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Assuming the Role of Editor for the Florida Pediatrician Journal

Responsibilities, Expectations, and Vision for the Position

Taking on the position of editor for the Florida Pediatrician journal is an honor that comes with significant responsibility and opportunity. The editor plays a central role in shaping the journal's direction, maintaining its standards, and fostering the professional development of pediatricians across Florida. Key responsibilities include:

- Editorial Oversight: Oversee all aspects of the journal's editorial process, ensuring that all content meets high academic and ethical standards.
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- Publication Ethics: Uphold high standards, manage conflicts of interest, plagiarism checks, and ensure transparency in all editorial decisions.
- Strategic Planning: Collaborate with the journal's Board and the FCAAP to set long-term goals, implement innovations, and expand the journal's reach and impact.

As new editor, my vision is to further the journal's mission by fostering innovation. As a Board we must continue to expand the scope of published content to include original research, clinical guidelines, case reports, and pediatric education department reports relevant to Florida's pediatricians. I welcome ideas from readers and authors alike. Feel free to contact me at *michaeljmd156@gmail.com* with your thoughts or concerns.

Assuming the role of editor is a privilege and a challenge. I would be remiss if I did not thank past journal editor, Dr. Mobeen Rathore, for his many years of dedication to the journal's successes. He brought the journal a long way from the early days of his tenure when it was but a newsletter. I am truly standing on the shoulders of an accomplished leader and good (and dare I say old) friend as I take the helm. And besides, he and I are fellow pediatric infectious disease specialists first meeting in the days of our fellowship training. Those days and now are filled with good times and accomplishments. I thank Mobeen for his unwavering support and agreeing to remain as a member and important voice on the Editorial Board.

I look forward to collaborating with Editorial Board members and the broader pediatric community to ensure that the Florida Pediatrician journal continues to inform, inspire, and advance the practice of pediatric medicine in Florida.

Michael J. Muszynski, MD, FAAP, FPIDS
Editor, The Florida Pediatrician

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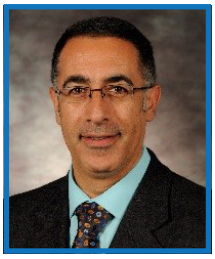

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ORIGINAL RESEARCH

Testicular Point-of-Care Ultrasound Utilization for Pediatric Patients

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ABSTRACT

Background

Acute scrotal pain is a common presentation to the Pediatric Emergency Department. Testicular point-of-care ultrasound studies performed in the Emergency Department may assist in expediting diagnosis and management. Access to point-of-care ultrasound or radiology ultrasound for acute scrotal pain may vary by institution.

Objectives

This study aims to be a descriptive study with regard to the utilization of ultrasound and access to surgical management for pediatric patients who present with acute scrotal pain in the Pediatric Emergency Department.

Methods

A survey inquiring about hospital settings, institutional types, availability of point-of-care ultrasound, radiology ultrasound, and surgical management for scrotal pathology and testicular was sent to two different Listervs. A second survey to further evaluate ultrasound use for testicular torsion management was sent to institutions that perform scrotal point-of-care ultrasound.

Results

The initial survey had 314 respondents from 147 separate institutions. Most respondents worked in an urban, academic, or Pediatric Emergency Department setting. Fourteen percent of the respondents perform a point-of-care ultrasound prior to radiology ultrasound for testicular torsion. Still, if the point-of-care ultrasound is negative for findings, 84% will order a radiology ultrasound study for further evaluation. For those institutions with surgical management capability, only 3% of the surgeons would operate on testicular torsion based on positive point-of-care ultrasound findings.

Conclusion

Performance of testicular ultrasound by point-of-care ultrasound remains low despite the urgency of rapid treatment for testicular torsion, as the salvage rate drops to 20-50% if operating room management is delayed 6 to 12 hours. Opportunities to encourage point-of-care ultrasound use for scrotal pathology may expedite management when compared to radiology ultrasound. Further study is needed to inquire into behavior and barriers preventing more point-of-care ultrasound use in the Pediatric Emergency Department.

INTRODUCTION

Acute scrotal pain is a common presentation to the Emergency Department (ED), making up approximately 0.5% of visits.[1,2] The severity of the diagnosis ranges from minor (epididymitis or torsion of the testicular appendage) to fertility-threatening conditions (testicular torsion). History and physical exam alone cannot be relied upon, as these conditions can mimic each other.[1,3,4] One case series of acute scrotal presentations described testicular torsion as the final diagnosis in 10% of the cases.[5]

Historically, a physical exam, urinalysis, and a radioisotope scan were used to differentiate between benign and surgical conditions.[1] However, ultrasound has now become the gold standard in the evaluation of scrotal pain.[3,6]

Testicular torsion is the most time-sensitive diagnosis to make in a patient with an acute scrotum presentation.[7,8] Frohlich et al showed that testicular salvage was around 90-100% if managed in the operating room within the first 6 hours of symptoms. Salvage drops to 20-50% if operating room management is delayed to 6 to 12 hours, and 11% if delayed beyond 12 hours.[7] This is particularly concerning, as at a Canadian academic center, Chan et al found that most patients presented to the ED at 4 hours after the onset of testicular symptoms and were not evaluated for an average of 79.8 minutes after presentation. An additional 48 minutes elapsed if an ultrasound was performed.[9] Overholt showed that in a rural setting, where patients need to be transferred for ultrasound, there was an additional 6 hours of delay before surgery (12.9 hours from onset of symptoms compared to 6.9 hours to those not needing transfer).[10]

Point-of-Care Ultrasound (POCUS) is a modality that can be readily performed at the bedside by a physician trained in its use. Friedman et al found in a retrospective study that performing POCUS saved 73 minutes in time to diagnosis when compared to radiology ultrasound (RADUS) in their evaluation of scrotal pain. Their POCUS studies demonstrated 100% sensitivity and 99% specificity when compared to RADUS ultrasound results.[11]

This study aims to describe the utilization of ultrasound and access to surgical management for pediatric patients who present with acute scrotal pain in the Pediatric ED.

MATERIALS & METHODS

This study was reviewed and approved by the Institutional Review Board.

Participants:

The survey was distributed to the members of P2Network and the Brown Pediatric Emergency Room (PEM) Listserv. The P2Network (The P2 standing for "PEM POCUS") is an international organization comprised of PEM POCUS communities with 375 members. The Brown PEM listserv includes approximately 2800 providers throughout the world with interests in PEM topics. All of our surveys were voluntary, and participants consented to the study when completing the survey.

Study Design:

The survey was designed by three PEM POCUS leaders, discussed during two online meetings, and edited by an additional eight PEM POCUS leaders.

First Iteration:

The first survey was sent to all P2Network and Brown listserv members. Disclosure of home institution was not required for participants. Demographic questions were based on the location where providers worked most of their shifts (Table 1). Questions included the availability of scrotal ultrasounds and consultants for the management of scrotal pathology in the ED. If providers indicate that they do testicular POCUS, they may continue to the next section of the survey (Table 2). If the provider cannot perform testicular POCUS in the ED, they do not continue to the following section.

