Connections 2021

UC San Diego School of Medicine

A Newsletter from the Children's Orthopedic and Scoliosis Program

Rady

Issue 17 - 2021



Message from the Chief

Well, we sure missed seeing you all this year (other than via zoom), and although there is more hope that the world will continue to open up, the delta variant is adding a new twist to the pandemic. It is hard to imagine, but this time last year we had just passed 100,000 lives lost to COIVD-19 in the US, now that loss stands at more than 600,000 lives. Worldwide over 4,000,000 deaths. Staggering and humbling. I trust you have stayed safe and maintained hope. As our daily lives seemingly fluctuate with each COVID surge, find balance and pleasure in both our families and our patients. We remain some of the luckiest folks around to have the joy of practicing pediatric orthopedics.

There are many ways to track the impact of COVID. The number of patients we cared for dropped precipitously, as I suspect occurred for many of you as well. Our clinical volume has returned to baseline and

beyond. The trend is plotted below - a bit bumpy on the recovery but we are back to helping the children of Southern California just as we did pre-pandemic.



We have several congratulatory announcements to make. First the latest additions to our Rady orthopedic family: baby Sawyer (Dr. Rickert's newborn), baby Katherine (fellow Jess Hughes' newborn), and baby Cidambi due soon. Next a promotion that took one from our team to lead another: Dr. Burt Yaszay has taken the chief of orthopedics position at Seattle Children's Hospital. Congrats Burt, we miss you already. Lastly, we celebrate with Dr. Scott Mubarak 44 years of clinical practice. Scott stepped down from clinical practice this June after what can only be considered a truly spectacular career. His story and pearls are in the pages that follow. It's a great read and very insightful. Dr Mubarak remains a key colleague, educator and mentor to so many of us, and I know we can count on his support for many years to come. He is a master surgeon, innovator, and researcher who has left an indelible mark on our community locally and our profession globally. If you missed his retirement zoom celebration, his parting shot was to cut his tie off with scissors, pull out his shirt tails and don the bolo. Drop the mic in classic Mubarak form. Congrats Scott!

I am pleased to announce the graduation of four outstanding orthopedic surgery fellows from our program. Anthony Catanzano, MD is returning to Duke where he completed his residency. Patrick Curran, MD is joining us in practice here at Rady. Jessica Hughes, MD will be heading to the east coast and has accepted a position at the University of Pittsburgh Medical Center where she and her husband Jonathon will be reunited. Finally, Brock Kitchen, DO will be joining the Nevada Orthopedic & Spine Center in Las Vegas.

- continued next page



Scott Mubarak











Peter Newton



Doug Wallace









Katie Rickert





Eric Edmonds

Andy Pennock

V. Salil Upasani

Emily Cidambi

Yu-Tsun Cheng

Suraj Achar

Message from the Chief

We have a strong incoming fellowship class. Our 36th fellowship class consists of: Katharine Hollnagel, MD – she will be joining us from the University of Toledo Medical Center. Caitlin Orner, MD – she completed her residency at the University of Rochester. Joshua Speirs, MD – coming to us from Loma Linda University, and Mike Tretiakov, MD who completed his residency at SUNY Downstate Medical Center.

I am excited to share that we are nearing the opening of our new gait lab and the Southern Family Center for Cerebral Palsy at Rady Children's Hospital. Despite setbacks related to pandemic era construction, Dr. Chambers was a champion with the grit and determination to see it to completion. As noted, we will welcome Dr. Patrick Curran to our family this fall when he returns after completing fellowships at Boston Children's, Rady Children's, and Royal Children's Melbourne. Dr. Curran will join Dr. Chambers and the rest of the orthopedic and rehabilitation team to expand care for patients with cerebral palsy throughout the southwest US and beyond. Welcome Patrick!

We enjoy sharing the stories that follow with all of you who mean so much to our program. I hope you will find Connections 2021 informative and fun to read. I hope next year will represent reunions and personal visits with friends and colleagues around the world... Here's to hoping the world will soon be getting small again.

Most sincerely,

Peter O. Newton, MD Chief of Orthopedics Surgeon-in-Chief Rady Children's Hospital

Dear friends and Rady orthopedic family,

The Pediatric Orthopedics and Scoliosis Clinical Fellowship at Rady Children's Hospital San Diego graduated another stellar group of clinical fellows. Despite all the challenges due to COVID-19, this group truly came together to work as a team and excelled both academically and clinically. I'm proud of everything that they have accomplished this year and I look forward to their successes in the years ahead.

Patrick Curran was a unique member of our fellowship class this year and he joined us after completing a pediatric orthopedics fellowship at Boston Children's Hospital. It was a pleasure to work with him for a few months and get him exposed to our neuromuscular program including the growing Rehabilitation Department at Rady Children's. He went on to complete a third fellowship at The Royal Children's Hospital in Melbourne, Australia and we look forward to welcoming him back to join our faculty in September 2021.

The other three fellows have also found excellent positions at top centers throughout the US. Anthony Catanzano, MD will join Duke University, Jessica Hughes, MD will join the University of Pittsburgh Medical Center, and Brock Kitchen, DO will join the Nevada Orthopedic and Spine Center.

This year we continued our virtual academic conferences with didactic offerings 5 days a week. While there were some advantages in terms of starting more multi-disciplinary meetings and increasing faculty involvement from our satellite offices, we are now enjoying a hybrid education program that started in June 2021. There is no substitute for in-person learning and the Socratic interactions that can take place when faculty and trainees are in the same room. However, this year has definitely forced us to re-think our curriculum and develop some innovative techniques that will continue to improve our didactic teachings.

We did return to an in-person Visiting Professor program this year. We were excited to host Sanjeev Sabharwal, MD, MPH from the University of California San Francisco. We enjoyed a full day of research and clinical presentations prepared with many of you joinning us virtually for his insightful lectures and clinical pearls.

Best,

V. Salil Upasani, MD Clinical Fellowship Program Director



Michael P. Kelly, MD, MSc

Michael (Mike) will be joining us as the new Medical Director of Scoliosis & Spinal Deformities. He was born and raised outside of Boston, attending Boston College and University of Massachusetts Medical School. He switched coasts for his residency training in Orthopedic Surgery at the University of California, San Francisco, a program with a storied history in spinal deformity care. From there he went to Washington University in Saint Louis, training in adult and pediatric spinal deformity with Drs. Keith Bridwell and Larry Lenke. He stayed as an attending, pursuing a Master's Degree in Clinical Investigation and a second fellowship in complex pediatric and adult spinal deformity over the first three years. In addition to a busy adult and pediatric clinical practice, Mike is active in research. He is a member of several renowned deformity study groups, including the Harms Study Group and the Fox Deformity Study Group whose focus are pediatric deformities. He has received peer-reviewed funding from the Scoliosis Research Society, AO Spine, and the Cervical Spine Research Society. Mike's current interests lay in examining a patient's immune response to surgery and in developing opioid-free care pathways.

When not at work, Mike enjoys time with his wife, Carolyn (a California native) and his two sons, Evan (7) and Declan (4). They are all excited to move back to the West Coast.

Patrick Curran, MD

Patrick (Pat) will be joining our burgeoning neuromuscular program. He was born in Germany and traveled the world as an Air Force dependent before settling for high school in Northern California. He attended Brown University where he majored in biomedical engineering and was an All-American football player. He then earned a master of science degree in biomedical engineering from Brown. After graduation, he was a clinical research assistant in general pediatric surgery at UCSF. He then earned his medical degree at the UC Davis School of Medicine. He completed his Orthopaedic Surgery residency at UCSF where he was the recipient of the Mauer Award for Outstanding Chief Resident and an OREF New Investigator Grant. After residency, he completed a general pediatric orthopaedic fellowship at Boston Children's Hospital followed by an abbreviated pediatric orthopaedic fellowship at Rady Children's Hospital. Most recently, he completed a pediatric neuromuscular orthopaedic fellowship at the Royal Children's Hospital in Melbourne, Australia. He has a clinical interest in caring for children with the neuromuscular disorders. His extracurricular interests include cooking, running, rugby, Lego building, roasting coffee and exploring the world with his wife, Megan, and three daughters.



Welcome Dr. Kelly



Dr. Curran and family

2020-2021 Fellows - Rady Children's Hospital

The RCHSD/UCSD fellowship program in children's orthopedics and scoliosis surgery remains among the most sought after in North America. The balance of training that our fellows receive covers all areas of children's orthopedics as well as providing excellent research possibilities. In addition, we arrange for our fellows to be responsible for primary call several nights each month, under the supervision of a senior staff mentor, which allows them to develop independent decision-making skills. Analysis of surgical training in North America indicates that titrating responsibility in a graduated fashion is imperative to the successful education of senior trainees, and this concept has become synonymous with our program. We are proud of our fellows who are graduating this year and we congratulate them on their accomplishments.



Anthony Catanzano, MD

Dr. Catanzano graduated from medical school at NYU and completed his residency at Duke University with former fellow Rob Lark (class of 2010). Dr. Catanzano returned to Duke at the completion of his fellowship. Dr. Catanzano's research primarily focused on spine. He worked on studies evaluating medium term outcomes of posterior spinal fusion, treatment comparisons in patients with curves >100°, spontaneous lumbar correction following vertebral tethering, and outcomes of selective fusion. He also worked on a study regarding depression screening in the orthopedic clinic. He had a very productive year, and we wish him luck in North Carolina.



Duke Medical Center



Patrick Curran, MD

Dr. Curran's story is detailed in the previous page. During his time with us, his research focused on the neuromuscular hip. As indicated in the previous pages, he will return to San Diego as a staff physician here at Rady Children's Hospital in September. His practice will focus primarily on neuromuscular conditions in the new Southern Family Center for Cerebral Palsy. We look forward to having him.



Rady Children's Hospital, San Diego

2020-2021 Fellows – Rady Children's Hospital



Jessica Hughes, MD

Dr. Hughes graduated from medical school at the University of Texas, San Antonio. She completed her residency at Baylor Scott and White in Temple TX. Dr. Hughes is a native of San Diego and her fellowship year was not the first time she worked with us. In 2018 she spent three months with us as a visiting research resident. During that time she began a study evaluating the predictors of conservative treatment failure for scaphoid fractures that we submitted for consideration of publication during her fellowship. In addition to her work on scaphoid fractures she also studied hip reconstruction in children with Down syndrome, fixation of tibial shaft fractures, outcomes of radial head and neck fractures, and the prevalence of trochlear dysplasia in breech presentation. Upon completion of her fellowship she accepted a position at the University of Pittsburgh Medical Center/Children's Hospital of Pittsburgh.



University of Pittsburgh Medical Center / Children's Hospital of Pittsburgh



Brock Kitchen, DO

Dr. Kitchen completed medical school at the University of North Texas Health Science Center and stayed in Texas for his residency, which was completed at the University of Texas Health Science Center at San Antonio. While with us he worked on a study evaluating the outcomes of an internal brace for ACL injuries and a prospective study comparing short leg vs long leg casting for distal tibial fractures that require reduction. Upon completion of his fellowship he joined the Nevada Orthopedic and Spine Center in Las Vegas.



'If a little knowledge is dangerous, where is the man who has so much as to be out of danger"

- Thomas Henry Huxley

Arriving Fellows – 2021-2022

The process of applying, interviewing, and being accepted to one of the top-ranked fellowship programs in children's orthopedics is a demanding one. Each year we receive 40-50 applications and narrow these down to a smaller group that we can interview and then select the very best of these candidates. The surgeons listed below arrived August 1, 2021 to begin their academic year. They are outstanding young orthopedic surgeons from throughout North America and we look forward to working with them.



