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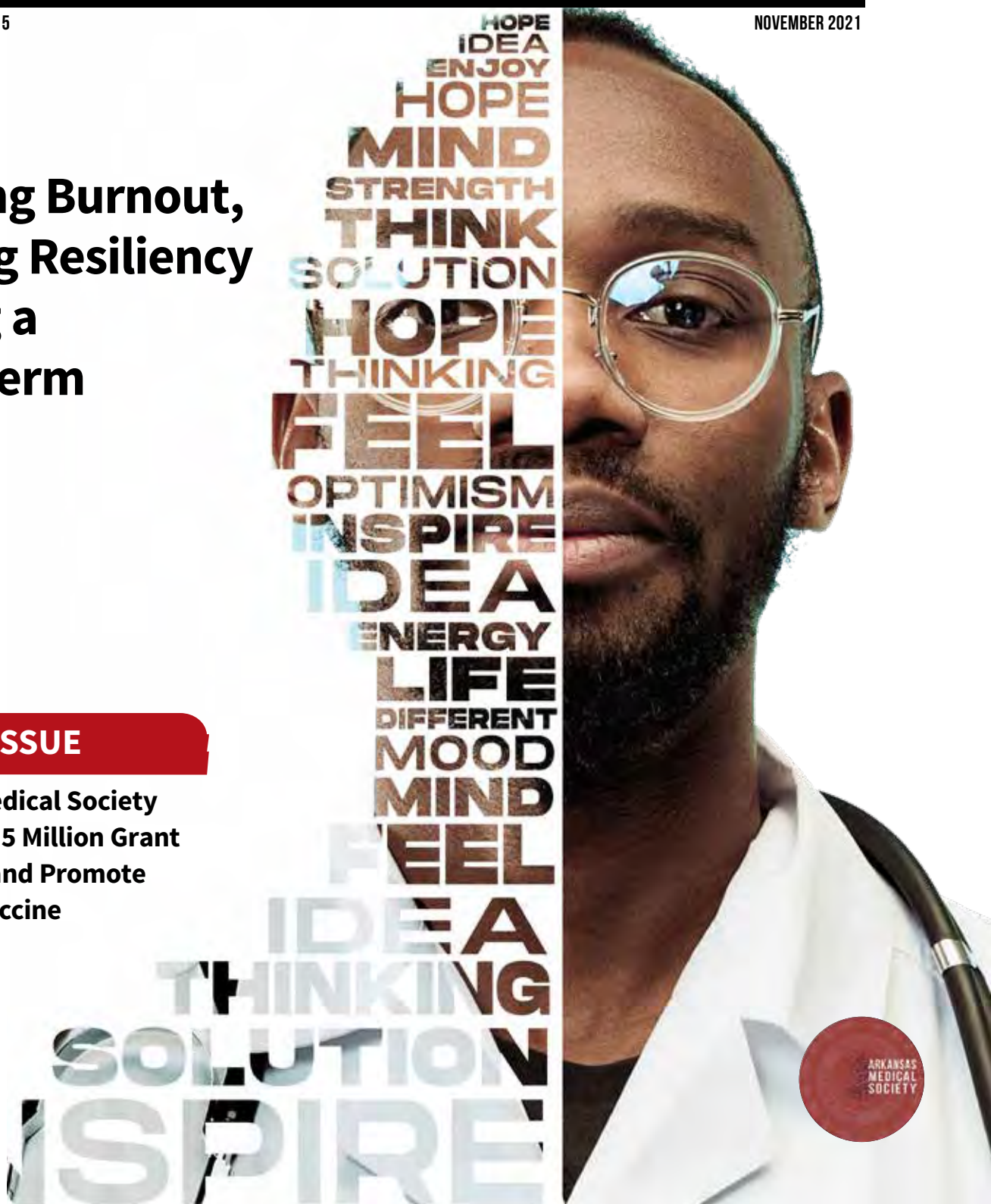
Fighting Burnout, Finding Resiliency During a Long-term Crisis



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COVER STORY

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BY MANISH JOSHI MD, FCCP; THADDEUS BARTTER, MD, FCCP; ANITA JOSHI, BDS, MPH

Delta Variant Surge and Covid-19 Surveillance Gaps - A Step Backward?

"When studying any matter, ask yourself two things: what are the facts and what is the truth that the facts bear out. Never let yourself be diverted by what you wish to believe, or what you think would have beneficent social effects if it were believed. Look only and solely at what are the facts."

- Bertrand Arthur William Russell, logician and Nobel laureate on evidence and data analysis (1959).

As the delta variant surges in the U.S. and across the globe, we are at another crossroads with this pandemic. There may be more to come; the pandemic is not over, and assiduous data collection would arm us to better prepare for the next variant or the next virus. We are dismayed by recent reversal by the Centers for Disease Control (CDC) on testing and surveillance recommendations for vaccinated individuals.[1] The decision not to collect data on breakthrough COVID-19 infections (unless associated with hospital admission or death) will leave gaps in our data base. Data is the lifeblood of scientific truth, and we believe that the CDC is going in the wrong direction with this change in policy.

Breakthrough infections are expected from every vaccine. Gathering data from breakthrough infections – in terms of incidence, transmission (from vaccinated to vulnerable and vice versa), variants, and hospitalizations – is paramount for public health efforts. To best understand infection and transmission, we need to look at several categories: those who are 1) previously infected and fully vaccinated, 2) previously infected and unvaccinated, 3) previously infected and partially vaccinated (one dose of a two-dose regimen), 4) fully vaccinated and never infected, 5) partially vaccinated and never infected and 6) neither infected nor vaccinated. Ignoring these categories generates misinformation. For example, data to date is highly suggestive that prior infection confers immunity equal to (and perhaps better) than that from full vaccination;[2-6] the insertion of persons previously infected in the unvaccinated group will falsely lower the benefits from vaccination and, vice versa, including those individuals in the vaccinated group leads to overestimation of vaccine effectiveness.

We also need to further investigate and refine our understanding of individuals for whom vaccination is not effective. Per available last detailed data in May 2021 from the CDC, >10,000 breakthrough infections (two or more weeks after full vaccination) have been reported in the U.S., with a mortality of ~2%.[7] The cumulative data from individual states, however, estimates that the number currently exceeds 100,000 breakthrough cases and over 1,000 deaths. The data raises important questions.[8,9] Can a lack of vaccine efficacy be documented by a lack of antibodies after vaccination? What categories of patient – immune status, age, etc. – are associated with ineffective immunity leading to breakthroughs? These questions directly impact patient care and advice.

Public messaging and scientific endeavor are entirely different. While messaging is a crucial aspect of the communication of scientific information to the public, messages need to be simple, consistent, and repetitive. In generating these messages, subtleties and some truths at times must be sidestepped. On the other hand, the scientific approach cannot be based upon a simplification of data collection. As noted above, ignoring prior infection in a study of COVID-19 can distort the data (and do it variably, dependent upon the incidence of prior infection in a population). Findings and data about vaccination should be "pre-tested" and "post-tested" with a rigor not evident in subsequent public messaging. Emergency approval of vaccines by the FDA was based upon pre-testing. Assiduous surveillance is now needed. A decision by the CDC not to track all breakthrough cases deprives us of foundational knowledge.

The CDC is uniquely qualified for the task of detailed data collection. As the delta variant currently surges in all 50 U.S. states, we hope the CDC will reverse this decision, as it impairs our capacity to understand, anticipate, and advise.

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*The **Journal of the Arkansas Medical Society** encourages commentary from all members. The commentary content does not necessarily reflect the views or opinions of the staff or officers of the membership in general.*

Holmes Joins AMS as Director of Practice and Health Policy

Tereasa Holmes, CMPE, has joined the Arkansas Medical Society as director of practice and health policy. In this new role, Holmes will provide personalized support for physicians and their clinical staff on the day-to-day practice operations, including assistance with commercial insurance and state-funded programs. She will be staying up to date on health policies and developing ongoing educational opportunities for physicians and staff. In addition to these duties, Holmes will also be maintaining a resource library for clinic management on topics such as billing, coding, medical records, and personnel issues, as well as providing project management support on the AMS Fight Covid project supporting physicians in the fight against COVID-19 (see page 102).

TEREASA HOLMES, CMPE

With over 30 years experience in all phases of clinical practice management and health care policy, Holmes has served on various committees representing providers, insurance carriers, and health care clients. In her previous position with Arkansas Foundation for Medical Care as director of beneficiary relations, she developed policies and procedures, monitored quality assurance measures, and assisted with preparation of grants and proposals. Holmes participated in meetings and developed professional relationships with various stakeholders, which enabled her to assist providers and beneficiaries in numerous federal and state health care programs.

