Cardiovascular Screening in Athletes
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Sudden death in high school and collegiate athletes is fortunately rare but often occurs without warning. An estimated risk of sudden death in this population is approximately 1/100,000. Sudden death results from electrical instability with consequent fatal arrhythmias in athletes with underlying cardiac abnormalities performing intense exercise. Individuals generally at higher risk include those participating in basketball, football, track and soccer. Unfortunately, screening tools are limited in determining who is at the highest risk. A thorough personal and family history remains the most important aid in identifying those with pathologic cardiac disease.

Several rare causes of sudden cardiac death need to be considered when evaluating athletes. More common entities in the United States include hypertrophic cardiomyopathy (HCM) accounting for ~40%, Marfan's syndrome and congenital coronary artery anomalies. Less common entities include congenital QT prolongation, Wolff-Parkinson-White syndrome, arrhythmogenic right ventricular dysplasia, congenital aortic stenosis and viral myocarditis.

Chest pain in athletes is more commonly non-cardiac in origin. Asthma and exercise induced bronchospasm (EAB) are the most common non-cardiac causes of exertional symptoms and need to be considered particularly with an underlying history of allergies and eczema. Symptoms including chest tightness, dry cough and/or shortness of breath typically begin several minutes after starting activity or during recovery. Athletes may also encounter substernal chest pain, nausea, vomiting or cough with esophageal reflux. This may be more apparent in athletes undertaking more vertical motion including jumping and running. Another common etiology of chest pain is costochondritis that typically worsens with a deep breath and cough. Physical exam usually reveals focal tenderness.

A personal history of exertional chest pain, palpitations, syncope or dizziness is often unreported or not experienced with athletic activities. When reported, however, these symptoms with activity are particularly concerning. The most helpful information when screening athletes is an accurate family history for genetic abnormalities including HCM and history of sudden death at an early age (<35). A history of syncope also raises concern with conduction abnormalities in conditions such as congenital QT prolongation and Wolff-Parkinson-White syndrome. Additional information that may be helpful includes a personal history of rheumatic fever or previous cardiac disease or surgeries.

Questioning regarding non-cardiac etiologies include a history of allergies and eczema, dietary consumption and relation to exercise as well as recent history of fall or minor trauma. Additional questioning should include use of prescription medications and over-the-counters regimens. Stimulant medications, even in normal doses, may account for intermittent episodes of palpitations or chest pain with exertion.
During a pre-participation exam, some findings may be helpful when present. A standing position or valsalva maneuver will increase an outflow obstruction and consequently a murmur in HCM. Murmurs may also be appreciated in athletic heart syndrome (AHS), which is an adaptive non-pathologic response to endurance training resulting in an increased ventricular volume and generalized wall thickness. Conversely, on physical exam, a murmur will decrease with standing and increase in the supine position.

Other physical exam findings may be helpful in detecting conditions such as Marfan’s syndrome. Supportive physical findings include arachnodactyly (long fingers), scoliosis, high arched palate, lenticular dislocation and an increased arm span/height ratio.

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Any athlete with history or physical exam findings needs further evaluation before considering athletic participation. Generally, an ECG is done initially with symptoms of chest pain. It is important to note that EKG findings of a well-conditioned athlete are variable secondary to increased vagal tone and physiologic hypertrophy. Findings may include sinus bradycardia, first or second-degree atrioventricular block, LV hypertrophy, and ST segment elevation with T wave inversion in the precordial leads. These changes typically normalize with cessation of regular exercise. Many athletes with pre-excitation syndromes and prolonged QT syndromes may have a normal ECG. In this case, an event monitor or exercise stress test may be helpful in identifying a pathological arrhythmia.

Echocardiography (ECHO) is beneficial in identifying septal hypertrophy, valvular abnormalities, and aortic dilation. When clinical suspicion is high for HCM, an ECHO is indicated to evaluate for septal hypertrophy and LV outflow tract obstruction. Asymmetrical septal hypertrophy greater than 13mm is concerning for HCM and may be difficult to differentiate from physiologic hypertrophy. Temporary cessation of training will result in diminished hypertrophy in AHS and remain unchanged in HCM helping to elucidate a diagnosis. If considering an anomalous coronary artery, cardiac consultation with possible cardiac catheterization may be necessary since an ECHO may not detect an abnormality.

Returning to athletic participation should only be considered after a team physician or cardiologist completes an appropriate cardiac evaluation. Athletes with confirmed HCM are considered ineligible for sports except for low-static, low-dynamic exercise such as golf. Those with suspected arrhythmias require monitoring during exercise and typically echocardiography to exclude associated cardiac abnormalities before considering return to play if the athlete is asymptomatic. Athletes with myocarditis require rest from activities for approximately six months followed by echocardiography to ensure left ventricular function has returned to normal.

