CONGENITAL CARDIOLOGY TODAY
Timely News & Information for Congenital/Structural Cardiologists & Cardiothoracic Surgeons Worldwide

International Edition
Vol. 21 - Issue 10

October 2023

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A Pediatric Case of Wide Complex Tachycardia

Kavitha Arulmozhi, MD; Bianca Castellanos, MD; Scott Ceresnak, MD; Lerraughn Morgan, DO

Introduction

Tachycardia can be classified into narrow or wide complex based on the width of the QRS complex. In the adult population, rapid ventricular activation can result in a narrow QRS complex (<120 ms), while abnormally slow ventricular activation can result in a wide QRS complex (>120 ms).[1,2] In this older population, a Wide Complex Tachycardia (WCT) is most commonly attributed to ventricular tachycardia, but the differential diagnosis can extend to different forms of Supraventricular Tachycardia (SVT), although to a lesser degree.[1]

In the pediatric population, the normal QRS width and the normal heart rate vary based on age.[3] There is a direct relationship between QRS width and age, so it is important to keep these in mind when evaluating wide complex tachycardia in pediatric patients.

The differential diagnosis of WCT in pediatrics includes: SVT with aberrancy, pre-excited tachycardia, ventricular tachycardia, electrolyte abnormalities, drug ingestion or myocardial ischemia. SVT is the second most common type of tachycardia in pediatric patients with an estimated incidence between one in 250 and one in 1000 patients, whereas ventricular tachycardia (VT) occurs less commonly with incidence rates between one and eight per 100,000 patients.[5] SVTs can be further classified into Atrioventricular Nodal Reentry Tachycardia (AVNRT), Atrioventricular Reentrant Tachycardia (AVRT), atrial flutter, or Ectopic Atrial Tachycardia (EAT).[6]

In this report, we present a case of a symptomatic teenage female found to have a WCT. She was found to have AVRT from a concealed, right-sided accessory pathway and AVNRT on electrophysiology study, which required radiofrequency ablation and cryoablation, respectively. This case elucidates the importance of identification, expert consultation, and management for aberrant SVT.

Case

History: A 15-year-old female with iron deficiency anemia, and dysfunctional uterine bleeding presented for acute onset palpitations while swimming. Associated symptoms included chest pain, shortness of breath, dizziness, headache, and nausea. Her smartwatch reported an abnormally high heart rate in the 200 bpm range. On arrival to the Emergency Department, pulse was 220 bpm. An electrocardiogram showed a WCT, left bundle branch block, and a superiorly-oriented QRS complex **(Figure 1).** Cardiac exam was normal except for tachycardia. Troponin I and brain natriuretic peptide were elevated at 1.4 ng/mL and 134.2 pg/mL, respectively. Family history was non-contributory. Following a saline bolus, heart rate decreased to 107 bpm and patient spontaneously converted to sinus rhythm **(Figure 2)**.

Hospital Course: The patient was admitted to the Pediatric ICU for observation and initiation of atenolol 25 mg twice daily. The troponin levels normalized. Baseline echocardiogram was

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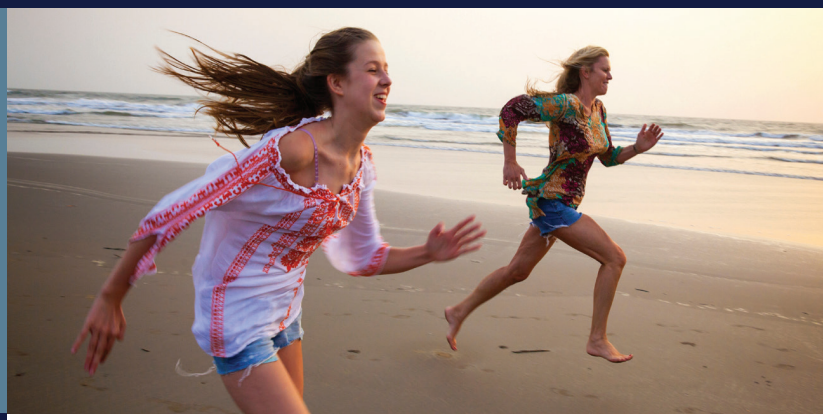

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normal. There were no recurrences of SVT. Upon discharge, a 30-day event monitor was placed. Patient reported no palpitations or recurrences of SVT. In consultation with pediatric electrophysiology, the patient elected to undergo an invasive electrophysiology study with possible ablation.