Katharine Hollnagel, MD University of Toledo Medical Center



Caitlin Orner, MD University of Rochester



Joshua Speirs, MD Loma Linda University



Mikhail "Mike" Tretiakov, MD SUNY Downstate Medical Center

Katharine Hollnagel, MD

Undergraduate: Colgate University, BA Molecular Biology Medical school: Virgina Tech, Carilion School of Medicine Residency: University of Toledo Medical Center

Caitlin Orner, MD

Undergraduate: Bennington College, BA Chemistry Medical School: University of Rochester School of Medicine and Dentistry Residency: University of Rochester, NY

Joshua Speirs, MD

Undergraduate: Bringham Young University, BS Biology Medical School: Paul L Foster School of Medicine, Texas Tech University Health Science Center at El Paso Residency: Loma Linda University, CA

Mikhail "Mike" Tretiakov, MD

Undergraduate: University of California, Irvine. BS in Biological Sciences Medical school: Oregon Health & Science University, Portland Residency: SUNY Downstate Medical Center, NY

Future Fellows – 2021 Match (for 2022-2023 Academic Year) We are happy to announce that we have matched with the outstanding residents listed below

Stephen "Bubba" Carveth, MD Mark Katsma, DO Michigan State University

Chinmay Paranjape, MD University of North Carolina

Naval Medical Center, Portsmouth

Joshua Tadlock, MD William Beaumont Army Medical Center

Research Year



Research Resident – UCSD

Liane M. Chun, MD

Dr. Chun was our UC San Diego research resident and is a native of Northern California. She completed her undergraduate studies in integrative biology at UC Berkeley and went to medical school at Case Western Reserve University in Cleveland. She worked on a number of projects while with us including developing a DDH model in porcine hips, evaluation of the remodeling capacity of the femoral head in patients with cerebral palsy, outcomes of treatment for os trigonum in the adolescent population, as well as a randomized study comparing outcomes of patients with anterior knee pain that were treated with either traditional physical therapy, or ARPwave technology.



Research Resident – Navy

Sarah A. Fogleman, MD

Dr. Fogleman is our first research resident from the Navy. She is a native of Rhode Island and studied physics at the Naval Academy in Annapolis, MD. She graduated from medical school at Georgetown University in Washington DC. Dr. Fogleman worked on studies both here at Rady Children's Hospital, as well as with Balboa Naval Hospital during her research year. Her Navy projects included a prospective, DoD grant funded, vitamin D screening to prevent stress fractures in military recruits. Her pediatric projects focused primarily on the elbow with studies evaluating radial head fractures, as well as radial neck fractures, and Little League elbow. She also worked on ACL related studies, as well as should instability projects.



Drs. Bosch, Edmonds, Upasani, and Chun during a lab day for one of Dr. Chun's projects.

Notes From A Former Fellow



Meghan Imrie, MD, FAAOS

Stanford Children's Health – Director of Stanford Children's Orthopedic Fellowship Lucile Packard Children's Hospital – Stanford

(Fellow - 2008-2009)

What a year it has been! As we pass the one-year anniversary of the start of the Covid 19 pandemic, it seems like a good time to look back and I am honored to have the opportunity to provide reflections on my year as a San Diego fellow for this year's "notes."

I am a native Californian, and grew up in a small-ish town (Los Gatos) in the not-so-small San Francisco Bay Area. My father is a second-generation orthopaedic surgeon from Mississippi who met my mother, a physical therapist who was born in Hungary and immigrated to the US after WWII, while he was a resident at Stanford. Not surprisingly since they both love their work, both of my parents are still working, even in the pandemic. My very happy childhood was dominated by competitive gymnastics, which I started at age 6 and finished at age 21 when I graduated from Yale – I attribute my work ethic (and ongoing, low grade back pain) to those 15 formative years. Originally thinking of a law career (Dr Wenger graciously would point out to me during fellowship that I'm a natural contrarian), it wasn't until I worked a summer as an OR orderly that I started thinking of a career in medicine. I enjoyed my four years at UCSD SOM, including a month-long sub I at Rady Children's Hospital where I was first introduced to pediatric orthopaedics and the amazing staff at the children's hospital - in fact, Maya Pring was one of the fellows when I rotated as a med student, and I was absolutely amazed and inspired by her. I then did residency back close to home, at Stanford, where I met my husband Greg, who is also an orthopaedist - we joked at our wedding that if anyone fell and broke a hip while dancing, they'd be well taken care of!

Based on my great experience as a medical student, I was ecstatic when I found out I would be a San Diego fellow, and the year was as amazing as I had hoped it would be. Prior to beginning fellowship, I thought that year would mark the end of my training – I soon realized that it was, in fact, the start of everything. We all know what fantastic training we receive at RCHSD in knowledge, surgical skills, fracture care, research, practice management, teamwork, and how to educate. It is still amazing to me what an outsize influence just one year has had on my day-to-day life. There is not a day that goes by that I'm not drawing from that experience - quoting Dr Wenger to a trainee (on scoliosis films, "first decide what you are going to do, then measure the Cobb angle"); using a surgical technique of Dr Newton's (I selfishly won't let anyone else "shine the spine" since I enjoy it so much); casting clubfeet like Dr Wallace taught me (though



The Imrie Masters clan at the happiest place on earth.

with softcast these days instead of plaster); channeling Dr Mubarak when evaluating a new baby for DDH or fitting their Pavlik harness; taping a bedsheet in front of the face of a prone neuromuscular patient in cranial traction so that their neck is protected in case they slip out, like Dr Yaszay taught me; or doing my best to safeguard resident education with a concurrent fellowship, as Dr Pring has done. And the influence goes beyond work - I am inspired by what a great family man Dr Chambers is, how Dr Edmonds balances work, research, and family. (Since I don't do sports, it may not be surprising that my ongoing lessons from Drs Chambers and Edmonds are outside of the hospital... I think I may still be Edmonds' favorite fellow of all time since I voluntarily didn't touch the scope once during my rotation with him and instead cheered him on in the OR and did all of the paperwork). As was the case for many of us, I had the best co-fellows - Abby Allen (New York), Ali Rozansky (Los Angeles), and Humberto Guzman (Puerto Rico), our "token male". I try not to look too much into it, but it would be 5 years before there was another female (or Puerto Rican) fellow at RCHSD - we may have been too much to handle!

Notes From A Former Fellow



Fellowship class of 2009

After my life-changing year in San Diego, I was lucky enough to go back to Stanford to join my two residency mentors, Drs Rinsky and Gamble, in practice; Greg had stayed in the Bay Area during my fellowship as he had started working for Kaiser Permanente in Santa Clara as a sports surgeon, where he still works today. Once I felt like I had "my feet under me" in practice, I spent the next 6 years or so in and out of maternity leaves as we welcomed 4 kids to the world



Fellows taking in a Padres game in their off-time

between 2012 and 2018. I never in my wildest dreams would have predicted I would have more than 1 or 2 children, but each one was so great, we just kind of kept going. I feel lucky, not only to have a supportive life partner in Greg, but also to have wonderfully supportive practice partners who graciously covered for me for 8 to 10 weeks every 2 years or so! During these years, Stanford Children's Orthopaedics really exploded in growth, going from 3 faculty to now 12, from 1 APP to 11, and starting our own fellowship in 2014. A lot of that expansion is thanks to another former San Diego fellow, Steve Frick, who came to Stanford in 2016 and has proven to be an inspiring leader and entertaining colleague. He was followed shortly thereafter by one of his co-fellows, Kevin Shea, so that we now have a pretty strong San Diego-trained contingent up here in Palo Alto, and our conferences, research program, and practice management (among many others) are the better for it.

Dr. Mubarak told me as I was finishing fellowship that being a great pediatric orthopaedist meant helping one patient at a time to the absolute best of your ability, but to really have an impact on as many patients as possible, meant doing and publishing research. The first decade of my career has been focused more on those former, "micro" skills I picked up in fellowship - taking (hopefully) excellent care of my patients, connecting with them and their families, and also being a team player with my partners and colleagues in the hospital and clinics, as well as teaching residents and fellows how to hopefully avoid the many mistakes I have learned from. I have focused, mostly on a local basis, on what really motivates me - education, helping to start our fellowship and now serving as program director, serving on and now chairing the pediatrics ICL committee for the Academy; and communication, serving as one of four pediatric "trainers" (and the only surgeon) in our health system's course, Advancing Communication Excellence at Stanford. But as my youngest child, Penny, is now 2 and I feel like I am possibly reaching my "cruising altitude" of life, I'm hoping I can turn my attention to more "macro" endeavors that San Diego exemplifies, so that I can do my best to fulfill Dr Mubarak's excellent advice.

This past year has taught me many things – namely, that I am a terrible 2nd grade teacher (just ask my 8-year-old), and that my love affair with pediatric orthopaedics, which started in San Diego as a medical student, and was stoked there during my fellowship, allows me an amazingly fulfilling career, especially during a global pandemic. I'm so grateful for the training, mentors, knowledge (and sunsets over the Pacific) that RCHSD afforded me, and hope that 2021 will bring a return of the in-person meetings and reunions that I always look forward to so much.

– Meghan Imrie



Go Giants!

Reflections on fifty Years of Medicine

Scott J. Mubarak, MD

After fifty years as a doctor and 44 years at Rady Children's, I would like to tell you about my journey and list a few principles that have guided my career. So, here is how it all started.

A Baby Boomer Comes to Life

My mother, a nurse, met my physician father at Marquette Medical School, where one of his teachers was Dr. Walter Blount. (David Sutherland, my future mentor, and partner, graduated from Marquette Medical three years after my father). WWII was in full force, and with military service obligations, my father and mother moved to the US army base in Fort Smith, Arkansas, where I hit the scene.



Mom and SJM age 1

SJM age 12 and sibs

A year later, we moved to the small western Wisconsin town of Tomah, population 5000. There I would grow up. My father was the town's principal general practitioner, handling house calls, plus removing gallbladders and appendices, delivering babies, and pinning hips. Truly a remarkable man who inspired me to go into medicine. For a while, we lived in an apartment above his office with my two brothers. (I had two years of kindergarten, loved finger painting, a skill set that would transfer years later to rolling plaster casts.

I attended Tomah High school, played on the golf team, and was awful. Thus, in my last two years, I joined the track team. There I found my niche and was the team's miler, breaking the school record on my last run as a senior (4 minutes and 48 seconds). I was a nerdy student with an aptitude in science/ math and enough good grades to become our valedictorian.

From high school, I attended Ripon College in Ripon, Wisconsin, where Jack Powers, my Bio-Chemistry professor so inspired my career as I worked as his research assistant in the summer months. After three years at Ripon, I was accepted into the University of Wisconsin Medical School, Madison (probably because of those two years of kindergarten). Two years later, after rotating on the craziness of a psycho-somatic service, I headed off for a two-week stint in orthopedics. I had found my chosen specialty. During these early years of med school, I met my bride, Sandy, also a nurse (as was my mother and grandmother), and a year later, we married, just about the time the first astronauts were walking on the moon (1969).

Medical School Finished, Head West Young Man

After finishing med school, now a family of three (Jason, six weeks old), we headed west a couple of thousand miles to Mercy Hospital, San Diego, for my internship. Our little family lived in Mercy Manor, a hospital apartment complex across the alleyway from the Mercy ER. It was an incredible year of a bygone era, where rotating interns were allowed exposure to various specialties. I flourished



Mercy Manor 1971 Jason, my son, and Drs. Jameel & Scott Mubarak

with the educational diversity. Just a few blocks away was UCSD's main hospital at that time, where I was fortunate enough to be accepted by the new chief, Wayne Akeson, for Orthopedic residency. At the start, Dr. Akeson was the only full-time member of the program.

UCSD was perfect for starting my academic career. During my first year, I encountered a compartment syndrome patient, which sparked my interest in pressure measurement. I toured the research floors of the UCSD campus and found the wick catheter used in animal interstitial fluid studies and, soon after, met Alan Hargens. He was a postdoc Ph.D., and I was a first-year ortho resident. We both combined our energies into developing a clinical wick catheter to measure muscle pressure in humans.

Principle #1: Study a disorder or disease thoroughly. Stay focused on a topic and understand its pathophysiology, etiology, diagnosis, treatment, and prevention. For compartment syndrome that required historical information on Volkmann and others, to understand the story and the confusing findings such as pulselessness (not a finding of compartment syndrome). We perfected the wick catheter (published,1976) and, a year later, the double-incision fasciotomy of the leg was published (1977). Hargens and my book on Compartment Syndrome and Volkmann's Contracture (1981) summarized our work.

During that first year of my UCSD ortho residency, I rotated over to Sharp Memorial Hospital. Still, I would join our 3rd and 4th-year ortho residents at Children's Hospital for knowledge and companionship on off times. Shortly after that, my chief, Dr. Akeson, hired David Sutherland from San Francisco to head the Pediatric Ortho program and start the Gait Lab at Children's Hospital. Much success followed.