Second Iteration:

The second survey was sent by email to POCUS Directors. If there was no POCUS Director, it was sent to the Division Director at the institutions, who confirmed that testicular/scrotal POCUS is performed at their institutions. This five-question survey was designed to gain a better understanding of locations where testicular POCUS is performed (Table 3).

Data Collection and Analysis Method:

REDCap (v11.1.16), an online, secure survey manager, was used to distribute the survey and collect responses.

RESULTS

A total of 62 completed the first survey from 147 separate institutions, with a response rate of 10%. Most respondents work in an urban, academic, pediatric ED setting. In-house, 24-hour radiology ultrasound for testicular/scrotal ultrasound studies was available for 81% of the institutions. A large majority (98%) of these institutions have either urologists or general surgeons who manage testicular emergencies available on-call.

Survey Questions: Demographics (n=314)	Percentage
Where is your pediatric emergency room located?	
Standalone Children's Hospital	59%
No Satellite of a Children's Hospital	2%
Pediatric ED in a General Hospital	37%
Part of a General Hospital	3%
Which of the following best describes your institution?	
Academic or Academic Affiliated	88%
Community Based	12%
Where is your hospital located?	
Urban	82.3%
Suburban	17.4%
Rural	0.3%
When is radiology ultrasound available for testicular/scrotal studies?	
In House 24/7	81%
Day Coverage with call in overnight	18%
Day coverage only	1%
None	0%
Who repairs torsion at your institutions (select all that apply)?	
Urology	88%
Pediatric Surgery	23%
General Surgery	1%
None	2%
What is your surgeon's availability?	
In House	21%
On-Call	77%
None	2%
Is Testicular/Scrotal POCUS done at your institution?	
Yes	41%
No	59%
Do you do your own POCUS?	
Yes	66%
No	34%

Table 1: Demographics of intuitions who completed the survey.

Survey Questions Part 1 (n=216)	Percentage
Have you completed a POCUS Fellowship?	
Yes	25%
No	75%
How many Testicular POCUS exams have you done in your career?	
0	41%
1-10	26%
11-24	14%
25 or more	19%
Is scrotal POCUS done prior to radiology for those capable?	
Yes	14%
No	61%
Sometimes	25%
If scrotal POCUS is negative defined by flow seen bilaterally and no associated abnormalities, will a RADUS be ordered?	
Yes	84%
No	4%
Sometimes	12%
Do your surgeons operate based on scrotal POCUS without a RADUS?	
Yes	3%
No	84%
Sometimes	13%

Table 2: Providers who do POCUS studies.

Only 41% of the respondents reported testicular or scrotal POCUS being performed at their institutions. Approximately 25% of the respondents completed a POCUS fellowship. However, almost 66% reported performing their own POCUS. Only 13% of PEM departments included testicular/scrotal ultrasound as part of their POCUS credentialing. Furthermore, only 14% reported testicular/scrotal POCUS routinely being performed before radiology studies in institutions capable of performing POCUS. In case of negative testicular/scrotal POCUS, 84% of respondents would proceed to order a confirmatory ultrasound in radiology. Only 17% of institutional surgeons would consider operating based on positive testicular/ scrotal POCUS alone. Similarly, only 18% of responding institutions reported their surgeons allowing testicular detorsion based on POCUS only. The top diagnoses made by testicular/ scrotal POCUS included testicular torsion (36%), hydrocele (26%), mass (17%), hernia (17%), and epididymitis (17%). A detailed breakdown of the responses is shown in Table 1.

A total of 62 institutions indicated they do testicular POCUS on the first survey, thus making them eligible for the second survey. Contact information for only 47 program directors was found (either POCUS Director or Division Chiefs), with 19 departments completing the follow-up survey describing current trends and practices related to ultrasound evaluation of the acute scrotum in their departments. Most departments reported that they care for more than 20 cases of testicular torsion (63%) annually, and RADUS performed more than 200 scrotal ultrasounds per year (68%) on average over the last 5 years. The process to complete RADUS with interpretation is usually between 31 and 90 minutes (79%), although three sites reported a turnaround time of under 30 minutes. One site reported a turnaround time greater than 90 minutes.

Survey Questions: Part 2 (n=19)	Percentage
How many cases of testicular torsion per year does your department see?	
0-10	11%
11-20	28%
>20	63%
How many scrotal ultrasounds per year are performed by diagnostic radiology?	
0-100	16%
101-200	16%
>200	68%
What is the approximate turnaround time (order, study completion and results) for testicular studies for radiology performed scrotal ultrasounds?	
0-30 minutes	16%
31-60 minutes	37%
61-90 minutes	42%
>90 minutes	5%
How many scrotal/testicular POCUS are performed per year?	
0-10	53%
11-20	26%
>20	21%
How many POCUS sonologists are comfortable performing scrotal/testicular studies?	
0	11%
1-5	79%
6-10	5%
11-15	5%

Table 3: Director's responses at institutions where testicular POCUS is done.

Compared to RADUS, the overall use of POCUS to evaluate the acute scrotum was much less frequent, with most programs reporting 0-10 bedside scans (53%) performed annually. Most programs reported having 1-5 PEM physicians (79%) in their group who felt comfortable performing scrotal/testicular POCUS. Full details of the survey results can be found in Table 3.

DISCUSSION

Point-of-Care Ultrasound (POCUS) is a limited ultrasound at the bedside to answer a specific clinical question. Medical ultrasound was first developed in the 1950's, with the first commercially used ultrasounds appearing in the 1960's. Ultrasound was initially used by cardiology, radiology, and obstetrics/gynecology. In the late 1980's, it was introduced to EM. Early EM POCUS focused on life-saving applications, looking for cardiac effusions and free fluid in trauma.

Formal training for EM POCUS began with minicourses in the early 1990's and has since developed into a core competency for EM residents by the Accreditation Council for Graduate Medical Education in 2001.[12]

The use of POCUS in Pediatric Emergency Medicine was first endorsed by the American Academy of Pediatrics in 2015. A 2020 survey found 97% of PEM Fellowship programs incorporate POCUS in their education. POCUS has expanded from the early critical care applications to include looking for less acute pathology, such as in the lung (pneumonia) and soft tissue evaluations (abscess or foreign bodies).[13]

Testicular torsion is a time-sensitive diagnosis, as testicular viability decreases over time. POCUS can help accurately speed up diagnosis.[11] This survey showed that many PEM providers are not comfortable with POCUS findings, and even when the PEM provider is comfortable, their surgical consultants tend not rely on these findings. This is consistent with prior surveys that concluded scrotal/testicular POCUS is viewed as an advanced modality.

PEM POCUS experts from the P2Network disagreed that testicular POCUS should be part of the PEM Fellowship or PEM POCUS Fellowship training. They conducted two Delphi-based survey studies, which required 80% consensus for approval to be included in the respective fellowships; 49% thought that scrotal POCUS should be part of fellowship training in Pediatric Emergency Medicine

(PEM), and 79% felt it should be part of PEM POCUS Fellowship training, just short of the 80% requirement.[14,15]

This two-part survey regarding testicular/scrotal evaluation assessed throughput for children in the ED and the application of POCUS. The first part of the first survey was open to providers subscribing to the Listservs, and the second part was limited to those who do their own POCUS. Of the 314 providers who filled out the first survey, 65% stated that they do their own POCUS. This disparity can be noted as departments had 59% of the faculty credentialed in POCUS.