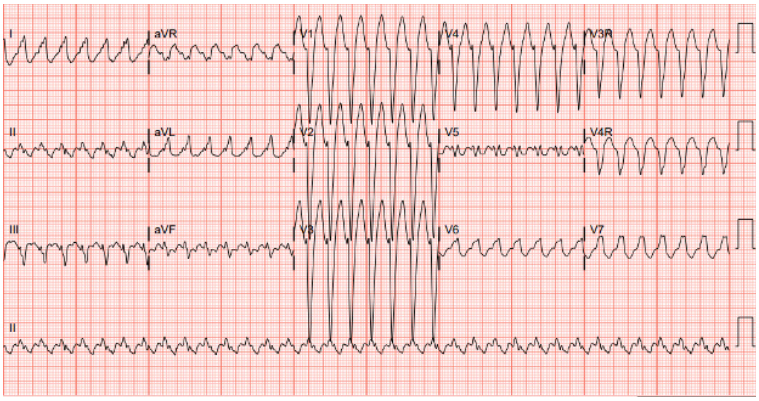

FIGURE 1 *Electrocardiogram on presentation in ED*

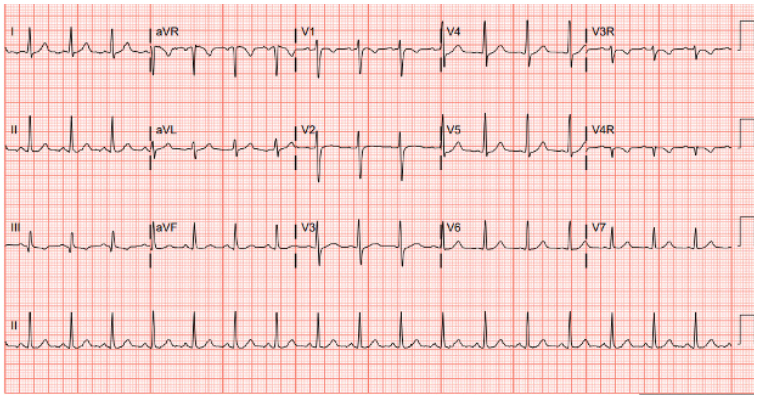

FIGURE 2 *Electrocardiogram after spontaneous conversion to sinus rhythm in ED, no pre-excitation evident*

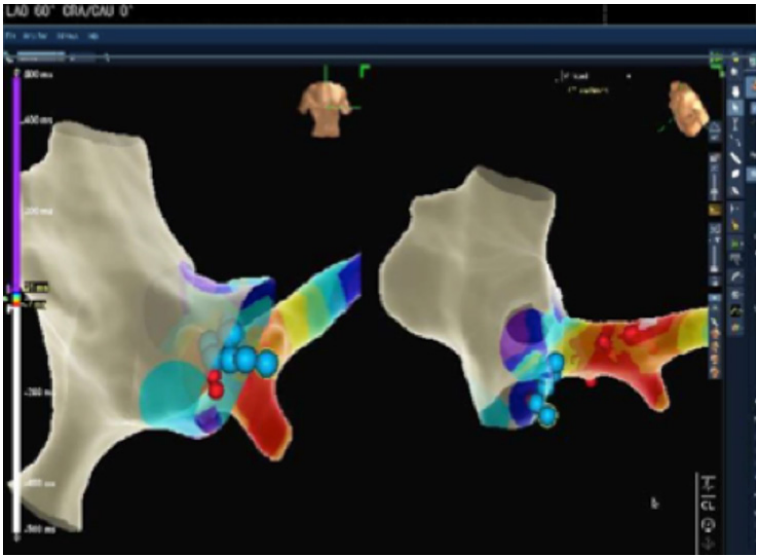

IMAGE 1 *Activation patterns with V-pacing to help localize the accessory pathway. Blue dots were used for cryoablation. Red dots were used for RF ablation.*

Post Procedural Results: Intraoperative findings were significant for two distinct substrates causing Orthodromic Reentrant Tachycardia (ORT) **(Image1)**. The first substrate was an AVRT from a concealed, right-sided accessory pathway, which was amenable to radiofrequency ablation. The second substrate was typical AVNRT, which underwent successful cryoablation. The patient was reporting occasional palpitations afterwards, but repeat electrocardiogram and event monitor were normal, so annual follow-up was recommended.

Discussion

Palpitations are a nonspecific finding that can be secondary to cardiac conditions, such as arrhythmia, myocarditis, pacemaker malfunctions, Postural Orthostatic Tachycardia Syndrome or cardiomyopathies.[7] Non-cardiac conditions such as hypoglycemia, pheochromocytoma, fever, anemia, exercise, hyperthyroidism, panic attack or drug ingestion can also cause palpitations.[7] While our patient was anemic, it was a previously known diagnosis, and the sudden onset of her symptons did not support this as the causative diagnosis.