She obtained the Adverse Childhood Experiences, Trauma and Resilience certification with the Community Resilience Initiative in Washington state and has served on the Adverse Childhood Experiences Coalition through AFMC. She conducted presentations to various organizations in the health care arena, educating on the awareness of trauma and resiliency.

Before coming to AFMC in 1999, Holmes worked in the private insurance industry, where she was responsible for providers' professional development and contracts. Her experience includes serving as clinic administrator in a private clinic setting, daily organizational management, staff education, and maintaining current policies.

She is a Certified Medical Practice Executive (CMPE) and is pursuing a Fellow through the American College of Medical Practice Executives. Holmes is a member of the National and Arkansas Medical Group Management Association. She is co-author of an article published in Clinical Publications, "Comparison of Office-Based Versus Outbound Immunization Recall Services." She has served as a certified facilitator for Alzheimer's Arkansas in support groups within central Arkansas and is a gifted motivational speaker.

With over 30 years' experience in all phases of clinical practice management and healthcare policy, Holmes has served on various committees representing providers, insurance carriers and health care clients.

Arkansas Medical Society Awarded $1.5 Million Grant from ADH to Bolster Support for Physicians, Clinics in Fight Against COVID-19

In an effort to increase the state's vaccine distribution efforts, the Arkansas Medical Society has been awarded a $1.5 million grant from the Arkansas Department of Health (ADH) to implement a three-year project to improve COVID-19 vaccination rates across the state and increase vaccine confidence. AMS will launch a series of initiatives to provide resources and programs for physicians in an effort to help their patients and their communities in the fight against the COVID-19 pandemic while also working with the public to encourage vaccination.

Utilizing funding from the grant, AMS will develop and facilitate education and training tools to ensure that clinics understand the guidelines and requirements for the COVID-19 vaccine program. Following guidelines put in place by state and federal officials, this program will focus on proper identification of patients, counseling, receiving and storage of vaccines, scheduling and screening of patients, post-vaccine screenings, tracking, and data reporting to the ADH. Clinics who are interested in joining this program will also have the opportunity to receive mini-grants from AMS to help eliminate equipment gaps of the necessary supplies to keep patients and staff safe.

Working with professional services provided by MHP/Team SI, AMS will launch a cohesive marketing campaign surrounding promotion and patient engagement that will include hosting community events and creating printed and video material, as well as creating and distributing social, digital, and television advertising and other paid media encouraging Arkansans to get vaccinated. Additionally AMS will launch enhanced communication to educate and prepare physicians to be successful participants in its vaccine programs and will assist clinic staff with education by providing printed materials to disseminate to patients.

"Our organization is dedicated to supporting Arkansas physicians and clinics in a variety of ways and, during the early days of the pandemic, we were eager to be an integral part of PPE distribution efforts across the state," said David Wroten, executive vice president of AMS. "Now, we will continue to apply our expertise and service to assist with the ADH's mission to not only improve vaccination rates but also increase vaccine confidence across the state."

AMS President Danny Wilkerson, MD, said, "I'm proud that AMS continues to step up to assist with improving vaccination rates in Arkansas, which aligns with our mission to serve the physicians of Arkansas so they can better serve their patients."

To learn more about the organization's efforts to increase vaccination rates across the state and bolster vaccine confidence, visit ARKMED.org/covid19.

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amsbenf@arkmed.org
ARKMED.org/resources/AMSBenefits
501-224-8967
Agency NPN# 1650351
NPN# 1653222
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BY CASEY L. PENN

MICHAEL BOLDING, DO. PHOTO COURTESY OF WASHINGTON REGIONAL MEDICAL CENTER.

Fighting Burnout, Finding Resiliency During a Long-term Crisis

In "normal" life, professional burnout for physicians and medical personnel is often brought on by exhaustion, a lack of work-life balance, increased work demands, and changes to the health care system. The health care climate over the past 18 months has been far from "normal." Since the start of the pandemic, Arkansas has seen nearly 500,000 cases of COVID-19 and more than 7,000 deaths. Burnout factors are at an all-time high as hospital beds remain full. Physicians and staff have worked tirelessly for months on end – often isolated from friends and family, and the delta variant continues spreading through our state and nation.

Erick Messias, MD, MPH, PhD, formerly of UAMS, now professor and chair of the Department of Psychiatry and Behavioral Neuroscience for Saint Louis University School of Medicine, is seeing the same situation in his new post as he saw in Arkansas. "The health care workforce is exhausted by the pandemic – like everyone else but worse," said Dr. Messias. "Some good news is that positive emotions like hope and motivation are still highly prevalent in health care. A significant majority express hope that life returns to normal 'in early 2022.'"

Unfortunately, high hopes for a return to normal during this epidemic have been dashed before. "A lot of us, even experts like myself that do this for a living, thought the worst was behind us around March 2021, when hospitalizations and cases decreased so much," said Amanda Novack, MD, medical director of Infection Prevention for Baptist Health Systems and medical director of Antimicrobial Stewardship. "It wasn't fathomable that we would find ourselves in this situation again when we have a pretty good preventative treatment. It's a whole new ball game. It's a different level of fatigue that people are dealing with right now."

Michael Bolding, DO, a hospitalist and one of two main attending physicians for COVID-19 patients at Washington Regional Medical Center in Fayetteville, compared the current climate to a race with no finish line. "In a race, they give you the elevation chart ahead of time. You know when you'll have to run harder and when you can coast," explained Bolding, who is also an avid runner. "We haven't had that luxury with this pandemic. When I signed on to do this in March of 2020, I knew it was going to be crazy. I thought, 'We'll be full of patients, and I'll probably have to move into the hospital and not see my family for a while … maybe six months max.' And our team, when we saw a big peak in the summer, we were like, 'Well, that was certainly *not* fun. Some days were nightmarish, but we did okay.' But when the vaccination rate got to 39% and stayed there, we saw it coming again. When it came back strong, it was – in a word – defeating."

> **"It's a whole new ball game. It's a different level of fatigue that people are dealing with right now."**
> *– Amanda Novack, MD*

Getting Stuck in Crisis Mode

So, it's a direly stressful situation that, for physicians more than most, just goes on and on and on. How do people *not* get burnt out in this situation?

The truth is, maybe it can't be entirely avoided. That's the conclusion that Dr. Novack came to earlier this year after experiencing burnout herself. Her story begins shortly after taking on the position of medical director of Infection Prevention. Often a part-time, behind-the-scenes job, the role became center-stage and demanding during the pandemic. "My contract started in December of 2019," she said, "and by the end of January 2020, six weeks before our first COVID case in Arkansas, I was sitting in meeting after meeting in preparation. There was a lot of speculation about how bad it would be."

By March 2020, cases were starting to be seen here in Arkansas, which brought growing amounts of pressure for Dr. Novack and her colleagues. "At that time, every outbreak, every positive employee, every new patient that turned positive was a new disaster that required crisis management," she recalled. Still, she was getting by all right, even as the days wore on. "At one point, I think I went 63 days without a day off. On Memorial Day weekend 2020, I turned off my phone. That was the first time I had gone 12 hours without a phone call. Over that summer – with the mask mandate in place – things kind of calmed down; still, I knew that fall, flu season, and respiratory virus season would be hard again, so I stayed in preparation mode.

AMANDA NOVACK, MD

Winter came, and her fears were realized. "It was exhausting … with so many employees out sick, so many patients, higher ER and ICU volumes," she said, "and by then, I was also treating COVID patients in our infusion clinic while managing the Infection Prevention program for the whole hospital system."

It wasn't until April of this year that the pace finally slowed for Dr. Novack. Only problem was, she couldn't follow suit. "I couldn't calm down. I found myself, physically, in a constant state of being wound up, anxious. I was being short with coworkers and getting riled up over issues that were important, but were not 'emergencies.' I began questioning whether I should be doing this job."

WASHINGTON REGIONAL MEDICAL CENTER IN FAYETTEVILLE. PHOTO COURTESY OF WASHINGTON REGIONAL MEDICAL CENTER

She was suffering from true burnout, she learned from her therapist. "I told her, 'The crisis is over, but I'm still so down, so sad. Nothing sounds good, and I feel like I can't catch my breath,'" said Dr. Novack, who compared her feelings to what soldiers might experience. "I don't mean to take away from the unique situation that soldiers face or to compare what I do to war, but it felt like a similar process, like trying to go from a [war-type] disaster to normal civilian life. That was a hard shift for me to make."

