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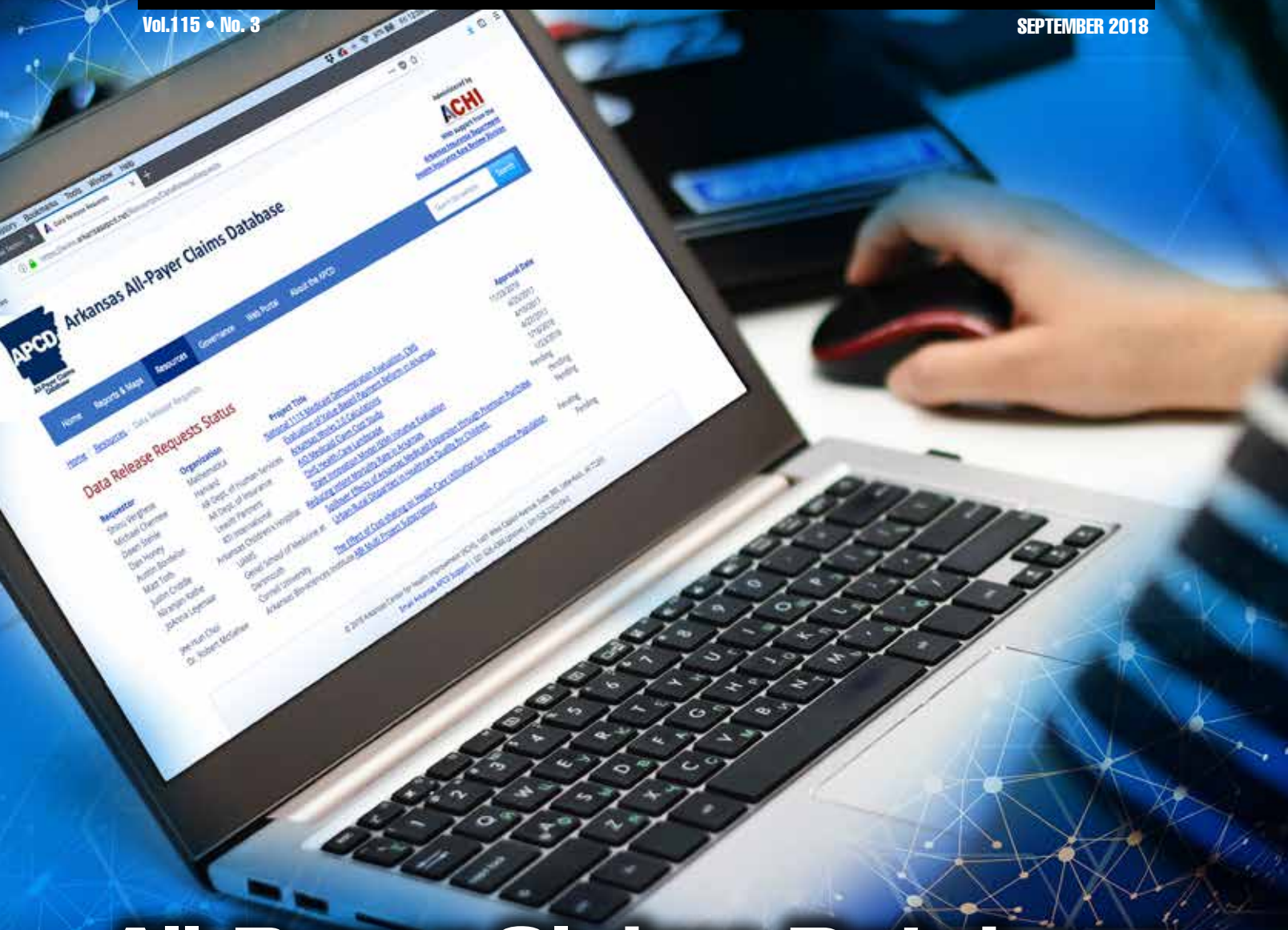

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by CASEY L. PENN

ON THE COVER

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Winner of the ASAE Excellence in Communications Award

THE Journal OF THE ARKANSAS MEDICAL SOCIETY

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WHAT HAVE WE DONE FOR YOU LATELY?

Tort Reform Battle Heating Up

Be sure to visit www.arjobsandjustice.com to learn more about Issue 1 and to contribute.

DAVID WROTEN
EXECUTIVE VICE PRESIDENT

The opponents of tort reform have, as expected, resorted to lawsuits in a desperate attempt to remove Issue 1 from the November ballot. That's what trial lawyers do, I guess…file lawsuits. Their argument is that Issue 1 is four separate amendments disguised as one. It's a flimsy argument at best, since all four provisions of the amendment are closely related (lawsuit reform) and the amendment was submitted to the voters of Arkansas by the General Assembly. We consider it nothing more than a delay tactic – an attempt to force supporters to spend financial resources on fighting a lawsuit rather than getting out to vote campaigns. I'm sure they think that occasionally long shots do come in on the horse track.

The Arkansas Medical Society, as part of the tort reform coalition Arkansans for Jobs & Justice, has successfully intervened in the case filed against the Secretary of State's office. We'll let you know the outcome.

Meanwhile, AMS staff and leadership continue traveling around the state to meet with physician groups to inform them about the effort and request financial contributions. AMS and related organizations such as county medical societies, specialty societies, individual AMS members, and professional liability insurers have contributed more than one-third of the total contributions to date, with more coming in.

As a reminder, Issue 1 is a constitutional amendment submitted to the voters by the General Assembly. It will appear on the November ballot as "Issue 1." It contains these four basic provisions:

- A 33 1/3 cap on attorney contingency fees in civil actions such as medical malpractice cases
- A $500,000 cap on non-economic damages
- A punitive damage cap equal to the greater of $500,000 or 3X compensatory damages
- Authorization for the General Assembly (by a 3/5 vote) to adopt, amend or repeal so-called "rules of the court."

The trial attorneys and their organizations are already out on the circuit talking about how this will be a disaster for Arkansans. They ignore the facts that none of these provisions are novel ideas. Many, many states have adopted these same tort reforms and the world didn't come to an end. Injured parties still go to court to settle civil cases, juries still decide the outcome and the monetary awards. You'll hear a lot from opponents about "setting a value on human life." Well that's what juries do every day. The problem is that juries make decisions on an emotional basis as evidenced by the wide spread of awards for basically the same injuries. Issue 1 is common sense legal reform.

You'll also hear that Issue 1 takes away the right of the courts to establish their own rules. The reality is that they can still do that. Issue 1 simply provides the legislature the ability to do the same while also serving as a check and balance to the courts. For those of you that aren't aware, "rules of the court" has been the basis for the Arkansas Supreme Court overturning nearly all the provisions of our Civil Justice Reform Act of 2003. Without this important provision in Issue 1, we'll continue to see the Court overturn common sense tort reforms such as affidavit of merit and qualifications for expert witnesses.

For more information and to contribute, be sure to visit www.arjobsandjustice.com. AMS

THE Journal
OF THE ARKANSAS MEDICAL SOCIETY

Appathurai Balamurugan, MD, DrPH, MPH

COMMENTARY

When the Rubber Does Not Meet the Road

We are familiar with the phrase, "When the Rubber meets the Road," and often use it to refer to when words are or are not translated. In the context of clinical practice, we encounter some of our patients who may know what needs to be done or hear from us what needs to be done to improve their health – be it medication adherence or lifestyle modification for chronic disease management – but are regularly nonadherent. While sometimes, we may stop and reason out why, many times in our busy practice we don't have time to stop and think or ask why. When the rubber does not meet the road, do we regularly stop to think or ask why? One of the commonly cited reasons for this has been the challenges posed by non-medical social needs or social determinants of health.

The conditions in which people are born, grow, live, work, or age that influence individual choices and significantly impact health are defined as the *social determinants of health* (SDOH). These conditions are, in large part, responsible for the health inequities that pervade our society at present times. A renowned physician and epidemiologist, Sir Michael Marmot, states, "Why treat people and send them back to the conditions that made them sick in the first place?" Assessing and addressing the conditions that made them sick in the first place would be a good first step to achieving health equity. The Department of Health and Human Services Officer of Disease Prevention and Health Promotion describes five key areas of SDOH, as illustrated in the schema here.