The differential diagnosis for pediatric WCT is broad including: rhythm abnormalities such as SVT with aberrancy, VT, genetic causes such as long QT syndrome or Brugada syndrome, cardiomyopathies, acquired conditions such as infectious myocarditis, and electrolyte abnormalities.[4] In the adolescent population, ingestion of stimulants such as amphetamines, cocaine, excess caffeine, and nicotine can also be potential contributors.[1]

The EKG in our case was most consistent with ORT with aberrant conduction, atriofascicular tachycardia, or aberrant conduction of atrial tachyarrhythmia. In a typical SVT, conduction through the AV node is rapid, resulting in a narrow complex tachycardia. However, in SVT with aberrancy, the conduction can be delayed due to abnormalities in the bundle branches or accessory AV conduction, leading to a wide QRS complex.[3] In atriofascicular tachycardia, the conduction pathway starts from the right atrium and progresses through an accessory connection (separate from the AV node and bundle of His) into a ventricular fascicle, also leading to a wide QRS complex.[8] Differentiating the etiology of WCT due to VT or SVT can be difficult on EKG, often leading to misdiagnosis.[9] In current practice, electrophysiology testing provides an accurate means for diagnosis and management as seen in our case.

Literature of WCT secondary to SVT in the pediatric population is limited. Hopkins et al. described a case of a nine-day-old girl with symptomatic COVID-19 infection who was found to have a WCT due to SVT with aberrancy.[10] She was treated with oral propranolol without recurrence of SVT during periodic follow-up. The utilization of smartwatches in recording cardiac rhythm and rate data when patients are experiencing symptoms have also shown to be beneficial. A 16-year-old female with three years of palpitations recorded a symptomatic episode on a smartwatch, later found to be due to likely AVNRT.[11] She was monitored with a Holter monitor for two weeks, but was asymptomatic and no arrythmia was detected. She subsequently had an electrophysiology study performed and underwent ablation for AVNRT, without recurrence of symptoms at a four month follow-up. While there are limitations to smartwatches, they can serve as a preliminary tool for early identification of arrhythmias prompting

the need for a formal workup and timely intervention as seen in the literature and in our case.

Wide complex tachycardias are commonly of ventricular origin in adults, but SVT with aberrancy is a more common etiology in the pediatric population. While conditions such as Wolff-Parkinson-White Syndrome are known to have predisposition to ventricular fibrillation, other etiologies of SVT, such as AVNRT, EAT, and AVRT have a lower risk to develop ventricular tachyarrhythmia.[4,12] Our case demonstrates the importance of identifying the etiology of a WCT. Healthcare practitioners should take into account the entire clinical scenario in order to prevent misdiagnosis and provide appropriate management of SVT with aberrancy.

Acknowledgements

Thank you to Valley Children's librarian, Brian Baker, for his support in the literature review for this case.

Sources of Funding & Disclosures: None

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Insights on CSI America 2023 – An Interview with Key CSI Faculty and Leaders in the Field

Jenny E. Zablah, MD
Interviewees: Zahid Amin, MD; Gareth Morgan, MD; Sir Shakeel A. Qureshi, MD; John Thomson, MD

CSI Congress (Congenital, Structural and Valvular Interventions) is one of many educational and networking meetings that are available for interventional cardiologists around the world. CSI started off in 1996 as a simple workshop for a particular ASD occluder, with only 77 attendees; it was a small meeting compared to well over 1500 participants who now congregate at CSI Frankfurt every year. Fast forward 20 years and the program for CSI Frankfurt now includes over 40 scheduled live cases transmitted from cardiovascular centers all over the world. Over the last decade, CSI has branched out to other locations worldwide, including Asia-Pacific, Middle East, Africa and most recently the United States.

This month, Dr. Jenny E. Zablah, Associate Professor of Pediatrics at the University of Colorado and Congenital Interventional Cardiologist at Children's Hospital Colorado, caught up with some of the key faculty of CSI America during the recent 8th World Congress of Pediatric Cardiology and Cardiac Surgery. Together with Sir Shak Qureshi, Dr. Zahid Amin, Dr. John Thomson, and Dr. Gareth Morgan; Dr. Zablah provides a glimpse of the workings behind putting on such a program – as well as the extraordinary camaraderie amongst the CSI family, which makes CSI more than just a meeting. With a track record of providing medical education in the field for over 26 years, this year's United States edition in Orlando is set to stand apart from other meetings by offering live animal training as part of the scientific program.

SCAN FOR CSI AMERICA WEBSITE

CSI America 2023 will take place November 15th-17th in Orlando.

To learn more or to join, please visit our website by scanning the QR code.