A Fresh Perspective

Dr. Novack took time off in June to recuperate. "It was about four weeks," she said, "and it took a couple of those weeks before I could sleep through the night, before I could feel like I was 'off' and let my guard down. And then, I spent a couple more weeks focused on immediate and extended family and reconnecting with friends that I had basically lost touch with for a year."

By the end of her respite, Dr. Novack felt capable of enjoying her work again – provided she made some changes. "I realized I would have to get back into a maintenance mode of not just putting out fires, but also long-term planning," she explained. "When it was time for me to come back, we saw cases going up again. Through those first weeks of July, I felt so grateful to have had that time. I didn't take time off to prepare for another crisis – I took it to get *out* of crisis mode – but it ended up giving me a chance to reprioritize and reorganize my brain … to let my body know that this isn't an emergency anymore. So as things started to build again, I had better coping mechanisms and, frankly, more self-compassion."

Taking time off initially led to feelings of embarrassment and even guilt for the high-level physician, who had to get past the culture of "toughing it out" that is common for physicians. "We tend to link being over-stretched to heroics," she said, "like we're superhuman for working 80 hours or not needing a vacation. And as a team member, there is a real sense that this is hard for everybody – why should *I* be able to take a break?

"In retrospect, what convinced me to do it – and what I used to comfort myself when I was doubting it — was recognizing that *someone* has got to fill up their tank. If we're all tired, none of us can be that good listener or that extra support for someone else."

Now, Dr. Novack tries to keep a fresh perspective in relation to time management and self-awareness. "I regularly acknowledge now that this is a crazy-hard job and I'm doing pretty good at it," she said. "I'm not going to be a super star every day. I'm letting go of that expectation. Instead of time management, I started thinking about energy management. I'm intentional about building the capacity for more energy – physical exercise is part of that as is putting healthy things in my body and having time to foster relationships in my life. I'm not always a winner at these things, but the time off has given me a chance to realize that burnout is, to some extent, inevitable with this sort of crisis, and it's not a failing. All humans need restoration. No one has limitless energy and resources."

Dr. Bolding, too, has learned lessons as he's gone through this pandemic. For example,

(CONTINUED ON PAGE 106)

he found out the hard way that he was taking too much of his burden home. He warned, "Physicians need to watch for this. My 13-year-old son is in counseling now because he got to a point where he just didn't want to have an opinion. He became passive and apologetic. When we got to the bottom of it, he was seeing what a nightmarish time I was having, and he didn't want to rock the boat. I wasn't coming home yelling at him or being angry, but he could see that maybe I was shorter than usual, or I would cry at things – I've never been a crier. He just wanted to make life at home so perfect because he knew what I was dealing with at work. Even if I went into another room, kids are smart. It's heartbreaking to see your son try to parent you and try to be the counselor to you. Whatever way I can get home and leave it at work, I've tried to do a better job at that."

But how do you decompress from the stressful workday if you can't bring the job home? For Dr. Bolding, a faith-based addiction recovery ministry has helped. "You know, physicians are a group that tries to handle things on our own. We need to lean on others who have training in this area," he said. "Celebrate Recovery works not specifically toward alcohol and drug addiction, but toward everything else. It's for whatever your bad habit or struggle is, and it's about breaking patterns of behavior. I went through steps with the group before the pandemic started and finished the steps during the first year. I can't credit that enough. I think mainly that helped me not to turn to unhealthy habits when overstressed."

To help relieve stress, Dr. Bolding runs three to five days a week in between patient care and has begun spending time in his backyard photographing birds. He also spends time offering vaccination-related advice on social media. "I enjoy just getting the message out there and hearing people say they've been vaccinated," he said. "Other things that help me through include patients that have messaged me with a 'thank you,' people in the community sending lunch, people telling our nurses, 'Thank you. We see you.' These things remind me that we're not alone."

Overcoming Burnout – A Little Help, Please

Ample research confirms a prevalence of burnout among physicians. Colin West, MD, PhD, is a professor of medicine, medical education, and biostatistics for The Mayo Clinic. In a July 2020 JAMA Network Open article, he noted recent national data suggesting that 44% of U.S. physicians experience symptoms of burnout, characterized by emotional exhaustion and/or depersonalization, at least weekly.

Increasing personal resiliency is often mentioned as a remedy for professional burnout, and we've seen through Drs. Novack's and Bolding's experiences the importance of building that individual resiliency. However, Dr. West stressed that physician burnout isn't necessarily a reflection on a physician's level of personal resiliency. In conducting research* related to physicians and how their resiliency levels compare with that of the general working public, West and others found that physicians are fairly resilient (6.49 on a scale of 8).

In a February 2021 American Medical Association webinar titled, "Physician burnout: It's not a resiliency deficit," Dr. West touched on the importance of both the individual and organizational sides to nurturing resiliency. "Self-care is important, relationships are important, and for different people, there are different aspects of mindfulness traditions or spirituality that can be important," he stated. "All of that said around individual strategies, there is a risk to an exclusively individual focus, and the concern is that this could actually deepen cynicism among physicians and other health care professionals through the perceived message that physicians have to 'toughen up' to cope with their working environment rather than addressing the working environment itself."

To become more resilient organizationally, Dr. West suggested that medical systems work on being value-oriented; providing adequate resources for physicians; promoting autonomy and flexibility in work-life balance; and promoting meaning, value, and purpose.

So what does "system" help for physicians and health care workers look like here in Arkansas? See our sidebar to see how one of our state's health systems works to nurture resiliency and sow support in its physicians and all medical staff.

Sources and Additional Resources

For more on burnout as it relates to physicians and resources to help with physician wellness within your organization, see our March 2021 *Journal* and these other helpful resources:

Articles and Webinars on Medical Burnout During COVID-19

https://www.aamc.org/news-insights/medical-burnout-breaking-bad

https://www.washingtonpost.com/health/2021/08/05/arkansas-covid-burnout-nurses/

JAMA Netw Open. 2020;3(7):e209385. doi:10.1001/jamanetworkopen.2020.9385
https://www.ama-assn.org/practice-management/physician-health/5-solutions-help-ease-physicians-covid-19-burnout

***AMA STEPS Forward™ Webinar (Feb 2021)**

"Physician burnout: It's not a resiliency deficit," Colin West, MD, PhD, and Christine Sinsky, MD

https://www.youtube.com/watch?v=p-IZFEzYqq0

Also mentioned in this webinar is the research done as part of an ongoing AMA-Mayo-Stanford partnership to conduct periodic national surveys of physician well-being in comparison to other individuals in the U.S. working population.

https://www.kff.org/report-section/kff-the-washington-post-frontline-health-care-workers-survey-toll-of-the-pandemic/

Need Help Personally?

The **Arkansas Medical Foundation** offers a wealth of resources for physicians in need of support.

https://arkmedfoundation.org/forms-resources.

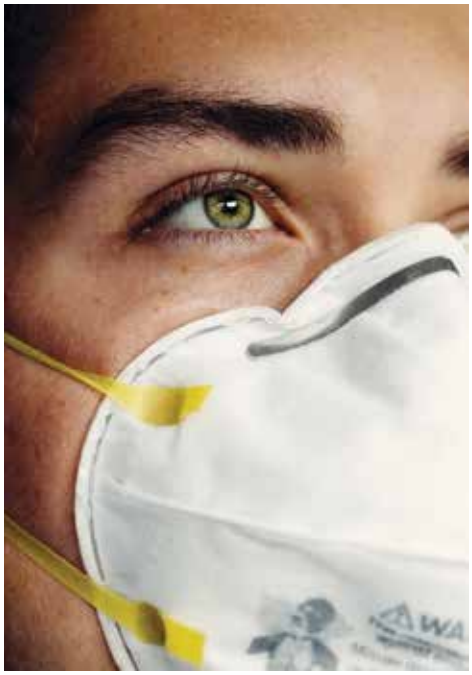
Support Line for Physicians

1-888-409-0141

The Physician Support Line is a free and confidential support line for physicians, staffed by over 600 volunteer psychiatrists. The website explains, "Because there is no formal doctor-patient relationship established, the call does not have to be reported to any medical board as therapy."

The service is only for physicians, but the website states that a similar service available to all front-line health care workers and first responders. **1-800-327-7451 (TTY 711)**

Sowing Support in One Arkansas Hospital



Hospitals throughout Arkansas have a variety of support systems in place for their physicians and staff. To get a more personalized idea of what resiliency support looks like from a health-system perspective, The Journal reached out to Birch G. Wright, administrator and chief operating officer for Washington Regional Medical Center, located in Fayetteville. Wright gave us an inside look at organizational support at WRMC.