Our survey continued for those who indicated that they do POCUS with questions that touched on how often they do testicular/scrotal POCUS and if they use it for clinical decision-making. In an article published by Abo et al concerning credentialing PEM POCUS faculty, they recommended 25 scans to be credentialed in testicular/scrotal POCUS.[16] In this survey, of those who performed POCUS, only 19% of providers had met the 25 testicular/scrotal scans milestone. Our survey also indicated that only 14% of those who perform POCUS do a testicular/scrotal POCUS before a RADUS routinely. Performing POCUS alone could save time and subsequent testicular viability. Friedman showed that a POCUS study saved 73 minutes in diagnosis at their institution. This 73-minute period could be the divergence between salvaging a testicle and its demise.[11]

One reason testicular/scrotal POCUS might not be performed is that providers do not think it is time-efficient. In the survey, only 3% of general surgeons and urologists routinely take testicular torsion to the operating room, based on a POCUS study alone. EM providers might be more willing to invest their time to learn and perform these POCUS studies if surgeons would rely on them. As previously noted, Friedman showed that POCUS by PEM physicians was 100% sensitive and 96% specific for the diagnosis of torsion.[11] Stringer demonstrated that residents were able to achieve 96% accuracy with the video module-based education plus one hour of hands-on training. Twelve Emergency Medicine residents and 12 Urology residents were tested on their knowledge of scrotal ultrasound, and 96% were deemed competent after this training and maintained their expertise at a 3-month reassessment.[17] This implies that there could be a role for POCUS in both high and low-probability settings, used in combination with a scoring system such as the Testicular Workup for Ischemia and Suspected Torsion (TWIST) score.[18]

Another reason there might be hesitation to perform these studies is fear of the consequences of missing a torsion, as well as the liability of missing the diagnosis.[19,20] In this survey, emergency providers still order a RADUS in 84% of cases. where there is flow seen bilaterally, and there are no associated symptoms.

The second survey was distributed to POCUS program directors at sites where testicular/scrotal POCUS is performed. The director was requested to do research by contacting radiology, surgery, and electronic medical record personnel to get specific numbers. These sites, for the most part, saw large volumes and had significant pathology, with most seeing greater than 20 cases of torsion per year (63%). They were consistent with the Friedman study, with the highest number of sites (42%) taking 61-90 minutes with RADUS. Most institutions performed 10 or fewer POCUS studies per year (53%) compared to RADUS, which performed 201 (68%). Most of these studies are being conducted by 1-5 providers (79%).

Limitations:

This study had several limitations. Most providers who filled out this survey were based out of academic institutions, and most perform their own POCUS. This indicated a bias to those who are interested and invested in POCUS. Since the survey was sent out to PEM and POCUS listservs, several institutions responded more than once. This could indicate that those groups with more interest in POCUS are more likely to respond.

Another limitation is that in the first part of the survey, providers were given best-guess answers, thus allowing for recall bias.

In the second part of the study, directors were asked to consult with radiology to obtain more concrete answers. This, in part, could have led to the low response rate, particularly in the second half of the survey.

Conclusions:

Performance of testicular ultrasound by POCUS remains low despite how time-sensitive it is to diagnose testicular torsion. Even among those who do their own POCUS, they often order a confirmation RADUS study, and surgeons rarely take patients to the operating room based on POCUS. Opportunities to encourage POCUS use for scrotal pathology may expedite management when compared to RADUS. Further study is needed to inquire into behavior and barriers preventing more POCUS studies from being performed in the Pediatric ED.

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REVIEW ARTICLE

The ARCH Feedback and Guidance Model: Practical Strategies for Implementation

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OVERVIEW/INTRODUCTION

The author conceptualized the ARCH Feedback and Guidance Model in 2003 at the Florida State University College of Medicine. It has been refined in partnership with Suzanne C. Bush, MD, and Gregory Turner, EdD.[1] ARCH became an integral part of the medical school's teaching methodology for clinical preceptors and remains so today. The ARCH model has been recognized and utilized by numerous medical schools, such as the Medical College of Wisconsin, Tufts University, Northeast Ohio Medical University, the University of Tampa, and the Ohio University College of Osteopathic Medicine. The Harvard-Macy Institute featured the ARCH Model in their January 2023 #MedEdPearls entitled, "The ARCH Guidance Model for Providing Effective Feedback."[2]

The ARCH Feedback and Guidance Model aims to help learners become skilled at the habits associated with self-assessment and self-directed learning throughout the continuum of gaining knowledge and skills as medical students, medical residents, and independent physician health care providers. This article explains the ARCH model and strategies for how clinicians teaching students or residents in the office or hospital setting can utilize the model to enhance learners' abilities to self-assess accurately and continuously develop strategies for self-directed learning.

Four components constitute the structure of the ARCH model as follows:

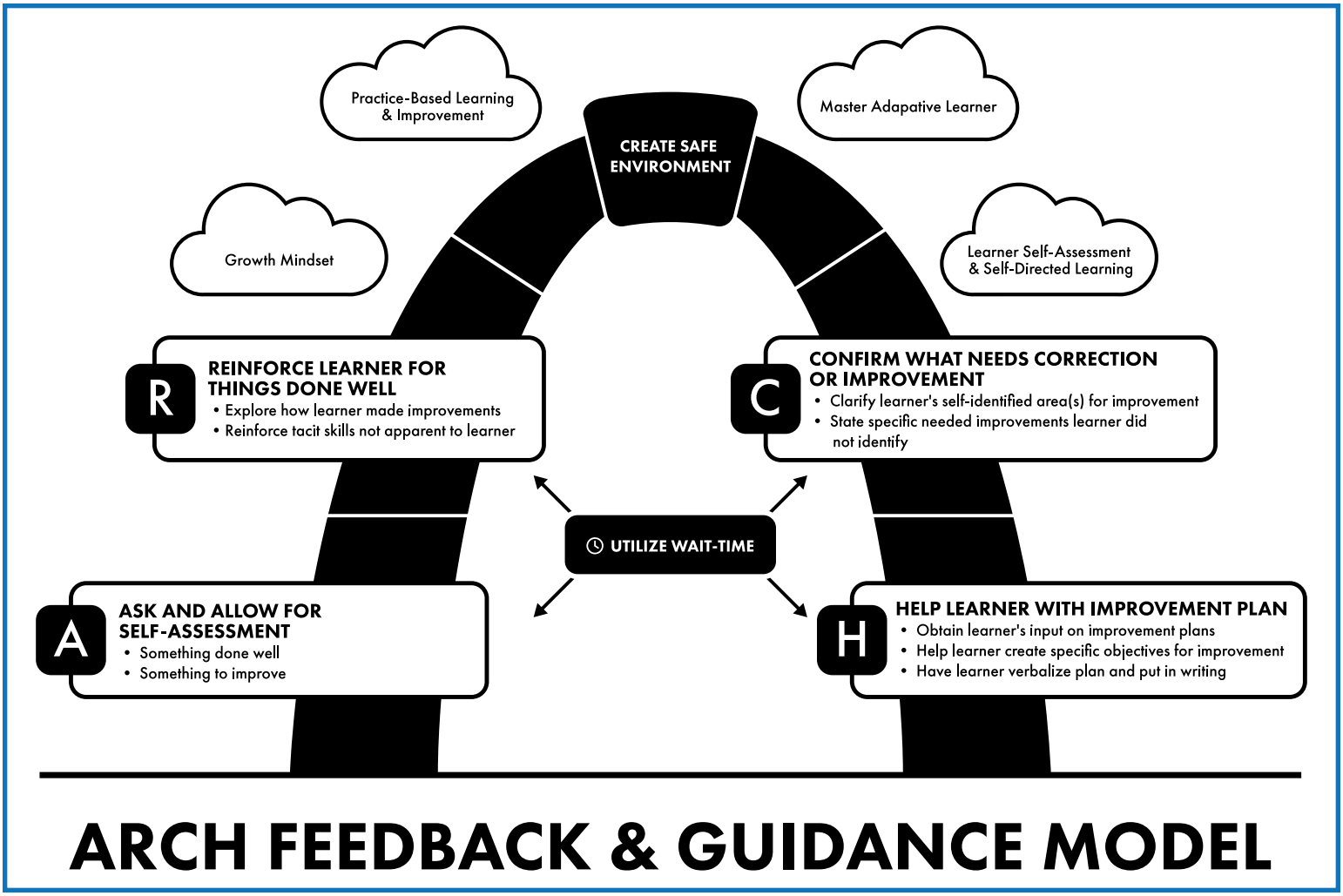
A = *Ask* and *Allow* for Learner Self-Assessment