Jenny Zablah (JZ): Shak, you started CSI over 25 years ago. What motivated you to take the lead in medical education with this conference and what keeps you going after so many years?

Sir Shakeel Qureshi (SQ): After I finished my training, I was attending meetings and I noticed that these meetings tended to be not as stimulating as I had hoped. A lot of the things that were discussed went way over my head and probably other new consultants felt the same.

After discussions with Horst Sievert, we decided to hold a meeting with a small number of interventionists back in 1996. There were only about 40 to 50 people that attended. We showed cases, and it was excellent for teaching, and that then led to Horst Sievert and Neil Wilson telling me: "Let's do another one." And so, we started that.

Neil and I liked to quiz people, put them on the spot, especially the experts, and get them involved in some basic questions and answers, and then get attendees involved as well. And so that's how we did it. And gradually that became the sort of footprint for CSI.

JZ: Shak, what motivates you to go and do this type of conference not just in Frankfurt, but extend it worldwide and especially America.

SQ: When we were doing CSI Frankfurt, during my travels around the world, people would say "Well, I wish I'd attended, but I couldn't" - either afford to, or get funding or get sponsorship, and there was a lot of demand in different regions. Along with Neil, Horst and Mario we thought, what better way to spread that education than take it locally, so a bigger portion of local doctors of all levels and nurses can attend. A lot of that relies on friendship. So, that's how we went to Bangkok, Tokyo. We did Ethiopia, Uganda, Kenya, and Tanzania for CSI Africa. This way people local to those continents and regions can attend without vast expenses. And this just disperses or spreads the education and makes it accessible to everybody.

JZ: Pretty impressive journey Shak. Gareth, you, and I represent different stages of the younger generation that Shak is trying to educate. From your perspective, what do physicians get out of attending conferences these days? In theory, we can just learn everything online. So, what can they get from going in person to these CSI meetings?

Gareth Morgan (GM): There are a lot of resources available online and CSI has really exploited the online platforms, using webinars and other educational tools. That's been a good adjunct, particularly as we struggled through the COVID pandemic.

We're currently at the World Congress in Washington, D.C. and I've interacted with and seen so many people from earlier parts of my career that I haven't seen in so long. I really don't think that online virtual meetings will ever replace in-person meetings. It's an absolute privilege and a delight to be able to physically interact with people that I respect and admire, and as well as having trainees who want to learn from us and other faculty from around the world here. In-person just provides a whole other layer of education and substance that you cannot achieve in an online meeting.


Jenny E. Zablah, MD


Zahid Amin, MD


Gareth Morgan, MD


Sir Shakeel A. Qureshi, MD


John Thomson, MD

JZ: Well said, and do you think that having the CSI hands-on training, on top of those available opportunities to hold face to face discussions, is valuable for trainees and junior faculty?

GM: The feedback from the trainees and the junior faculty is that the hands-on stuff that we do, whether it's an anatomic assessment, or whether it's use of devices or simulators, provides an enormous boost for them. So, I think the hands-on training needs to stay a big part of this and needs to be integrated into our meetings.

JZ: John, a couple of years ago there was a lot of speculation about how education in general, not just in the medical field, would change completely to virtual. Truth is, we are doing in-person conferences, but now can benefit from online educational meetings in addition. Where do you think the future in medical education lies with this?

John Thomson (JT): Well, I think Zoom and Teams, and so on, were life savers during COVID. They allowed us to continue with some elements of what we were doing before, but frankly, they're not the same. A huge part of meetings and conferences, and medical education is networking. A huge part of education is relatively informal talks with colleagues. Personally, I'm very glad that we're back to meetings; it feels natural and completely appropriate, and whilst I don't underestimate the value of Zoom and virtual meetings in the overall structure, I don't think they will replace meetings, and I don't think that they ever will be anything other than parts of the education portfolio.

JZ: Great points. Now more specifically speaking about regional versions of CSI. Zahid, Orlando now opens its doors to CSI America this year in one of its more special meetings. What makes it different?

Zahid Amin (ZA): CSI America started in San Francisco for a couple of years. And then moved to Denver where Gareth and you knocked it out of the park.

I think, CSI coming to Orlando, has several benefits. One, we will attract not only physicians practicing in the U.S., but also from Central and South America due to proximity. And second, we have a very special venue called Nicholson Center, which is a research facility with animal labs. So, we thought, based upon some successes that we have had with the hands-on workshops, animal training workshop as an addition to the congress would be a huge advantage and put a positive spin on CSI America meeting.

The program is made in such a way that there will be didactic sessions, but at the same time you'll also have hands-on live animal training sessions separately covering congenital and structural interventions. I know it's a big task, but I think it is a big deal and it makes this year's CSI America better and different.

