA). If a patient's leg is not straight prior to surgery, they can have either a "varus" (when the

More than a clinical practice, the Anderson Orthopaedic Institute is committed to providing the highest quality patient care while also doing clinically-relevant research and training the next generation of orthopaedic surgeons.

less of a threat to the long-term durability of contemporary hip replacements. You can read more about this research in the July 2020 edition of the *Bone and Joint Journal*.¹

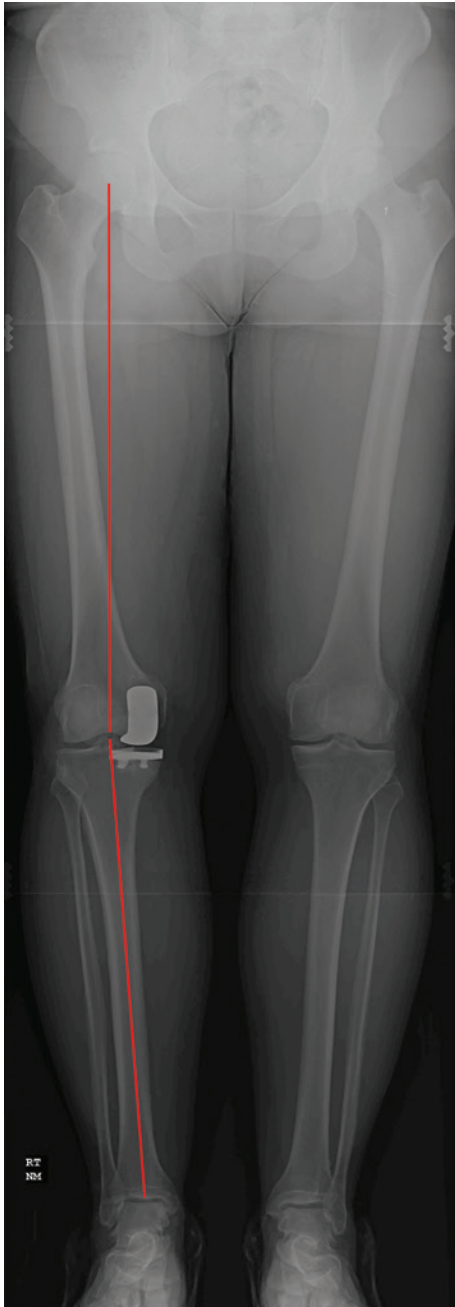
More than a clinical practice, the Anderson Orthopaedic Institute is committed to providing the highest quality patient care while also doing clinically-relevant research and training the next generation of orthopaedic surgeons. While

to review the 90-day outcome of 15,650 hip and knee joint replacements performed between 2006 and 2016. Based on the data from 40 fellows who were trained at Anderson over that period, there was no evidence of increased complications or revisions at the beginning of the fellowship year or at the beginning of a quarter. The authors concluded that graduated autonomy can be safely employed in a fellowship program to ensure the continued high-caliber training

knee bows outward) or a "valgus" deformity (when the knee bows inward). Since patients who undergo a UKA often have a varus deformity before surgery, there is debate about whether the knee should be straightened or left in a little varus when the medial (inside) compartment of the joint is replaced. In such a situation, the reason for undercorrecting the knee alignment is to avoid putting excessive stress on the lateral (outside) compartment that is not replaced.

¹ Engh CA Jr, McAsey CJ, Cororaton AD, Ho H, Hopper RH Jr. Have newer bearing surfaces changed expectations regarding the longevity of total hip arthroplasty? *Bone Joint J.* 2020 Jul;102-B(7 Supple B):105-111.

² Dattilo JR, Parks NL, Ho H, Hopper RH Jr, McAsey CJ, Hamilton WG. Does a "July Effect" exist for fellowship training in total hip and knee arthroplasty? *J Arthroplasty.* 2020 May;35(5):1208-1213.



