Allen Luis (00:17):

Hello and welcome to the AHA Recurrent Pericarditis Podcast entitled what is a kid pericarditis signs and signals. This is the first episode of a series of podcasts from the American Heart Association. I am Dr. Allen Luis. I am the co-director for the Pericardial Diseases Clinic at Mayo Clinic in Rochester, Minnesota. And I am the associate dean for student and faculty affairs for the Mayo Clinic School of Health Sciences. I'm joined by two special guests with expertise in the field of pericardial diseases: Our first guest is Dr. Janet Kloos. Dr. Kloos has been involved as a critical care nurse for over 40 years and is currently working in a post ICU interdisciplinary team as a clinical nurse specialist. She has worked extensively on research, including addressing stress and anxiety in critically ill patients and has authored articles on pericarditis and cardiac tamponade.

Allen Luis (01:24):

My second guest is Dr. James Lloyd. He is a fellow in the department of cardiovascular medicine at Mayo Clinic in Rochester, Minnesota. His special interest is in pericardial disease and James has worked extensively in our pericardial diseases clinic. He has worked on numerous research projects and pericardial diseases and has recently completed a book chapter in pericardial diseases. Dr. Lloyd is also trained in multimodality imaging and I'm sure we'll have some great insights on multimodality imaging and pericardial diseases. And to begin, I will start by asking Janet if she could give us a brief overview on what acute pericarditis actually is and who does disease prices typically affects?

Janet Kloos (02:13):

Well, thank you Dr. Lewis. I'd like to start by talking about acute pericarditis is a somewhat common condition. It's the inflammation of the pericardium and I'm sure everyone remembers the pericardium is the sack that covers the heart. It's got a serous inner layer and a fibrous outer layer. And the pericardial sack itself is fluid filled and that prevents friction each time the heart is beating or twisting in the thorax. With some of the incidents of pericarditis has been reported to be about 27.7 cases per 100,000 of the population in urban Italian area. And Sputnik reported that up to about 5% of emergency room visits probably were related to pericarditis and generally pericarditis affects men more than women from the ages of 16 to 65.

Allen Luis (03:20):

Yes, as opposed to most of our typical cardiovascular diseases, definitely addresses a younger population and our clinics more so than things such as coronary artery disease. These patients, as you mentioned, are very common in terms of their presentations to the hospital emergency room and to the outpatient clinics. I was wondering if you could please give us your insight from a nursing point of view regarding the initial nursing assessment of such a patient presenting to either the emergency room or to the outpatient clinic and how you would approach this?

Janet Kloos (03:54):

Well, the predominant symptom that patients present with is chest pain. And the chest pain that they describe is something that nurses really want to dig into. It's generally a sharp pain typically called a pleuritic pain, meaning that it worsens with inspiration. And then there's some other features that are characteristic of acute pericarditis being that it's worse if the patient is supine or laying. And it seems to be a little more relieved when the patient is sitting up and especially more relieved when they're leaning forward.

Janet Kloos (04:34):

The chest pain can radiate to the trapezius muscles or the shoulder. It's important to find out when this chest pain occurred. Did the patient have some virus and then there was a latency period and now it's occurring sometime after some recovery from the virus or did it occur more acutely and quickly? Those are important things to find out and report to the medical team. Another important thing is when listening to the heart sounds, pretty characteristic, a person or one of the nurses will hear pericardial friction rub. And this is a sound like grading or squeaking with each heartbeat. So another feature that's very characteristic of acute pericarditis.

Janet Kloos (05:27):

And we know a standard of practices that any time a patient presents with chest pain, we're going to obtain a 12 lead ECG. And some characteristic findings with the ECG are elevated ST segment that is throughout the precordium and or the ECG might demonstrate a PR depression. So again, these are common features found on the ECG. Now, other symptoms that nurses should be assessing the patient for and reporting are the presence of fever. If a patient has a fever greater than 38 or 104 Fahrenheit, 100.4 Fahrenheit, that should be something reported to the medical team. As well as if the patient has any immunosuppression. If they have any systemic kind of condition, did they recently, were they involved in some trauma or are they on any anticoagulants or heavy doses of NSAIDs? All of these features can make the patient develop a more serious case of the acute pericarditis.