What is the current situation at WRMC in relation to physician/staff well-being?

This current surge is the most serious situation we have encountered since the beginning of this 18-month pandemic. Since mid-June 2021, we have seen an exponential surge in the number of individuals hospitalized with COVID-19. The region is also seeing more critically ill non-COVID patients than at any other time during the pandemic. This is most likely due to patients putting off preventative care earlier in the year. These volumes are having an unprecedented impact on health systems in our region, including Washington Regional, largely due to the need for hospital nursing staff, respiratory therapy staff, ancillary staff, and availability of inpatient beds. Many patients are younger and sicker, even without co-morbidities. More than 90% of the hospitalized COVID patients in our region are not vaccinated, which makes this surge more frustrating than the winter surge, as most cases were preventable with vaccination.

This crisis is unique because normally if one health system is in crisis, we lean on others for support. During this pandemic, we are continually trying to maintain normal hospital operations, enhance our Centers of Excellence such as stroke and neuro care, joint care, and our Level II Trauma center while simultaneously balancing a pandemic of global proportions. We hear the phrase "the war against COVID," and some seem content to allow the frontline workers to fight the fight while they get back to their normal everyday lives. We all need to fight to overcome, and we need to support our 'soldiers.'

BIRCH WRIGHT, COO

How have you adapted to provide quality patient care, despite the strains on staff?

Our tiered surge plan allows us to shift resources and personnel to areas of greater need, which allows our team members to fill alternate roles and frees up some nurses and other qualified staff for direct patient care. We can scale our surge plan up or down based on the prevalence of the virus, positivity rates, daily census, and community needs. We focus continually on overall team wellness through consistent communication – rounding, weekly emails, town hall meetings, and support of our employee assistance plan.

It's hard to build resiliency during a long-term crisis. What's in place at WRMC to help physicians, nurses, and other health care workers cope and even destress during this ongoing trial?

The Northwest Arkansas community is one-of-a-kind! To help lift morale, they continue to provide an outpouring of support in various forms including cards and letters and donated meals and snacks. Community members have painted sidewalks with uplifting messages, held "pro" support rallies for hospital team members, and volunteered their time and energy to give breaks to those that need it most.

In-house, we have focused administrative rounding on staff, physicians, and surge teams to provide real-time communication and support and to address any unmet needs. We have also provided significant incentive bonuses for team members who take on additional shifts in areas of greatest need.

Our Employee Assistance Program offers counseling and mental health resources to all team members whenever, wherever, they need that assistance. Our chaplains have helped staff cope with their emotions and have offered decompression workshops.

Additionally, our RN New Graduate Residency program offers support to our nursing students and helps new graduates navigate through their first year at the bedside.

Finally, being the only locally owned, community governed non-profit health system in the area allows the board of directors great latitude in allowing Washington Regional to meet our mission. The support of the board of directors and the local community has allowed us to improvise, adapt, and overcome any challenges that we have faced.

We hear the phrase "the war against COVID," and some seem content to allow the frontline workers to fight the fight while they get back to their normal everyday lives. We all need to fight to overcome, and we need to support our 'soldiers.'

– Birch Wright, COO

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A CLOSER LOOK

EDITORIAL ADVISOR: Chad T. Rodgers, MD, FAAP, CPE

Role of Monoclonal Antibodies in COVID 19: A Changing Landscape

ATUL KOTHARI, MD, FIDSA[1,2,3] AND RYAN DARE, MD[2,4]

The earliest application of antibodies for the treatment of infections can be traced back to the late part of the 19th century, with the use of sera for the treatment of diphtheria[1]. This crude treatment was later replaced by purified antibodies from pooled sera, intravenous immunoglobulin. Monoclonal antibodies are another approach to fighting viral infections. These are laboratory-made proteins that mimic a person's immune system's ability to fight off harmful viruses. Monoclonal antibody therapy has been used extensively in viral infections, with Food and Drug Administration (FDA) approved products available for treating respiratory syncytial virus and ebola[1].

Monoclonal neutralizing antibodies directed against severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) spike protein have been developed by isolating B-cells from individuals recovered from COVID-19 illness. DNA from these specific B cells is inserted into cell culture to mass-produce the antibodies in vitro. These monoclonal neutralizing antibodies can then be directly infused into patients. They bind to the virus particles blocking them from entering human cells or tagging the virus antibody complex for destruction by the immune system[2].

In November 2020, the FDA issued emergency use authorization (EUA) of 2 products: bamlanivimab[3] and the combination of casirivimab and imdevimab (REGEN-CoV)[4] for the treatment of mild to moderate COVID-19 illness in patients 12 years of age or older at high risk of progressing to severe disease. Subsequently, in February 2021, etesevimab received FDA EUA to be used with bamlanivimab[5]. Use of casirivimab/imdevimab or bamlanivimab/etesevimab has both been shown to decrease the risk of admission or 28-day mortality by 70% [6, 7]. The US Department of Health and Human Services (HHS) distributed these products free of cost.

In vitro studies have shown decreased activity of both bamlanivimab and bamlanivimab/etesevimab against beta and gamma variants[8, 9]. With the increased circulation of these SARS-CoV-2 variants of concern in the United States, EUA for bamlanivimab was revoked (April 2021)[10], and shipments of bamlanivimab/etesevimab have been paused (June 2021)[5].

Most recently, sotrovimab was granted EUA by the FDA due to clinical trial data showing an 85% risk reduction in hospitalizations or death within 28 days[11, 12]. Thus, currently, there are two EUA monoclonal antibody products available to treat COVID-19: REGEN-CoV (distributed by HHS) and Sotrovimab. Both products retain activity against the delta variant, which is the primary driver of cases nationally[8, 12].

As the evidence from different clinical trials has accumulated, the FDA has made several revisions to the original EUAs, expanding the criteria used to determine high-risk status in patients. Monoclonal antibodies are not authorized for use in patients hospitalized due to COVID 19 or those requiring oxygen therapy due to COVID-19. In June 2021, based on pharmacokinetic data, REGEN-CoV was authorized to be given by subcutaneous route in addition to intravenous infusion. In July 2021, REGEN-CoV was authorized for post-exposure prophylaxis in certain high-risk settings (Table 1).

This was based on clinical trial data, which showed an 81% reduction in the development of symptomatic COVID 19 when this therapy was used in household contacts of infected individuals[6].

In Arkansas, monoclonal antibody therapy for COVID 19 is provided in a wide variety of settings, including hospital-associated infusion clinics, ERs, urgent care clinics, doctors' offices and pharmacy locations. Mobile clinics have been organized in correctional facilities and nursing homes in response to outbreaks of COVID 19. In-home therapy through home infusion services is available in some parts of the state. Statewide utilization of REGEN-CoV increased by >1000% between July and August 2021 (data supplied by HHS through tele-tracking).

While significant strides have been made in the widespread availability of monoclonal antibody therapy in Arkansas, several challenges remain. Twenty-one (28%) out of 75 Arkansas counties still do not have a local site where patients can access early treatment. In addition, patients who do not have an established primary care provider often encounter barriers in accessing care in the more rural parts of the state.

Real-world data from Arkansas has shown that monoclonal antibody therapy is safe and highly effective in the early treatment of COVID-19 infection. We believe that innovative approaches will be needed to overcome barriers, e.g., using telehealth services for patient evaluation followed by subcutaneous therapy in local pharmacies or home infusions. Collaborative agreements between primary care practices and local pharmacies may be a model, which allows care to be made available closer to the patient's home. As our current delta surge subsides, we expect the demand for monoclonal antibody therapy to drop. However, we must remain ever vigilant against newer viral variants and be prepared to reactivate the existing infrastructure of infusion clinics, pharmacies and home infusions in future surges. Newer monoclonal antibody therapies are in the pipeline and may offer more options to patients and providers in the face of a rapidly evolving virus. Monoclonal antibody therapy has changed our paradigm from test and isolate to test and treat. ▲

Table 1: Indications for post-exposure prophylaxis with REGEN CoV:

- Individuals who are not fully vaccinated or who are not expected to mount an adequate immune response to complete SARS-CoV-2 vaccination (for example, people with immunocompromising conditions, including those taking immunosuppressive medications[1]), and
  - have been exposed to an individual infected with SARS-CoV-2 consistent with close contact criteria per Centers for Disease Control and Prevention (CDC), or
  - who are at high risk of exposure to an individual infected with SARS-CoV-2 because of occurrence of SARS-CoV-2 infection in other individuals in the same institutional setting (for example, nursing homes or prisons)

Prophylaxis with REGEN-COV is not a substitute for vaccination against COVID-19. REGEN-COV is not authorized for pre-exposure prophylaxis to prevent COVID-19 before being exposed to the SARS-CoV-2 virus – only after exposure to the virus.