The mechanical axis used to describe leg alignment is defined by lines connecting the centers of the hip, knee and ankle. Based on the x-ray above of a medial UKA patient, the alignment is 4.3 degrees of varus (meaning that the knee bows slightly outward).

To investigate the optimal knee alignment after partial knee replacement, AORI researchers worked with orthopaedic surgeons at the Walter Reed National Military Medical Center to evaluate how post-operative alignment influences outcome after a medial compartment UKA. To do this, the study examined patients who required a revision and compared them with matched patients whose implant continued to function well after 10 years. The research found that leaving a medial UKA patient in slight varus (so the knee bows outward by approximately 4 degrees) was associated with successful long-term outcome. In contrast, knees revised for implant loosening or subsidence tended to be in more varus while those revised for progression of osteoarthritis in the lateral compartment (where the outside compartment of the knee wears out after the inside compartment has been replaced) had more valgus alignment. The study concluded that the optimal mechanical alignment for medial fixed-bearing UKA survival with contemporary polyethylene is likely slight varus. In less technical terms, the practical message from this research is that undercorrecting a UKA patient so they are left with a slight outward bow of their knee is fine when replacing the inside portion of the knee joint. You can read more about this study in the February 2020 edition of the *Journal of Arthroplasty*.³

In view of the ongoing opioid crisis in the United States, understanding how joint replacement patients use narcotics after surgery is essential to provide adequate pain relief while minimizing the potential for addiction. To examine how pain medication usage varies among different joint replacement procedures, Dr. Jonathan Dattilo worked with AORI researchers to review the results of a pain medication survey that was routinely administered to patients after surgery. Compared to total knee arthroplasty, partial knee replacement was associated with less narcotic consumption, shorter duration of use, fewer refills, and a lower likelihood of continuing to require narcotics at 4-week follow-up. The researchers also found that total hip arthroplasty patients had less narcotic consumption, shorter duration of use, fewer refills, and a lower likelihood of requiring narcotics at 4-week follow-up than total knee arthroplasty patients. We hope that sharing AORI's findings regarding the narcotic consumption patterns for different procedures will aid other orthopaedic surgeons as they prescribe post-operative pain medications for their patients. You can read more about these findings in the August and September editions of the *Journal of Arthroplasty*.^{4,5}

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3. Slaven SE, Cody JP, Sershon RA, Ho H, Hopper RH Jr, Fricka KB. The impact of coronal alignment on revision in medial fixed-bearing unicompartmental knee arthroplasty. *J Arthroplasty*. 2020 Feb;35(2):353-357.
4. Dattilo JR, Cororaton AD, Gargiulo JM, McDonald JF 3rd, Ho H, Hamilton WG. Narcotic consumption in opioid naïve patients undergoing unicompartmental and total knee arthroplasty. *J Arthroplasty*. 2020 Aug;35(8):2022-2026.
5. Dattilo JR, Cororaton AD, Gargiulo JM, McDonald JF 3rd, Ho H, Hamilton WG. Narcotic consumption in opioid-naïve patients undergoing total hip and knee arthroplasty. *J Arthroplasty*. 2020 Sep;35(9):2392-2396.

Thanks for Your Support



As we reflect on all the people who make our research possible, everyone at AORI would like to express our sincere gratitude to those who have supported our work. Each donation we receive enables us to undertake research with the goal of improving the quality of life for joint replacement patients.

Your donation and bequests go towards:

- The scientific assessment of new and existing implant systems
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Dr. Andy Engh visiting his father, Dr. Charles, in Florida, December 2019



An x-ray of a total hip replacement with the porous-coated stem pioneered by Dr. Charles Engh

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An x-ray of a total knee implant used to replace the entire knee joint

Carolyn Walkup Continued from page 3

physically challenging sport, the arthritis in my hip came close to stopping me. At that point, I made an appointment with Dr. Andy.” Carolyn’s left hip was replaced in June of 2014. She spent two months at home recuperating and doing physical therapy at the Sports Medicine Department of the College of William and Mary. “Since the physical therapists were used to rehabilitating athletes, they designed a ‘horse’ made from rehab equipment for me to practice mounting and dismounting. Another really fun thing they had me do was sit on a rolling office stool and pull myself around the whole facility using my legs. Those things dramatically increased my strength. I was literally ‘back in the saddle’ riding with my James River Hunt Club four months after surgery.”