Allen Luis (06:43):

I might swap over to James at the moment. And James, I was hoping that you could guide us what you would be looking for as a physician following hearing from Janet and her team about what is important in the history and the physical examination when you assess a patient from a medical point of view with suspected acute pericarditis.

James Lloyd (07:05):

Sure. As Janet had rightly pointed out, there are numerous things on both history and physical examination that we do look to identify in pursuing this diagnosis of acute pericarditis. But as you also rightly pointed out, it's important at the same time to entertain the possibility of other diagnoses, particularly if someone is presenting to the emergency department and seeking to ensure that we're not missing something else like an acute myocardial infarction or acute coronary syndrome.

James Lloyd (07:33):

When evaluating a patient in this respect, we like to use, again, assuming we're focusing on acute pericarditis and those other things have been potentially eliminated or made less likely, on the diagnostic criteria for acute pericarditis and a rough framework is given by a variety of national and international cardiology associations, but it would generally be predicated on the identification of at least two of four classic features. Again, not found in everyone, but features that we use to serve as a framework for that diagnosis.

James Lloyd (08:06):

These would classically include, just as Janet outlines, very characteristic chest discomfort, the possibility of a pericardial friction rub. And it's worth noting that when you evaluate a patient's, the pericardial friction rub is commonly only founded about a third of patients. And even when it's found, it's actually

difficult to appreciate, particularly for those who haven't heard it before. And also it can be somewhat transient and sick like in its osculation. And so one may catch it or may not in the same patient.

James Lloyd (08:35):

Then one looks for characteristic EKG changes as Janet very nicely outlined and then also the presence or absence of a pericardial effusion. Either one that is worsening or one that is actually new in it's appreciation. So with that framework in mind, we then focus on the historical features. We try to identify if there's anything in the history that suggest a cause for that patient's pericarditis. Most commonly, we assign the cause idiopathic, meaning of no clear etiology, generally ascribing it's to a proceeding viral infection as Janet pointed out. We also, as she rightly said, try to identify any other precipitating factors, that is, did they have evidence underlying auto-immune process? Is there evidence of pericardial injury? This would be for instance, a recent sternotomy. This could also include things like an ablation. And in some cases, gastric banding in case reports have suggested there can be contiguous inflammation to the pericardium.

James Lloyd (09:30):

Then we think of other less common things like malignancy or bacterial infections. And so we try to elicit that through history. And when it comes then to the physical examination, we try to pay attention to their human dynamic status. That is, are they displaying subtle signs of perhaps a significant diffusion? And this would include elevated heart rates, lower blood pressures, narrower pulse pressures. We also try to listen for that often stubbornly identifiable friction rub that may be elusive if not absent altogether. And then we also look to see if there are any other stigmata of higher risk disease, that is, do they have features of heart failure to suggest that there may be inflammation not only of the pericardium, but also of the underlying myocardium giving rise to a peri mild carditic or a mild pericarditic picture.

James Lloyd (10:21):

So all of those are things that we take into accounts to evaluate the severity of potentially that patient's presentation and any associated complications. While we're doing this, we're trying to identify other things that we rightly can't miss. This would be does the patient actually have acute coronary syndrome? Is there evidence of an acute arthropathy that's caused for instance, a simultaneous pericardial effusion or is this the result of something else? And so it's our job as clinicians to integrate all of those features of the history and physical examination using, however, this framework of acute pericarditis that's generally given as sort of a basis in the course of that evaluation.