Principle #2: Focus on a subspeciality

Concentrate your training and subspeciality so you can be the best, clinically and academically, in that area. Study a specialty that consumes you. As I rotated to Children's in my later residency years (R4 & R5), those patients won me over. Children were fun to treat, so was the specialty. As we all know, Peds Ortho covers from the neck down to the toes and from birth to adulthood. It covers a wide range from trauma to deformity, congenital to infection, from muscle disease to neurologic conditions, such as cerebral palsy. We see the gamut. It is a little boo-boo or in-toeing for some patients, and for others, too much pathology, but we as physicians can



Scott, Sandy and Jason heading to Toronto fellowship

help. Dr. Sutherland's practice was delightful, and he, as my mentor, encouraged me to get more training as fellowships were springing up at this time. The best programs were Dupont Institute with Dean McEwen and Hospital for Sick Children with Bob Salter. Toronto was our next stop. With Sandy, Jason (now 5yrs), a Great Dane named Tarsus, and a hippy van with camels painted on the sides, we headed to Canada and cold weather.

What a fun year I had with Drs. Salter, Rang, Gillespie, Bobechko, Gibson, and my mentor, Norris Carroll. (Fig.5) Norris is a magnificent person, anatomist, diagnostician, and knifeman. He was brilliant with the scalpel and the best surgeon in Toronto. He inspired me in all those areas. Based on the patient's history and exam, no mysterious disease would slip by this brilliant "Detective Carroll." *Principle #3: Careful history and superb examination* are quintessential to be an outstanding doctor. An enjoyable year was quickly gone, and my family and I returned to UCSD in San Diego where We have been ever since.



Norris Carroll, my Toronto mentor

1977 Peds Ortho Career Begins, Almost

On arrival back in San Diego, Professor Akeson assigned me to the VA Hospital. Daniel Daniels, the last chief, left to go to Kaiser and David Gershuni, the new VA Chief, had visa problems. So, this now well-trained pediatric orthopedist, added to his resume, Chief of Orthopedics at the Veterans Administration for the next four months. It was challenging to write a paper with limited technology; my secretary could not type, and we had only typewriters and no computers. Back then, it was an exhausting chore to submit a paper to a journal, typos everywhere.

I continued exploring new avenues in compartment syndrome studies, such as exercise-induced chronic syndromes, continued learning about the acute syndrome and the crush syndrome. At UCSD, our present dean, Steven Garfin, was the Ortho research resident, the first, I believe. In my absence, he was the wick resident, measuring pressures on patients for all orthopedists throughout San Diego County, as I did in the years prior. We had data on over 400 cases covering pressure measurement studies for the city, 24 hours a day, seven days a week. Dr. Garfin also led our research efforts in the understanding of the pathophysiology of rattlesnake bites. In 1979 we stunned the UCSD medicine faculty with our New England Journal of Medicine paper on the Crush Syndrome (Sandy was my model for the drawings). This leads me to Principle 4: Publish with art. All good publications need a drawing or three to tell the story or purpose of the study. Orthopedists are visual learners, and pictures are mandatory. Keep the words simple and to a minimum. (Please do not disclose this truth, or the AAOS may give me the boot.)



Wick & Compartment Syndrome team: Alan Hargens, Wayne Akeson, SJM and Steve Garfin 2017

Space, The Next Frontier

Principle 5: Cross-fertilization research with scientists and physicians outside your community. Drs. Phil Gollnik, Ph.D. (Washington) and Charlies Tipton, Ph.D. (Iowa), superstar muscle experts, collaborated with Akeson, Hargens, and me on a massive grant proposal for NASA soon-to-be-launched 1st Space Shuttle. I was hoping to be on the shuttle to do the research. However, when we got to Houston with our proposal, I realized many astronauts were in front of the line. Probably best that I was not selected, as a few shuttles, unfortunately, blew up subsequently. NASA took all our ideas of pressure measurement, muscle biopsy techniques and used them in space experiments in later years. Alan Hargens would work as a scientist for NASA, and

as another side benefit, I learned how to do percutaneous muscle biopsies, which would help my muscle disease patients here at Rady (Hank Chambers et al. 1992). And it was fascinating to be in Houston, climbing on a space shuttle before they were launched.

Infant Hip Dysplasia Needs a Harness

I continued my compartment syndrome studies in the 1980s, but I had a new focus in pediatric orthopedics, hip dysplasia. We realized that we needed to define the technique for Pavlik harness application (no directions anywhere), and most commercial brands were of poor quality, and Pavlik pitfalls were everywhere. We designed a new harness and defined the application process with drawings (1981). *Principle 6: Create technique*



Pavlik Harness. "Cure hip dysplasia without a scar."

recipes for any procedures, and of course, lots of illustrations. And then carefully follow the directions of the chef.

Out on My Own

By 1982 after five years at UCSD, my practice was stagnating, and I left to start a private practice in pediatric orthopedic surgery, the first pediatric orthopedist in private practice in San Diego. Indeed, a daunting proposition that none of the younger staff or fellows will likely experience. Bills for rent, staff salaries appear quickly, your first case has not been booked, and it will be months before you see the cash in your checking account. Fortunately, the best pediatric surgeon in San Diego, David Collins, supported me by providing rental space in his office.

In the 1970s, Children's Hospital (the old brick building and former polio hospital with an entrance on Frost Street) only had two operating rooms. In 1983 we opened a brand-new wing, the Hahn Pavilion, with eight ORs, a new cafeteria, and for the first time, our radiology



SJM and Dennis Wenger, 1986 and Fig. 9. San Diego Pelvic Osteotomy

department. We also became the trauma center for all children's trauma in southern California.

In 1984 after two years in private practice, I was swamped with pathology, and I needed an experienced partner to help. Fortunately, Dennis Wenger, whom I first met in Toronto, longing for a new horizon, joined me. Our friendly relationship with the gentle Dr. Sutherland prospered, as we linked our services, started our annual visiting professorships (1984), and a few years later, our peds ortho fellowship training (1986) with Dennis Wenger as the lead.

Together Dennis and I teamed up on many research opportunities, including the San Diego Pelvic Osteotomy (Fig. 9). With Ted Harcke, a radiologist from Dupont, we were one of the first to begin infant hip ultrasound studies in our clinics with our cherished radiology tech, Natalie McNeil. In 1985 in conjunction with the Scoliosis Research Society in San Diego, Dennis Wenger and I performed the first CD spinal instrumentation on one of my patients with the help of French surgeons Yves Cotrel and Jean Dubousset in front of a live television audience of scoliosis surgeons.

Principle 7: Publish on surgical anatomy and improved operative approaches. Whether defining a surgical procedure, a better understanding of the nerves in the four compartments of the leg, or where a muscle hernia in the leg impinges on the superficial peroneal nerve, elucidate surgical approaches with anatomical clarity. Anatomy never goes out of date. And of course, rely on Principle 4, lots of drawings. Subsequently, in 1987, Mubarak, Hargens, and Akeson won the AAOS Kappa Delta award for our pressure study research, indeed a tremendous honor.

Family Fun

About this time, our home hobby switched from raising love birds (the real birds) to raising llamas after a trip to the Lost City of the Incas, Machu Picchu, on our way to a SICOT meeting in Rio de Janeiro in 1983.

Principle #8: International ortho trips: always add on a week for touring. Soon our budding llama herd that Sandy was managing in our backyard had outgrown their pasture, literally. We sought a larger ranch for the increasing herd size. Now with two sons,



A llama of Rancho Machu Picchu

Jason and Josh, and many dogs, we left our coastal home for a fifty-foot trailer on a lonely parcel of land in the boonies of Poway as we built a new house, barn, and llama pastures. My neighbors were distressed as they assumed my orthopedic business had imploded.

Last Decade of the 20th Century

Our orthopedic business had not deteriorated as we were inundated with patients. The roaring 1990s brought many changes to Children's. In 1990 David Sutherland retired, the end of an era. Dennis and I moved our office from across Frost St. to a brand-new building attached to the Hahn Pavilion, the MOB (Medical Office Building,

such a catchy name) With peds ortho on the top floor, Hank Chambers (1992), a prior fellow. Two previous UCSD ortho residents, Peter Newton (1994), after further training in Texas, and Doug Wallace (San Diego fellow class of1995), joined the team and rescued the beleaguered Mubarak and Wenger. Our practice settled into a solid growth era.



1995 Doug Wallace, Hank Chambers, Peter Newton, Dennis Wenger, and Scott Mubarak

In 1995 the Rose Pavilion opened, and we finally had our emergency room, a brand-new ICU, and a large Ortho Clinic on the first floor. We already had all major trauma headed our way since 1984, but with that came all the little stuff, such as hundreds of supracondylar and radius fractures. This leads to *Principle 9: Study and publish on pathology plethora* such as these subjects in our published articles:

- Supracondylar fractures, a new finding, kids fall from heights, not a run and fall.
- Treatment for supracondylar' fractures, Type 3, use three pins two laterally and final stabilizer, medially with the elbow in extension.
- Remove ice cream trucks from the streets, which attracts children like flies to honey; Too many injuries and deaths (our politicians still have not made this happen)
- Parents use a handrail when descending a staircase with your child. This prevents falls and bad injuries to you and your child.
- Proximal tibia fracture locations are age dependent. Toddlers sustain metaphyseal fractures from a trampoline and teenage males usually sustain a displaced tibial physeal injury from attempting a big jump or dunk.



Ndjia's physeal bar (left) and Ndjia in her spica cast after surgery

In 1995 I operated on my most famous patient, Ndjia, a two-year-old Western Lowland Gorilla. She had developed a 90-degree knee flexion deformity and physeal bar from an unspecified prior distal femur fracture. Our Children's orthopedic OR team, including my partner, Doug Wallace, joined me on the case as we operated on her at the Wild Animal Park with their lead zoo vet Jeff Zuba. The surgery was a success, and she even tolerated the spica cast (also a first for a gorilla). Ndjia's knee straightened with growth over the ensuing years, and recently she had her first baby at the Los Angeles Zoo (25-year, follow-up). More importantly, as soon as I left the park's OR that day, the press reporters from across the nation were ready for interviews, including a popular TV show, "That's Incredible." What a marketing department the San Diego Zoo has, and what a fun experience.

2000, A New Century and More Growth

In 2001 UCSD and Children's Hospital merged the inpatient services. By 2004 our hospital bed total was up to 250. Thanks to the generous donation of Ernest and Evelyn Rady, we became Rady Children's Hospital, San Diego, in 2006. And in 2009, all the medical and surgical fields (more than 200) became part of a new medical foundation, and most doctors part of the UCSD faculty.

I had the great honor of being elected President of the Pediatric Orthopedic Society of North America, 2004-2005, with our meeting in Ottawa, Canada.



Ernest Rady, center, with Gaby Haddad, Pediatrician in Chief, and Scott Mubarak, Surgeon in Chief, 2018

SJM and his first lady, Sandy, 2005 Pediatric Orthopedic Society of North America, President, Ottawa

My specialty focus evolved to primarily hips and feet as I stopped spine surgery. With my emphasis on these disorders, papers followed: breech babies (Imrie et al. 2009); reduction of dislocated hips using special braces and in-office ultrasound (94% reduction of dislocated hips in babies, best results in the country, (Swaroop et al. 2009); foot procedures such as 3 C osteotomies (calcaneal, cuboid, and cuneiform, (Rathjen and Mubarak, 1998) for flatfeet and cavus foot; an abundance of papers on all aspects of tarsal coalition during the next dozen years. Again, the same principles applied: study thoroughly with classification, clinical and radiographic diagnosis, and surgical resection.

Principle #10: Research travels, spread the word

I developed friendships in this country from our society meetings with none better than with George Thompson, Chief at Rainbow





George and Scott surfing on the same board, amazing

George Thompson, SJM with Ortolani and his father's hip specimens in Padua, Italy

Babies Hospital, Cleveland. For the past twenty years, we have gone to Maui with our spouses and traveled together internationally also.