They are as follows:

- *Economic stability* (employment, food insecurity, housing instability, poverty)
- *Education* (early childhood education and development, enrollment in higher education, high school graduation, language and literacy)
- *Social and community context* (civic participation, discrimination, incarceration, social cohesion)
- *Health and health care* (access to health care, access to primary care, health literacy)
- *Neighborhood and built environment* (access to foods that support healthy eating patterns, crime and violence, environmental conditions, quality of housing).

These key areas impact our patients, preventing them from making health a priority. These five key areas impact health in various ways; for example, housing instability could include homelessness, difficulty paying rent, or poor housing conditions due to bug infestation or mold, and could lead to respiratory and cardiovascular diseases, death from extreme temperatures, or risk of at-home injury. Lack of child care could be a barrier for educational or employment opportunities for patients. Exposure to interpersonal or community violence may impact the physical and emotional health of our patients.

The American Academy of Family Physicians and other national organizations have developed some screening tools (https://www.aafp.org/patient-care/social-determinants-of-health/everyone-project/tools.html#patients) for SDOH that can help identify specific needs or challenges faced by our patients. These screening tools can be administered by receptionists or medical assistants, or integrated as part of intake form in patient's electronic health records. Nurses, physician assistants, or physicians can review the completed SDOH screenings to determine patient needs and create an action plan during the visit. Engaging care managers, social workers, or community health workers to determine available resources in the community, facilitate referrals, and ensure follow-up between patient visits would go a long way toward improvement. Each patient's need may be different, as there is no one-size-fits-all in addressing SDOH. Some social services available at the practice level to help address social needs of the patients include a free, online social services search engine called Aunt Bertha (www.auntbertha.com), 211 Helpline Center, and State Health Departments (https://www.healthy.arkansas.gov/resources).

The SDOH screening tools and patient action plan provide a starting point to assessing and addressing SDOH in a busy practice. With the movement toward value-based payment models, physicians are held accountable for health outcomes rather than processes. Assessing and addressing SDOH would assist with behaviors and social factors that impact health outcomes.

The views expressed in this commentary are that of the author and are not necessarily those of the Arkansas Department of Health. AMS

by CASEY L. PENN

All-Payer Claims Database

A Largely Untapped Resource for Physicians

This digital age we're living in has left much of our personal lives open to voyeurism. As physicians and other AMS-member health care providers, you may feel a bit professionally vulnerable as well – like every patient conversation, every prescription given, every choice you make may be recorded and potentially accessible.

While we are all personally and professionally vulnerable to data collection and associated scrutiny, it's possible that these collections could also offer helpful information. If your actions as a physician are to be subjected to data collection, shouldn't you also benefit from it? For example, what if you could use some of this data for the good of your patients and your clinic?

A relatively new source of data collection is making this possible here in Arkansas.

The Arkansas Center for Health Improvement, in partnership with Arkansas Insurance Department, has developed the Arkansas All-Payer Claims Database, a storehouse, if you will, of pertinent health care information. Operational since 2016, it contains information dating back to 2013.

Photography courtesy of ACHI.

Kenley Money, director of information systems architecture for the Arkansas Center for Health Improvement, works on a plan for checking data quality in response to a request for data.

Arkansas is among 20 states to develop such a database. Now that it is up and running, AMS wants physicians to be aware of the value it may hold for them specifically. "The claims from all the different insurance carriers in the state go into this database," explained AMS Executive Vice President David Wroten. "Physicians may be able to utilize this available data in many ways … for example, a physician could use the database to determine the average billed charge for a knee replacement and/or the average amount paid by insurers for that knee replacement."

APCD – The Basics

The APCD is administered by ACHI and overseen by the Health Insurance Rate Review Division, a division of the AID. The APCD receives advisory input from the Arkansas Healthcare Transparency Initiative Board. This board is the result of legislation that supported and established the APCD, namely, the Arkansas Healthcare Transparency Initiative Act 1233 of 2015.

The Act mandated that public and private payers submit health care data to the APCD and established the purposes for which APCD data may be used.

Original data elements that payers were required to submit included medical, dental, and pharmaceutical claims; enrollment files; and provider files. Act 948 of 2017 added medical marijuana registry data as a new element to the APCD. Act 979 of 2017 added hospital discharge and emergency department records for the un-

insured, birth and death records, and cancer registry data.

Per Act 1233, APCD data may **not** be used to support purely commercial purposes (resale), disclose trade secrets of submitting entities, re-identify or attempt to re-identify an individual who is the subject of any submitted data without obtaining the individual's consent, or create or augment data contained in a national claims database.

According to ACHI, the mission of the APCD here in Arkansas is to be a trusted and timely source of information that could help improve health care quality and delivery, lower costs, and more. The state's APCD contains data pertaining to a variety of areas within health care, and this information can be used to evaluate health programs, conduct research, design quality improvement initiatives, and even compare the performance, price, and ability of physicians and provider-level health care professionals.

"The Arkansas APCD's objective is to serve as a dynamic tool for providers, researchers, policymakers, employers, and consumers who want to better understand how and where health care is being delivered and how much is being spent, find opportunities to improve outcomes and lower costs, study trends, promote competition, and make more informed consumer decisions," said Joe Thompson, MD, MPH, former Arkansas Surgeon General and current president and CEO of ACHI.

Photography courtesy of ACHI.

Trang Riley, data request manager for the Arkansas Center for Health Improvement, takes requests for AR APCD data.

According to Dr. Thompson, the APCD is fulfilling a great need in our state by showing us

> Continued on page 56.

According to ACHI, the mission of the APCD here in Arkansas is to be a trusted and timely source of information that could help improve health care quality and delivery, lower costs, and more.

where our health care dollars are going and why. "The American health care system is the most expensive in the world, yet by most indicators it is one of the least effective," said Dr. Thompson. "As consumers and providers begin to absorb more of the financial responsibility for care, they will increasingly demand information on how much things cost and where dollars are being spent. The APCD is one mechanism to unlock the 'black box' of insurance payments and open the window of transparency. Indeed, many states have used data from their claims databases to build health care transparency websites that allow consumers to compare outcomes and costs for certain procedures."

Examples of such state-based comparison sites include Maine (comparemaine.org) and Minnesota (mnhealthscores.org).

A recent report by the Catalyst for Payment Reform shows Arkansas receiving an "F" on statewide transparency laws and efforts. The Arkansas APCD is a big step in changing that low grade in that it makes price and quality information more readily available to providers, policymakers, researchers, and individual and business consumers and thus supports more informed decision-making.

For Use By …

The Arkansas APCD is available to individuals and entities alike, and data release requests** show that its information is being utilized for varied purposes by consumers, providers, researchers, policymakers, and other parties.

Bradley Martin, Pharm.D., Ph.D., professor of Pharmaceutical Evaluation and Policy at UAMS College of Pharmacy, is the principal investigator in a research project made possible by the APCD. Funded through a grant from UAMS's Translational Research Institute, his analyses project is entitled, "Care Decisions and the Risk of Long-Term Opioid Use in Patients with Low Back Pain."

"Our interest is in identifying potentially modifiable factors such as how opioids are prescribed and other management decisions including physical therapy made at the time of opioid initiation," said Martin. "Improved decision-making around these modifiable factors at the initiation of care may provide the best opportunity to prevent long-term use. In this pilot project, we take a crucial step towards our goal by examining data from two state-wide all-payer claims databases – Arkansas and Utah. Both have higher than average rates of opioid prescribing. The results of our study are not expected until May of 2019."

Another ongoing use of the database centers on medical marijuana. For this analysis being done by ACHI, data is being pulled to examine the profiles of individuals registered for medical marijuana using medical claims from 2013-2016. The APCD profiles registrants by qualifying medical condition, insurance type, and age. A recent case study served as a preliminary look at the characteristics of individuals registered for medical marijuana in Arkansas and found that, for example, the most common condition seen in those individuals was disease of the musculoskeletal system and connective tissue (arthritis).

… Physicians

A quick scan of those requesting data from the APCD showed few physicians; still, Dr. Thompson indicated that the database can serve as a rich resource for physicians and other care providers. "Individual physicians and other providers may need assistance with producing meaningful information from the APCD data itself, but analyses of the data can yield a wealth of information valuable to physicians," he explained.

He shared insights physicians might glean from analyses of APCD data, including a better understanding of patients' utilization and cost of services outside their clinics; an idea of quality and cost of providers to whom they refer patients (to help patients get better value and outcomes), and information to help those selecting accountable care partners.