JZ: So, this seems to be an upgrade from the heart dissection workshop that you have in CSI Frankfurt for years now. I know that Gareth has collaborated on your cause for that, too. How do you think such training sessions benefit attendees? What's the feedback you've got throughout all these years, and your experience with it?

ZA: So, it's interesting. We started the hands-on dissection workshops at CSI six years ago and when we did the first session, it was so well received that I was asked to do another session the next day. At CSI America this year we will do live animal workshops, which is more challenging. This means that the trainee will do a beating heart case in animal, This will give the trainee a real time, real cath lab experience. The trainee will be able to confer with world experts and learn from them.

JZ: On that note, Shak. I think this is the first time I have heard of animal training being offered in the context of a medical conference. How do you combine the scientific sessions and these trainings? What do you envision?

SQ: Animal training has some benefits where you remember techniques or issues that really influence the rest of your career. We've got lots of sessions really running parallel to the training; we have congenital and adult interventional. So, the animal training is a part of that. CSI really offers a wide variety of education from live cases, from lectures, from animal training and Cathlab Cafe. There is really something there for all different specialties and people can attend whatever session they want.

JZ: I think one question that a lot of the more junior people that go to CSI America is how to get involved with CSI. John, how did you first get involved?

JT: A big part of it is networking, and the reality is that all of us, at one stage were young learning cardiologists, and we relied on older people like Shak, Neil Wilson, Zahid, others to help us. And I think that's ultimately how I got involved - by being enthusiastic, being available and listening carefully to the advice that I was given, and I don't think that would have happened if all of that was occurring on Zoom. I think this is something that occurs naturally when you're in a meeting environment.

GM: Yeah, the "getting involved thing" is something that I think a lot of young cardiologists are anxious about. It is important that we encourage younger people to get involved. In my case, it was through just being

enthusiastic and drawing Shak's attention to what I was trying to do when I was a young attending and a registrar in the UK. This allowed Shak to say, "I'm going to give him a crack and see whether he can get up and make a fist of this at the podium." And I think that's important.

JT: Just to add to that, one of the unique selling points of CSI has always been inclusivity. In this meeting we've worked hard to include people and spread discussion out beyond the traditional circles. And that means including young people and people that are growing through the earlier stages of their career. And frankly, that's something that I'm proud of. It's something that we've always tried to do, and we'll continue to do it at CSI.

JZ: Something that is very appreciated by us, the new generations, is that during CSI meetings it is easier to participate in the larger discussions. I think it's important to highlight for people that have not been to CSI meetings, that it is a very relaxed environment that makes everybody participate. During the early career years, it is harder to just stand up to ask a question in front of a big forum. The setup during CSI makes people more comfortable to ask the question, it makes the conversation flow.

Along these lines, one very special session during CSI is the Cathlab Cafe, what are your thoughts on this?

GM: The diversity of presenters at Cathlab Cafe is impressive with people from all around the world presenting phenomenal cases. It allows a way in, and it's a great way to demonstrate the inclusivity of CSI.

ZA: I think the Cathlab Cafe makes the attendee relax. It's like you are going to go for a cup of coffee. If you go for coffee with Shak Qureshi, you can let yourself loose a little bit. After 25 years of practicing, I still learn every time I go to Cathlab Cafe, hence, I think it is a fantastic part of the meeting.

SQ: Just one more thing to add, Jenny. Early on in CSI Frankfurt, Neil and I used to really feel exhausted after each meeting, and on the way back, instead of relaxing, we'd say what did we do right? What did we do badly? And how can we improve it next year? One of the things that we used to do was Neil and I would walk around and pick on attendees randomly. It wasn't somebody we knew, it would be somebody junior, somebody middle training, somebody senior, and that, what that did was it made people feel really happy and good that we were picking on them. Because it gave them an opportunity to express an opinion, and that was the feedback we used to get. And that's how the whole concept of inclusivity progressed. And Neil was absolutely brilliant at this concept.

JZ: Shak, I think that's something that I personally lived. As I started as a fellow, Neil would come to me during a session at CSI Frankfurt, and tell me: "Are you paying attention?" Walked away, two minutes later, he asked me a question. This was very appreciated. Continuing this dynamic and with that legacy that you have built with Neil, is quite important.

Zahid, what else do you think is going to make CSI America different compared to the other meetings that we have had this year in the US?

ZA: We will hold several sessions in Spanish for the Latin American community. This aims to include more of our Spanish-speaking community and network in their own language. In a few sessions, English will be optional so that the attendees are able to ask questions in Spanish and Portuguese.

JZ: Thanks Zahid, thank you everyone. I am excited to be able to share part of the CSI history with this conversation and also highlight how diversifying the meeting is by bringing new insights and allowing more people to get involved and actively participate in such an amazing conference.