R = *Reinforce* Knowledge, Skills, and Attitudes Demonstrated by the Learner

C = *Confirm* with the Learner What Needs Correction or Improvement

H = *Help* the Learner with a Plan for Improvement

Each of these four components is described in this paper (See Figure).



ADDITIONAL FEEDBACK MODELS

Numerous feedback models are described in the medical education literature. Examples include: Pendleton's Rules,[3] Ask-Tell-Ask,[4] R2C2,[5] FEEDBK,[6] and ADAPT.[7]

This paper does not describe these models, but references are provided for their accession. These models represent an effort to move beyond the infamous "Feedback Sandwich" and move to a feedback framework that engages the learner in a conversation with the teacher, purposed to help the learner create and implement strategies for improving knowledge, skills, and attitudes.

The primary purpose of these models is to help learners gain metacognitive skills to improve their performance continuously and with less dependency on others. The ARCH Feedback and Guidance model is an additional model for medical school faculty, residency faculty, and clinical preceptors to consider in efforts to enhance learners' metacognitive skills and habits associated with self-directed learning.[8]

WHEN AND WHERE ARCH CAN BE IMPLEMENTED

This paper focuses on using ARCH in the clinical training setting (e.g., third- and fourth-year clerkships and throughout residency training). However, using ARCH in years one and two of medical school is also appropriate for the feedback and guidance processes associated with small group learning, simulation activities, objective structured clinical exams, etc. The advantage of the ARCH model is that it can be utilized throughout the continuum of medical education, including CME programming.

WAIT-TIME AND ARCH

The ARCH model is an interaction between teacher and learner, driven by teacher questions and learner responses. When asking the learner a question, the instructor should give the learner a 3 to 5-second time-frame of silence to create and deliver a response. This 3 to 5 seconds of instructor silence after the instructor asks a question is called "wait-time I." Wait-time II is a 3 to 5-second time-frame of silence provided by the instructor after the learner gives a response that provides the learner time to think and extend their

initial answer to the question if needed. Thus, wait-time provides the learner with "think-time." The benefits of using wait-time are well documented in the educational literature (Rowe, 1986; Small, 1988; Sachdeva, 1996; Schneider et al., 2004; Nicholl & Tracey, 2007; Cho et al., 2012; Long, 2015; Barrett et al., 2017).[9-16] Using wait-times I and II may appear to be challenging to utilize when teaching in busy patient care settings, but just taking the time to be silent for 3 to 5 seconds to give learners, especially the more introverted learners, a little more think-time can increase the quantity and quality of learners' answers to questions. Overall, wait-time has been shown to enhance the teaching and learning process. Using wait-time can be applied to all four practice points of the ARCH model described in this paper. Remember, wait-time provides think-time.

Practice Points for Implementing the A of ARCH: Ask & Allow for Self-Assessment

Three practice points are important when implementing **A** of ARCH.

1. *Create a safe climate for the learner to give and receive information.*

   When arches were originally made of stone, the stone at the top center was called the keystone. If the keystone were removed, the arch would collapse because its integrity depended on it. Likewise, making the learner feel safe in verbalizing strengths and weaknesses are the keystone of the ARCH model.

2. ***Ask** and **Allow** the learner to self-assess an encounter with a patient while you observe.*

   An example question to learners after you have observed them interview and examine a child with the mother present might be: What is something specific you did well during the encounter when you obtained a history from Ms. Jones about her child's ear-ache and then examined the child's ears, and what is something on which you think you can improve? Avoid asking a broad question such as, "How do you think that went?" Suppose the teacher establishes a pattern of asking the learner to report on something specific that was done well and something specific needing improvement after a patient encounter. In that case, learners will get in the habit of self-assessing their particular actions in anticipation of the teacher's question, and, importantly, it will make the conversation with the learner more time efficient.

3. *Use the learner's self-assessments as a launching pad for discussion of the next components of the model (RCH).*

Practice Points for Implementing the R of ARCH: Reinforce Learner for Things Being Done Well

Three practice points are suggested for effectively reinforcing what the learner is doing well.

1. *Recognize and reinforce the learner's self-assessed strengths before adding strengths you, the teacher, identified.*

2. *Explore how the learner worked to improve knowledge or skills and how the learner determined the improvement was satisfactory.*

3. *Add skills you have directly observed the learner doing well that the learner did not mention.*

Be specific and state why those good skills are essential. This will make learners' tacit skills (e.g., making good eye contact with the patient) and knowledge more explicit to them and thus more likely to be repeated.

Practice Points for Implementing the C of ARCH: Confirm with the Learner What Needs Correction/Improvement

Three practice points are suggested to confirm the knowledge and skills the learner needs to improve or correct. Remember that in the A of ARCH, the teacher asked the question, "What is something you did well, and what is something you need to improve?" The three practice points are as follows.

1. *Clarify the learner's self-identified area(s) for correction/improvement by verbalizing what they said and then checking for learner agreement.*

2. *If needed, share something the learner needs to correct that the learner failed to mention that may be critically important to improve. Be descriptive, not judgmental.*

3. *Avoid overwhelming the learners with too much to improve or correct.*

Practice Points for Implementing the H of ARCH: Help Learner with an Improvement Plan

Four practice points are suggested to help learners with an improvement plan.