"Providers could use the APCD to better understand the differences in payment rates and reimbursement times from different health insurance providers," continued Dr. Thompson. "The APCD could also be used to provide a consolidated report documenting performance across payers so that providers have one source for examining or defending their practice's profiles."

Looking to the future, ACHI expects that providers could look at referral sources—hospitals, specialists, therapists—for insight into not only the quality of care but also utilization profiles and health outcomes. "This would be similar to episodes of care now," said Dr. Thompson, "but with information enabling providers with financial risk to better select their referral providers.

"Providers could use the APCD to benchmark for value-based performance indicators and assure appropriate treatment under new risk-bearing payment models. Data from the APCD can also support efforts in the Choosing Wisely campaign to try and identify unnecessary tests and services and gaps in appropriate care to help improve the effectiveness and efficiency of the healthcare system.

"Finally, it is important for the physician community to help guide and to use this new source of information. As our Arkansas health care system gets reshaped by public and private payers, tracking the dollars to ensure our patients continue to get the care they need will be paramount, and this new tool to pull back the curtain on payment is critical."

For more examples of how Arkansas APCD data is being used, visit the APCD Council's Showcase at apcdshowcase.org/case-studies. For more information and answers to frequently asked questions, call the Arkansas All-Payer Claims Database Team at 501-526-2244 (8 a.m.-4:30 p.m., Monday-Friday).

*press date July 20, 2018

**https://www.arkansasapcd.net/Resources/DataReleaseRequests AMS

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Radiation Exposure in Children Undergoing Abdomen-computed Tomography:

Experience in Arkansas Community Hospitals Differs from the Children's Hospital

[1]Robert F. Buchmann, DO; [2]Shilpa Hegde, MD; [1]Leann E. Linam, MD; [1]S. Bruce Greenberg, MD

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Abstract

Radiation exposure to children associated with computed tomography (CT) is a public health concern. Our purpose was to compare radiation exposure of children who underwent abdomen and pelvis CT exams at Arkansas community hospitals with Arkansas Children's Hospital. A total of 178 community hospital and 111 children's hospital CT abdomen and pelvis exams were compared. Radiation exposure was calculated for all exams and techniques compared. The mean effective dose of the community hospital group was nearly double that of the children's hospital group. Higher energy (kVp 120 or greater) and multiphase imaging accounted for the large difference and can be easily corrected by community hospitals.

Introduction

Computed tomography (CT) accounts for a large portion of medically administered ionizing radiation. The "Image Gently" campaign was inaugurated in 2008 to address concerns about excessive patient radiation exposure, particularly in children.[1] The primary objective of the campaign was to raise awareness in the imaging community of the need to reduce radiation dose to children by establishing pediatric specific CT protocols.[2] The campaign targeted radiologists and technologists who perform CT primarily in adults who, in aggregate, perform a significant number of CT scans in children.

We were concerned that many community hospitals in Arkansas continue to use adult protocols in children and that additional education might be necessary to alter practice patterns in hospitals that are primarily focused on adult care but perform pediatric CT examinations. Our purpose was to compare radiation exposure of children who underwent abdomen and pelvis CT exams at community hospitals with that of children who received the exams at Arkansas Children's Hospital. A secondary purpose was to analyze technique differences that could result in specific recommendations to reduce radiation exposure in community hospitals independent of available equipment.

Materials and Methods

The study was approved by the hospital institutional review board. The study included all 178 abdomen and pelvis CT examinations performed at community hospitals in children that were subsequently referred to Arkansas Children's Hospital during the first six months of 2013. Inclusion criteria included age less than 19 years and a dose page that included phantom size, computed tomography dose index (CTDI) volume, and dose length product (DLP). The control group included 111 CT examinations performed at the children's hospital between April and June, 2013. Patient age, number of imaging phases, peak kilovoltage (kVp), CTDI volume, and DLP were recorded for each examination.

The size-specific dose estimate (SSDE) was calculated for each study.[3] The anteroposterior and lateral patient diameters were summed on the middle slice of each study to determine the conversion factor, which was multiplied by the scanner-recorded CTDI volume to calculate the SSDE.[3,4] The effective dose was calculated for each study using the conversion factors published by Deak.[5] The conversion factors were based on phantom size, patient age, kVp and body location.[5] T tests compared differences in patient group ages, kVp, effective dose and SSDE. Fischer's exact test was used to assess the frequency of single and multiphase studies in the two groups.

Results

The results are summarized in Table 1. The mean ages of the community hospital group, 10.0 years (SD 4.8 years), and the children's hospital group, 10.7 years (5.1 years), were not significantly different ($p = 0.25$). The mean energy for the community hospital group was 116 kVp (SD 9.8 kVp) and for the children's hospital was 101.5 kVp (SD 11.1 kVp). The difference in energy was highly significant ($P < 0.0001$). 120 kVp or greater was used in 83% of the community hospital examinations. By contrast, the children's hospital used 100 kVp or less in 85% of their CT examinations. The mean SSDE for the community hospital group was 26.4 mGy

Table 1. Comparison of radiation with CT abdomen and pelvis examinations between community hospitals and Arkansas Children's Hospital.

	Community Hospitals	Arkansas Children's Hospital	Significance (P)
Patient Age (years)	10.0 (SD 4.8)	10.7 (SD 5.1)	0.2533
kVp	116 (9.8)	101.5 (11.1)	< 0.0001
SSDE (mGy)	26.4 (51.3)	9.7 (SD 6.9)	0.0007
Effective Dose (mSv)	13.0 (12.4)	6.6 (SD 5.9)	< 0.0001

Table 2. Comparison of multiphase CT abdomen and pelvis imaging between community hospitals and Arkansas Children's Hospital.

	Community Hospitals	Arkansas Children's Hospital
Number of Exams	178	111
Single Phase	133	106
Multiple Phases	45	5
Multiphase %	25%	4.5%

(SD 51.3 mGy) and for ACH was 9.7 mGy (SD 6.9 mGy). The mean SSDE of the community hospital group was 272% that of the children's hospital and the difference was extremely significant (P = 0.0007). The mean effective dose for the community hospital group was 13 mSv (SD 12.4 mSv) and for ACH was 6.6 mSv (SD 5.9 mSv). The mean effective dose of the community hospital group was 197% of the children's hospital, which was extremely significant (P < 0.0001). Multiphase imaging (Table 2) was performed in 25% of the community hospital studies, but only 4.5% of the children's hospital examinations. The difference was extremely significant (P < 0.001).

Discussions

Over 90% of hospitals claim to use pediatric specific CT protocols, but smaller and non-teaching hospitals are less likely to utilize pediatric protocols.[6] Kanal has reported head-computed tomography CTDI volume measurements to be 21% less in pediatric hospitals than community hospitals.[7] Hopkins reported community hospital SSDE as 1.6 times greater than for a pediatric hospital even when the pediatric hospital was still using filtered back projection reconstruction techniques.[8] Our results confirm increased radiation exposure of children undergoing CT examinations in community hospitals as compared to exposure of those receiving the same from tertiary care pediatric hospitals.

We identified two specific factors common in community hospital practice that are easily correctable: the higher-than-needed energy and more frequent use of multiphase imaging in children. Most community hospital studies are still performed using higher energy than is necessary. Radiation dose is proportional to the square of the change in kVp. Reducing kVp will lead to an exponential decrease in dose. For example, a decrease of 20 kVp will result in a 20-40% reduction in dose.[9] A reduction from 120 kVp can be performed on any scanner and only requires additional education for practicing radiology and technologists at community hospitals. In our practice, we routinely use 80 or 100 kVp for most CT body imaging. Occasionally, a large or obese child may require higher energy for penetration.

Mutiphase imaging was performed on 25% of the community hospital studies. Adult protocols frequently call for multiphase imaging to evaluate the liver or kidneys, but are rarely necessary in children. Although multiphase imaging in 25% of cases is too high, the results show that 75% of community hospital pediatric CT studies do not use routine multiphase imaging. Hopefully in the future the number of multiphase studies will be further reduced to the handful that require delayed imaging.

A recent article in 2011 by Goske et al. demonstrated significant progress in radiation safety for children, but emphasized the need for continued education and change of practice at adult-focused hospitals where many pediatric CT exams are being performed.[10] Sharing the results of this study with our community hospitals should prompt a revision of pediatric CT imaging protocols and reduce radiation exposure to children undergoing computed tomography. A limitation of this study is that we eliminated some studies that did not include dose pages since radiation exposure could not be determined.