To end the interview, I will ask you some rapid-fire questions, tell me the first thing that comes to mind.

How old were you on your first CSI meeting?	
Shak	44
Zahid	32
John	32
Gareth	31

Who do you text the most in the CSI family?	
Shak	Inga*
Zahid	Inga*
John	Shak
Gareth	Inga*

*Inga Sievert, CEO at cme4u GmbH and key person for CSI conferences logistics and success

What is the session you do not want to miss and why?	
Shak	Paravalvar leaks, mitral in particular. They are interesting because there are so many ways to close them. So, I'm always keen to learn different methods. Session wise it's the nightmare cases for me.
Zahid	"What's new" at CSI Frankfurt. The session in the morning on the first day. Usually what's new, so new devices, techniques or procedures are discussed - that I like a lot.
John	I like the new neonatal intervention sessions because they're difficult. And it's always interesting hearing other people's views and ways of tackling things.
Gareth	I like a bit of psychology through the nightmare cases,

Which CSI was your favourite?	
Shak	The meeting where Neil played the melodeon on the rooftop at the faculty dinner.
Zahid	All CSI Frankfurt
John	Being in the bar in the Maritim hotel in Frankfurt, when the singer used to be there in the morning with all the greatest interventional cardiologists, all singing and dancing on the dance floor.
Gareth	Arriving back in my hotel room in a shopping cart at CSI Frankfurt.

What is your favourite procedure to see in live cases?	
Shak	It used to be coronary fistula, but now it's more Sinus Venosus ASD.
Zahid	The ones I used to do with Dr. Horst Sievert, when I used to do live cases at CSI.
John	I always like ASD closure. I think there's lots of technique, and there are some fabulous operators from around the world that we're lucky enough to see at CSI, that really teach those things.
Gareth	It's watching Dr. Sivakumar do 12 live cases every year.

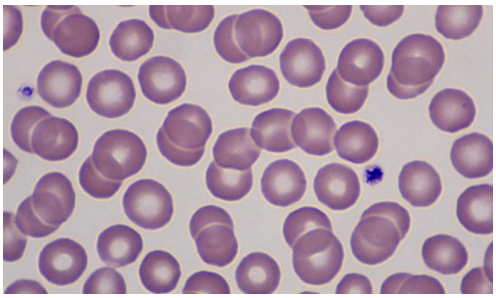
What would you prefer - leading training hubs or doing live cases?	
Shak	Live cases I think. I get the buzz out of it.
Zahid	Training hub. I love training hub.
John	Either. I don't mind.
Gareth	I think it depends on the subject.

Research Reveals Blood Platelets Play Important Role in Kawasaki Disease

Findings From Cedars-Sinai Investigators Suggest Another Therapeutic Approach for This Mysterious Pediatric Disease

Cedars-Sinai Guerin Children's investigators have advanced our understanding of the role that blood platelets play in Kawasaki disease, a serious illness that primarily affects children younger than 5 years old and causes their blood vessels to swell.

The findings, published in the peer-reviewed journal JCI Insight, may guide the development of a new treatment for the approximately 20% of children with Kawasaki disease who are not helped by current standard therapy. They also suggest a new biological marker clinicians can use to measure disease severity.



The latest research from Cedars-Sinai Guerin Children's investigators has advanced our understanding of the role that blood platelets (shown here in dark purple) play in Kawasaki disease. Photo by Getty.

Without timely treatment, Kawasaki disease can damage the heart and its arteries, causing coronary artery abnormalities such as dilatation and aneurysms.

"We now have a better understanding of how this disease attacks blood vessels, which we can use to develop new therapies," said Moshe Arditi, MD, executive vice chair of the Department of Pediatrics for Research, part of Guerin Children's, and corresponding author of the study.

Moshe Arditi, MD
Photo by Cedars-Sinai

Magali Noval Rivas, PhD
Photo by Cedars-Sinai

It was already known that children with Kawasaki disease typically develop an increased platelet count a few weeks after their first symptoms. But it was unclear until now if--and how--the platelets might contribute to cardiovascular damage.

Although rare, Kawasaki disease is the leading cause of acquired heart disease in children and adults in the U.S. The disease was first described in Japan by pediatrician Tomisaku Kawasaki in 1967.

The first symptom of Kawasaki disease is usually a sudden fever that lasts several days. The disease can also cause a rash, swelling in the hands and feet, red eyes, swollen lymph nodes and other symptoms. Scientists hypothesize that Kawasaki disease is triggered by a viral infection, but its exact cause is not yet known.