1. www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/fully-vaccinated-people.html

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Author affiliations:
1. Arkansas Department of Health, Little Rock, AR 72205
2. Department of Medicine, University of Arkansas for Medical Sciences, Little Rock, AR 72205
3. Department of Bioinformatics, University of Arkansas for Medical Sciences, Little Rock, AR 72205
4. Baptist Health Medical Center, Little Rock, AR 72205

"The views expressed in this paper are not necessarily those of the Arkansas Department of Health."

BY GARRETT N. KLUTTS, MD;[1] NINA BONWICH, MD[1]

[1]UNIVERSITY OF ARKANSAS FOR MEDICAL SCIENCES , LITTLE ROCK, ARK.

Amyand's Hernia: A Rare Presentation of an Inguinal Hernia

Introduction

An inguinal hernia repair is a common operation performed by surgeons that accounts for more than 700,000 operations in the U.S.[1] In 0.1% of inguinal hernia repairs, the appendix is found in the hernia sac.[2] This was first recognized by Claudius Amyand in 1735 and is known as Amyand's hernia. This is a case report of the management of Amyand's hernia as well as a review on the topic.

Case

A 62-year-old male presented to the general surgery clinic with a right groin bulge after a previous laparoscopic right inguinal hernia repair a decade prior. He reported a two-year history of worsening right groin bulge with discomfort on physical exertion. On physical exam, he had a reducible bulge in his right groin. Based on his clinical presentation, a recurrence of his right inguinal hernia was diagnosed. He was scheduled for an open right inguinal hernia repair. In the operating room, once dissection and isolation of the hernia sac were achieved, the sac was opened, and the cecum and the appendix were found within – consistent with Amyand's hernia (Figure 1). The appendix and cecum both appeared healthy, therefore no resection was performed. The hernia was repaired in Lichtenstein fashion. He had no complications.

Discussion

The clinical diagnosis of Amyand's hernia is identical to an inguinal hernia, with the patient presenting with a tender inguinal bulge. Therefore, this is usually not appreciated until the patient is in the operating room. An Amyand's hernia is almost exclusively found in a right-sided inguinal hernia, given the location of the appendix, and is more common in males.[3] Preoperative imaging (CT or ultrasound) can lead to a diagnosis of an Amyand's hernia prior to an operation.[4] Management is dependent on the clinical scenario, most notably the appearance of the appendix, and guidelines have been published by Losanoff and Basson.[5] This stratifies the hernia as type one through four, with management recommendations depending on the type (Table 1).[5]

FIGURE 1.

Conclusion

The incidence of an Amyand's hernia is rare but includes two of the most common pathologies seen by a surgeon. Given the high volume of inguinal hernia repairs performed by surgeons, an Amyand's hernia is likely to be encountered during one's career. Having a basic understanding of the entity, along with a treatment algorithm, will help a surgeon be prepared for its management.

Type of Hernia	Features	Surgical Management
1	Normal appendix	Reduction or appendectomy (depending on age), mesh hernioplasty
2	Acute appendicitis localized in the sac	Appendectomy through hernia, endogenous repair
3	Acute appendicitis, peritonitis	Appendectomy through laparotomy, endogenous repair
4	Acute appendicitis, other abdominal pathology	Appendectomy, diagnostic workup, and other procedures as appropriate

TABLE 1.

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BY AMY E. HUDSON;[1] NINA COPELAND, APRN;[2] AMY R. HUDSON, MD[3]

[1] JUNIOR, MOUNTAIN BROOK HIGH SCHOOL, MOUNTAIN BROOK, AL.
[2]NURSE PRACTITIONER, JOHNSON DERMATOLOGY, FORT SMITH, ARK.
[3]DERMATOPATHOLOGIST AND LABORATORY DIRECTOR, JOHNSON DERMATOLOGY, FORT SMITH, ARK.

Group Trip Results in Cutaneous Parasitic Infections in Three Patients: Case Study with Clinical and Histopathological Findings

Abstract

Following a trip to a remote region of the Bolivian Amazon, three patients developed similar skin lesions. All three patients eventually presented to the same dermatology clinic for evaluation. We present the clinical and histopathological findings and the confirmatory test results from the Centers for Disease Control & Prevention (CDC).

Case Reports

Approximately one month after a group trip to a remote region of the Madidi National Park in the Bolivian Amazon, a 63-year-old college professor, the organizer of the trip, developed a non-healing lesion on his left arm. His primary care physician prescribed topical antibiotic ointment (type unknown), and a seven-day course of Bactrim DS BID; there was no improvement.

Communication among members of the travel group revealed that several people had similar cutaneous lesions. After researching infectious diseases endemic to the region they visited, the professor developed a high index of suspicion for leishmaniasis as a possible etiology and presented to a dermatology clinic for evaluation.

Upon examination, he had a red annular plaque with a central crust on his left arm above the elbow, approximately 3 cm in greatest dimension (Figure 1). He reported occasional stinging, burning, and oozing from the lesion. Two 6 mm punch biopsies were performed. One biopsy was processed for routine histologic evaluation, and the other biopsy was sent to the Centers for Disease Control & Prevention (CDC) for *Leishmania* species identification. The patient was treated with topical gentamicin sulfate 0.1% ointment TID until pathology results became available. Small satellite lesions subsequently developed on the same arm following his initial visit to the dermatology clinic.

FIGURE 1: RED ANNULAR PLAQUE WITH CENTRAL CRUST ON LEFT UPPER ARM OF INITIAL PATIENT.

Routine histologic sections of one punch biopsy showed a marked lymphoplasmacytic and histiocytic infiltrate involving the dermis and subcutis, with zones of tissue degeneration. Abundant organisms morphologically compatible with *Leishmania* were visible in some areas (Figure 2). *Leishmania* PCR and DNA sequencing performed by the CDC on the second punch biopsy confirmed *Leishmania braziliensis* as the species, and *Leishmania* microscopy was reported as positive by the CDC. The patient was referred to an infectious disease physician for treatment. After considering his options, the patient elected to take oral Miltefosine rather than intravenous Amphotericin B. His skin lesions resolved over time, leaving a depressed scar at the site of the initial lesion. No subsequent systemic findings developed.

Two additional members of the travel group (ages 61 and 22) presented to the same dermatology clinic with similar skin lesions a week after the initial patient and were biopsied in the same manner. Histologic evaluation of the 61-year-old patient's right lower leg lesion revealed similar histologic features, but with a smaller number of visible organisms. The CDC reported *Leishmania braziliensis* by *Leishmania* PCR and DNA sequencing and positive *Leishmania* microscopy as well. Histologic findings on the 22-year-old patient's biopsy from left lower leg included extensive necrotizing granulomatous inflammation within the dermis and extending into the subcutis. However, definite parasitic organisms were not identified histologically. The CDC evaluation demonstrated *Leishmania braziliensis* by PCR and DNA sequencing, and the microscopy results were reported as negative for *Leishmania* organisms, concurring with the initial dermatopathologist's impression of no visible organisms. The additional patients were also referred to an infectious disease specialist for treatment.

Discussion

Leishmaniasis is caused by any of the over 20 species of this protozoan parasite. Infection is