Conclusion

In summary, radiation exposure of children undergoing CT in a community hospital is significantly higher than that received at a tertiary care pediatric hospital. Higher than needed kVp and the greater use of multiphase imaging accounted for the increased exposure – both of which can be easily corrected. Sharing this information with community hospitals should prompt a revision of pediatric CT imaging protocols.

Disclosures

This manuscript is unique and not under consideration by any other publication and has not been published elsewhere.

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Meeting Treatment Challenges of Chronic Kidney Disease

BY GERREN HOBBY, MD; ANDREA EASOM, MNSc, APRN; and MANISHA SINGH, MD

Chronic kidney disease (CKD) is a common disease that creates a subset of patients with complex, intertwining medical conditions, high morbidity and mortality, high health care expenditures and a low quality of life. Despite our various specialties, we all take care of these patients, presenting unique challenges to every clinical scenario.

Fifteen percent of adults have CKD,[1] meaning more than 45 million Americans have kidney failure. More than 400,000 Arkansans have some degree of CKD. On average, CKD patients have more than six symptoms across different organ systems and take more than eight medications. Low awareness of CKD symptoms, disease course and outcomes can cause lower support for these patients.

CKD and end-stage renal disease (ESRD) treatment costs comprise some of Medicare's highest costs. Medicare spending for beneficiaries younger than age 65 with CKD exceeded $8 billion in 2014, representing 44 percent of all health care spending for this age group. The same metric for those above age 65 was $50 billion and 20.8 percent of all health care spending for this cohort.[1]

The most common causes of CKD are diabetes and hypertension. Other risk factors include: African-American decent, older age, low birth weight, family history of CKD, smoking, obesity, analgesic medications, exposure to heavy metals, excessive alcohol consumption, acute kidney injury, cardiovascular disease, hyperlipidemia, metabolic syndrome, hepatitis C virus, HIV infection and malignancies.[2]

STAGING CKD

CKD is defined by the presence of kidney damage or decreased kidney function for at least three months based on documentation or inference.[3] Kidney damage is defined by albuminuria >30mg/24 hours, urine sediment abnormalities, electrolyte abnormalities due to tubular disorders, abnormalities shown on renal histology and structural abnormalities shown on imaging. Kidney transplant also qualifies as CKD.

The classification of stages is done from estimated glomerular filtration rate (eGFR):

- CKD Stage 1: eGFR >90 mL/min/1.73m² (must meet non-eGFR criterion for CKD)
- Stage 2: eGFR 60-89 mL/min/1.73m² (must meet non-eGFR criterion)
- Stage 3: eGFR 30-59 mL/min/1.73m²
- Stage 4: eGFR 15-29 mL/min/1.73m²
- Stage 5: eGFR <15 mL/min/1.73m²
- ESRD: permanent renal failure requiring chronic dialysis to maintain life (sometimes represented as CKD Stage 5D for dialysis dependence)

MORTALITY AND MORBIDITY

Rates of re-hospitalization for CKD patients are higher (22.3%) than for patients without diagnosed CKD (15.8%). In 2013, adjusted mortality rates remained higher for Medicare patients with CKD (117.9/1000) than for those without CKD (47.5/1000).[1] Rates increase with CKD severity. Coronary artery disease is common in CKD patients. The risk of coronary death or nonfatal MI in adults, with CKD stage 1 to 4 and over the age of 50, is greater than 10 percent in a 10-year period.[1] The dialysis population has an adjusted one-year survival rate of 76 percent; dropping to 36 percent at five years.

A study published in Kidney International examined the quality of life of patients with stage 4 or 5 CKD. Patients reported a poor quality of life[4] and 61 percent of patients regretted their decision to start dialysis.[5]

CONTROLLING CKD PROGRESSION

The first step is to identify high-risk patients and attempt to reduce the modifiable risk factors such as smoking or obesity. Treat the underlying etiology of CKD by controlling diabetes, hypertension and using antiproteinuric medications. Nephrology referral is critical. Referring patients to dieticians and CKD education programs also helps to slow progression.[6]

If unable to control progression, patients must understand their remaining options: dialysis, kidney transplant and palliative care.

Dialysis can be provided via different paths:

- In-Center Hemodialysis (IHD), the most common and expensive, involves three- to four-hour treatments, three times weekly.
- Home Dialysis (HOD) provides patient autonomy, diet liberalization, ability to continue employment and the convenience of home. HOD provides better clinical outcomes and patient satisfaction and saves about $19,000 per patient, per year. It most closely mimics the body's natural physiological renal clearance, with more frequent and longer dialysis.
- HOD can be administered via peritoneal dialysis (PD), using the peritoneal membrane as a filter; no blood or needles are involved.
- Home hemodialysis (HHD) usually provides shorter but more frequent dialysis using patient-friendly machines.

Kidney transplantation can be performed with a living or deceased donor. Outside of patients with cirrhosis, most individuals with eGFRs below 20 mL/min/1.73m² are eligible for possible transplantation. Most transplants occur after patients are on dialysis. Preemptive kidney transplant can occur before the patient needs dialysis. Early referral for transplant evaluation is important.

Palliative care discussions can be part of the patient and family discussion about treatment goals. For some patients, the burden of chronic disease or frequent hospitalizations prevents an acceptable quality of life. Renal failure compounds this situation and for some patients, dialysis does not increase quality of life or longevity.

Awareness of CKD is low. In a large managed-care cohort of CKD patients, stages 3-5, physician documentation was 14.4 percent.[7] In a survey of high-risk, urban, African-American adults, less than 3 percent named kidney disease as an important health problem, compared to 61 percent and 55 percent naming hypertension and diabetes, respectively.[8,9] Even among patients with stages 4-5 CKD, less than half were aware of their disease.

IMPROVING CKD-PATIENT CARE:

1. At the primary care level, recognize high-risk patients, assess GFR using urine dipstick for proteinuria/albuminuria and have the lab calculate eGFR.
2. Involve nephrology care as soon as appropriate.
3. Optimize care using CKD management guidelines, produced and freely accessible from KDIGO.
4. Know the options for CKD control and ESRS management.

The UAMS Division of Nephrology and Arkansas Department of Health's Chronic Disease Branch are working to increase CKD awareness and support CKD education. The Arkansas State Chronic Kidney Disease Advisory Committee (ARCKDAC) is a collaboration of multiple governmental agencies, renal groups, nonprofits and patient advocates. Its goals are to improve awareness, detection and education through community engagement. The AFMC has ongoing initiatives for similar goals, including grassroots health education for CKD patients. ▲

The authors practice in the Division of Nephrology, Deptment of Internal Medicine, UAMS.

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CASE STUDY

Inadvertent Exposure to Topical Testosterone: an Overlooked Phenomenon

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Abstract

Topical testosterone products are effective and popular treatment options for patients with androgen deficiency. While testosterone transfer to immediate contacts is a known potential hazard, there continue to be cases of unintentional exposure. This report describes a pair of siblings with signs and symptoms of hyperandrogenism due to secondary contact with their father's topical testosterone product.

Introduction

Testosterone therapy, primarily administered via long-acting injections and topical gels, is the standard of care in the treatment of patients with testosterone deficiency.[1] Topical gel administration is effective and convenient, making it a popular choice among patients and providers.

In recent years, there has been mounting concern surrounding the potential for interpersonal testosterone transfer between a patient and his immediate contacts. Several cases have reported isosexual or contrasexual precocity in the children of patients who utilize topical testosterone products.[2, 3, 4] As the number of cases of unintentional testosterone transfer began to grow, the FDA called for black box warnings on two of the popular topical gels in 2009. This warning was then expanded to include all topical testosterone products and includes caution against the risk of secondary exposure, advising that children avoid contact with unwashed or unclothed application sites. Despite these warnings, testosterone transfer among family members still occurs and if left untreated can precipitate detrimental somatic (i.e. rapid bone maturation and compromised adult height) and emotional (i.e., anxiety, depression, disruptive behavior) consequences in a growing child. Signs of early puberty always warrant a thorough investigation to identify its etiology and to individualize treatment plans. We describe a 3-year-old boy and his 6-year-old sister with signs and symptoms of hyperandrogenism due to secondary exposure to their father's topical testosterone product.