With good research, international meetings and visiting professorships followed. My travels took me to most of Europe (I joined the European Pediatric Orthopedic Society, EPOS), South Korea, Taiwan, Singapore, Australia, New Zealand, and South America. These travels led to new friendships and new study opportunities with international coauthors: Victor Bialik, Israel, as we explored his former country Czechoslovakia for the Pavlik bio (Pavlik, Man & the Method, 2003) Christian Willy et al., Germany (Volkmann: Surgeon and Renaissance Man,2008) Alain Dimeglio, France (Navicular Excision for severe cavus feet,2011) Remi Kohler, France (Focal fibrous cartilaginous dysplasia, 2007), Luis Moraleda (Flatfoot, 2014), and Jung and Kim et al. Korea (Posttraumatic Tib-fibula Synostosis,2015). And with Sandy, my many international wine friends guided us through



The Mubarak's with Valerie and Alain Dimeglio in France

cellars in France (A. Dimeglio, R. Kohler), Switzerland, (F. Hefti), New Zealand, (H. Crawford), Australia, (B. Foster & T. McGuire), Brazil, (A. Paula & C. Chang) and Taiwan, (K. Kuo). They are great friends, who kindly host us when we go to their countries, and we have had the privilege to return the favor at our home.

Principle #11: International friendships provide new topics for study and side benefits, like personal tour guides in countries around the planet.

More Additions to Team Ortho

New docs joined our team of five: #6 Maya Pring (2006), #7 Eric Edmonds (2007), and #8 Burt Yaszay (2008). On 10/10/2010, we opened a brand-new surgical center (16 ORs) and many more beds in the Acute Care Pavilion, and now we are the largest children's hospital in California. Also, our Pediatric Ortho Division at Rady was ranked in the top programs in America and twice as high as #2. And



Team Ortho 2020

in 2010, our group added our tenth with Andy Pennock, rounding out: two sports docs and two spine docs. *Principle # 12: If a subspecialty is essential, you need two docs*.

In 2013 we left our 4th-floor sanctuary and moved all Ortho patients to the 3rd floor of the MOB, and we moved our offices to the brand-new Educational Office Building. Plus, I should not forget to acknowledge our dozen nurse practitioners and physician assistants, as we were one of the first in the country to integrate these valuable providers into our practice.

The following additions to Team Ortho were Salil Upasani (2014) Katie Rickert (2017) and Emily Cidambi (2019), to expand us to a happy dozen.

Similarly, my family has grown from Scott, Sandy, and son Jason fifty years ago (1971), to Josh (1982) and their families. The oldest, Jason, and his wife, Heather, produced Avery, Ella, and Alden. And Josh and his wife added two more girls, Scotlyn and Sadie. Thank you, Sandy and my sons, for persevering on my call nights for many years. And our sons have developed our work ethic and energy to be successful.

Principle # 13: Have fun with your family along the way. We have had only three homes in these fifty years, but what memories—one overlooking Mission Bay, fun parties, beach, and ocean adventures. A second, in a eucalyptus grove with poolside adventures. And finally, our ranch in Poway, where llamas roamed, was gradually replaced by Old Coach Vineyards in 2000, with Sandy was the award-winning winemaker. There, our granddaughters can play in their namesakes' wooded environment: Avery Falls, Lake Ella, Alden Pond, Scotlyn Park, and Sadie Creek. How fortunate am I!

Final Thoughts

Principle #14: Be happy. Have fun with your patients and their parents, and do not ignore the sibs. It makes the clinic a joy, and you will

learn something about the family that will help with their care. Most importantly they will like you. Be friendly, introduce yourself, and, most importantly, smile. It is the best drug around to change an attitude. And do that around the clinic, hospital, and office. Everybody will know you. The grumps they ignore and look the other way. Be Happy

Principle #15 Remember you are first a physician and surgeon; research and education are a secondary goal. When in the OR, you are part of a five-person basketball team playing an important game, and the surgeon is the point guard. Everybody needs to watch your lead and win the game. Focus on your job, not the fans in the stands, and win this event for your patient. No family wants 90% success. As my old Packer Coach Vince Lombardi said, "we will chase perfection, and we will chase it relentlessly, knowing all the while we can never attain it. But along the way, we shall catch excellence."

And finally, *Principle # 16: Research leading to publications and positive changes in patient care.* My proudest career moments are my ideas and procedures that physicians around the globe implemented for the care of their patients. It is not the many thousands of patients I have treated for these 44 years in the operating room or clinic, with many cures or functional improvements (i.e., casting a fracture or reducing a baby's hip with a Pavlik harness). The greatest joy is recognition that your ideas are positively helping patients worldwide with a better understanding of the pathogenesis and treatment of problems such as: compartment syndromes, muscular dystrophy, cerebral palsy (San Diego pelvic osteotomy and foot correction osteotomies, fractures (elbows and ankles) hip dysplasia, and congenital foot abnormalities (bracket epiphysis, etc.). It is these scientific contributions I am most proud, and which gives me lasting satisfaction.

Research matters, so, do some, do a lot, help many.



Old Coach Vineyards, family fun



SJM at Lambeau Field, Green Bay, Wisconsin

POSNA 2021

POSNA IS BACK!

POSNA 2021 was held in person in Dallas, TX. It was a hybrid meeting with attendees both in person and across the globe, virtually. We had a good showing with 12 podium presentations and 3 ePosters. Dr. Newton was honored as being the Presidential Guest Speaker. Dr. Edmonds won the Arthur H. Huene memorial award. Dr. Pennock won the best clinical paper award and Dr. Edmonds was involved in a multi-center study that won the best trauma paper award.



Dr. Pennock and Dr. Edmonds enjoying POSNA down time with former fellow and Texas native Matt Ellington.



Dr. Newton giving the Presidential Guest Lecture.



Dr. Edmonds being presented with the Huene award.



POSNA Board of Directors.

47th Annual David H. Sutherland Visiting Professorship



Sanjeev Sabharwal, MD, MPH

University of California, San Francisco Benioff Children's Hospital San Francisco, CA

June 11, 2021

Like many events in 2021, our Visiting Professor program was held as a hybrid event. We were honored to have Dr. Sanjeev Sabharwal as the 47th Annual David Sutherland Pediatric Orthopedic Surgery Visiting Professor and thankful that he was here in person. Dr. Sabharwal is a pediatric orthopedic surgeon and Chief of Orthopedics and program director for the orthopedic fellowship program at the University of California, San Francisco. Dr. Sabharwal's clinical research interests include the management of pediatric lower limb deformities, including Blount disease, and studying the motivations and impact of Orthopedic volunteerism. Dr. Sabharwal is actively engaged in global outreach and bidirectional learning. He serves on the board of directors for Health Volunteers Overseas, a non-profit organization and is the sole Honorary member of the Pediatric Orthopedic Society of India.



Research Team Year in Review

Written by Tracey Bastrom, MA

This spring has been hitting a little different as we all begin to cautiously emerge from our pandemic hibernations post vaccination. I hope you all are enjoying the weather in your respective parts of the country/world and cherishing opportunities to once again safely gather with some loved ones. I know many of you are proud of the way your organization and teammates rallied to keep each other and your patients' safe during the past year. I certainly feel that way about our team here at Rady.

Some of the virtual technology embraced in the past year to allow for continuity of patient care, such as telemedicine options – also are being explored within the research world. Rady and the UCSD IRB have implemented mechanisms to allow for electronic completion of consent forms. In combination with some changes in the interpretation of Common Rule, there are options with low risk studies to include a waiver of documented consent combined with verbal consent obtained by virtual discussion (telephone or video). Our department is exploring the implementation of such options to allow for more convenience for our families participating in our observational studies, as well as allow our research team to operate more efficiently.

We also transitioned most of our early morning research meetings to be all virtual via Zoom. While there is certainly an adjustment associated with this, it has the added advantage of allowing our investigators to attend meetings even if they have an early clinic at one of our satellite locations. This change to all virtual research meetings did not seem to have a negative effect on our current fellows' ability to get their projects done. They all have done a fantastic job making progress on their various research projects and met the goal of having data analyzed in time for Visiting Professor.

We have also had the fortune of having two research residents for 2020-2021. Liane Chun, MD joined us from UCSD and Sarah Fogleman, MD joined us from the Navy program. They also presented a few of the studies they worked on during the Visiting Professor program.

While 2020 may have curtailed many activities in life, we saw an increase in the number of authored publications in peer reviewed journals -61 for the year as compared to 52 in 2019. In the first 4 months of 2021, a total of 36 authored or co-authored articles can be found on google scholar from our investigators.

The make up of our clinical research team has remained stable over the last few years, with 8 of us dedicated to supporting the divisions human subjects research efforts. Sara Acevedo, our research administrative associate and Christy Farnsworth, MS, our translational research manager – round the team off to 10 personnel in total.

Thank you for taking the time to read our research team update. I hope that I get to see many of you in person soon.



OBRC and Translational Research Year in Review

Written by Christine Farnsworth, MS

As we support our pediatric orthopedic surgical staff, fellows and residents in addressing specific research topics to ultimately improve and expand patient care, we are honored to continue to provide tools and resources for the training of future orthopedic surgeons, scientists, and engineers. This past academic year milestones include 5 manuscripts published, 3 manuscripts submitted for consideration of publication and, despite virtual platforms, 8 research abstracts that were presented at national and international meetings including the Orthopaedic Research Society 2021, PRISM 2021, and POSNA 2021.

We have enjoyed working with Liane Chun, MD who is spending a full year of her orthopaedic residency doing research with our group; a position that our Drs. Upasani and Cidambi occupied in the past. She headed up a study to develop and analyze a model of DDH in a pig model, and to test a hip implant prototype, along with Patrick Bosch, MD from UPMC Children's Hospital of Pittsburgh.

UCSD Medical Student, Samuel Baird's project "Comparison of Acetabular Morphology Changes in Pediatric Pelvic Osteotomies using Patient-Specific 3-D Models," was presented at ORS 2021 and POS-NA 2021. Along with Dr. Upasani, he evaluated pelvises of patients with DDH using a dual material 3-D printer to produce patient-specific models which then underwent acetabular osteotomies. Pre- and post-osteotomy models had CT scans which were reconstructed and had 3-D hip coverage analysis performed and compared between 4 different osteotomy techniques. UCSD medical student Garrett Rupp worked with Dr. Edmonds to study radiation exposure of a medial epicondyle fracture model using a four-view radiograph exam, in-office cone beam CT scans, and standard CT scans.

UCSD medical student Jason Caffrey, PhD performed a study that compares different VDRO blade plates biomechanically. This study uses 3-D printed models of proximal femurs from children with varus deformity to answer a clinical question that arises frequently during bone board discussions amongst our attending staff.

We are very grateful to continue our research collaborations with UCSD. Together with Samuel Ward, PT, PhD; Bahar Shahidi, PhD; and David Berry, PhD; we continue to seek a better understanding of tissue components and muscular architecture involved with scoliosis. Histology, RNA expression, and MR imaging of muscle from concave vs. convex sides of curves in AIS are being evaluated and compared. Collaborative studies with the UCSD Department of Bioengineering: Cartilage Tissue Engineering Lab, PI Robert Sah, MD, ScD; include evaluation of hip synovial fluid of patients with DDH, 3D shape analysis of growth cartilage and joint surfaces, multi-level (macro-, meso-, and micro-scale) imaging of growth and articular cartilage development, multi-level imaging of spine development and comparative anatomy investigation between growing mice and the pediatric population. Within UCSD Biological Sciences Cell and Developmental Biology, PI Kimberly Cooper PhD is partnering with us to develop a potential bipedal animal model for DDH by swaddling neonate Jerboa. In addition, we get to work with the Rady Children's Genomics Institute and Biorepository and the 3D Innovations Lab (3DI Lab) on several projects.



Thoracoscopic Tutorial April 2021. Todd Ritzman (fellow class of 2007), Dr. Newton, Jessica Hughes (2021 fellow), Dr. Upasani.



Thoracoscopic Tutorial April 2021. Liane Chun, MD (research resident), Anthony Catanzano and Brock Kitchen (2021 fellows), Dr. Newton.

Hip Center

Hip Team Year in Review

Written by V. Salil Upasani, MD

The Hip Center at Rady Children's Hospital San Diego went through some big changes in 2021 with the retirement of Drs. Dennis Wenger and Scott Mubarak. These two giants in the field of pediatric hip surgery have made substantial contributions to our understanding and management of developmental dysplasia of the hip, slipped capital femoral epiphysis, Legg-Calve-Perthes disease and neuromuscular hip disease, and they will continue to make a lasting impact on this institution.