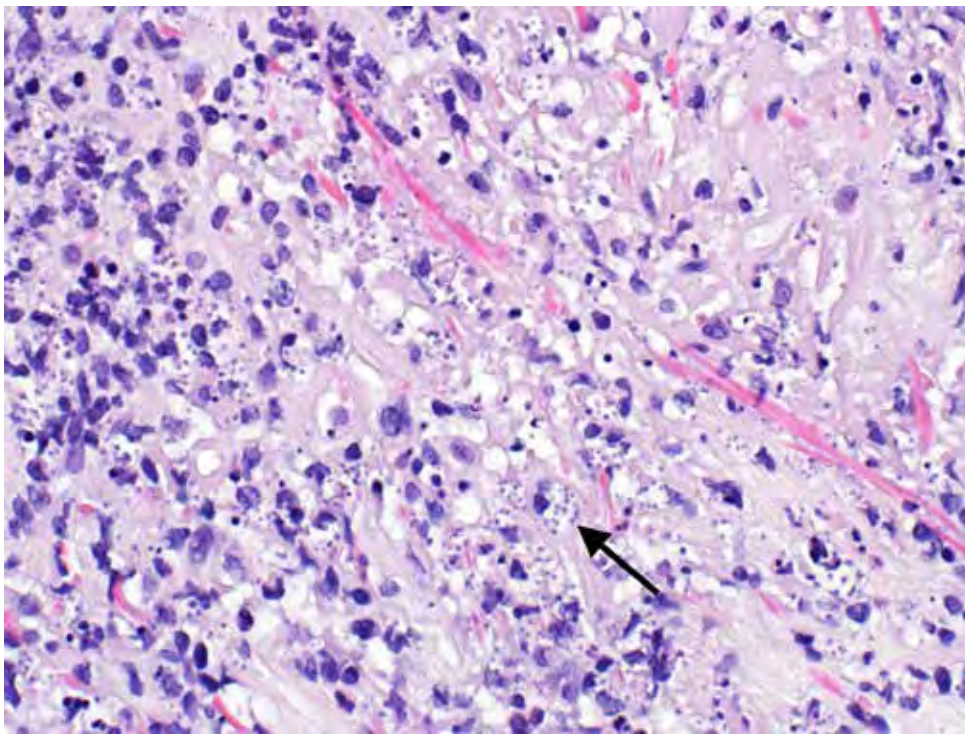

FIGURE 2: HISTIOCYTIC INFLAMMATION WITH ABUNDANT PARASITES IN SKIN BIOPSY OF INITIAL PATIENT. ARROW POINTS TO A MACROPHAGE CONTAINING NUMEROUS DOT-LIKE PARASITIC ORGANISMS (H&E STAIN).

transmitted through the bites of infected female phlebotamine sandflies, which feed on blood to produce eggs. Only a small fraction of people infected by *Leishmania* develop disease, which manifests in three main forms: visceral, cutaneous, and mucocutaneous. Cutaneous leishmaniasis is the most common form.[1]

Diagnosis of cutaneous leishmaniasis typically involves clinical suspicion of the disease and identification of parasitic organisms in a skin biopsy. When parasites are few or absent in tissue sections, molecular techniques (typically PCR) have been shown to be the most sensitive method for diagnosis. Additionally, molecular testing allows typing of the *Leishmania* species, which is important for determining optimal treatment and disease prognosis.

Immunohistochemical methods for identifying the parasites in tissue sections may be useful in some situations but are not widely available, particularly in countries where the disease is rare.[2]

The usual clinical course of cutaneous leishmaniasis in symptomatic patients presents within one week to three months following a bite by an infected sandfly. Initially, a red papule appears at the site of the bite, which enlarges to form a plaque or nodule. Progression to a well-circumscribed, crusted ulcer with violaceous hypertrophied borders occurs over time and is usually followed by an atrophic scar at the site of the bite.[3]

The typical histopathological picture evolves from an early stage with numerous amastigotes (the diagnostic form of the parasite), primarily within macrophages, to a dense mixed inflammatory infiltrate. Superficial dermal edema may be followed by epidermal ulceration and eventual granulomatous inflammation. As the inflammatory process progresses, the number of parasitic organisms in the skin generally decreases over time, usually to a point where they cannot be identified histologically.[4]

Despite the typical clinical and histologic picture described above, diagnosis can be difficult due to the wide range of clinical and histopathological manifestations, which may imitate other inflammatory or neoplastic processes. Clinically, lesions may mimic a wide variety of entities, including squamous cell carcinoma, sarcoidosis, lymphoma, atypical mycobacterial infection, cutaneous lupus erythematosus, deep fungal infection, and tuberculosis. Diagnosis can be even more challenging if the number of amastigotes is low or absent in tissue sections, and lesions may be mistaken on histologic evaluation for a variety of other conditions also, including squamous cell carcinoma, deep fungal infection, secondary syphilis, panniculitis, tuberculosis, mycosis fungoides, and sarcoidosis.[3]

The particular manifestations of the disease in any single individual are determined by a complex interaction between the species of *Leishmania* and the genetic and immunological status of the host.[4] This was evident in our case series, as one patient presented with abundant parasitic organisms in the skin biopsy that were easily diagnosed by light microscopy, and the other patients had more advanced inflammatory reactions, with one displaying necrotizing granulomas and an absence of visible organisms. Since cutaneous leishmaniasis is rarely encountered by physicians in the U.S. and is almost always limited to patients with a history of travel to endemic areas, the third patient's diagnosis could easily have been missed if the travel history was not revealed and the other travel companions had not been seen previously at the same clinic.

In summary, the diversity of clinical and histopathological features of cutaneous leishmaniasis can lead to missed or delayed diagnosis and treatment, increasing the risk for progression of the disease. Our case series highlights the importance of knowing a patient's travel history and maintaining a high index of clinical suspicion for parasitic infections in endemic regions outside of the U.S.

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BY IMARI FACESON, OMS III; BRIANNE WEHNER, DO

[1]OSTEOPATHIC MEDICAL STUDENT, CLASS OF 2023, NYITCOM AT ARKANSAS STATE UNIVERSITY, JONESBORO, ARK.
[2]ASSISTANT PROFESSOR, OSTEOPATHIC MANIPULATIVE MEDICINE, NYITCOM AT ARKANSAS STATE UNIVERSITY, JONESBORO, ARK.

Diagnosis of Pediatric Ascariasis in Rural Missouri

Abstract

Ascariasis lumbricoides is an infectious parasite found in soil and feces with an increased prevalence in developing countries. Incidence in the U.S. is less common due to sanitation efforts and drinking water initiatives. The low prevalence encourages a low index of suspicion from clinicians when faced with children complaining of non-specific symptoms. This case describes a child infected with Ascariasis presenting to the clinic after previously being diagnosed with a viral infection. Our report illuminates the pathogenesis of infection and sequelae along with the importance of familiarity of this organism despite the lower rate of incidence in developed countries.

Background

Ascariasis is an intestinal disease caused by the roundworm Ascariasis lumbricoides, commonly found in the soil.[1] The life cycle of A. lumbricoides encompasses many stages, beginning with a fertilized or unfertilized egg in feces that can also be present in the soil[2] and ending with defecation of an egg from the human host (Figure 1).

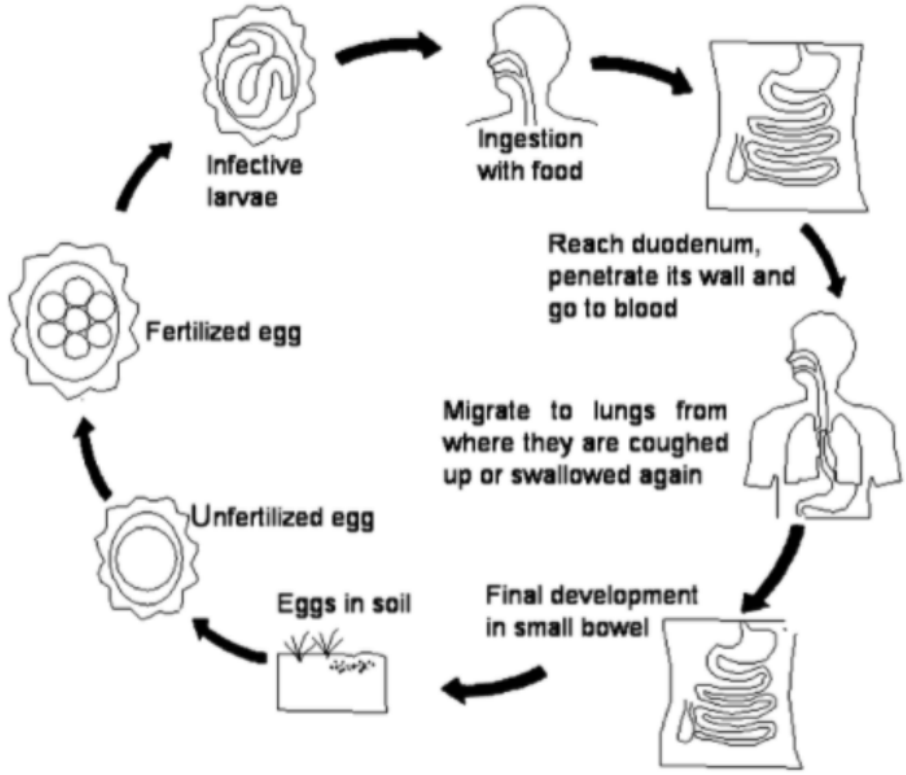

FIGURE 1. THE LIFE CYCLE OF ASCARIS LUMBRICOIDES.[3]

As seen in Figure 1, ingestion of the infective larvae begins the life cycle inside the human host, where it moves from the small intestine through the portal system hematogenously to the right side of the heart and eventually landing in the pulmonary alveoli. During this migration process, eggs can unintentionally enter surrounding organs and cause an inflammatory response. Commonly affected organs include the appendix, biliary passages, and liver. Hematogenously or lymphatically, the ova pass upward through the bronchi and trachea usually via a cough without sputum production. After coughing, the parasites are swallowed and reenter the stomach and small intestine. Sexually mature parasites producing unfertilized and, subsequent, fertilized eggs then progress through the gastrointestinal tract. At the end of the migration through the large intestine, the host can defecate eggs and the eggs can spread the infection to a new host. Ascariasis is usually more of a burden in developing countries but can be found anywhere in the world.[4] Prompt treatment can prevent life-threatening complications such as cholangitis, pancreatitis, appendicitis, or intestinal obstruction.