Allen Luis (11:00):

I'd like to highlight a couple of points that both James and Janet have made. And I think the history is widely important here. You really need to know what the story is behind the patient's presentation. It's important for all of us to keep in mind whether we're nurses or physicians or other members of the healthcare team, that every patient has been to Dr. Google and Googled their signs and symptoms and they've come up with preconceived ideas of what's wrong with them and in doing so sadly, a preconceived history of what's going on. I think as we're all taught back in school, it is really, really important that we take open history, asking very open questions and listening carefully to the patient. I think the non classic words to the patient users that are not in Google really give why two clues as to the underlying cause of the symptoms here.

Allen Luis (12:00):

I think that it's important to recognize that acute pericarditis and recurrent pericarditis are due to prolonged inflammation of the pericardium. And so this tends not to be a discomfort that comes and goes, but rather discomfort that persists over hours and more classically days. And so that's important to take into account if you've got a patient that says I have symptoms that last for five minutes and then it goes away and then two hours later, it comes back. It's less likely to be pericarditis.

Allen Luis (12:31):

I think it's very important to keep in mind a broad differential diagnosis exactly as James and Janet highlighted. The most important thing that you want to exclude particularly in the emergency room is an acute coronary syndrome. It is widely important to keep that in mind. In the outpatient setting and also in the emergency room, it is important to keep in mind the possibility of musculoskeletal chest pain after excluding other causes and I think this tends to make up a large proportion of patients that present to the outpatient clinic.

Allen Luis (13:06):

They have been diagnosed as having something cardiac in etiology, including pericarditis, but when you examine them carefully, including pressing on their chest, you can elicit quite musculoskeletal chest discomfort. And so it's important not to exclude this diagnosis without performing the pertinent history and physical examination. And the last point that I would make in addition to what James has already said about potential etiologies is on your examination to look for rheumatological diseases of potential cause for patients presenting with acute and also in future sessions, recurrent pericarditis.

Allen Luis (13:48):

And these include the classical rheumatological features of joint pain, morning stiffness as well as associated features and as well as doing a careful rheumatological assessment, looking for the rash of systemic lupus, erythematosus, joint swelling and just doing an overall careful clinical examination. So thank you, Janet and James, for very carefully going through all of that for us. These patients present with a broad range of potential etiologies. We have a list of potential causes. However, just wondering in your clinical practice, what do you typically order by way of laboratory investigations in such a patient presenting with either acute or recurrent pericarditis and what's reasonable and what's your thought process behind the tests that you do order in terms of laboratory investigations?

James Lloyd (14:42):

Sure. As you suggested, I try with a combination of first history and physical examination to identify leading suspicious contributing factors and contrast that with possible etiologies. In the course of my examination, I generally, as a framework, like to essentially think of everything that could cause chest pain from an interior to a posterior distribution. So that would include for instance, the integument as a whole followed then by the musculature, costochondritis and related musculoskeletal pathologies. And then working my way essentially through the pleural space, the heart, the esophagus and extending posteriorly.

James Lloyd (15:21):

And so depending on the history and physical examination, I will take that and my differential to identify then what additional studies I would order. In the setting of acute pericarditis, it's almost uniformly the case that we acquire, regardless of our suspicions, a certain basic set of laboratory tests and also an

electrocardiogram. The laboratory tests that we customarily acquire, essentially universally, would include a serum creatinine as well as a CBC and markers of inflammation. Now, these studies are important because of the consideration for treatment options as well as to support and or refute our diagnosis depending on our initial pretest probability. With the serum creatine, we're trying to identify is there any baseline renal dysfunction? Is that real dysfunction potentially related to a consequence of their acute pericarditis, for instance, pericardial effusion, tamponade and impaired cardiac output.

James Lloyd (16:20):

But importantly, they also have underlying renal dysfunction that may influence our subsequent management commonly with nonsteroidal antiinflammatory drugs. With the complete blood count or the CBC, we're looking for other markers of inflammation and or systemic processes. As you had mentioned, Dr. Luis, there can be the suspicion of underlying rheumatologic process and or malignancy in which case the complete blood count may shed additional light on that. And then lastly, with our inflammatory markers, we're particularly looking for baseline assessments of their degree of inflammation. That is important when titrating therapies, following confirmation of the diagnosis, as well as then monitoring the patient's response to those therapies.