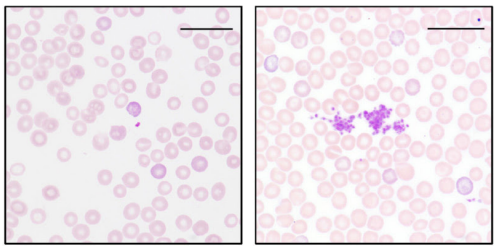
The standard treatment regimen for Kawasaki disease is an initial round of intravenous immunoglobulin (IVIG), which is meant to strengthen the body's immune system, and high- to moderate-dose aspirin to address acute inflammation, followed by low-dose aspirin for an anti-platelet, blood-clotting effect.

In previous studies, scientists such as Arditi and colleagues reported that a group of proteins involved in the body's inflammatory response called interleukin-1 might contribute to damage in the heart and blood vessels of children with Kawasaki disease.

Arditi and colleagues reported that two inflammatory molecules, IL-1α and IL-1β, which signal through the interleukin-1 receptor, induce heart damage and aneurysm formation in laboratory mice with a Kawasaki-like illness. They also have discovered that treatments that work against IL-1 molecules or against the interleukin-1 receptor may prevent coronary artery lesion formation. Their work has led to clinical trials involving a treatment called anakinra, which suppresses and blocks the function of the interleukin-1 receptor.

In their latest study, investigators describe the interactions between platelets and monocytes, which are a type of white blood cell. The three classes of cells that circulate in blood are white blood cells, red blood cells and platelets.

To reach these findings, Arditi and colleagues analyzed blood samples from children with Kawasaki disease and discovered the genes involved in the activation of platelets are overexpressed more frequently during intense phases of the disease.



Pictures of blood smears from laboratory mice with a Kawasaki-like illness (right) show an accumulation of platelets as compared with blood smears from laboratory mice without Kawasaki disease (left). Image by Cedars-Sinai.

The investigators also studied laboratory mice with Kawasaki-like inflamed blood vessels and noted increased platelet counts. In addition, they observed the formation of monocyte-platelet aggregates (MPAs), which occur when platelets bind to monocytes. Platelets and MPAs are known to increase production of interleukin-1.

"It is likely MPAs amplify the production of IL-1βs and thus stimulate inflammation that causes vascular damage," said Magali Noval Rivas, PhD, Associate Director of the Infectious and Immunological Diseases Research Center and assistant professor of Pediatrics and Magali Noval Rivas, PhD Biomedical Sciences at Cedars-Sinai, and another senior author of the study.

Investigators observed that laboratory mice with a Kawasaki-like illness and a higher number of MPAs also had increased IL-1β formations and were more likely to have vascular lesions. When the investigators used certain drugs to deplete the platelets in mice, which led to less MPA formation, the severity of the blood vessel inflammation and lesions decreased.

"These findings support a strategy involving therapy to block MPA formation, especially in children whose bodies don't respond to IVIG, and at the end emphasizes the importance of anti-IL-1 therapies in Kawasaki disease patients," said Arditi, who is also the GUESS?/Fashion Industries Guild Chair in Community Child Health and leads the Infectious and Immunologic Diseases Research Center at Cedars-Sinai.

"MPAs could also serve as a potential marker of disease severity that could help with tailoring the intensity of treatments."

Other Cedars-Sinai investigators involved in the study include Youngho Lee, PhD; Nobuyuki Nosaka, MD, PhD; Masanori Abe, MD, PhD; Daisy Martinon; Malcolm Lane; Debbie Moreira; Shuang Chen, MD, PhD; and Rebecca A. Porritt, PhD.

"This study and others from Arditi and colleagues are laying the groundwork for a significantly different treatment landscape for children with Kawasaki disease," said Ophir Klein, MD, PhD, executive director of Cedars-Sinai Guerin Children's and the David and Meredith Kaplan Distinguished Chair in Children's Health.

Arditi and colleagues continue to study the processes involved in the development of cardiovascular lesions in Kawasaki disease and potential ways to block MPAs and IL-1 pathways.

Funding: The study was funded by the National Institutes of Health (award numbers R01AI072726, R01HL139766, R01HL159297 and R01AI157274).

OCTOBER

23RD

TCT 2023
San Francisco, California, USA
https://tct2023.crfconnect.com/register?utm_source=08082023&utm_medium=email&utm_campaign=tct2023&utm_content=tct_program_directors_and_faculty_emory--btn

28TH

13th Annual UCLA Fetal Echocardiography Symposium
Westwood, California, USA
https://events.medschool.ucla.edu/event/fetalcardiac23

NOVEMBER

10TH-11TH

CSI FOCUS LAA 2023
Frankfurt, Germany
https://www.csi-congress.org/laa

15TH-17TH

CSI America - Catheter Interventions in Congenital, Structural and Valvular Heart Disease and Heart Failure
Orlando, Florida, USA
https://www.csi-congress.org/laa

22ND-23RD

ALICE 2023
Essen, Germany
https://alice-the-course.info/

DECEMBER

8TH-9TH

CSI FOCUS D-HF 2023
Frankfurt, Germany
https://www.csi-congress.org/dhf

ŌNŌCOR Signs an Exclusive US Distribution Agreement with B. Braun Interventional Systems Inc.