Patient Report

A 3-year-and-2-month-old previously healthy male was referred to the Endocrinology Clinic at Arkansas Children's Hospital for initial evaluation of precocious puberty. Patient history was negative for recent growth spurt, presence of acne, and deepening voice. Physical examination revealed a well-developed toddler who was tall for his age (height at the 97th percentile, figure 1). He had pubic hair (Tanner stage II), descended and prepubertal testes (~2 mL each, Tanner stage I), and a generous penile size for age (7 cm non-stretched length, 2.5 cm width, consistent with Tanner stage III-IV). There were no suspicious skin lesions, birthmarks, or other abnormal findings.

His bone age was interpreted to be eight years using standard images of the Greulich-Pyle skeletal atlas (figure 2). His chronological age was 3-years-2-months, which was greater than 5 standard deviations (SD) above the mean (Predicted adult height 151 cm; Mid-parental target height 178 cm).

Laboratory assessment was notable for significantly elevated total testosterone (223 ng/dl; RR<10) and only mildly elevated Androstenedione

> Continued on page 64.

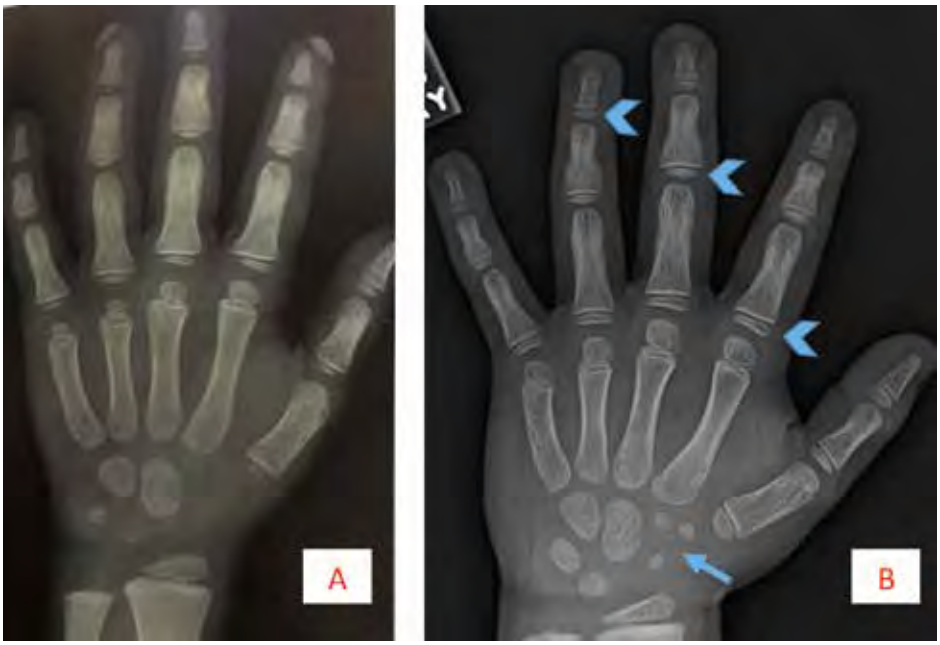

Figure 2.
A. Bone age X-ray image of a healthy three-year-old male child.
B. Patient's X-ray examination of the left wrist. Note the presence of three (trapezium, trapezoid and scaphoid) extra ossified carpal bones (arrows), and wider epiphyses of the phalanages (chevron).

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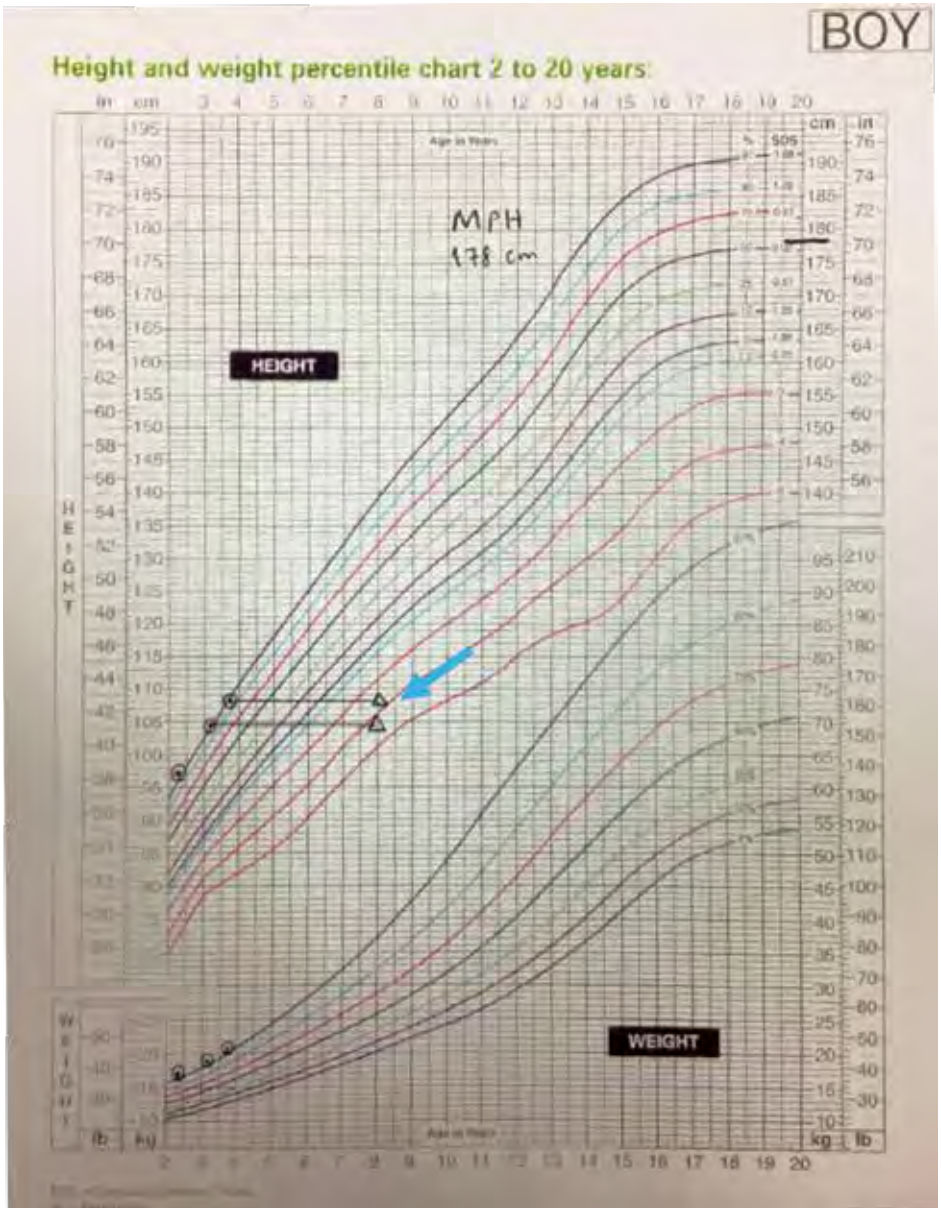

Figure 1. Patient's growth chart. Note markedly advanced bone age (arrow) which compromises adult height prediction.

(23 ng/dl; RR<16) levels. LH and FSH concentrations were within the pre-pubertal range. He had normal beta-hCG (<2.35 mIU/ml), 17-OHP (23 ng/dl), and DHEA (50 ng/dl, RR<65) levels. Pelvic and scrotal US showed no mass or lesion that could potentially be responsible for excessive androgen production.

The patient's father had been on topical testosterone replacement for the past five years for a diagnosis of hypogonadism of unknown etiology. His 6-year-old sister was diagnosed with premature adrenarche by her primary care physician when she presented with pubic hair and was found to have advanced bone maturation of 8 years (>2 SD above the mean). The patient's mother has inflammatory acne and has been treated with spironolactone (anti-androgen) for the last two years.

Given the negative initial work-up, our patient was diagnosed with possible exogenous testosterone exposure. We asked the patient's father to discontinue topical therapy. After one month, the patient's testosterone level dropped to 29 ng/dl, and at six months, to 9 ng/dl (RR<10). His growth velocity was 4.5 cm/year (normal 4-6 cm/year), and a repeat bone age showed no further advancement. However, there was no noticeable change in his penile size.