Our hip team is now led by Dr. Salil Upasani and includes Dr. Maya Pring, Dr. Doug Wallace, and Dr. Katie Rickert. Dr. Hank Chambers and Dr. Patrick Curran help manage a majority of our children with spastic neuromuscular conditions and Dr. Andrew Pennock and Dr. Eric Edmonds perform hip arthroscopic procedures on our sports patients or in conjunction with open surgeries performed by the rest of our team. Our goal is to continue to provide world-class care by applying the knowledge gained through clinical experience and research to address the complex congenital and developmental hip conditions for which we care.

This year we also started a strong collaboration with our colleagues at the University of California San Diego by forming the Hip Preservation and Restoration Clinic to coordinate patient care and research addressing the entire spectrum of hip disease from infancy to geriatric care. This clinic brings together the expertise and experience of various specialists and researchers who are focused on providing joint-preserving treatment options to all patients suffering from hip pain to restore a high level of function. Transitional care from childhood to adulthood will also be facilitated for patients with neuromuscular disorders through the Southern Family Center for Cerebral Palsy.

Through these collaborations and with increasing referrals of active-duty military patients, the number of young adult hip surgeries performed at Rady Children's Hospital continues to grow. Last year, we managed the care of a 24-year-old female fighter pilot in the Air Force who underwent femoral head allograft surgery for a large necrotic segment in her femoral head due to a traumatic injury. At one-year post-op she has healed beautiful and has been able to return to full flight duty.

We continue to grow as a referral source for complex patients. Drs. Pring and Upasani recently treated a 15-year-old male who was involved in a severe motor vehicle accident in Mexico. He sustained a left hip dislocation with a comminuted posterior wall fracture and was immobilized in Mexico for 6 weeks till he recovered from his other injuries. He was then transferred to Rady Children's Hospital for definitive treatment. A distal femoral traction pin was placed to apply traction to his hip for one week and then he underwent a left hip surgical dislocation with posterior wall open reduction internal fixation. He has healed well from his injuries.

Another interesting patient has been followed by Dr. Mubarak since she was 3 years old. She was diagnosed with right hip Perthes disease and managed with bracing and physical therapy. She went on to heal with a Stulberg 3 hip and was relatively asymptomatic through middle school. At 16-years-old she started having significant pain on the lateral aspect of her hip with limited hip abduction and extra-articular impingement. A hip MR arthrogram demonstrated a pristine joint with no intra-articular pathology. She underwent a Morscher osteotomy to address her leg length discrepancy of 2cm and to improve her hip mechanics. She has gone on to heal well and has returned to full activities in high school.

Our hip research program continues to be prolific and is actively involved in various multi-center prospective study groups including the International Hip Dysplasia Registry (IHDR), the International Perthes Study Group (IPSG), and the SCFE Longitudinal International Prospective Registry (SLIP). We are also excited to be part of the HIP HOPE Network established by Dr. Kishore Mulpuri at BC Children's Hospital in Vancouver, Canada. We continue our strong collaborations with basic scientists at the University of California San Diego including Robert Sah, MD, ScD at the UCSD Jacobs School of Engineering and Kim Cooper, PhD in the Division of Biological Sciences, Section of Cell and Developmental Biology. We are also starting another collaboration with Dr. Stephen Kingsmore at the Rady Children's Institute for Genomic Medicine to study the genetics of Perthes disease.

A number of our studies were presented at the POSNA annual meeting in Dallas this year. We are very proud to announce that Dr. Pennock was awarded the Best Clinical Paper for his study looking at 5-year outcomes after non-operative management of femoroacetabular impingement. He prospectively followed a cohort of children treated with a systematic approach to activity modification, physical therapy and cortisone injections demonstrating successful management of FAI based on subjective questionnaires and return to sport / function data. Dr. Upasani presented a study that used patient-specific 3D prints to analyze the effect on acetabular volume and morphology after four commonly performed pediatric pelvic osteotomies. He showed that that redirectional osteotomies like the Salter osteotomy result in a significantly smaller decrease in acetabular volume than bending acetabuloplasties like the Pemberton, Dega and San Diego. The study also showed that acetabular coverage changes differed significantly between these 4 procedures, demonstrating the need to customize a treatment plan specific to the unique pathology of each patient. Dr. Megan Severson, who graduated from our clinical fellowship in July 2020 and is now working at The Carilion Clinic in Roanoke Virginia presented a study on the 3D acetabular morphology of patient with neuromuscular hip disease.

Spine Center

Scoliosis and Spine Deformity Center Year in Review

Written by Peter Newton, MD

The Spine Service has been hopping this year with much activity despite the pandemic. I have a sense that we saw more new patients, with greater degrees of scoliosis, potentially due to less screening and well child visits by our pediatrician and primary care colleagues due to COVID.

I am finishing my time on the SRS board of directors in my role as past-past president this September (2021) and will miss the leadership team, but look forward to seeing the next generation of leaders flourish and the society grow. What a joy and honor to have had the opportunity to serve both the SRS and POSNA through the years.

Dr. Burt Yaszay made a big transition this year as he left the practice to join the Seattle Children's Orthopedic Division which he will lead as their new chief. This is of course a spectacular opportunity for Burt and his family and we are very proud of him. It will be a loss for us and we are missing his clinical expertise and breadth of knowledge in pediatric spinal deformity. Burt joined the practice 14 years ago as his first job out of fellowship (NYU, Tom Errico, MD and team). He is returning to his residency roots in Seattle and the University of Washington. We wish him the best and know he will remain a close friend and left coast ally





New Chief of Pediatric Orthopedic Surgery, Seattle Children's Hospital

Welcome Dr. Michael Kelly!

Dr. Michael Kelly will be joining our spine team this fall. Dr. Kelly did his orthopedic training at UCSF and has been in practice at Washington University since he finished his fellowship there in 2011. We are happy to have Michael and his wife Carolyn back in Californial Dr. Upasani has increased his effort in spinal deformity care (still active in hip) and I will remain clinically active as I enter a new role as Surgeon in Chief. We are all eager to welcome Dr. Kelly who will direct our spine program.

The research team has been very busy this year and much of the interest continues to focus on the clinical outcome of tethering spinal growth. With the FDA approval of the Zimmer Biomet device, retrospective and prospective research on the approved indications

has greatly accelerated. Our own group has been looking back at our now 10+ year experience, with recent publications on anterior vertebral tethering compared to the gold standard posterior spinal fusion as well as 3 dimensional analyses of the shape change over time within the apical discs and vertebrae. As our experience grows the indications seem to be narrowing. This is an interesting new technology that deserves our most rigorous research approach. We have also been working hard through the Harms Study Group to review the multicenter experience with tethering. This work was honored with the IMAST Best Paper Whitecloud award this year. In fact, we had 3 papers nominated for the Whitecloud award this year - nice recognition for the work of our team and that of the Harms Study Group. The findings of these studies confirm the potential to substantially modulate spinal growth, but there is significant room to advance this technology in the coming years. The primary objective being to produce a consistent non-fusion outcome that will match those of posterior spinal fusion.

We missed having our international spine research fellows this past year, much of the success listed above as well as many of our 2020 publications were the helped by several of our past fellows: Yi Yang – Australia, Wataru Saito – Japan, Masayuki Ohashi – Japan, Kaiying Shen – China, Yohei Takahashi – Japan. We look forward to welcoming back our international fellows and pray that COVID vaccination will open worldwide travel and exchange.

I am continually humbled by our patients. Following, I share a note with you from one of my patients, who after years of bracing eventually went on to have a spinal fusion. Her words were to me, but they are really to all of us who do our best every day to change the life of a child/teen/young adult.

"Because of you...

Because of you lam tail enough to be a rockette	Now I dont have to hold my breath at the ballet barre so my rib
Because of you I am able to say I'm titanium. Because of you I've learned to love my body. Because of you I never have to squeeze myself into a brace again. Because of you I can stand taken and that's all that matters. Thank you for not only closing a doon, but opening a new one. The Past nine years I would not change. Wearing a brace was hard but it taught me to work handler. It inspired me to push myself during the H hours the brace was off of me. I cannot wait to continue daincing thanks to you.	dopsing stick out. Now I along have bisqueeze in my right shoulder blade or align my hips every second. Re learning will be have but its nothing I can's handle. I've learned in strongerthan I think I am thanks to you. So thank you from the battom of my heart for being a part of my normey. I owe it all to yours. LOVE, Sophia

360 Sports Medicine Year in Review

Written by Eric Edmonds, MD

One of the traditional ninth anniversary gifts is willow, which represents both nature and flexibility. No doubt, flexibility is a defining word for a program dedicated to sport-related injuries during a pandemic. In our 9th year, we survived by being overly productive academically. There was no shortage of patients to be seen, but there is only so much variety to the injuries seen from backyard trampoline and running up and down stairs in the house. Thankfully, Arizona and Nevada are short drives from Southern California, and we still had active sports participation for the sanity of our local *athletarum populous*.

Our group had 43 peer-reviewed publications go into print over the past 18 months, which is definitely a record for the 360 Sports Medicine program. Furthermore, we have received multiple internal Rady Children's Hospital grants and extramural grants, particularly the Arthur H. Huene Award from the Pediatric Orthopaedic Society (POSNA). And, speaking of POSNA, Dr Pennock won the Best Clinical Paper award for his work on non-operative management of femoroacetabular impingement. We were also part of the team of multicenter contributors to the Best Trauma Paper award on Z-type clavicle fractures. We continued to contribute to the Pediatric Research Society of Sports Medicine, with podiums and committee participation. We also presented a couple projects at the American Orthopaedic Society of Sports Medicine meeting in Nashville.

We continue to be the team physicians for the San Diego Loyal (the local USL Championship Division II league professional soccer team) and active participants in the community regarding local education to physical therapists, athletic trainers, athletic directors, and primary care physicians. Things are definitely picking up clinically



with the pandemic restrictions being reduced, so hopefully we can continue our academic drive whilst managing the volume that appears to be pushing into the office door.

With the recent staffing transitions the past two years, we are happy to share that nobody left during the pandemic. Moreover, we gained in a huge way by bringing Sunny Park, NP into the fold. She was formerly "Team Wenger" so she brings not only an interest in sports injuries, but also current understanding and management plans for the occasional stray limping child, curly toe, or baby hip that wanders into Sports clinic! This has been tremendously helpful during the pandemic clinics which have been full of pseudo-athletes. Welcome to the team Sunny!

Last, but certainly not least, we want to share great news about one of our Athletic trainers, Katie Adrian who successfully completed her Masters in Public Health from the California State University San Marcus program. Congrats, Katie!



Sunny Park, NP has joined the 360 team.



Introducing Katie Adrian, MPH

Advanced Practice Provider Team

Written by Chrissy Paik, PA-C

Advanced Practice Provider Team Members

Casey Abare, MSN, CPNP Amanda Asaro, MPAS, PA-C Linh Darnell, PA-C Allison Dickinson, PA-C Katie Fields, CPNP Erynn Krasovic, PA-C Abigail Nakamitsu, PA-C Kimberly Padilla, CPNP Chrissy Paik, MPAP, PA-C Sunny Park, CPNP Raquel Sanchez, PA-C MaryLou Scott, MSN., CPNP Philip Stearns, MSN, CPNP



Rocky is back! Her cancer treatment was successful and we are happy to report that she has resumed her duties here at RCHSD.

Throughout this most unique and difficult year, as the coronavirus pandemic continued its hold on almost all aspects of our life, the PAs and NPs in our orthopedic department worked efficiently and diligently to provide San Diego area children appropriate and timely access to the orthopedic care they needed. As a display of adaptability during the pandemic, the PAs and NPs evolved the Acute Injury Clinic into a more general walk-in orthopedic clinicaddressing not only acute trauma and fractures, but also complaints such as chronic limb/joint pains and limping children without history of injury. The pandemic also created a scenario where our Acute Injury Clinic was the first line of care for children with multisystem injuries. This required complex and detailed clinical workups as well as patient transfers to Rady Children's Emergency Department, and naturally the PAs and NPs met this new role with poise, intellect, integrity, and teamwork. Now, as Southern California kids sports open up and students return to in-person school and playgrounds, the Acute Injury Clinic is once again a key community resource for acute orthopedic injuries. The patient volume has increased dramatically in the last few weeks, with occasions of 60 patients coming through the Acute Injury Clinic in a day. With only one PA/NP provider staffing the clinic per session, the volume of patients that arrive at one time can be overwhelming. In an effort to prevent long wait times for the patients, the PAs and NPs as a whole have stepped-up by absorbing Acute Injury Clinic patients into their own, often already full independent clinics or seeing a few of the patients amidst working in a full/overbooked physician clinic- this highlights the teamwork, time management, and efficiency of our Advanced Practice Provider

team. Importantly, the end result is happy parents and referring providers, mostly happy patients, and always professional, skilled, top quality pediatric orthopedic care and treatment.