Unlike her left hip, the pain in Carolyn’s right hip came on more suddenly. When Carolyn saw Dr. Andy in March of 2019 for follow-up, her left hip was doing well but the pain in her right hip had substantially worsened over the past month. Because her hip pain was adversely impacting her overall quality of life, Carolyn elected to have surgery in June of 2019. “I thought having the hip surgery then wouldn’t interfere with my hunting schedule. When she had her right hip replaced, Carolyn consented to participate in the PEPPER study. Formally titled “Pulmonary Embolism Prevention after hiP and knee Replacement,” the purpose of this national multicenter clinical trial is to determine which blood



Carolyn and her sister, Dianne, at a fox hunt

“Riding in a chase is an incredible leg workout. It’s not about holding onto the reins as much as having strong legs and hips or, in my case, good hip replacements!”

thinner works best after a hip or knee replacement. Patients who participate are randomized to one of three blood thinners and Carolyn received aspirin (the other two medications are warfarin and rivaroxaban). “After my second surgery, I used Anderson’s online physical therapy program. I followed the instructions and did my rehab at home. I added the rolling office stool walking to build up my hips and thighs.” Carolyn also put her saddle on a sawhorse

to practice alternately standing and sitting mimicking the technique of posting. She was riding again by the end of October 2019.

“I’m retired now, and it is so nice to make my own daily schedule. Horses take a lot of time, but I like to do other things, too. A fun thing I’m trying to get back into is oil painting. My sisters and I took art lessons during our youth. Currently, I’m painting landscapes and seascapes.”

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Carolyn Walkup Continued from page 11

Describing herself as a consummate do-it-yourselfer, Carolyn acknowledges, “Sometimes the do-it-yourself part takes longer than expected. For example, I have been building a patio for well over two years. My husband and I started it together. It took two years to dig out a 12 x 30 foot area. I am laying the pavers now. Then, I’ll landscape around it. I hope to finish it soon.”

At age 71, Carolyn lives a vibrant life. “With Dr. Andy’s help, I plan to stay active. My hip replacements get an A-plus. I am so thrilled to have zero pain! For me, physical activity is the key to a happy and healthy life. Besides riding my horse, I ride my bike and I kayak periodically, too. It is so much fun! Dr. Andy used his expertise and enriched my life by allowing me to continue doing the things I love. Today, I am completely pain free and loving life!” Hearing Carolyn share her story inspires all of us at AORI to continue our research dedicated to improving joint replacement outcomes. Since participating in prospective clinical trials is completely voluntary, we are also deeply grateful for all the patients like Carolyn who make AORI’s research possible.



Carolyn Walkup happy to be riding her mare, Bella

Reflecting on the Past Year Continued from page 7

As researchers learn more about the human genome, there is increasing evidence that a patient’s DNA plays a role in how they respond to specific pain medications. Using pharmacogenetic testing, clinicians can now obtain a DNA analysis from a cheek swab to determine if a drug is expected to have a normal clinical effect, heightened effect, or no effect at all. In a pilot study conducted by AORI, 42% (13/31) of patients had a genetic variant that could affect how they responded to at least one of the pain medications prescribed after knee replacement. You can read more about this exciting new research in the June 2020 edition of the *Bone and Joint Journal*.⁶ Research now underway will help determine if using pharmacogenetic information to modify a patient’s medication will improve outcomes and reduce post-operative narcotic usage.