Discussion

Precocious puberty (PP) refers to the onset of physical and hormonal changes of pubertal development before eight years of age in girls and nine years of age in boys. The most common form of PP is central precocious puberty caused by various causes that lead to early activation of the hypothalamic-pituitary-gonadal axis. It is characterized by elevated gonadotropins (LH and FSH). Peripheral or gonadotropin-independent PP, on the other hand, causes iso- or contra-sexual precocity due to the increased levels of sex steroids (testosterone or estrogen) in the absence of FSH and LH elevation. Excess sex steroids in peripheral precocious puberty (PPP) can be due to endogenous sources, such as the gonads or adrenal glands, or from exogenous sources like topical products.

» A thorough physical examination and family history can guide the provider in formulating a diagnostic plan that might avoid unnecessary testing.

Sustained secondary exposure to exogenous testosterone is a well-characterized etiology of sexual precocity in boys and virilization in girls. We described a 3-year-old boy with increased penile size, pubic hair, and significantly advanced bone age. Due to the fact that the patient had been exposed to topical testosterone since birth, he likely had been experiencing accelerated linear growth from infancy. As a result, neither the family nor the referring provider recognized his significant growth spurt or examined the patient's bone age. By the time of referral, the patient's bone age was five years advanced with an adult height prediction markedly below his genetic height potential (Predicted adult height 151 cm; Mid-parental target height 178 cm). Additionally, evidence of secondary exposure was also present in other family members. The patient's 6-year-old sister had an advanced bone age and presence of pubic hair. Their mother had been receiving spironolactone, an androgen-blocker, for inflammatory acne. Signs and symptoms of all family members were presumably attributed to inadvertent exposure to the father's topical testosterone. This assumption was confirmed after the cessation of topical testosterone treatment, which improved the patient's serum testosterone levels after one month.

In previously reported cases of precocious puberty due to exogenous exposure, symptoms resolved after discontinued exposure. Martinez-

Pajares reported that 29% of the patients who had precocious puberty elicited by secondary androgen exposure had no regression of symptoms. This was characterized by persistently enlarged penile size, presence of pubic hair, and advanced bone age despite normalized androgen levels; 47% of patients had only partial regression of these symptoms.[4] Our report highlights the importance of obtaining a detailed family history in the workup of a patient with early puberty. Obtaining this information will guide the provider in establishing the diagnosis earlier and individualizing the care, as well as avoiding unnecessary and expensive diagnostic tests. Furthermore, it should be emphasized that pubertal assessment by the parent is not a reliable measure of exact sexual maturation of the child; therefore, the genital examination must be part of annual health supervision visits for every child to determine the stage of puberty.[5]

Although eight years have passed since the FDA enforced black box warnings on topical testosterone products, there continue to be incidences of virilization like the one discussed above. These cases suggest lack of education and understanding of exposure prevention, as well as lack of adherence. Secondary testosterone exposure remains overlooked by the medical community, and as a result, primary care providers and specialists are not as cognizant of this public health concern as they should be. Considering the potentially irreversible adverse effects of prolonged testosterone exposure in a growing and developing child, it is of paramount importance to have a detailed conversation between the patient and prescribing provider to illuminate the best administration option of testosterone—a conversation that takes into account the patient's family life, schedule, and living arrangements.

Conclusion

Secondary androgen exposure should always be high on the differential diagnosis in cases of sexual precocity, particularly in a family with multiple affected members. A thorough physical examination and family history can guide the provider in formulating a diagnostic plan that might avoid unnecessary testing. An open and continued dialogue between the patient and physician would ensure that the recommended mode of treatment meets the patients' needs and can accommodate the patients' lifestyle and home life while limiting secondary exposure to children.

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Senile Cardiac Amyloidosis Presenting as Tachycardia-induced Cardiomyopathy: Case Report and Literature Review

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Abstract

Wild type transthyretin (ATTRwt) cardiac amyloidosis, or senile cardiac amyloidosis, is an underdiagnosed disease. Data from autopsy studies show that, around one-fourth of elderly patients >80 years has ATTRwt deposits in their heart. They often present with heart failure with or without conduction abnormalities. Atrial fibrillation is present in around 50% of these patients and the risk of intra-atrial thrombus may be higher. We present the case of a 72-year-old man who presented with tachycardia mediated cardiomyopathy and was found to have ATTRwt amyloidosis.

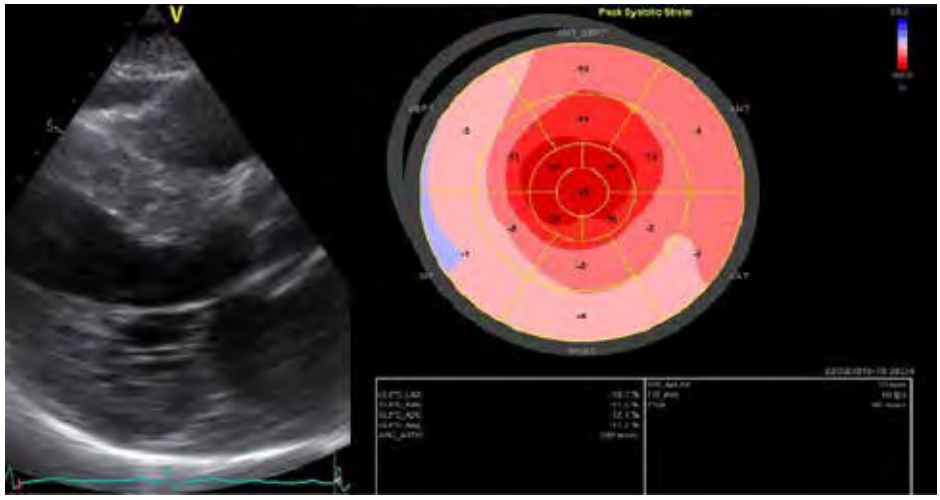

Figure 1: 2D echo image (left) and longitudinal strain image (right) showing increased wall thickness and apical sparing respectively, consistent with amyloidosis.

Case Presentation

Seventy-two-year-old African American male with no major medical illness presented to the hospital with palpitations and worsening dyspnea on exertion for the past six months. He denied chest pain, fever, chills, or dizziness. He was on no prescription medication at home and denied alcohol or drug abuse. At presentation, his heart rate was 115 bpm, blood pressure 125/82mmHg, and he was saturating normally on room air. Physical exam was significant for irregularly irregular rhythm with no signs of congestive heart failure (CHF).

Complete blood count, metabolic panel including liver function test, and thyroid function tests were normal. ECG showed atrial fibrillation with rapid ventricular rate, non specific T-wave abnormality in the inferolateral leads, and normal QRS voltage. Chest radiography showed mild cardiomegaly without any signs of overt heart failure. His prior workup for dyspnea included normal pulmonary function tests. A transthoracic echocardiogram revealed concentric left ventricular hypertrophy and reduced LV ejection fraction 25-30%. Tachycardia-mediated cardiomyopathy (TCM) was suspected and rhythm control by electrical cardioversion was planned. However, trans-esophageal echocardiography showed a 10mm X 10mm thrombus in the left atrial appendage. There was also evidence of spontaneous echo contrast ("smoke"). Due to the presence of atrial thrombus, the plan for cardioversion was abandoned. Patient was started on diuretics, long-acting metoprolol succinate and digoxin for rate control as well as warfarin for anticoagulation. Coronary angiography showed no obstructive coronary artery disease.

A month later, he was re-evaluated and found to have achieved sinus rhythm spontaneously. Medical management was continued and he was placed on amiodarone to keep him in sinus rhythm. A repeat echocardiogram revealed improvement in LV ejection fraction to 55%. Wall thickness was increased (septal wall thickness 2.2cm) with grade 2 diastolic dysfunction and longitudinal strain analysis was suspicious for amyloidosis. Cardiac MRI was performed and confirmed concentric hypertrophy with a diffuse subendocardial enhancement pattern that did not confirm to a vascular territory; the pattern was suspicious for cardiac amyloidosis.

Workup for AL amyloidosis including bone marrow aspirate and biopsy were negative for plasma cell neoplasm. To establish the diagnosis as well as determine the type of amyloid deposition, endomyocardial biopsy was performed. There was amyloid deposition in multiple foci in the interstitium and vessel walls of heart confirmed by thioflavin-t and Congo red stains. Mass spectrometry for amyloid subtyping resulted in transthyretin wild type amyloid. Sequencing of the TTR gene did not show a known mutation.