James Lloyd (17:04):

Importantly, we know that for instance, C reactive protein is elevated in most individuals with acute pericarditis and that greater elevations and more prolonged elevations of that particular inflammatory marker may actually be an harbinger of increased risk, not only of recurrence disease, but consequences related to the initial episode of acute pericarditis down the line. Now, if our intersection of differential diagnoses based on chest pain and our assessment of their history and physical examination raise the concern for non idiopathic causes of acute pericarditis, then we expand that initial laboratory and diagnostic evaluation to include things like anti-nuclear antigens, other markers of rheumatologic disease, evaluations for particular infectious etiologies and then additional imaging studies. But those of course would be predicated based on our initial findings.

Allen Luis (18:01):

I completely agree with all of your thoughts there. My only comment would be in terms of investigations for potential viral etiologies for pericarditis. Exactly as James said, it's really important to take the history into account when deciding what to test for. We generally find that a broad battery of tests looking for viral causes is generally unyielding. The reason I say that is most people have been exposed to the viruses associated with pericarditis over their lifetime and so it is not uncommon that they test positive to multiple of those possible viruses underlying or that are potentially associated with the acute or recurrent pericarditis.

Allen Luis (18:49):

Additionally, the treatment of viral pericarditis outside a few specific etiologies is pretty much the same as what you would treat idiopathic pericarditis with. And so since it doesn't change our management, we do not routinely perform viral serology except in specific cases where it's indicated. James, I'm going to turn back to you and your expertise and multimodality imaging here and was hoping that you could run us through the different imaging options that are available in such a patient with acute pericarditis and the potential advantages and disadvantages of each of these types of imaging, particularly when would you choose one imaging modality over another and what are their strengths and weaknesses?

James Lloyd (19:35):

The options for imaging modalities are quite broad. I do personally include the resting 12 lead ECG as an image of sorts in the sense that it's an electrical image of the heart's function and can provide a picture. Now it ranges from the resting 12 lead ECG to something more advanced like a cardiac MR. The 12 lead ECG alone, as was already suggested, can provide us evidence of pericardial inflammation. It can also suggest the presence or absence of underlying myocardial inflammation, depending on the evolution and initial presentation of that EKG. It also can suggest for instance, the possibility of a pericardial effusion, if you have, for instance, low amplitude QRS complex is on that EKG. In the absence of other causative factors like obesity, it may suggest that this is caused by an effusion.

James Lloyd (20:22):

In any case going from there, the next thing that I would consider would be a chest x-ray. Now the chest x-ray will have limited ability to identify the presence or absence of an effusion, particularly someone with more acute disease. It nonetheless, however, allows one to evaluate the presence or absence of other complicating factors. A gross evaluation for a dissection, for instance, can also provide evidence of heart failure that may occur if there is concomitant mild carditis. It may also shed light on other causative etiologies like trauma. Now, certainly this is a very widely available modality and can be easily acquired, rendering this almost a uniformly acquired test.

James Lloyd (21:05):

It's after the resting 12 lead ECG and the chest x-ray that we must become a little bit more nuanced in terms of the imaging that we choose largely because of cost and availability. Now, if we recall our diagnostic criteria that we use as a framework for acute pericarditis, one of those four, again, two essentially being required as a rough rule of thumb for the diagnosis includes the presence or absence of a pericardial effusion and if already present, the worsening pericardial effusion.

James Lloyd (21:33):

And so to clinch that diagnosis of acute pericarditis, we may deploy one of three or if not more additional imaging techniques and that would include a transthoracic echocardiogram, a CT or a cardiac MR. Now the echocardiogram is generally widely available. It's a very simply done test and because our population is much younger, it importantly does not include any associated ionizing radiation. And as a result, it can easily support a diagnosis of pericarditis simply by placing the probe on the patient's chest and identifying an effusion. It can also be used in that context to evaluate quickly for any related complications, including heart failure related to associated mild carditis, pericardial effusions that are clinically and human dynamically significant causing tamponade, which would change management and potentially result in pericardiocentesis. And it can also be used to facilitate an evaluation of other diagnoses.