Alternative non-cardiac etiologies are a diagnosis of exclusion when clinical suspicion is high or there is a positive family history. After a normal evaluation, a trial of treatment directed at other causes may be tried before returning to full activity.

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Case Study: Hip Stress Fracture

Stress fractures have become a common injury in recent times. These injuries occur more commonly in runners. Stress fractures occur in all parts of the body with the most common locations being the tibia, fibula, and the metatarsals. Stress fractures of the pubic rami account for only 1% to 2% of all stress fractures.

Stress fractures of the pubic ramus was first described in 1937 in male military recruits. The most predominant location for these types of stress fractures are at the junction of the inferior pubic ramus and the ischial ramus. These are usually attributed to the pulling of the adductor magnus muscle. These muscles pull on the lateral aspect of the pubic ramus and ischium as the hip is extended. When all four pubic rami are involved, which has never been reported before, this injury is called a straddle fracture.

A 35 year old female presents to the clinic with a 2 week history of left hip pain. She is training for a half marathon and has noticed pain and stiffness during and after running. The pain is localized to the posterior aspect of the hip and buttock. She quantifies the pain intensity as 1 / 10 at rest and 6 / 10 with weight bearing exercise. She also describes the pain as a dull ache. She has no history of trauma or any history of pain in that area. The pain has been alleviated by rest and 600 mg. of ibuprofen. Exacerbating factors include: sitting, walking, and twisting. She denies any radiation of pain, paraesthesia, bladder or bowel dysfunction, and groin pain. Her past medical history includes asthma, controlled on albuterol as needed. She has had no surgeries, or hospitalizations.

On physical exam: patient ambulates with a somewhat antalgic gate, and is pes planus. She has full range of motion at her hips, and spine. She has 5/5 strength in left hip in flexion, extension, abduction, adduction. She has negative straight leg raise. She has buttock pain with knee flexion, hip abduction with external rotation. She has noted noted tenderness over the left ischial tuberosity and mild tenderness over the left greater trochanter.

Imaging was performed, which displayed no bony abnormalities.

Initial diagnosis was left hip ischial bursitis, with trochanteric bursitis. The patient was instructed to begin physical therapy concentrating on stretching, and core strengthening. She was to begin cross training and was instructed to not run. She was told to followup in the clinic in one month.

Patient returned at one month. Her symptoms have improved for 3 weeks with painless walking, biking, and elliptical machine usage. She attempted to run at week 4 and noticed constant pain during the run. She now experiences left gluteal pain with prolonged walking. She denies any neurologic symptoms.

On exam, she has ischial tenderness to palpation, pain with resisted abduction and adduction. Pain with resisted hip extension and groin pain with resisted straight leg raise.

Diagnosis was possible stress fracture and an MRI was scheduled for her pelvis. She was instructed to not run and was told to follow up after the MRI.

Patient was instructed to avoid all weight bearing exercise for 5 weeks. She would be able to cross train and use the elliptical machine. At 12 weeks she started back into running gradually returning to her previous mileage. She described no pain at this point.

Anatomic differences between the male and the female pelvis are widely known. From a biomechanical standpoint, these differences may cause the female pelvis to be more exposed to compression forces than the male pelvis.

Risk factors include: recent changes in training programs and running surfaces have been reported as risk factors for runners. Short stature was found to be a risk factor in women for every kind of stress fracture as they overstride to keep up with taller runners. This overstriding comes from having excess flexion and extension. A crossover running style, which is adduction of the leg across the line of gait progression, has noted to contribute to stress fractures in women, also. The increase of mileage to over 20 miles per week. And some underlying diseases, which may include ostopenia, end stage renal disease, rheumatoid arthritis, chronic corticosteroid use, pelvic irradiation, and alcoholism.
Meet Our New Staff  
Erica Beth Dhuy  

Erica Beth Dhuy, MS ATC Erica comes to the UK Orthopaedic Surgery & Sports Medicine staff after graduating from Georgia State University in 2008 with a masters' degree in Sports Medicine. During her master's studies, Erica worked in the Sports Medicine Department at Kennesaw State University. Prior to GSU, Erica was a 2005 graduate of Florida Southern College with a bachelor's degree in Athletic Training. During her final semester internship, Erica found her way to Lexington, KY to work with the Lexington Horsemens Arena Football team. Upon graduation, Erica decided to return to Lexington as an Outreach Athletic Trainer with responsibilities that include Head Athletic Trainer for the Lexington Horsemens and local outlying county schools.

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Upcoming Events

Saturday, November 1st: KHSAA State Volleyball Tournament, Louisville

Wednesday-Saturday, November 5th-8th: KHSAA State Soccer Games, Georgetown

Saturday, November 15th: KHSAA State Cross-Country Meet, Lexington

Friday - Saturday, November 12-13th: KHSAA State Football Finals, Louisville