Case Presentation

A two-year, eight-month-old male presents with one day of a worm in diaper as described by his mother. History was provided by the mother due to the child's age. The mother describes her son's office visit two weeks ago for coughing, and he was diagnosed with a viral infection. After about one week, he had vomiting followed by diarrhea for the last two days. This morning, she found the worm in his diaper. Mother admits to having dogs in the house and careful supervision while patient is playing in the sandbox outside. The mother brought in the worm specimen in a diaper, and there is a noticeable white worm in the stool. Vitals are unremarkable. Mother denies insomnia or fever of the child. She admits he had some nausea and vomiting approximately one week ago, but has not since. Mother denies the patient having previous pinworms or hemorrhoids. Past medical history is unremarkable and his immunizations are up-to-date. She denies past surgical history. The patient does not take any medications. Patient has no known drug allergies. On exam, an alive adult white worm is noted in diaper. Patient had a negative scotch test and microscopy. Rectal exam showed absence of external hemorrhoids, fissures, masses, tenderness, and there was normal anal tone.

Differential Diagnosis

The absence of umbilical pain migrating to the right lower quadrant ruled out Yersinia enterocolitis infection and appendicitis. The lack of observable jaundice or edema ruled out hepatitis and hepatitis secondary to Ascariasis

infection. The constipation brought intestinal obstruction high on the differential but only secondary to parasitosis, since coughing is unusual. Labs measuring liver function and CT of abdomen were not warranted.

Treatment

Patient was prescribed one tablet of Pyrantel orally in clinic and one more tablet in two weeks. Education and reassurance were provided and the mother was encouraged to continue to observe the stool for further A. lumbricoides worms over the coming weeks. The patient's mother was encouraged to return to the clinic if symptoms worsen.

Outcome and Follow-Up

Patient resolved without any complications.

Discussion

After completing a PubMed search for the parasite, many of the articles included infection leading to dangerous complications like gall-bladder perforation and biliary complications resulting from the migration of the worm during the life cycle. Of note, many of the cases involving infection occurred in countries where water sanitization and resources are sub-optimal.[5] Although uncommon in the U.S., it would benefit clinicians, medical students, and their future patients to be familiar with this disease process to avoid a preventable death. Recognizing abnormal symptoms is key to establishing a diagnosis of Ascariasis.

Learning Points

- Pediatric intestinal Ascariasis can present as a viral infection in its earlier stages.
- Prompt treatment of Ascariasis can prevent life-threatening sequelae.
- Clinicians must always have a degree of suspicion of common parasitic infections despite being in a developed country.
- Counseling patients on sanitation and close observation of children playing outside is imperative to decreasing risk of children contracting Ascariasis.

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BY SYED UMAR SUHAIL, OMS-IV;[1]
STACY RICHARDSON, DO;[2] ANDREA DUCHOW, DO[3]

[1]NYIT COLLEGE OF OSTEOPATHIC MEDICINE AT ARKANSAS STATE UNIVERSITY, JONESBORO, ARK
[2]DEPARTMENT OF EMERGENCY MEDICINE, NEA BAPTIST MEMORIAL HOSPITAL, JONESBORO, ARK
[3]DEPARTMENT OF INTERNAL MEDICINE, NEA BAPTIST MEMORIAL HOSPITAL, JONESBORO, ARK

Acute Epiglottitis as a Possible Manifestation of COVID-19 Infection

Abstract

We describe the case of a man who presented from an urgent care center for evaluation after being diagnosed with acute epiglottitis. The patient maintained a patent airway and was discharged after several days of conservative treatment. He tested negative for Strep A and Mononucleosis and positive for SARS-CoV-2 infection. Blood cultures showed presence of gram-positive cocci in clusters in one of three bottles, though *Staphylococcus aureus* was not detected. With this result likely being a clinically insignificant contaminant, and without any other positive microbiologic or noninfectious findings, it could be presumed that this patient's epiglottitis was secondary to COVID-19.

Background

SARS-CoV-2 (otherwise known as the novel coronavirus or COVID-19) has been known since its discovery to present in different forms and to various extents. As it is classified as a severe acute respiratory syndrome, COVID-19 infection predominantly causes respiratory tract symptoms. However, literature has progressively identified that the manifestation of COVID-19 can be non-specific, ranging anywhere from an asymptomatic presentation to acute respiratory distress syndrome leading to multiple organ dysfunction.[1]

Case Presentation

A young-adult, obese Caucasian male with a surgical history of tonsillectomy, social history positive for snuff use, and otherwise no pertinent comorbidities or allergies, presented to an urgent care facility with a one-day history of left-sided sore throat, fever, hoarseness, dysphagia, and odynophagia. The patient reported experiencing no relief with acetaminophen or ibuprofen. He denied significant dyspnea or sialorrhea. On exam, the patient had posterior oropharyngeal erythema, as well as superficial bilateral cervical adenopathy. Vital signs were remarkable for low-grade fever (temperature of 38.1 °C) and tachycardia (108 beats per minute). The rest of his physical exam was unremarkable. He was alert, his lungs were clear to auscultation bilaterally, and he had normal respiratory effort. There was no evidence of stridor or trismus on exam.

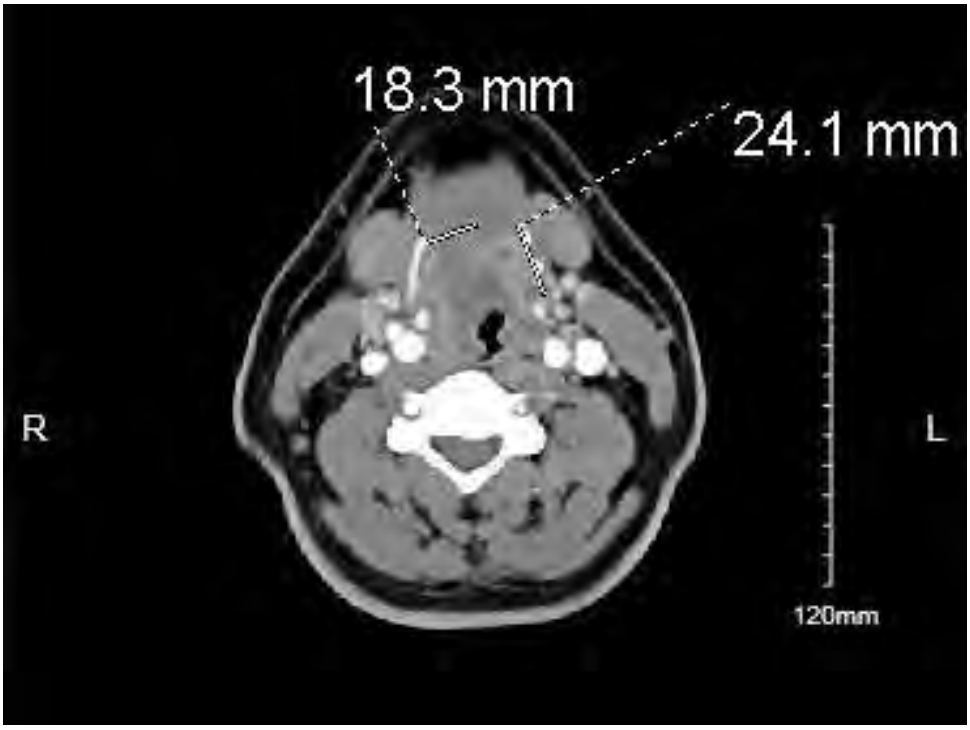

FIGURE 1. IMAGE DISPLAYING AP AND TRANSVERSE DIMENSIONAL MEASUREMENTS OF EPIGLOTTIC ENLARGEMENT.