1. *Ask learners how they might correct or improve specific knowledge or skills and locate information related to those skills or knowledge.*

2. *Add your thoughts/suggestions for improvement collaboratively.*

3. *Have learners verbalize/summarize the specific improvement plans, and if needed, ask them to outline the plans in writing and share them with you.*

4. *Make it clear to learners that you are available and willing to be a coach as needed and invite learners to ask you for help. Learners must view you as a "safe source" for help as needed.*

Current Thoughts/Principles in Medical Education Supported by Using the ARCH Model

The ARCH model speaks to four important concepts in medical education: (1) learner self-assessment, (2) growth mindset, (3) master adaptative learner, and (4) practice-based learning and improvement. ARCH creates the environment for all four concepts/characteristics to flourish.

The ARCH model begins with a learner's self-assessment (e.g., "What is something you did well, and what is something you can improve?"). Asking the student to self-assess and then making it safe for the learner to give an honest answer helps facilitate a growth mindset within the learner, which is an implicit belief by the learner that intelligence and abilities are changeable rather than fixed.[17] Thus, a learner with a growth mindset looks for opportunities to continuously improve knowledge, skills, and attitudes. A learner's feeling of safety when engaging in the improvement process fosters those opportunities. ARCH also facilitates the development of the "master adaptive learner" as the master adaptive learner routinely engages in four aspects of learning, those being: (1) Creates plans for improvement, (2) Engages in the improvement process, (3) Assesses the effectiveness of the improvement strategy, and (4) Makes adjustments as needed.[18] All of these concepts/principles can take place in the context of clinical training that constitutes the important ACGME Competency Domain of Practice-Based Learning and Improvement.[19]

ARCH AS A FLEXIBLE MODEL

ARCH is a flexible model because it can be applied in several different learning settings. It can be used routinely in the context of precepting a student or resident in the office or hospital setting. It is a beneficial model for sitting with a learner and conducting a mid-clerkship feedback and guidance session. It can also be used to structure an end-of-week feedback and guidance discussion between the teacher and learner in which accomplishments and needed areas for improvement are documented with associated improvement strategies discussed. Likewise, ARCH can be utilized to guide an end-of-clerkship discussion in which the teacher and learner summarize what the student did well during the clerkship and what skills they may wish to improve in upcoming clerkships.

CLOSING THOUGHTS

Feedback and guidance via the ARCH Model is an engagement process in which the teacher engages the learner in a manner that helps the learner form the enduring habit of self-assessing, creating strategies for improvement, and implementing those strategies with coaching as needed. Any teaching strategy works better if the learner is aware of the teaching strategies employed by the teacher. For this reason, it is essential to introduce the ARCH model to the learner as part of an orientation at the beginning of a clerkship/rotation. Let the learner know about the components of ARCH and when and where you will employ the model as a regular part of the teaching process. This will enable the learner to anticipate your use of the ARCH components and to mentally prepare for the questions associated with the model. This will help ensure the success of both the teacher and the learner throughout a clerkship/rotation.

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CASE REPORT

Neonatal Lupus Erythematosus: A Case Report of an Infant with Annular Rash

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ABSTRACT

Neonatal lupus erythematosus is a rare autoimmune disorder caused by the transplacental passage of maternal autoantibodies, primarily anti-SSA/Ro and anti-SSB/La. It commonly presents with dermatologic manifestations and, less frequently, cardiac, hepatic, and hematologic involvement.[1] We report the case of a 6-week-old male who presented with a widespread annular rash. Despite an unremarkable perinatal history, physical examination of the patient's mother revealed that she had a facial rash raising strong suspicion for undiagnosed systemic lupus erythematosus. Laboratory testing of the patient confirmed elevated anti-SSA and anti-SSB antibodies, consistent with neonatal lupus erythematosus. The patient exhibited hematologic abnormalities, including neutropenia and anemia, but cardiac evaluation, including ECG, Holter monitoring, and echocardiography, showed no conduction defects. The infant's rash gradually resolved, consistent with the self-limiting nature of dermatologic neonatal lupus erythematosus. This case underscores the diagnostic challenges of neonatal lupus erythematosus, particularly in infants born to asymptomatic mothers. It highlights the importance of considering maternal autoimmune disease in cases of unexplained neonatal rashes. Given that many affected mothers lack a prior diagnosis of autoimmunity, maternal antibody screening during pregnancy may aid in early identification of at-risk neonates. While dermatologic findings typically resolve as maternal antibodies degrade, cardiac involvement can have significant long-term consequences, necessitating close monitoring and multidisciplinary care. This case emphasizes the need for heightened clinical suspicion, prompt recognition, and appropriate follow-up to optimize neonatal outcomes and identify undiagnosed maternal autoimmune conditions.

BACKGROUND

Neonatal lupus erythematosus (NLE) is an acquired autoimmune condition resulting from the transplacental passage of maternal autoantibodies, specifically anti-Sjögren's-syndrome-related antigen A (anti-SSA/Ro), anti-Sjögren's-syndrome-related antigen B (anti-SSB/La), or anti-U1 ribonucleoprotein (anti-U1-RNP). It is a rare disorder, with an estimated incidence of 1 in 20,000 live births in the United States.[1]

PRIMARY OBJECTIVE

This report aims to illustrate the importance of considering NLE in infants with unexplained annular rash, even in the absence of known maternal autoimmune disease, to facilitate early diagnosis and appropriate management.

SUBJECT PRESENTATION

We present the case of a 6-week-old male born at full term (40 weeks and 5 days) to a 37-year-old G2P2 mother via normal vaginal delivery, with APGAR scores of 9 at both 1 and 5 minutes. The infant's medical history was unremarkable until he presented to his pediatrician with a one-week history of rash. The rash initially appeared on the face and later spread to the head, arms, trunk, legs, and diaper area. The lesions remained unchanged since their onset. The patient had no history of fever or upper respiratory symptoms. The mother was breastfeeding and supplementing with formula. She reported switching the formula about a week before the rash developed, but no other changes in the patient's oral intake were noted. No other household members had a similar rash.

At presentation, the infant was afebrile, with a height and weight in the 84th and 57th percentiles, respectively. Examination revealed a widespread erythematous, blanching rash involving the face, head, trunk, legs, and groin. The rash consisted of annular lesions with maculopapular features, flat lesions on the trunk and extremities (Figures 1 and 2), and slightly raised lesions on the head (Figure 3).

The appearance of the rash prompted the clinician to investigate the mother's medical history further, revealing that she had an undiagnosed facial rash since 2014 (Figure 4) and a history of carpal tunnel syndrome. Neonatal lupus emerged as the leading differential diagnosis, prompting anti-SSA/Ro and anti-SSB/La antibody testing. Other differentials were considered, including papular eczema and scabies/mite infestation. However, scabies/mites were deemed less likely due to the absence of symptoms in other family members and the lack of resolution in the lesions.

Figure 1 (see text)

Figure 2 (see text)

Laboratory testing confirmed the diagnosis of NLE with elevated anti-SSA antibodies (7.2 units/mL) and anti-SSB antibodies (>8 units/mL). The patient's mother was informed of the diagnosis and returned to the clinic a few days later. At this visit, the patient's rash was noted to be non-bothersome and showed signs of resolution, with no new lesions present. After consultation with pediatric rheumatology, the care plan included obtaining an EKG, repeating antibody testing when the patient reached 6 and 12 months of age, and referring the patient to cardiology and dermatology.