James Lloyd (22:29):

If for instance, regional wall motion abnormalities are appreciate, that would raise one suspicion for acute coronary syndrome and the acute coronary syndrome actually giving rise to contiguous inflammation of the pericardium. Beyond that with echocardiography being essentially our workhorse imaging modality, apart from chest x-ray in this case, then we can consider things like a CT and cardiac MR. Now a CT is associated with ionizing radiation, but importantly, it's actually quite accessible, rapidly acquired and can provide additional information similar to a chest x-ray, but with greater sensitivity into complicating factors of the disease process and associated conditions.

James Lloyd (23:10):

We think of this primarily in individuals who've had trauma, who've had prior interventions. And so for whom this suspicion is raised regarding other non idiopathic causes, like for instance pneumonia or other pulmonary contributions that could give rise to a similar pleuritic chest discomfort. In our emergency departments, this is generally easily acquired and so as a consequence can also be used to evaluate these conditions.

James Lloyd (23:36):

I would also like to highlight that if one suspicion for acute pericarditis is high and other diagnostic features are not present, cross-sectional imaging such as CT can provide a very good sensitivity to make the diagnosis. And lastly, cardiac MR has been burgeoning in its utility for pericardial diseases over the course of the past several years because it provides a very unique evaluation of the pericardium, highlighting inflammation directly of the pericardium, thickening of the pericardium to suggest edema. It can also be used to evaluate for underlying constriction like an echocardiogram.

James Lloyd (24:10):

And so it can help distinguish acute pericardial inflammation from residual healed scarring of the pericardium that may suggest a prior diagnosis. Just like CT, it too can help identify other contributing factors that may explain a non-idiopathic cause of pericarditis. An example would be lupus erythematosus in which case we may see concomitance pleuritis on the cardiac MR helping to target our further evaluation. In contrast to the other modalities, however, this is less available and is considerably more expensive making this a second or more commonly third line test for evaluating these patients.

Allen Luis (24:48):

Thank you very much James. I really liked how you started in the way we really should start, keeping things simple and widely available. Starting with the chest x-ray and an ECG and then working your way up depending on what we actually need to make the appropriate diagnosis in patients. Particularly, I know that the question that frequently arises in our audiences when to choose an echocardiogram and when to choose a cardiac MRI and it's important for our audience to realize that both tests have superiority over the other tests in some regards and inferiority over the other tests in other regards. And echo is frequently available, may even be available in the emergency room to the emergency physicians by way of a fast scan or getting a formal transthoracic. Cardiac MRI tends to be less widely available and considerably more expensive.

Allen Luis (25:48):

In terms of both of these tests, I'd like to highlight their strengths. I think cardiac MRI is an excellent anatomical test. It shows you the pericardium very well. And with the aid of gadolinium and edema sequences, does a fantastic job of showing you whether that pericardium is truly inflamed or not. On the other hand, echocardiography is a superb tested hemodynamics. And so if I'm looking for true physiological things such as constriction or tamponade, I often prefer an echocardiogram because of its ability to show me the hemodynamics and do a better job of haemodynamics than cardiac MRI does.

Allen Luis (26:29):

So just to remember that both those tests are used complimentarily and really compliment each other in terms of their diagnostic use. And I was wondering, Janet, if you could give us an overview from a

nursing point of view about the education that we should be offering our patients when they come in with acute pericarditis.