While these highlights are only a partial list of the research projects published during the past year, we hope they provide insight about how AORI’s work impacts joint replacement patients and the orthopaedic community. At the same time that we are grateful for the opportunity to conduct research, we must also acknowledge that the Covid-19 pandemic has caused some economic hardship for AORI, as it has for many people and organizations around the world. Traditional sources of support that AORI has relied on for decades have been substantially reduced, leaving us even more grateful for the generous donations from individual donors who have been an essential source of support over the years. As we reflect on all the people who make AORI’s research possible, we would like to extend a special thanks to those who support our research through their time and financial gifts.

6. Hamilton WG, Gargiulo JM, Parks NL. Using pharmacogenetics to structure individual pain management protocols in total knee arthroplasty. *Bone Joint J.* 2020 Jun;102-B(6 Supple A):73-78.

Sonny Hoeltzel Continued from page 5

A buddy of mine and I run food to needy families through a non-profit organization called Tree of Life Ministries. Tree of Life is dedicated to improving the lives of the needy in our local community in five areas: food, shelter, healthcare, life skills, and relief.

something else would happen.” It was the late 1980s and Sonny, now in his early 40s, was ready for the knee problems to end, but his orthopaedic surgeon in Leesburg told him he was still too young.

“When I felt like I was ‘old enough’ I sought to have my knees replaced, but I did not like the local hospital where my orthopaedic surgeon practiced. So, I asked him for a referral to a doctor at another hospital. He recommended Anderson.” Sonny ended up with Dr. Jerry Engh as his knee surgeon. Dr. Jerry specialized in partial knee replacements and was able to do a partial knee replacement on Sonny’s right knee shortly before his 60th birthday. “My right knee was not touched until Dr. Engh did the partial knee replacement surgery on October 16, 2006. That partial knee replacement is still going strong.” Since Sonny’s left knee was much worse, Dr. Jerry ended up doing a full knee replacement a few years later on April 28, 2010.

With his knee replacements working well, Sonny has turned his attention to a new volunteer activity. “A buddy of mine and I run food to needy families through a non-profit organization called Tree of Life Ministries. Tree of Life is dedicated to improving the lives of the needy in our local community in five areas: food, shelter, healthcare, life skills, and relief. We also cook occasional meals in the evenings for those coming to take skill-development classes. Tree of Life wants to empower people, so they aren’t just taking a handout. As their lives improve, they can help others. It is a Christian-based organization. Many of the big-box stores share goods to fill our pantry.”

Sonny’s dad eventually sold the car franchise where he was comptroller and opened up a used car lot in Purcellville. “I now work part time at the Purcellville car lot. The manager is my nephew. Weekday mornings I run there to do accounting, payroll, and reconciliations.”

When Sonny isn’t helping others, he enjoys his daily quiet time and watching nature from the windows of his three-acre, wooded homestead. “We have one house cat, Lovey, but the rest of our ‘pets’ are the birds, deer, foxes, raccoons, squirrels and even turkeys looking for food in our yard.” He also endeavors to stay in shape. “I go to the gym two or three days a week. I’m almost 6’3” and weigh around 250 pounds but don’t have a big beer gut. I still have muscularity and look like a football player. I do a lot of cardio and lift weights to keep fit. The knee replacements are good. They ache sometimes with the weather and I ice them when I stand up too long, but they are stable and I’m doing great. I go to the gym and play a bit of golf but there is no running for me,” Sonny chuckles, “at least, not like the kind I did as a toddler.”

Do you have a story you would like to share with the readers of the Joint Journal or a question you would like to ask? Please contact Susan Sensi at (703) 619-4411 or email research@aori.org.

Remembering Rosemary D. White (1937–2020)

Throughout her life, Rosemary White devoted herself to the service of others while persevering through adversity. The second of three children, she was born on November 13, 1937, in York, Pennsylvania, in the midst of the Great Depression. Although her family was poor and her father left when she was 9, Rosemary's mother worked in a factory for 50 cents an hour to make sure her children could achieve the education she never had the opportunity to pursue. Despite not always having enough to eat, Rosemary attended York Catholic High School and subsequently earned a degree from St. Agnes School of Nursing in Baltimore, Maryland. In 1958, she began working as a registered nurse at York Hospital while engaged to Marine First Lieutenant Francis V. White, Jr. Rosemary and Frank were married in 1959 and they welcomed their first child, Kathleen Marie, the following year. Over the next 4 years, their family grew to five with the births of Stephen Francis and Andrea Jeanette.