The effects of the coronavirus pandemic created a need for medical assistance outside of pediatric orthopedics. In acts of generosity, kindness, duty, the desire to be part of the larger solution, we had some of our NPs and PAs provide crisis medical care. Sunny Park, NP and Amanda Asaro, PA-C both administered COVID-19 Vaccinations at the Rady Children's Hospital Community Vaccination Clinic. Casey Abare, NP and Phil Stearns, NP, worked long shifts providing nursing support at the county covid isolation facilities for unsheltered adults. Casey Abare, NP has additionally dedicated what little free time she has to Operation Apollo, where she provides medical care to unaccompanied immigrant minors that are being sheltered at the San Diego Convention Center. This stand-up community outreach, sacrifice of personal time, acts of civic-mindedness by our very own PAs and NPs is noteworthy and laudable.

Our Advanced Practice Provider team continues to contribute their specialized medical knowledge, gift of teaching, and commitment to Rady Children's Orthopedic support of patient-centered care. As more than half of the clinical team in Orthopedics, the PAs and NPs continue to take great pride in assisting in the clinical teaching of the UCSD Medical Students, the UCSD, Navy, Army and Air Force Orthopedic Residents, and our Pediatric Orthopedic Fellows. Erynn Krasovic, PA-C, continues to orient our new or returning orthopedic residents, ensuring their competency with EPIC, and detailing their clinical and surgical expectations. Chrissy Paik again sat on a panel of physicians as the only PA during a virtual Q&A parent information session at Camp Perthes, a camp organized by Perthes Kids Foundation, for children ages 7-15 that have been diagnosed with Legg-Calve-Perthes disease. In a form of cooperative science, Dr. Vidyadhar Upasani and Chrissy Paik, PA-C have trialed and developed a multidisciplinary clinic that can provide patients sameday orthopedic evaluation and a physical therapy evaluation. They have worked with a few of our wonderful Rady Children's physical therapists including Larry Berman, Heather Waters, and currently Jay Blumberg. This approach has improved patient care by cutting out the wait time for insurance authorization on the physical therapy referral, limited the number of days required for patients to seek clinical care and therefore likely limited school days and work days missed for the family. This highly efficient clinical model is also optimal from a provider standpoint in that it unifies our team as we learn from each other, support each other and collaborate on a detailed full-range plan of care together.

The Advanced Practice Providers have worked especially hard at the academic year's end, running close to 20 extra clinics in the month of May to accommodate the influx of pediatric injuries. In reflecting on our situation one year ago, when our patient care was abruptly and dramatically diminished, today we are happy to be "back in business" and we are confident we will continue to contribute to the productivity and success of our nationally ranked Orthopedic Division at Rady Children's Hospital.

Rehab Team Year in Review

Written by Andrew Skalsky, MD

The Rehabilitation Medicine Center strives to provide the very best care and services to every patient by delivering excellent medical care and by conducting applicable research. The patients are a source of inspiration, and the Rehab team is able to create a lasting positive impact on the lives of the patients they serve by ultimately improving their function and quality of life. We have unceasingly provided outpatient and inpatient rehabilitation services for children and adolescents who have a variety of physical and cognitive issues. The Rehab Team is an integral part of various outpatient clinics in which rehabilitation medicine is a core component such as cerebral palsy, neuromuscular disorders, spinal cord injuries, and post-traumatic head injuries.

An interesting clinical case the Rehab Team is currently involved with is a toddler with tetraplegia from a near-drowning experience. Under the FDA Compassionate Use program, this patient is being treated with multiple doses of bone-marrow derived mesenchymal stem cells. Experimental data indicate the possibility of effective use of stem cell technologies in the treatment of patients with severe brain injury and other neurologic disorders in adults. We are hoping to see significant progress especially in this pediatric patient's muscle tone and functionality given his very young age and stage of neuroplasticity.

We have published several peer-reviewed articles over the years in various scientific journals. With the aim of offering the best care and practices to our patients, our team has been conducting both evidence-based research and clinical trials not only to advance our knowledge in this field, but most importantly, to develop systems that can positively impact patient lives and improve their outcomes.

Some of the notable on-going projects that Dr Skalsky, our Division Chief, has the pleasure of spearheading include a novel instrumented glove to measure muscle tone. In collaboration with the UCSD Jacobs School of Engineering, this glove was designed to reliably and objectively quantify spasticity, a condition that we treat in many of our patient population.

We are also studying monosialotetrahexosylganglioside (GM1) antibodies in partnership with PI Sameer B Shah, PhD at the UCSD Department of Orthopedic Surgery and Muscle Physiology laboratory. We are investigating the use of GM1 antibodies as a possible clinical intervention that could deliver a longer lasting effect in the treatment of hypertonicity. Our goal is to provide a safe, effective, and pain-free alternative with the hope of therapeutic advancement. This study will provide preliminary evidence and proof of concept needed to move forward in the process of discovery. Currently, we are in the process of submitting a grant application to the NIH.

Our cerebral palsy outpatient clinic continues to be a Clinical Center actively involved in the Cerebral Palsy Research Network (CPRN) Registry. Our participation contributes to the compilation of previously unavailable epidemiological information about cerebral palsy patients and helps facilitate the overall goal of ultimately improving clinical care for children with cerebral palsy throughout North America.



Andrew Skalsky, MD Chief of Rehabilitation Medicine



Jeffrey Algra, MD, MSc



Susan Biffl, MD

Rehabilitation Medicine



Mackenzie Brown, DO



Pritha Dalal, MD



Joan Le, MD



Kyle Ryan, MD



Phoebe Scott-Wyard, DO



Abigail Callahan, NP



Colleen Kelly, MSN, RN, PNP



Andrea Parker, NP



Elizabeth W. Smith MSN, RN, FNP-C



Abygaile Almoite, MS



Anastasia Amundson, BS



Orthopedic trainees absorbing the discussion during the dynamic Rady Children's Hospital Friday morning orthopedic x-ray review conference.

The Rady Children's Hospital-University of California San Diego orthopedic program continues as one of the world's leading centers for children's orthopedic clinical and biomechanical research. Our work is published in the most important orthopedic journals and is widely quoted. The publications listed below were produced by our department between January, 2020 – December 2020.

Abousamra, O., Sullivan, B.T., Shah, S.A., Yaszay, B., Samdani, A.F., Cahill, P.J., Newton, P.O., Sponseller, P.D., 2020. Do seizures compromise correction maintenance after spinal fusion in cerebral palsy scoliosis? J Pediatr Orthop B 29, 538–541.

Asturias, A.M., Bastrom, T.P., Pennock, A.T., Edmonds, E.W., 2020. Posterior Shoulder Instability: Surgical Outcomes and Risk of Failure in Adolescence. Am J Sports Med 48, 1200–1206.

Bachmann, K.R., Lu, E., Novicoff, W.M., Newton, P.O., Abel, M.F., Buckland, A., Samdani, A., Jain, A., Lonner, B., Yaszay, B., Reilly, C., Hedequist, D., Clements, D., Miyanji, F., Shufflebarger, H., Flynn, J., Asghar, J., Thiong, J.M.M., Pahys, J., Harms, J., Bachmann, K., Lenke, L., Glotzbecker, M., Kelly, M., Vitale, M., Marks, M., Gupta, M., Fletcher, N., Cahill, P., Sponseller, P., Gabos, P., Newton, P., Betz, R., Lehman, R., George, S., Hwang, S., Shah, S., Errico, T., Upasani, V., Harms Study Group, Harms Study Group Investigators, 2020a. The Lumbosacral Takeoff Angle Can Be Used to Predict the Postoperative Lumbar Cobb Angle Following Selective Thoracic Fusion in Patients with Adolescent Idiopathic Scoliosis. J Bone Joint Surg Am 102, 143–150.

Bachmann, K.R., Yaszay, B., Bartley, C.E., Vitale, M., Roye, B.D., Marks, M.C., Sponseller, P.D., Asghar, J., Samdani, A.F., Newton, P.O., 2020b. The variability in the management of acute surgical site infections: an opportunity for the development of a best practice guideline. Spine Deform 8, 463–468.

Bauer, J.M., Shah, S.A., Sponseller, P.D., Samdani, A.F., Newton, P.O., Marks, M.C., Lonner, B.S., Yaszay, B., Harms Study Group, 2020. Comparing short-term AIS post-operative complications between ACS-NSQIP and a surgeon study group. Spine Deform 8, 1247– 1252.

Beauchamp, E.C., Lenke, L.G., Cerpa, M., Newton, P.O., Kelly, M.P., Blanke, K.M., Harms Study Group Investigators, 2020. Selecting the

"Touched Vertebra" as the Lowest Instrumented Vertebra in Patients with Lenke Type-1 and 2 Curves: Radiographic Results After a Minimum 5-Year Follow-up. J Bone Joint Surg Am 102, 1966–1973.

Bland, D.C., Valdovino, A.G., Jeffords, M.E., Bomar, J.D., Newton, P.O., Upasani, V.V., 2020. Evaluation of the Three-Dimensional Translational and Angular Deformity in Slipped Capital Femoral Epiphysis. J Orthop Res 38, 1081–1088.

Boachie-Adjei, O., Duah, H.O., Yankey, K.P., Lenke, L.G., Sponseller, P.D., Sucato, D.J., Samdani, A.F., Newton, P.O., Shah, S.A., Erickson, M.A., Akoto, H., Sides, B.A., Gupta, M.C., Fox Pediatric Spinal Deformity Study, 2020. New neurologic deficit and recovery rates in the treatment of complex pediatric spine deformities exceeding 100 degrees or treated by vertebral column resection (VCR). Spine Deform.

Boachie-Adjei, O., Sackeyfio, A., Duah, H.O., Lenke, L.G., Sponseller, P.D., Sucato, D.J., Samdani, A.F., Newton, P.O., Shah, S.A., Erickson, M.A., Wulff, I., Sides, B.A., Gupta, M.C., Fox Pediatric Spinal Deformity Study, 2021. Does thoracoplasty adversely affect lung function in complex pediatric spine deformity? A 2-year follow-up review. Spine Deform 9, 105–111.

Bodendorfer, B.M., Shah, S.A., Bastrom, T.P., Lonner, B.S., Yaszay, B., Samdani, A.F., Miyanji, F., Cahill, P.J., Sponseller, P.D., Betz, R.R., Clements, D.H., Lenke, L.G., Shufflebarger, H.L., Marks, M.C., Newton, P.O., Harms Study Group, 2020. Restoration of Thoracic Kyphosis in Adolescent Idiopathic Scoliosis Over a Twenty-year Period: Are We Getting Better? Spine (Phila Pa 1976) 45, 1625–1633.

Bram, J.T., Mehta, N., Flynn, J.M., Anari, J.B., Baldwin, K.D., Yaszay, B., Pahys, J.M., Harms Study Group, Cahill, P.J., 2020. Sinister! The high pre-op left shoulder is less likely to be radiographically balanced at 2 years post-op. Spine Deform.

Brooks, J.T., Bomar, J.D., Jeffords, M.E., Farnsworth, C.L., Pennock, A.T., Upasani, V.V., 2020. Defining a new three-dimensional method for determining femoral torsional pathology in children. J Pediatr Orthop B.

Buckland, A.J., Woo, D., Vasquez-Montes, D., Marks, M., Jain, A., Samdani, A., Betz, R.R., Errico, T.J., Lonner, B., Newton, P.O., 2020. The Relationship Between 3-dimensional Spinal Alignment, Thoracic Volume, and Pulmonary Function in Surgical Correction of Adolescent Idiopathic Scoliosis: A 5-year Follow-up Study. Spine (Phila Pa 1976) 45, 983–992.