Janet Kloos (26:53):

Thank you Dr. Luis. I'd like to start by remembering something that I read recently in the literature that said sometimes up to 50% of the patients that we're discharging from the hospital or the emergency department really don't understand the diagnosis. They've heard some words, but truly don't understand what that means. And so I think to start with, we need to describe to the patient what is acute pericarditis, maybe drawing even a picture of the heart and there's a covering around the heart and just use lay language to talk to them and explain to them what this acute pericarditis is. We need to talk to patients about signs and symptoms of worsening. So when is it that they should get back either to the emergency room or really follow up with their cardiologist or their primary care provider?

Janet Kloos (27:53):

We need to talk about the medications that they're going to be taking, what's the action of the different medications, what side effects might they expect? If they have some side effects, how to manage those or when to get in touch with their provider, because possibly a dose adjustment is necessary. The social aspect for patients is important to consider. Does the patient have insurance? Do they have prescriptive coverage? Colchicine being a medication that's widely prescribed for patients with acute pericarditis. It's an older medication, but it's expensive. And so we need to consider is the patient able to afford that medication?

Janet Kloos (28:41):

The other thing to consider is many centers have a meds to beds program, meaning that whatever the patient will be discharged with is brought to them prior to discharge. And again, the nurse can review the actions of the medications, how to take them, how often to take them. An important thing with medications and acute pericarditis is for patients to not stop taking their medications unless they've been told to by their provider. So it's important if there are side effects, that's a conversation with the doctor, but the patient should be continuing to take their medications.

Janet Kloos (29:26):

Exercise is another consideration to discuss with the patient. The literature talks about athletes who are very active and that this is something that this high intensity exercise should be avoided for about three months, perhaps longer. When there's a followup visit with the cardiologist or provider, there can be a discussion of when exercise can be resumed and perhaps in a step up type of fashion, but generally patients are advised and as nurses, we should be talking to them about maintaining every day activity, hygiene activities, things around the house, going out into the community, but nothing of great intensity.

Janet Kloos (30:18):

And then to really emphasize with patients that they should have that follow up appointment with their cardiologist or their primary care provider, very important to be able to track what the progress of this condition has been. How is the patient responding to the different medications and what their recovery has looked like for them? So all of these are important aspects of education for the patient that nurses need to really hone in on.

Allen Luis (30:51):

Thank you very much for that Janet. I would like to highlight a couple of things that I think are extremely important in what you said. And I think firstly, it is that we use simple language that the patients understand. I think as healthcare providers, particularly in the United States, we all have a tendency to use large words. Large words mean that the patient then has to go back to Dr. Google to satisfy their desire for knowledge and really that knowledge should be coming from us. And we should be communicating it in a way that our patients understand, simplifying, drawing and really showing the patient what the underlying disease processes is extremely important. If you're going to use big words really, it is important that we explain what those big words are and preferably try and avoid those big words wherever possible.

Allen Luis (31:43):

The other really important point that I think is the importance of exercise restriction. I do frequently notice in my clinical practice that exercise particularly during acute pericarditis does worsen the inflammation. I acknowledge that the data is lacking regarding exercise restriction in this patient population. I also acknowledge that this is a young patient population and typically in my clinic, this is the only population of cardiac patients that truly loves to exercise. But exercise restriction is particularly important, in my opinion, to settle down the inflammation and so does vital that we educate the patient when we make the diagnosis, that exercise restriction is necessary until the pericardium and pericardial inflammation resolve.

Allen Luis (32:35):

This is not a long-term thing. I think it's important to tell patients that this is not a lifelong exercise restriction, but rather a short term exercise restriction. I would like to thank my presenters Dr. Kloos and Dr. Lloyd for their knowledgeable input into this discussion about the clinical features of acute pericarditis. This podcast series on recurrent pericarditis is supported by an education grant from Canixa Pharmaceuticals. In closing, I would like to remind everyone that pericardial disease does affect a lot of our patients and that it is really important that we consider this diagnosis and that we carefully collaborate with each other as a group and a multidisciplinary team to optimize outcomes for patient care. For more educational materials, please visit AHA's learn.heart.org website. Thank you very much.