As the wife of a Marine Corps officer, Rosemary supported her husband and served as the glue that held the family together whether they were all in the same place or separated by hundreds or thousands of miles while Frank was deployed. Over the course of his military career, the family frequently relocated in conjunction with Frank's assignments, moving from North Carolina to New York with multiple stays in Virginia and Pennsylvania. During the 1960s, Rosemary took care of raising her young children while her husband was at sea or serving in Vietnam. In addition to their many moves within the United States, the family also relocated to Spain in 1975 where Rosemary made a home in the heart of Madrid while the country was still under the rule of Francisco Franco. In the late 1970s and early 1980s, she again undertook the task of caring for the family while Frank deployed multiple times out of Camp Lejeune, North Carolina, aboard ship for six months at a time.



Rosemary and Frank on their wedding day
in September 1959

While her husband served in the United States military for many years, he was not the only warrior in the family. When Rosemary was in her late 30s, she first began to experience joint pain while living in Madrid. Walking everywhere to get around the city, Rosemary's knees began to ache and the cobblestone surfaces sometimes caused her to twist an ankle. In 1987, she underwent an arthroscopic surgery on her left knee, the first of what would prove to be many procedures as she battled the debilitating effects of osteoarthritis. In her mid 50s, Rosemary underwent replacement of both knees within a six month period and subsequently had her right hip replaced in 2000 at the age of 62. Rosemary's first hip replacement was complicated by considerable blood loss that required several transfusions. She subsequently developed a large hematoma that became infected and underwent additional surgery a month after her initial hip replacement to treat the infection. Owing to the complications she experienced, Rosemary was referred to the Anderson Orthopaedic Institute when she needed her left hip replaced. Although blood



Rosemary recuperating from one of her surgeries in the late 1980s

thinners like Coumadin are commonly used after joint replacement surgery to prevent clots, Dr. Charles Engh avoided the use of these agents when he performed her surgery in October of 2001 and Rosemary recovered without complications. In addition to her hip and knee replacements, Rosemary also had both shoulders replaced, her ankle fused, and multiple surgeries to address degeneration of her cervical and lumbar spine.

Despite her lifelong struggle with arthritis, Rosemary never complained about her pain and always devoted herself to her family and community. In retirement, she discovered a passion for needlework and beading. Whether knitting, cross-stitching, smocking, quilting, or designing and creating beaded jewelry, Rosemary's talent for color and composition was evident in everything she touched. She met some of her dearest friends through her quilting community and her generosity in supporting charitable quilting projects was well known.

While Rosemary's life was filled with many adventures and wonderful memories, she derived the greatest pleasure from her family. Over the years, she cherished watching her children grow to become independent adults. Rosemary was also deeply grateful that she and

Frank were able to enjoy 60 years of marriage and they both treasured the memory of holding their newborn grandson, Alex, for the first time. Even in the face of tremendous adversity and personal loss, Rosemary remained dedicated to her family. Despite continuing to suffer from advanced arthritis and congestive heart failure, she found the strength to bring her family together to celebrate a truly marvelous holiday season in 2019 while still mourning the loss of her husband two months earlier in October.

As the recipient of multiple joint replacements, Rosemary personally understood the horrific damage that progressive arthritis can cause but also recognized that joint replacement can restore mobility and reduce pain. When she passed in August of 2020, Rosemary generously donated her six joint replacements to AORI. In lieu of flowers, her family also requested donations to AORI in her honor. To perpetuate her legacy of service to others and with a profound sense of gratitude for the generosity of Rosemary and her family, AORI will strive to use the anatomical gifts and financial support that has been received to continue advancing joint replacement research for the benefit of all patients.



Rosemary holds her grandson Alex at his baptism in 1993

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