At the dermatology visit, additional confirmatory tests were ordered, including a complete blood count (CBC), a comprehensive metabolic panel (CMP), and several autoimmune markers. CBC showed a hemoglobin of 9.3 g/dL and neutropenia (absolute neutrophil

Figure 3 (see text)

Figure 4 (see text)

count of 1.08 cells/μL, neutrophils 14%), but no lymphopenia and a normal white cell count and platelets. CMP showed an AST of 38U/L but otherwise normal liver and renal function. The patient's antibody testing was positive for ANA (titer of 1:1280 and speckled pattern) and chromatin (67 AI) and negative for dsDNA (1 IU/mL), Sm/RNP (7 units/mL), Scl-70 (2 AU/mL), and Smith antibodies (3 AU/mL).

Cardiology evaluation included an EKG showing normal sinus rhythm without conduction abnormalities, a Holter monitor displaying sinus rhythm with occasional sinus tachycardia, and an echocardiogram showing normal anatomy and function. These tests confirmed that the patient did not exhibit any cardiac manifestations of NLE.

At the two-month well-child visit, the mother reported significant improvement in the infant's rash, and the child continued to breastfeed well. The mother was subsequently tested and diagnosed with systemic lupus erythematosus (SLE).

DISCUSSION

NLE is characterized by maternal autoantibodies crossing the placenta and affecting the fetus. Clinical manifestations include dermatologic, cardiac, hepatic, neurologic, and hematologic features. Cardiac manifestations, which are the most serious, include congenital heart block, myocarditis, and valvular dysplasia. One postulated mechanism of cardiac pathogenesis involves anti-Ro-mediated calcium dysregulation leading to apoptosis. Anti-La antibodies then form immune complexes with apoptotic cells, activating inflammatory cascades that disrupt cardiac conduction.[2] Unlike dermatologic features, which typically resolve as maternal antibodies degrade, cardiac manifestations are irreversible and may lead to significant morbidity and mortality. Fortunately, infants with NLE presenting with only non-cardiac manifestations and no evidence of heart block at birth by examination and ECG are unlikely to develop cardiac disease.

This case underscores the importance of considering NLE in the differential diagnosis of infants presenting with rash, especially annular rash, even in the absence of a significant maternal autoimmune history. Studies have shown that many mothers of infants with NLE are asymptomatic at the time of delivery. One study reported that only one in 20 cardiac NLE cases occurred in a child born to a mother previously diagnosed with SLE.[3] At the same time, another found that 64% of mothers of infants with NLE were asymptomatic.[4] These findings highlight the diagnostic challenges and emphasize the potential value of screening for antinuclear antibodies during pregnancy to identify at-risk pregnancies.[5]

In conclusion, clinicians should maintain a high index of suspicion for NLE in infants presenting with unexplained rashes. Early recognition and multidisciplinary management are crucial to preventing complications and ensuring favorable outcomes.

Author Disclosure Statement: The authors report no conflicts of interest.

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CASE REPORT

Lemierre Syndrome in an Adolescent: A Case Report

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ABSTRACT

Lemierre syndrome, a rare and life-threatening complication of pharyngitis, is characterized by bacteremia and septic thrombophlebitis of the internal jugular vein. Typically caused by *Fusobacterium necrophorum*, this syndrome has become uncommon since the advent of antibiotics but has seen a rise in reported cases in recent decades. We present the case of a 14-year-old male with Lemierre syndrome, aiming to elucidate its clinical presentation, diagnostic nuances, treatment approaches, and outcomes in the adolescent population. The previously healthy adolescent presented with a history of fever, severe sore throat, and anorexia. Physical examination revealed dehydration, posterior oropharyngeal erythema, tender cervical lymphadenopathy, and splenomegaly. Blood cultures and Doppler ultrasound played a crucial role in confirming the ultimate diagnosis. The patient's complex treatment course, involving antibacterial therapy, anticoagulation, and surgical intervention for osteomyelitis, highlights the multidisciplinary approach required in managing Lemierre syndrome. This case report contributes valuable insights into the nuances of Lemierre syndrome in adolescents, emphasizing the need for heightened clinical awareness, early recognition, and prompt intervention.

BACKGROUND

Lemierre syndrome (LS), also known as postanginal sepsis or necrobacillosis, is a rare but potentially life-threatening complication of pharyngitis characterized by bacteremia and septic thrombophlebitis of the internal jugular vein (IJV). It is typically caused by *Fusobacterium necrophorum*, a Gram-negative, obligate anaerobic rod that is part of the normal oral flora.[1] However, other pathogens such as *Staphylococcus aureus*, *Eikenella corrodens*, streptococcal species, and *Klebsiella pneumoniae* have also been implicated.[2,3] LS usually affects immunocompetent young adults, with a higher prevalence in men.[1,4] Its incidence is estimated at one case per million people annually, but is over ten times higher among teenagers and young adults in their early twenties.[3,5] Although once more common before the widespread use of antibiotics, LS has reemerged since the late 1970s, likely due to decreased empiric antibiotic use for oropharyngeal and upper respiratory infections.[3] Despite its rarity, the rising incidence and potential for severe morbidity in otherwise healthy young individuals make early recognition and treatment critical.[6]

We present the case of a 14-year-old male with LS.

OBJECTIVE

To elucidate the clinical presentation, diagnostic nuances, treatment approaches, and outcomes of Lemierre syndrome in the adolescent population through the case of a 14-year-old male.

SUBJECT PRESENTATION

A previously healthy 14-year-old male with dental braces developed fever, severe sore throat, decreased appetite, and nausea and vomiting, which persisted for four days before he presented to the pediatric emergency department. He noted swollen neck lymph nodes, initially extending to his jaw but improving at the time of evaluation. One week prior, he had gone water tubing at a local state park.

On physical exam, he appeared dehydrated with posterior oropharyngeal erythema, tender cervical lymphadenopathy, and splenomegaly. Initial labs showed thrombocytopenia, hyponatremia, hypochloremia, and elevated inflammatory markers (Table 1). Empiric antibiotics were started with IV ampicillin-sulbactam and oral doxycycline.

Test Parameter	Patient's Value	Reference Range
Platelet	13,000/mcL	150,000-450,000/mcL
Sodium	121 mEq/L	135-145 mEq/L
Chloride	90 mEq/L	98-107 mEq/L
Erythrocyte sedimentation rate	21 mm/hour	1-10 mm/hour
C-reactive protein	13.9 mg/dL	< 1 mg/dL
Procalcitonin	70.6 ng/mL	< 0.1 ng/mL

Table 1: Initial Notable Laboratory Values of the Patient

The differential diagnosis included bacterial and viral pharyngitis, acute mononucleosis, tick-borne illnesses (e.g., Ehrlichia, Rickettsia), Leptospirosis (given water exposure), and Lemierre syndrome (LS) secondary to Fusobacterium. Rapid Streptococcus pyogenes and Monospot® tests were negative, and throat culture later confirmed no Streptococcus pyogenes growth. Blood cultures (aerobic and anaerobic) were drawn. Doppler ultrasound revealed a nonocclusive right internal jugular vein (IJV) thrombus (Figure 1). Anaerobic blood cultures grew Gram-negative bacilli within 24 hours. Abdominal ultrasound showed mild hepatosplenomegaly and a minor left pleural effusion without inferior vena cava thrombus. Antibiotics were escalated to IV meropenem, and anticoagulation was initiated.