Chambers, H.G., 2020. Knee pain in children with cerebral palsy. Dev Med Child Neurol 62, 663.

Cheng, T.T., Edmonds, E.W., Bastrom, T.P., Pennock, A.T., 2020. Glenoid Pathology, Skeletal Immaturity, and Multiple Pre-Operative Instability Events are Risk Factors for Recurrent Anterior Shoulder Instability after Arthroscopic Stabilization in Adolescent Athletes. Arthroscopy.



Clement, R.C., Anari, J., Bartley, C.E., Bastrom, T.P., Shah, R., Talwar, D., Upasani, V.V., 2020a. What are normal radiographic spine and shoulder balance parameters among adolescent patients? Spine Deform 8, 621–627.

Clement, R.C., Yaszay, B., McClung, A., Bartley, C.E., Nabizadeh, N., Skaggs, D.L., Thompson, G.H., Boachie-Adjei, O., Sponseller, P.D., Shah, S.A., Sanders, J.O., Pawelek, J., Mundis, G.M., Akbarnia, B.A., Growing Spine Study Group, 2020b. Growth-preserving instrumentation in early-onset scoliosis patients with multi-level congenital anomalies. Spine Deform 8, 1117–1130.

Dikmen, P.Y., Halsey, M.F., Yucekul, A., de Kleuver, M., Hey, L., Newton, P.O., Havlucu, I., Zulemyan, T., Yilgor, C., Alanay, A., 2020. Intraoperative neuromonitoring practice patterns in spinal deformity surgery: a global survey of the Scoliosis Research Society. Spine Deform.

Edmonds, E.W., 2020. Editorial Commentary: Osteochondritis Dissecans of the Knee: The Great Confounder. Arthroscopy 36, 795–796.

Edmonds, E.W., Bland, D.C., Bastrom, T.P., Smith, M.M., Upasani, V.V., Yaszay, B., Pennock, A.T., 2020a. Minimally displaced pediatric humerus lateral condyle fractures: risk factors for displacement and outcomes of delayed surgery. J Pediatr Orthop B.

Edmonds, E.W., Fuller, C.B., Jeffords, M.E., Farnsworth, C.L., Lindgren, A.M., Pennock, A.T., Upasani, V.V., 2020b. Femoral derotational osteotomy level does not effect resulting torsion. J Exp Orthop 7, 9.

Edmonds, E.W., Phillips, L., Roocroft, J.H., Bastrom, T.P., Pennock, A.T., Chambers, H.G., 2020. Stable childhood osteochondral lesions of the talus: short-term radiographic outcomes suggest risk for early osteoarthritis. J Pediatr Orthop B 29, 363–369.

Eguia, F., Nhan, D.T., Shah, S.A., Jain, A., Samdani, A.F., Yaszay, B., Pahys, J.M., Marks, M.C., Sponseller, P.D., Harms Study Group, 2020. Of Major Complication Types, Only Deep Infections After Spinal Fusion Are Associated With Worse Health-related Outcomes in Children With Cerebral Palsy. Spine (Phila Pa 1976) 45, 993–999.

Ellis, H.B., Li, Y., Bae, D.S., Kalish, L.A., Wilson, P.L., Pennock, A.T., Nepple, J.J., Willimon, S.C., Spence, D.D., Pandya, N.K., FACTS Study Group, Kocher, M.S., Edmonds, E.W., Farley, F.A., Gordon, J.E., Kelly, D.M., Busch, M.T., Sabatini, C.S., Heyworth, B.E., 2020. Descriptive Epidemiology of Adolescent Clavicle Fractures: Results From the FACTS (Function after Adolescent Clavicle Trauma and Surgery) Prospective, Multicenter Cohort Study. Orthop J Sports Med 8, 2325967120921344.

Fabricant, P.D., Milewski, M.D., Kostyun, R.O., Wall, E.J., Zbojniewicz, A.M., Research in Osteochondritis of the Knee (ROCK) Study Group, Albright, J.C., Bauer, K.L., Carey, J.L., Chambers, H.G., Edmonds, E.W., Ellis, H.B., Ganley, T.J., Green, D.W., Grimm, N.L., Heyworth, B.E., Kocher, M.S., Krych, A.J., Lyon, R.M., Mayer, S.W., Nepple, J.J., Nissen, C.W., Pennock, A.T., Polousky, J.D., Saluan, P., Shea, K.G., Tompkins, M.A., Weiss, J., Clifton Willimon, S., Wilson, P.L., Wright, R.W., Myer, G.D., 2020. Osteochondritis Dissecans of the Knee: An Interrater Reliability Study of Magnetic Resonance Imaging Characteristics. Am J Sports Med 48, 2221–2229.

Fischer-Colbrie, M.E., Louer, C.R., Bomar, J.D., Hahn, P., Edmonds, E.W., Pennock, A.T., Upasani, V.V., 2020. Predicting epiphyseal stability of slipped capital femoral epiphysis with preoperative CT imaging. J Child Orthop 14, 68–75.

Goldhaber, N.H., Goldin, A.N., Pennock, A.T., Livingston, K., Bae, D.S., Yen, Y.M., Shore, B.J., Kramer, D.E., Jagodzinski, J.E., Heyworth, B.E., 2020. Orthopedic Injuries Associated with Hoverboard Use in Children: A Multi-center Analysis. HSS J 16, 221–225.

Goldin, A.N., Muzykewicz, D.A., Mubarak, S.J., 2020. Nonossifying Fibromas: A Computed Tomography-based Criteria to Predict Fracture Risk. J Pediatr Orthop 40, e149–e154.

Hachadorian, M.E., Mitchell, B.C., Siow, M.Y., Wang, W., Bastrom, T., Sullivan, T.B., Huang, B.K., Edmonds, E.W., Kent, W.T., 2020.

Identifying the axillary nerve during shoulder surgery: an anatomic study using advanced imaging. JSES Int 4, 987–991.

Halsey, M.F., Myung, K.S., Ghag, A., Vitale, M.G., Newton, P.O., de Kleuver, M., 2020. Neurophysiological monitoring of spinal cord function during spinal deformity surgery: 2020 SRS neuromonitoring information statement. Spine Deform 8, 591–596.

Hansen, C.H., Asturias, A.M., Pennock, A.T., Edmonds, E.W., 2020. Adolescent Posterior-Superior Glenoid Labral Pathology: Does Involvement of the Biceps Anchor Make a Difference? Am J Sports Med 48, 959–965.

Holt, J.B., Pedowitz, J.M., Stearns, P.H., Bastrom, T.P., Dennis, M.M., Dwek, J.R., Pennock, A.T., 2020a. Progressive Elbow Magnetic Resonance Imaging Abnormalities in Little League Baseball Players Are Common: A 3-Year Longitudinal Evaluation. Am J Sports Med 48, 466–472.

Holt, J.B., Stearns, P.H., Bastrom, T.P., Dennis, M.M., Dwek, J.R., Pennock, A.T., 2020b. The Curse of the All-Star Team: A Single-Season Prospective Shoulder MRI Study of Little League Baseball Players. J Pediatr Orthop 40, e19–e24.

Hosseinzadeh, P., Rickert, K.D., Edmonds, E.W., 2020. What's New in Pediatric Orthopaedic Trauma: The Upper Extremity. J Pediatr Orthop 40, e283–e286.

Hughes, J., Yaszay, B., Bastrom, T.P., Bartley, C.E., Parent, S., Cahill, P.J., Lonner, B., Shah, S.A., Samdani, A., Newton, P.O., Harms Study Group, 2020. Long Term Patient Perception Following Surgery for Adolescent Idiopathic Scoliosis if Dissatisfied at 2 Year Follow-up. Spine (Phila Pa 1976).

Hughes, J.L., Newton, P.O., Bastrom, T., Fabricant, P.D., Pennock, A.T., 2020. The Clavicle Continues to Grow During Adolescence and Early Adulthood. HSS J 16, 372–377.

Hwang, S.W., Pendleton, C., Samdani, A.F., Bastrom, T.P., Keeny, H., Lonner, B.S., Newton, P.O., Harms Study Group, Pahys, J.M., 2020. Preoperative SRS pain score is the primary predictor of postoperative pain after surgery for adolescent idiopathic scoliosis: an observational retrospective study of pain outcomes from a registry of 1744 patients with a mean follow-up of 3.4 years. Eur Spine J 29, 754–760.



Kluck, D., Newton, P.O., Sullivan, T.B., Yaszay, B., Jeffords, M., Bastrom, T.P., Bartley, C.E., 2020a. A 3D Parameter Can Guide Concave Rod Contour for the Correction of Hypokyphosis in Adolescent Idiopathic Scoliosis. Spine (Phila Pa 1976) 45, E1264–E1271.

Kluck, D., Sullivan, T.B., Bastrom, T.P., Bartley, C.E., Yaszay, B., Newton, P.O., 2020b. Predictors of spontaneous lumbar curve correction in thoracic-only fusions: 3D analysis in AIS. Spine Deform.

Kluck, D.G., Farnsworth, C.L., Jeffords, M.E., Marino, N.E., Yaszay, B., Upasani, V.V., Newton, P.O., 2020. Spinal rod gripping capacity: how do 5.5/6.0-mm dual-diameter screws compare? Spine Deform 8, 25–32.

New Book Alert! Fracture Healing in Children A Review of Pediatric Osseous Modeling and Remodeling



Our own Erynn Krasovic, PA-C has teamed up with Dr. David Bennett (Phoenix Children's) to create this review of pediatric osseous modeling and remodeling, meant to serve as an aid for practitioners in discussion with parents regarding non-operative treatment for pediatric fracturs. This tool helps alleviate parental concerns regarding their child's angulated or displaced fracture appearance. It demonstrates the great poten-

tial that children have to remodel osseous deformity over time with detailed examples of various bones throughout the body.

It is available for purchase directly on Amazon for only \$29.99.

Koehler, R.J., Shore, B.J., Hedequest, D., Heyworth, B.E., May, C., Miller, P.E., Rademacher, E.S., Sanborn, R.M., Murphy, J.S., Roseman, A., Stoneback, J.W., Trizno, A.A., Goldstein, R.Y., Harris, L., Nielsen, E., Talwar, D., Denning, J.R., Saaed, N., Kutz, B., Laine, J.C., Naas, M., Truong, W.H., Rotando, M., Spence, D.D., Brighton, B.K., Churchill, C., Janicki, J.A., King, K., Wild, J., Beebe, A.C., Crouse, S., Rough, T., Rowan, M., Singh, S., Davis-Juarez, A., Gould, A., Hughes, O., Rickert, K.D., Upasani, V.V., Blumberg, T.J., Bompadre, V., Lindberg, A.W., Miller, M.L., Hill, J.F., Peoples, H., Rosenfeld, S.B., Turner, R., Copley, L.A., Lindsay, E.A., Ramo, B.A., Tareen, N., Winberly, R.L., Li, G.Y., Sessel, J., Johnson, M.E., Johnson, S., Moore-Lotridge, S.N., Shelton, J., Baldwin, K.D., Schoenecker, J.G., Children's Orthopaedic Trauma and Infection Consortium for Evidence Based Study (CORTICES) Group, 2020. Defining the volume of consultations for musculoskeletal infection encountered by pediatric orthopaedic services in the United States. PLoS One 15, e0234055.

LaValva, S.M., Baldwin, K., Swarup, I., Flynn, J.M., Pahys, J.M., Yaszay, B., Abel, M.F., Bachmann, K., Shah, S.A., Sponseller, P.D., Cahill, P.J., Harms Study Group#, 2020. Prolonged Postoperative In-

tubation After Spinal Fusion in Cerebral Palsy: Are There Modifiable Risk Factors and Associated Consequences? J Pediatr Orthop 40, 431–437.

Lindgren, A.M., Bennett, R., Yaszay, B., Newton, P.O., Upasani, V.V., 2020. Quality improvement in post-operative opioid and benzodiazepine regimen in adolescent patients after posterior spinal fusion. Spine Deform 8, 441–445.