Follow up and outcome

The patient was started on diflunisal therapy to prevent further aggregation of transthyretin molecules. One year post-diagnosis patient continues to have signs and symptoms of fluid overload, currently being managed with increasing doses of diuretics and paracentesis. His atrial fibrillation did not recur and he continues to be on amiodarone therapy.

Discussion

This previously asymptomatic patient with no prior co-morbidities presented with atrial fibrillation and LV systolic dysfunction. It was attributed to tachycardia mediated cardiomyopathy and improved with rhythm control therapy. However,

comprehensive echocardiographic evaluation including myocardial deformation analysis suggested an infiltrative cardiomyopathy especially in the absence of systemic hypertension. The diagnosis of amyloidosis was further supported by cardiac MRI and was conclusively established by endomyocardial biopsy; mass spectrometric analysis and genetic mutation testing confirming the diagnosis of ATTRwt.

Cardiac amyloidosis can be broadly divided into light chain (AL) amyloidosis, hereditary transthyretin amyloidosis (ATTRm) and wild-type transthyretin amyloidosis (ATTRwt). Systemic amyloidosis from Amyloid A and other types of amyloidosis infrequently affects the heart. AL amyloidosis is a plasma cell dyscrasia and can complicate multiple myeloma. ATTRm results from inherited mutations in transthyretin leading to formation of an aggregation prone – amyloid forming mutant protein. On the other hand ATTRwt results from sporadic changes resulting in destabilization and abnormal fibril formation of "normal" transthyretin protein.[1]

In several autopsy studies on elderly individuals >80 yrs, the frequency of amyloid deposits in the heart were as high as 25%.[2] Cardiac amyloidosis due to ATTRwt is an underdiagnosed disease and its incidence is unknown. Dyspnea on exertion (86%) and peripheral edema (64%) are the most common clinical symptoms.[1] Atrial fibrillation was present in around 50% of patients. The incidence of atrial fibrillation is increased in ATTRwt compared to ATTRm or AL disease.[3] This could partly be explained by the advanced age at diagnosis as well the presence of concomitant risk factors such as a hypertension.

Non-invasive diagnostic methods like ECG, ECHO, Cardiac MRI, and nuclear scintigraphy aid in the diagnosis of ATTRwt. Though low-voltage ECG along with q-wave or t-wave changes are considered to be related to amyloidosis, they are not specific for ATTRwt disease.[3] Echocardiography is useful for identifying and monitoring cardiac amyloid disease and is one of the best imaging techniques for assessing ventricular diastolic function. Interventricular septal thickness of >12mm in the absence of aortic valve disease or systemic hypertension, speckling appearance of myocardium, small LV chamber volume, atrial enlargement, and features of restrictive diastolic filling are suggestive of cardiac amyloidosis. But these changes may not be present in early stages of the disease. Myocardial deformation analysis using longitudinal strain assessment reveals an apical soaring pattern

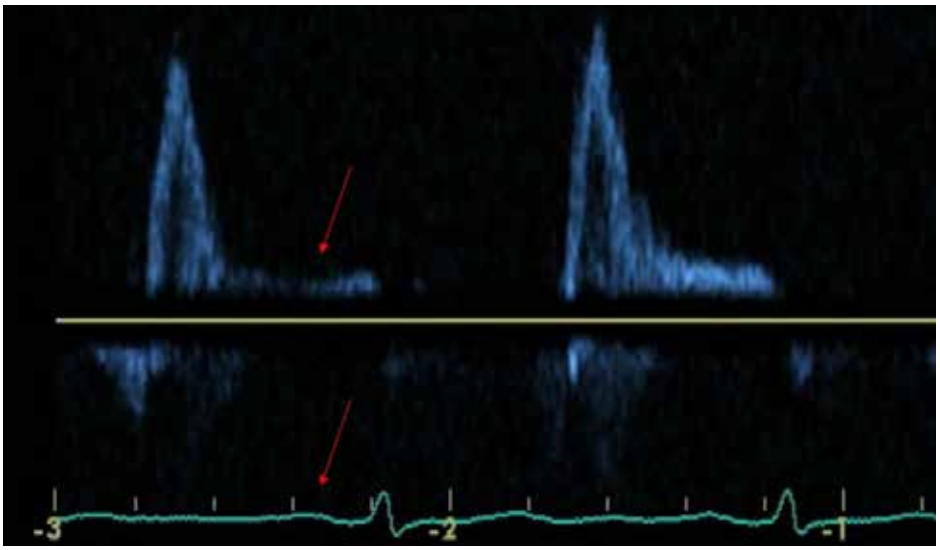

Figure 2: Mitral inflow showing severe atrial mechanical dysfunction despite achieving sinus rhythm, which explains the increased risk of thrombus in these patients even when in sinus rhythm. Arrow corresponds to lack of atrial contraction in echo during p-wave in ECG.

which occurs in most cases of amyloidosis as well as some cases of other causes of LV hypertrophy such as systemic hypertension. Late gadolinium enhancement cardiac MRI (CMR) can identify cardiac amyloidosis with a sensitivity and specificity of around 90% compared to cardiac biopsy. Global transmural or subendocardial late gadolinium enhancement is the most common pattern seen. In contrast, territorial enhancement is seen in myocardial infarction.[4] Studies on both CMR and echo imaging suggest that wall thickness and mass are greater in TTR compared to AL disease, but they fail to differentiate between the various types of amyloid.[3,5] Although not definitive, nuclear scan using 99mTc-DPD has been able to differentiate the type of amyloid. Positive 99mTc-DPD strongly suggest ATTR disease when performed in cardiac amyloid. Further studies in this regard are currently ongoing.

Cardiac biopsy is the gold standard for the diagnosis of amyloid cardiomyopathy. Amyloid can be identified by congo red staining. Immunohistochemistry/mass spectrometry can be useful in analyzing the type of AL amyloid deposition. Mass spectrometric analysis can help identify the various types of amyloid protein while gene analysis is needed to further differentiate between ATTRm and ATTRwt.

Treatment of ATTRwt cardiac amyloidosis mainly involves management of heart failure and cardiac conduction abnormalities, along with therapies that slow deposition of amyloid. Fluid optimization using diuretics and spironolactone form mainstay in treatment of heart failure. ACE-inhibitors and beta-blockers are poorly tolerated by many patients due to symptomatic hypotension.[6] Calcium channel blockers and digoxin are considered contraindicated in ATTR cardiac amy-

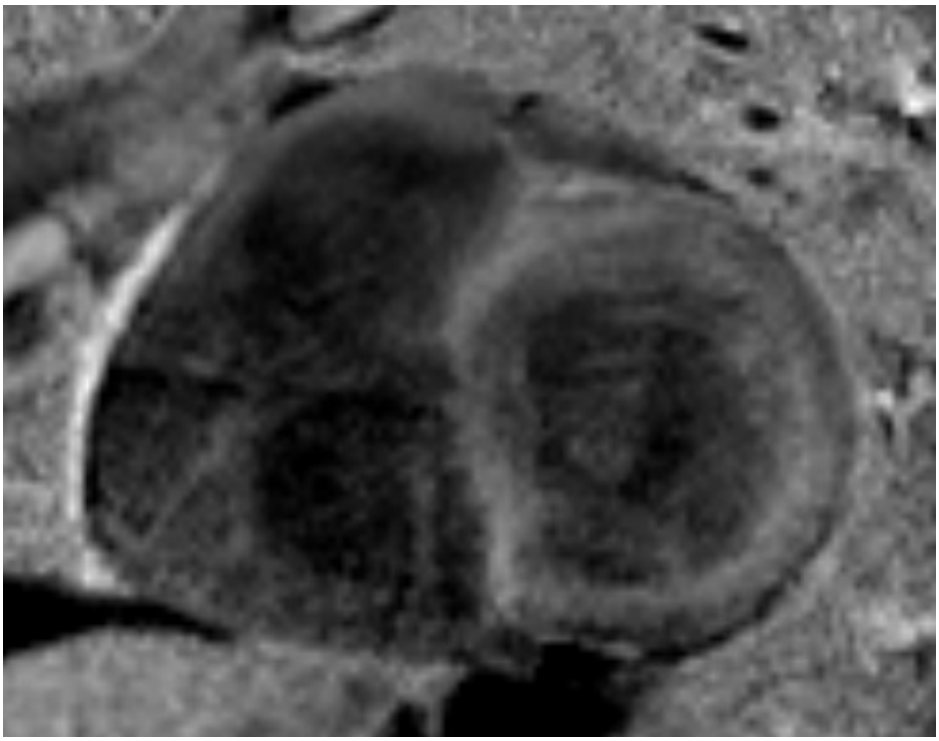

Figure 3: Cardiac MR showing abnormal late gadolinium enhancement.