ŌNŌCOR LLC, a medical technology company dedicated to developing essential safety tools and other facilitating technologies for the modern-day catheterization lab, today announced that they have signed an exclusive distribution agreement with B. Braun Interventional Systems Inc. (BIS) as an important next step in preparation for the commercial launch of the ŌNŌ Retrieval Device in the US.

Under the agreement, BIS will initiate the US commercialization activities for ŌNŌCOR's ŌNŌ Retrieval Device. Through the collaboration, ŌNŌCOR positions itself for success as an innovator of safety technology in the growing market of catheter-based interventions, while BIS expands its portfolio around its strong congenital and structural heart focus.

The ŌNŌ is a novel device designed to receive, align, compress and remove material (non-biologic and biologic) from the vascular system. The ŌNŌ is intuitive to use and is compatible with commercially available vascular sheaths, endovascular snares and other graspers. It is designed to make catheter-based retrieval less tedious, faster and safer as well as mitigate the need for remedial surgical procedures. The ŌNŌ received FDA clearance in May 2022.

"We are very pleased to partner with ŌNŌCOR to bring the novel and highly anticipated ŌNŌ Retrieval Device to the market," said Peter Flosdorf, Director, Upstream Marketing and Portfolio Strategy, who led the establishment of a partnership between the two companies for B. Braun Interventional Systems. "The ŌNŌ pushes the boundaries of how we can serve the needs of congenital and structural heart interventional cardiologists and the patients they treat. Our shared dedication to innovation in safety technologies and expanding the capabilities of transcatheter interventional procedures position the collaboration between our companies for long-term success."

The ŌNŌ has been used at select US catheterization labs since 2022. The teams at ŌNŌCOR and BIS plan to conduct a limited launch of the retrieval device this summer with the full launch planned for the PICS Society Annual Symposium in August.

"We've always believed that the ŌNŌ would be a tool that helps physicians safely expand the scope of minimally invasive procedures," said Mark Piper, CEO of ŌNŌCOR. "We are thrilled to have entered into an agreement with B. Braun Interventional Systems that will allow every interventionalist performing a catheter-based procedure to have an ŌNŌ device at hand."

Two dozen ŌNŌ clinical use cases have been accomplished thus far, including several published case reports by early users. Additionally, clinical evidence on the use of the ŌNŌ Retrieval Device been recently presented at several scientific meetings, including, the SCAI Scientific Sessions 2023, and the CSI Frankfurt 2023 meeting.

*The ŌNŌCOR LLC ŌNŌ retrieval device is indicated for use in the cardiovascular system to retrieve foreign objects using minimally invasive procedures. For complete instructions and other important safety information for the ŌNŌ, please refer to the Instructions for Use.

About ŌNŌCOR

ŌNŌCOR LLC is a medical technology company dedicated to developing essential safety tools and other facilitating technologies for the modern-day catheterization lab. For more information, please go to www.onocorvascular.com.

About B. Braun Interventional Systems

B. Braun Interventional Systems offers interventional solutions designed with the patient in mind. Many of the products offered have been developed in response to the needs of physicians, technicians, and nurses. The company is committed to delivering safety, precision and convenience to interventional procedures. B. Braun Interventional Systems Inc. is part of the B. Braun Group of Companies in the U.S., which is headquartered in Bethlehem, Pa., and includes B. Braun Medical Inc., Aesculap® and CAPS®.

Globally, the B. Braun Group of Companies employs more than 64,000 employees in 64 countries. Guided by its Sharing Expertise® philosophy, B. Braun continuously exchanges knowledge with customers, partners and clinicians to address the critical issues of improving care and lowering costs. To learn more about B. Braun Interventional Systems Inc., visit www.bisusa.com/about-us and connect with B. Braun Interventional Systems on LinkedIn.

CONGENITAL CARDIOLOGY TODAY

CORPORATE OFFICE

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Sarasota, FL 34232 USA

OFFICIAL NEWS & INFORMATION PARTNER OF

PICS Society

Pediatric *and Congenital* Interventional Cardiovascular Society

ISSN 1554-7787 print. ISSN 1554-0499 electronic.
Published monthly.