Lonner, B.S., Haber, L., Toombs, C., Parent, S., Shah, S.A., Lenke, L., Sucato, D., Clements, D., Newton, P.O., 2020. Is Anterior Release Obsolete or Does It Play a Role in Contemporary Adolescent Idiopathic Scoliosis Surgery? A Matched Pair Analysis. J Pediatr Orthop 40, e161–e165.

Louer, C.R., Nunez, J., Bomar, J.D., Fischer-Colbrie, M.E., Chambers, H.G., Upasani, V.V., 2020. Comparison of Staged Versus Sameday Bilateral Hip Surgery in Nonambulatory Children With Cerebral Palsy. J Pediatr Orthop 40, 608–614.

Lurie, B., Van Rysselberghe, N., Pennock, A.T., Upasani, V.V., 2020. Functional Outcomes of Tillaux and Triplane Fractures with 2 to 5 Millimeters of Intra-Articular Gap. J Bone Joint Surg Am 102, 679–686.

Lurie, B.M., Bomar, J.D., Edmonds, E.W., Pennock, A.T., Upasani, V.V., 2020. Functional Outcomes of Unstable Ankle Fractures in Adolescents. J Pediatr Orthop 40, e572–e578.

Miller, D.J., Flynn, J.J.M., Pasha, S., Yaszay, B., Parent, S., Asghar, J., Abel, M.F., Pahys, J.M., Samdani, A., Hwang, S.W., Narayanan, U.G., Sponseller, P.D., Cahill, P.J., Harms Study Group, 2020. Improving Health-related Quality of Life for Patients With Nonambulatory Cerebral Palsy: Who Stands to Gain From Scoliosis Surgery? J Pediatr Orthop 40, e186–e192.

Mo, A.Z., Miller, P.E., Glotzbecker, M.P., Li, Y., Fletcher, N.D., Upasani, V.V., Riccio, A.I., Hresko, M.T., Krengel, W.F., Spence, D., Garg, S., Hedequist, D.J., 2020. The Reliability of the AOSpine Thoracolumbar Classification System in Children: Results of a Multicenter Study. J Pediatr Orthop 40, e352–e356.

Murphy, R.F., Williams, D., Hogue, G.D., Spence, D.D., Epps, H., Chambers, H.G., Shore, B.J., 2020. Prophylaxis for Pediatric Venous Thromboembolism: Current Status and Changes Across Pediatric Orthopaedic Society of North America From 2011. J Am Acad Orthop Surg 28, 388–394.

Murtha, A.S., Bomar, J.D., Johnson, K.P., Upasani, V.V., Pennock, A.T., 2020. Acetabular labral tears in the adolescent athlete: results of a graduated management protocol from therapy to arthroscopy. J Pediatr Orthop B.

Newton, P.O., 2020. Spinal growth tethering: indications and limits. Ann Transl Med 8, 27. Newton, P.O., Bartley, C.E., Bastrom, T.P., Kluck, D.G., Saito, W., Yaszay, B., 2020a. Anterior Spinal Growth Modulation in Skeletally Immature Patients with Idiopathic Scoliosis: A Comparison with Posterior Spinal Fusion at 2 to 5 Years Postoperatively. J Bone Joint Surg Am 102, 769–777.

Newton, P.O., Ohashi, M., Bastrom, T.P., Bartley, C.E., Yaszay, B., Marks, M.C., Betz, R., Lenke, L.G., Clements, D., 2020b. Prospective 10-year follow-up assessment of spinal fusions for thoracic AIS: radiographic and clinical outcomes. Spine Deform 8, 57–66.

Ohashi, M., Bastrom, T.P., Bartley, C.E., Yaszay, B., Upasani, V.V., Newton, P.O., Harms Study Group, 2020a. Associations between three-dimensional measurements of the spinal deformity and preoperative SRS-22 scores in patients undergoing surgery for major thoracic adolescent idiopathic scoliosis. Spine Deform 8, 1253–1260.

Ohashi, M., Bastrom, T.P., Marks, M.C., Bartley, C.E., Newton, P.O., 2020b. The Benefits of Sparing Lumbar Motion Segments in Spinal Fusion for Adolescent Idiopathic Scoliosis Are Evident at 10 Years Postoperatively. Spine (Phila Pa 1976) 45, 755–763.

Paez, C.J., Bomar, J.D., Farnsworth, C.L., Bandaralage, H., Upasani, V.V., 2020a. Three-Dimensional Analysis of Acetabular Morphology and Orientation in Patients With Slipped Capital Femoral Epiphysis. J Pediatr Orthop.

Paez, C.J., Lurie, B.M., Bomar, J.D., Upasani, V.V., Pennock, A.T., 2020b. Plate Versus Lag Screw Only Fixation of Unstable Ankle Fractures Involving the Fibula in Adolescent Patients. J Pediatr Orthop.

Parvaresh, K.C., Vargas-Vila, M., Bomar, J.D., Pennock, A.T., 2020. Anterior Glenohumeral Instability in the Adolescent Athlete. JBJS Rev 8, e0080.

Pennock, A.T., Chang, A., Doan, J., Bomar, J.D., Edmonds, E.W., 2020a. 3D Knee Trochlear Morphology Assessment by Magnetic Resonance Imaging in Patients With Normal and Dysplastic Trochleae. J Pediatr Orthop 40, 114–119.

Pennock, A.T., Huang, S.G., Pedowitz, J.M., Pandya, N.K., McLaughlin, D.C., Bastrom, T.P., Ellis, H.B., 2020b. Risk Factors for Adverse Radiographic Outcomes After Elastic Stable Intramedullary Nailing of Unstable Diaphyseal Tibia Fractures in Children. J Pediatr Orthop 40, 481–486.

Rickert, K.D., Sarrel, K.L., Sanders, J.S., Jeffords, M.E., Hughes, J.L., Upasani, V.V., Farnsworth, C.L., Edmonds, E.W., Pennock, A.T., 2020. Medial Epicondyle Fractures: Biomechanical Evaluation and Clinical Comparison of 3 Fixation Methods Used in Pediatric Patients. J Pediatr Orthop 40, 474–480.

Robaina, J.A., Bastrom, T.P., Richardson, A.C., Edmonds, E.W., 2020. Predicting no-shows in paediatric orthopaedic clinics. BMJ Health Care Inform 27

Roye, B.D., Simhon, M.E., Matsumoto, H., Bakarania, P., Berdishevsky, H., Dolan, L.A., Grimes, K., Grivas, T.B., Hresko, M.T., Karol, L.A., Lonner, B.S., Mendelow, M., Negrini, S., Newton, P.O., Parent, E.C., Rigo, M., Strikeleather, L., Tunney, J., Weinstein, S.L., Wood, G., Vitale, M.G., 2020. Establishing consensus on the best practice guidelines for the use of bracing in adolescent idiopathic scoliosis. Spine Deform 8, 597–604

Saarinen, A.J., Bauer, J.M., Verhofste, B., Sponseller, P.D., Krengel, W.F., Hedequist, D., Cahill, P.J., Larson, A.N., Pahys, J.M., Martus, J.E., Yaszay, B., Phillips, J.H., Helenius, I.J., 2020. Results of Conservative and Surgical Management in Children with Idiopathic and Non-Idiopathic Os Odontoideum. World Neurosurg.

Segal, D.N., Orland, K.J., Yoon, E., Bastrom, T., Fletcher, N.D., Harms Study Group, 2020. Fusions ending above the sagittal stable vertebrae in adolescent idiopathic scoliosis: does it matter? Spine Deform 8, 983–989.

Shen, K., Clement, R.C., Yaszay, B., Bastrom, T., Upasani, V.V., Newton, P.O., 2020. Three-dimensional analysis of the sagittal profile in surgically treated Lenke 5 curves in adolescent idiopathic scoliosis. Spine Deform 8, 1287–1294. https://doi.org/10.1007/s43390-020-00168-4

Sikora-Klak, J., Upasani, V.V., Ilharreborde, B., Cross, M., Bastrom, T.P., Mazda, K., Yaszay, B., Newton, P.O., 2020. Three-dimensional analysis of spinal deformity correction in adolescent idiopathic scoliosis: comparison of two distinct techniques. Childs Nerv Syst.

Skalsky, A.J., Dalal, P., Le, J., Ewing, E., Yaszay, B., 2020. Screening Intrathecal Baclofen Pump Systems for Catheter Patency via Catheter Access Port Aspiration. Neuromodulation 23, 1003–1008.

Sullivan, T.B., Bastrom, T.P., Bartley, C.E., Dolan, L.A., Weinstein, S.L., Newton, P.O., 2020. More severe thoracic idiopathic scoliosis is associated with a greater three-dimensional loss of thoracic kyphosis. Spine Deform 8, 1205–1211.

Talathi, N.S., Trionfo, A., Patel, N.M., Upasani, V.V., Matheney, T., Mulpuri, K., Sankar, W.N., 2020. Should I Plan to Open? Predicting the Need for Open Reduction in the Treatment of Developmental Dysplasia of the Hip. J Pediatr Orthop 40, e329–e334.

Upasani, V.V., Badrinath, R., Farnsworth, C.L., Jeffords, M.E., Hallare, J.A., Ahmed, S.I., Schrader, T., 2020a. Increased Hip Intracapsular Pressure Decreases Perfusion of the Capital Femoral Epiphysis in a Skeletally Immature Porcine Model. J Pediatr Orthop 40, 176–182.

Upasani, V.V., Bandaralage, H., Farnsworth, C.L., 2021. 3D conebeam tomosynthesis provides axial imaging of the spine with lower radiation compared to computed tomography. Spine Deform 9, 41–49.

Upasani, V.V., Bomar, J.D., Bandaralage, H., Doan, J.D., Farnsworth, C.L., 2020b. Assessment of three-dimensional acetabular coverage angles. J Hip Preserv Surg 7, 305–312.

Van Rysselberghe, N.L., Souder, C.D., Mubarak, S.J., 2020. Unsuspected tarsal coalitions in equinus and varus foot deformities. J Pediatr Orthop B 29, 370–374.

Verhofste, B.P., Berry, J.G., Miller, P.E., Crofton, C.N., Garrity, B.M., Fletcher, N.D., Marks, M.C., Shah, S.A., Newton, P.O., Samdani, A.F., Abel, M.F., Sponseller, P.D., Harms Study Group, Glotzbecker, M.P., 2020. Risk factors for gastrointestinal complications after spinal fusion in children with cerebral palsy. Spine Deform.

Vivas, A.C., Pahys, J.M., Jain, A., Samdani, A.F., Bastrom, T.P., Sponseller, P.D., Newton, P.O., Hwang, S.W., Harms Study Group, 2020. Early and late hospital readmissions after spine deformity surgery in children with cerebral palsy. Spine Deform 8, 507–516.

Williams, B.A., McClung, A., Blakemore, L.C., Shah, S.A., Pawelek, J.B., Sponseller, P.D., Parent, S., Emans, J.B., Sturm, P.F., Yaszay, B., Akbarnia, B.A., Pediatric Spine Study Group, 2020. MRI utilization and rates of abnormal pretreatment MRI findings in early-onset sco-liosis: review of a global cohort. Spine Deform 8, 1099–1107.

Yaszay, B., Bartley, C.E., Sponseller, P.D., Abel, M., Cahill, P.J., Shah, S.A., Miyanji, F., Samdani, A.F., Daquino, C., Newton, P.O., 2020. Major complications following surgical correction of spine deformity in 257 patients with cerebral palsy. Spine Deform 8, 1305–1312.

Zhang, L., Wallace, C.D., Erickson, J.E., Nelson, C.M., Gaudette, S.M., Pohl, C.S., Karsen, S.D., Simler, G.H., Peng, R., Stedman, C.A., Laroux, F.S., Wurbel, M.A., Kamath, R.V., McRae, B.L., Schwartz Sterman, A.J., Mitra, S., 2020. Near infrared readouts offer sensitive and rapid assessments of intestinal permeability and disease severity in inflammatory bowel disease models. Sci Rep 10, 4696.

Zuckerman, S.L., Lenke, L.G., Cerpa, M., Kelly, M.P., Yaszay, B., Sponseller, P., Erickson, M., Garg, S., Pahys, J., Cahill, P., Sides, B., Gupta, M., Fox Pediatric Spinal Deformity Study Group, 2020. Interobserver and intraobserver reliability of determining the deformity angular ratio in severe pediatric deformity curves. Spine Deform.



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