loidosis as they can potentially bind to transthyretin amyloid fibrils and can cause toxicity.[7,8] Atrial fibrillation can be managed either by rate control strategy or by rhythm control strategy along with anticoagulation. Amiodarone can be safely used in ATTR amyloidosis. Amyloidosis patients have a higher incidence of intra-atrial thrombus. It is postulated that the presence of chronic amyloid in atria along with systolic and diastolic ventricular dysfunction causes atrial mechanical dysfunction and increases the risk of thrombus in addition to usual risk in atrial fibrillation. In fact, atrial thrombus has been reported in patients with cardiac amyloidosis in the absence of atrial fibrillation.[9] In view of this, all patients with cardiac amyloidosis and AF should be anticoagulated irrespective of their risk status based on a score such as CHA2DS2-Vasc score. Anticoagulation with novel oral anticoagulants, though popular, is not studied in this patient population.

Earlier, liver transplantation was the only available therapy as it improved survival and reduced transthyretin production. But it was found that amyloid deposition continues to occur in heart and neural tissues from the transthyretin produced by donor liver. Newer therapies specific to ATTR type amyloid are currently in phase two and three clinical trials. Revisiran utilizes RNA silencing to inhibit transthyretin mRNA in hepatocytes. Phase two trials showed a decrease of >85% in ATTRwt and ATTRm cardiomyopathy patients. Tafamidis has been shown to halt disease progression in terms of neuropathy by stabilizing the structure transthyretin and preventing formation of amyloid beta pleated sheets. However, its effect on cardiomyopathy is not known. Diflunisal, an NSAID, has shown to decrease the progression of cardiac and neurological disease in small studies.[10] It acts by stabilizing transthyretin through its anti-aggregating effect.

This case illustrates the importance of considering an underlying cardiomyopathy in patients with suspected TCM due to arrhythmias. Patients with reduced LVEF from an arrhythmia such as AF may either achieve normal LV systolic function ("pure" TCM) or merely an improved but impaired LV systolic function ("impure" TCM) with control of the arrhythmia. Once the arrhythmia is controlled, a search for underlying cardiomyopathy should be considered.

Learning Points

Atrial fibrillation is present in around 50% of patients with ATTR type cardiac amyloidosis and can cause tachycardia mediated reduction in LV ejection fraction, which can improve with achieving sinus rhythm.

Amyloid cardiomyopathy with concomitant atrial fibrillation has an increased risk of atrial thrombus, and risk should not be estimated based on CHADs2VASC score alone.

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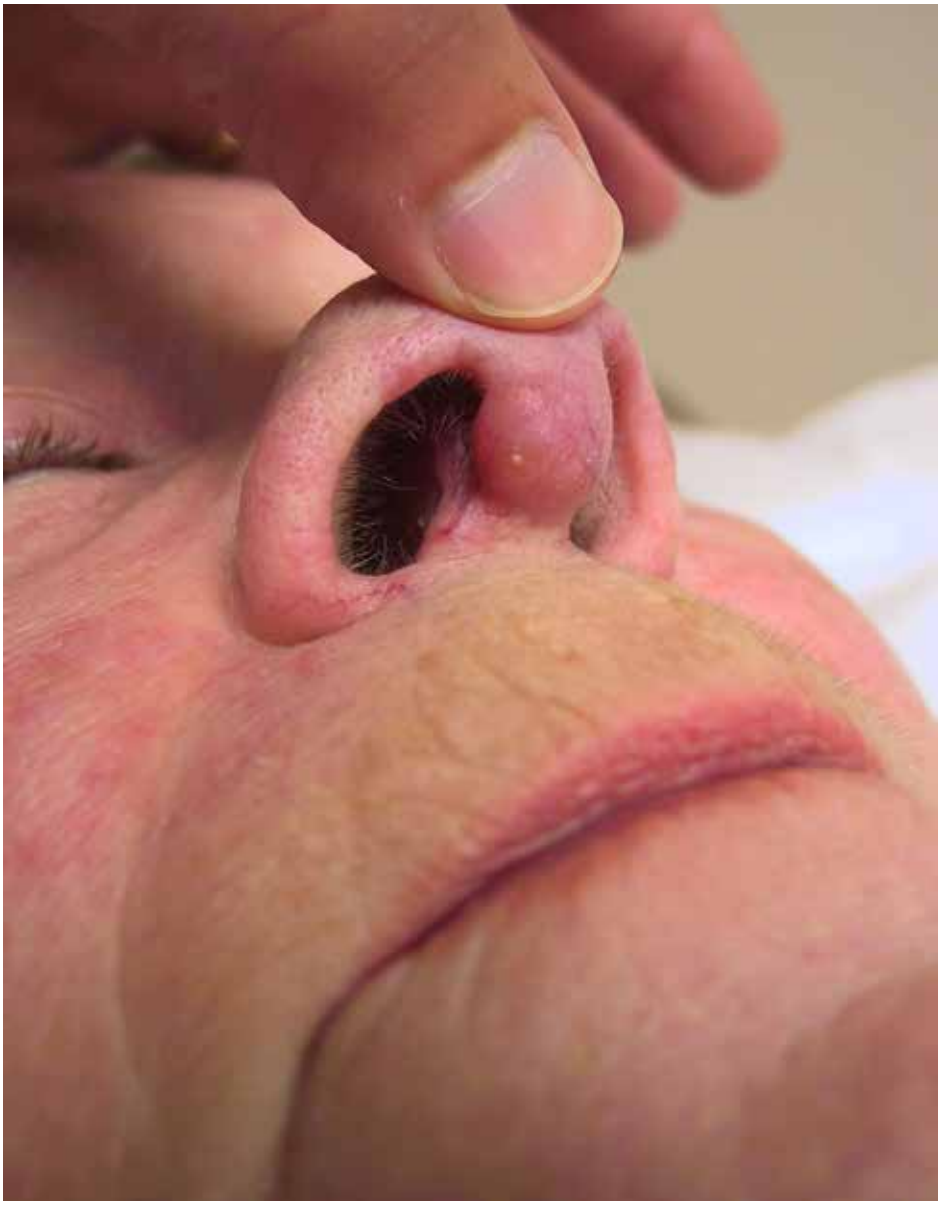
Derm Dilemma

Blake St. Clair, M3; Kevin St. Clair, MD

This 58-year-old woman presented with a 10-month history of an asymptomatic indurated dermal nodule of the nasal septum. No other pertinent cutaneous findings were noted, and the patient enjoys good general health. A biopsy was taken for routine histology and tissue culture. Hematoxylin and eosin staining demonstrated non-caseating granulomatous inflammation of the dermis. Neither acid fast bacilli nor deep fungi were detected in the biopsy specimen or tissue culture.



What is the next appropriate step in evaluation or treatment of this patient?

A. Excision utilizing the Mohs technique (margin control using frozen tissue sections)

B. Standard surgical excision with margin control via formalin fixed permanent tissue sections

C. Imaging of the maxillary and frontal sinuses with CT or MRI

D. Chest radiography

E. Sputum culture

Answer: D. Chest Radiography

Non-caseating granulomatous inflammation accompanied by negative tissue stains and cultures is typical of *sarcoidosis*. Sarcoidosis is a multiorgan disease of unknown etiology characterized by a chronic cell-mediated immune response to an unknown antigen. The lungs and intrathoracic lymph nodes are most commonly affected; approximately 25% of patients have cutaneous involvement. This patient exhibits probably the most specific skin manifestation: lupus pernio. Other integumentary findings include panniculitis of the lower legs (associated with Lofgren's syndrome), purple-dusky red plaques, or deeper subcutaneous nodules.

Most patients, symptomatic or not, experience some degree of pulmonary involvement, ranging from bilateral hilar adenopathy to parenchymal infiltrates to fibrosis. Chest radiography is essential when beginning the work up of a patient with presumptive sarcoidosis. AMS

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