A series of laboratory tests were ordered during the patient's stay at the urgent care facility. Strep A and Mononucleosis screening tests were negative. However, a SARS-CoV-2 screening test was positive. This was the patient's second positive test for COVID-19, as he reported testing positive around four months prior to current visit. The patient was also found to have significant leukocytosis (25.1 x 10^9/L). A CT Soft Tissue Neck with Contrast was later ordered, which showed marked enlargement of the epiglottis secondary to an abscess located anteriorly in the region of the frenulum.

Upon discovery of this radiologic finding, the patient was sent to the emergency department. Blood cultures were collected, as well as a procalcitonin level, which was found to be mildly elevated (0.33 ng/mL). A manual differential later collected showed a segmented neutrophil percentage of 76%. Aside from mild hyponatremia, the basic metabolic panel was within normal range. He received IV dexamethasone 10 mg while in the emergency department, and after blood culture collection, was started on IVPB clindamycin 900 mg/50 mL. ENT was consulted and recommended ICU admission, with scheduled steroid therapy and continuous

clindamycin administration. The patient was transferred from the emergency department to the ICU in stable condition. Here, he was noted to have done well without any respiratory complications overnight, maintaining an oxygen saturation range of 91-94% on room air. He was placed on a schedule of IVPB clindamycin, 900 mg/50 mL every eight hours, and IV dexamethasone, 4 mg every six hours. He also had scheduled ipratropium-albuterol (DuoNeb), 3 mL every six hours PRN, as well as routine aerosol treatments every four hours. He was placed on NPO diet.

On hospital day two, ENT evaluated the patient and found him to report significant improvement overnight in his sore throat, dysphagia, and hoarseness. He was noted to be handling his own secretions and denied any dyspnea, otalgia, hemoptysis, or continued odynophagia. From an ENT standpoint, he was deemed stable for transfer from the ICU to a medical-surgical floor, with anticipated discharge home the following day. He was also deemed appropriate to start a full liquid diet and advance to regular diet as tolerated. He continued to receive medications as originally scheduled.

By hospital day three, one of three blood culture bottles collected from his stay in the emergency department showed presence of aerobic gram-positive cocci in clusters. A MRSA/SA Blood Culture Assay did not detect *Staphylococcus aureus*. He was re-evaluated by ENT and noted to have significant improvement in quality of voice and resolution of dysphagia and odynophagia. His physical exam was unremarkable, and he was cleared for hospital discharge from ENT standpoint.

Discussion

Acute epiglottitis is a potentially life-threatening illness characterized by inflammation of the epiglottis as well as the nearby supraglottic structures. It is known to affect both children and adults, though their etiologies may differ. In adults, epiglottitis is commonly bacterial in origin, though viral origin may be suspected if no pathogen can be isolated.[2] The most common bacterial cause of epiglottitis in adults is known to be Group A beta-hemolytic Streptococci.[3] Other bacterial causes include *Haemophilus influenzae* type B (Hib), *Streptococcus pneumoniae*, and *Staphylococcus aureus*, among others. Known viral causes include herpes simplex, varicella, and parainfluenza.[4]

Prior to further workup in the emergency department, our patient was noted in urgent care to have a negative rapid Strep A screening test and a negative Mononucleosis test. Blood cultures collected during his stay in the emergency department eventually showed growth of gram-positive cocci in clusters in one of the bottles interpreted. Gram-positive cocci that specifically grow in clusters are known to be Staphylococcus, as opposed to Streptococcus, being gram-positive cocci that grow in chains. Additionally for our patient, *Staphylococcus aureus* was not detected on MRSA/SA Blood Culture Assay. *S. aureus* is differentiated from the other subdivisions of staphylococci in that it is classified as coagulase-positive, whereas *S. epidermidis* and *S. saprophyticus* are classified as coagulase-negative. As *S. aureus* was not detected in our patient, the bacteria present could be construed as coagulase-negative. The clinical significance of positive cultures can vary depending on the circumstances – it is known that if a coagulase-negative Staphylococcus is found in only one bottle from a set of blood cultures, the isolate is likely a contaminant.[5] As this was the case for our patient, the positive culture finding is most likely clinically insignificant.

(CONTINUED ON PAGE 118)

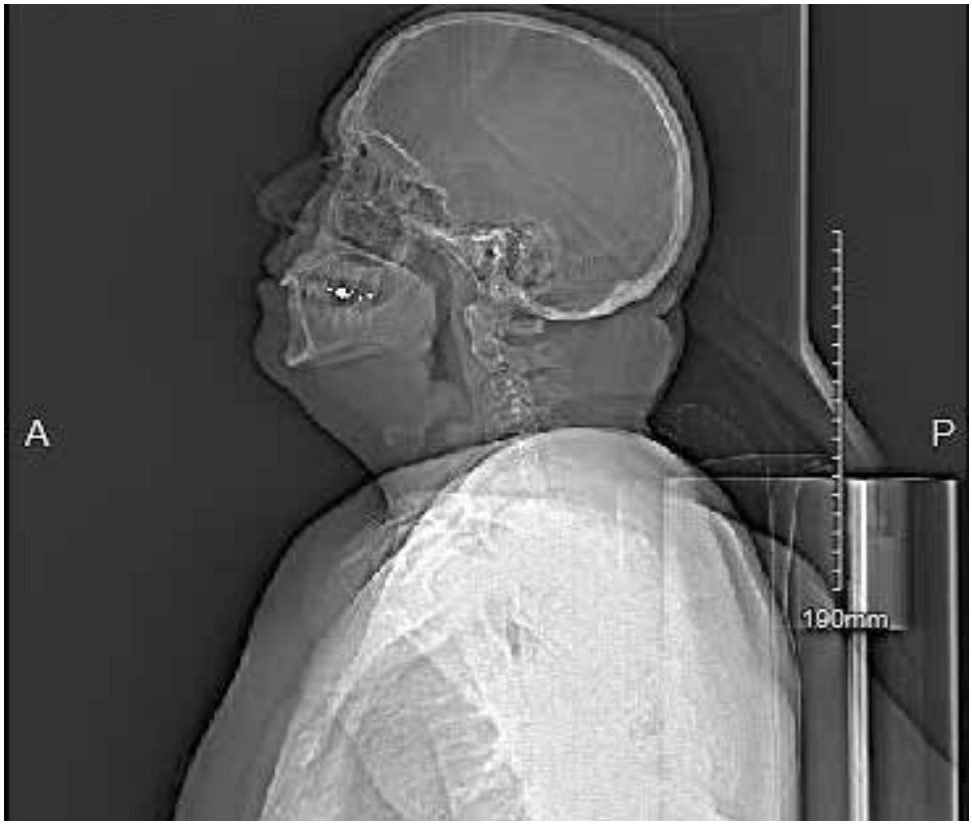

FIGURE 2. ADDITIONAL IMAGE EXHIBITING CEPHALOCAUDAL EXTENT OF ABSCESS.

Review of literature shows that a few studies currently exist on the association between acute epiglottitis and COVID-19 infection. One case report pointed to the possibility of concurrent epiglottitis and COVID-19 infection being of a noninfectious etiology, particularly secondary to e-cigarette use. The rationale posited was related to a localized epiglottic inflammatory response elicited by a combination of COVID-19 infection and e-cigarette use.[6] Although our patient was not known to be an e-cigarette user, he was noted to be a user of snuff, i.e. smokeless tobacco. Literature on smokeless tobacco has shown that its use can trigger local, gingival vasodilatation,[7] though its role in inducing an inflammatory response beyond oral mucosa (and specifically involving the epiglottis) is unclear. Importantly, smokeless tobacco use has been noted to possibly increase susceptibility to secondary infection, due to suppression of circulating levels of immune cells.[8] In the context of this particular case, this further supports the likelihood of our patient's epiglottitis being infectious in nature, rather than being noninfectious. Another case report involved a patient who, similarly to our patient, also had a history of prior COVID-19 infection. The individuals involved in this study noted that COVID-19-induced cytokine storm, secondary to repeat epithelial and endothelial damage caused by excessive upregulation of the host inflammatory response, could be the underlying mechanism behind their patient's presentation with acute epiglottitis along with COVID-19 infection.[9]

Some limitations in this case study exist. Certain diagnostic tests that might have aided in confirming the causative factor for our patient's presentation were not performed, such as sputum cultures, an extensive respiratory viral panel, and urine antigen testing. It is also uncertain if the epiglottic abscess our patient had was purulent, a finding that would have supported a bacterial cause for his presentation. It is possible – and perhaps likely, given the results of the microbiologic testing performed – that COVID-19 infection was the sole infectious cause of this patient's epiglottitis. It is also possible that this case involved bacterial superinfection, or that our patient's COVID-19 infection and epiglottitis occurred separately but simultaneously.

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