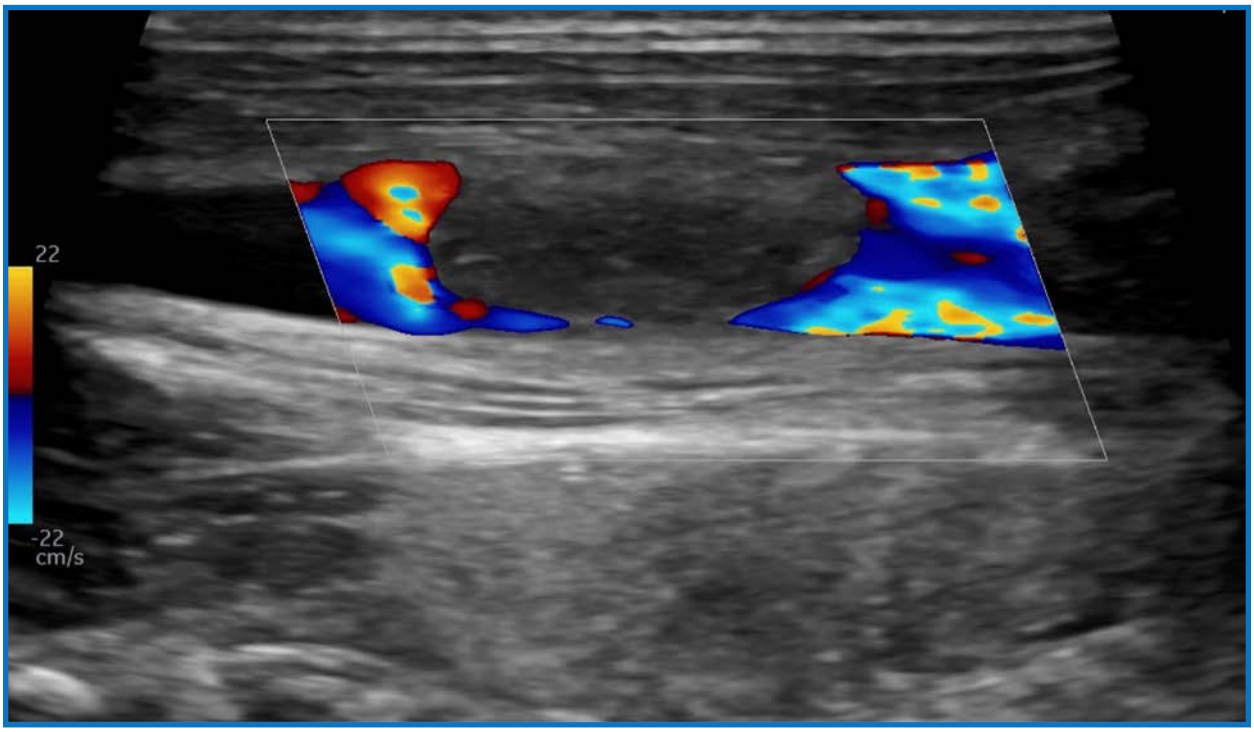

Figure 1: Neck ultrasound with Doppler in long axis view showing nonocclusive right internal jugular vein thrombus.

Figure 2: Magnetic resonance showing distal left femoral osteomyelitis with subperiosteal abscess (red arrow).

During hospitalization, the patient remained febrile, tachycardic, and tachypneic in the early course but gradually improved. He developed left upper quadrant abdominal and costal tenderness. Anticoagulation was briefly paused due to severe thrombocytopenia (platelets 13,000/mcL) but resumed once platelets recovered to 86,000/mcL.

Subsequently, the patient developed bilateral foot edema, which progressed to the entire left lower extremity, associated with weight-bearing pain and tenderness over the medial posterior left knee. Doppler ultrasound ruled out deep vein thrombosis. MRI revealed distal left femoral osteomyelitis with a subperiosteal abscess (Figure 2). He underwent surgical joint washout and drainage.

Postoperatively, persistent left upper quadrant pain and new warmth and swelling over the left lower ribs were noted. Chest MRI revealed osteomyelitis of the left seventh rib, a subperiosteal abscess, a pleural abscess, and multiple lung nodules suggestive of septic emboli (Figure 3). Antibiotic therapy was transitioned to continuous IV piperacillin-tazobactam.

Repeat Doppler studies showed enlargement of the right IJV thrombus. The patient was discharged on oral rivaroxaban and IV piperacillin-tazobactam via PICC line and completed a six-week course of IV antibiotics.

DISCUSSION

LS usually results from a pharyngeal infection but has also been reported following dental work or mastoiditis.[2,3] The bacteria use the lymphatic system to invade the lateral pharyngeal space, reaching the IJV.[3,4] Common symptoms include prolonged sore throat, high fever, neck pain, dysphagia, swelling of the sternocleidomastoid, and cranial nerve palsies.[2,4] Once the IJV is infected, septic emboli can seed other areas of the body, causing septic arthritis, osteomyelitis, pyomyositis, pneumonia, renal and liver involvement, endocarditis, and sepsis.[3,4] Rarely, CNS involvement can also occur.[7]

While the diagnosis is primarily clinical, a CT scan of the neck is the best imaging modality for diagnosing thrombosis of the IJV.[4,7,8] Doppler ultrasound can also aid in diagnosis but is less sensitive.[7,8] Blood cultures should be performed to identify the causative

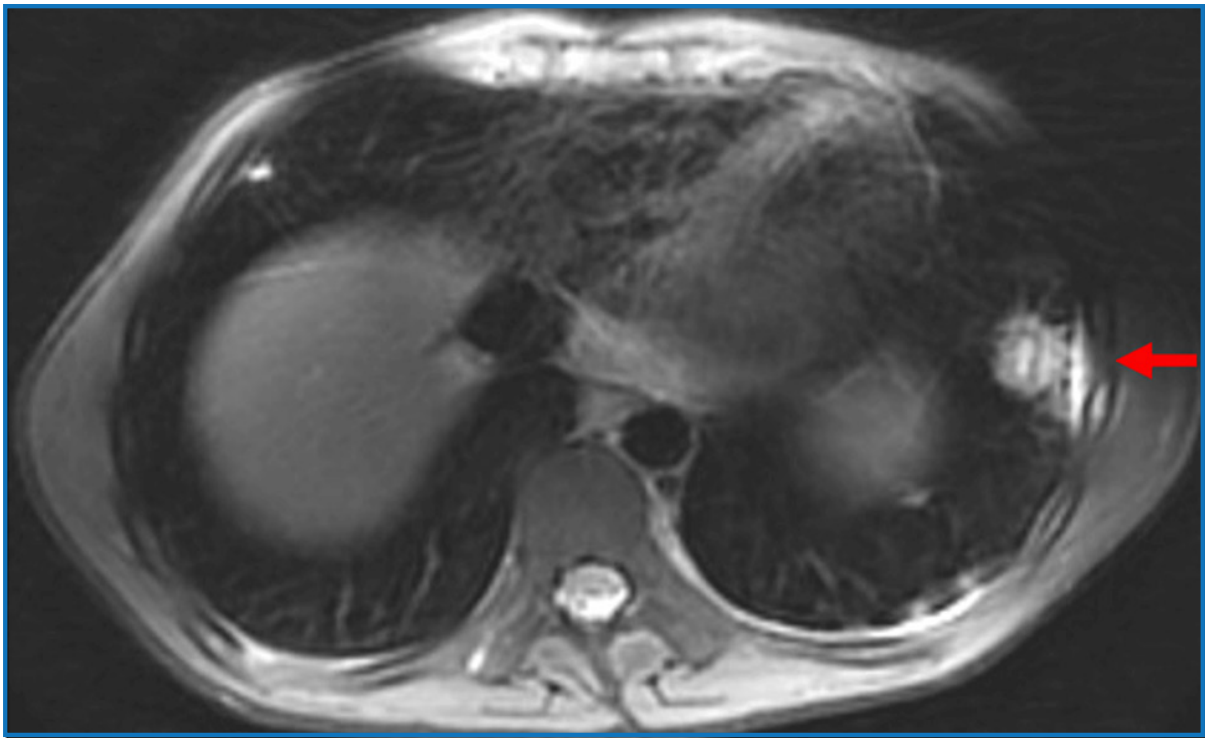

Figure 3: Magnetic resonance showing osteomyelitis of the left seventh rib with subperiosteal abscess (red arrow), pleural abscess, and multiple lung nodules concerning for septic emboli.

organism. The mainstay of treatment involves supportive care and IV antibiotics, typically three to six weeks in duration. Depending on the severity of clinical illness, empiric antibiotic therapy should be effective against anaerobes, including *F. necrophorum*, as well as Gram-positive infections caused by Staphylococcus and streptococci, and Gram-negative organisms. Antibiotic therapy may include penicillin with a beta-lactamase inhibitor, clindamycin, carbapenems, or metronidazole.[1,2,4] *F. necrophorum* is resistant to fluoroquinolones, tetracyclines, aminoglycosides, and macrolides.[4] Antibiotics should be tailored based on culture results and susceptibilities. Surgical intervention, such as incision and drainage or vein excision, should be routinely considered, as literature supports its role alongside antibiotics and supportive care as core components of treatment.[1,4]

In our case, we transitioned from meropenem to continuous intravenous piperacillin-tazobactam to maintain broad-spectrum and anaerobic coverage while supporting antibiotic stewardship by minimizing carbapenem use. Additional considerations included adequate bone penetration and alignment with the Infectious Diseases Society of America guidelines for polymicrobial infections.[9] Continuous infusion of piperacillin-tazobactam was also selected to optimize pharmacokinetic/pharmacodynamic targets, maintaining consistent drug levels and potentially improving clinical outcomes in critically ill patients.[10,11]

Due to the formation of blood clots in LS, anticoagulation is initiated in over 60% of patients, though its use is controversial.[2] Options include heparin, low molecular weight heparins, warfarin, or direct oral anticoagulants.[2] A 2020 meta-analysis found a decreased incidence of new venous thromboembolism or septic lesions in patients on anticoagulation.[12] However, a different meta-analysis found no statistically significant difference in mortality between patients with LS who received anticoagulation and those who did not.[2] The decision to implement anticoagulation in this case was guided by the patient's clinical progression and thrombus development.

This case report contributes to the existing literature by highlighting the complex presentation and progression of LS in an adolescent patient. Our patient exhibited a constellation of symptoms, including severe sore throat, fever, and lymphadenopathy, prompting consideration of various differential diagnoses, such as bacterial and viral etiologies. Their clinical course, marked by persistent fevers and thrombocytopenia, exemplifies the complexities associated with LS. The case also reveals classic complications of LS, including the development of osteomyelitis at multiple sites.

The rarity of LS demands a high index of suspicion and presents significant diagnostic challenges, often mimicking more common causes of pharyngitis. Clinicians should maintain a strong clinical suspicion in cases of acute tonsillopharyngitis accompanied by persistent neck pain and signs of sepsis. Accurate diagnosis in our case relied on a multidisciplinary approach and was ultimately confirmed through Doppler ultrasound, CT imaging, and blood cultures, identifying *Fusobacterium necrophorum*. The decision to initiate anticoagulation highlights the complexities of individualized treatment plans. While this case supports existing knowledge of LS, the unique aspects observed emphasize the need for continued research and additional case reports to refine diagnostic and therapeutic strategies.

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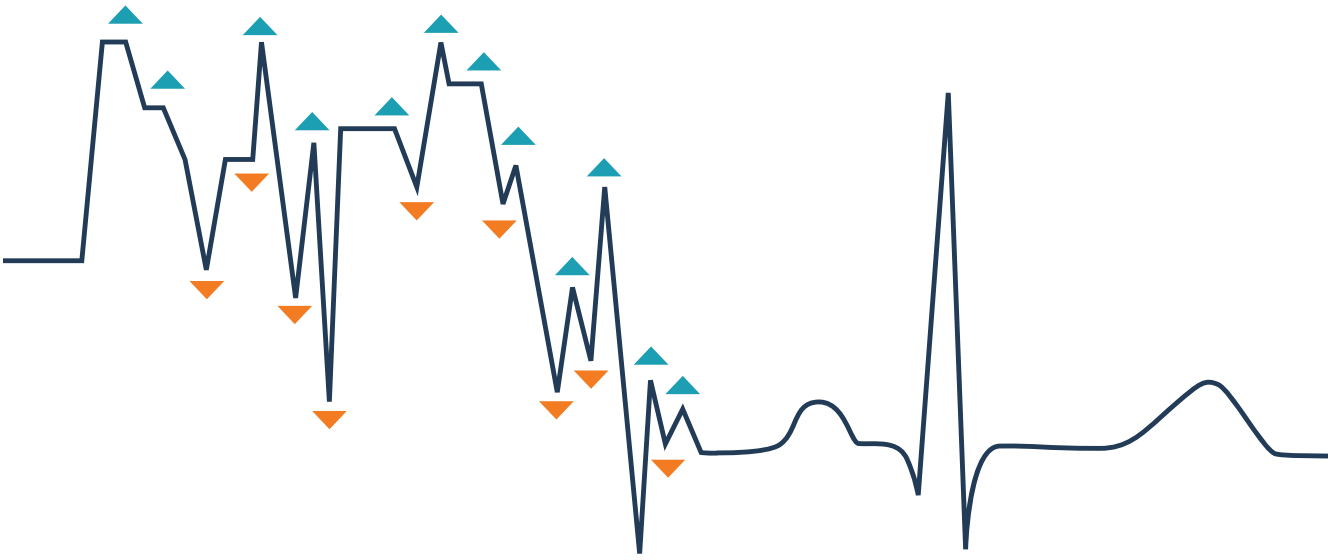

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