PALPITATIONS – WHEN AND WHEN NOT TO WORRY!

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Introduction

Palpitations (awareness of one’s heart beat - and thus by definition occurring in older children) are a common source of worry for children and their parents. By working together the family practitioner and specialist can quickly arrive at an accurate diagnosis. A good history and an ECG will allow differentiation between the vast majority that are benign and the rare instances when they are the symptom of a life-threatening arrhythmia. Palpitations are rarely due to bradyarrhythmias as they usually present with syncope or exercise intolerance.

Family Physician Care

1. Clinical Features

The history is the most important. Most children have only short, infrequent episodes and do not need referral unless any of the following features are found:

- Frequent or prolonged episodes
- Structural heart disease - particularly those who have undergone a surgical repair are most at risk of life threatening arrhythmias.
- Syncope - very rapid atrial arrhythmias or ventricular arrhythmias may cause low output states with dizziness, syncope and fits.
- Precipitant factor - Hypertrophic Cardiomyopathy (HCM) or Right Ventricular Arrhythmogenic Dysplasia (RVAD) may present with exercise induced arrhythmias or syncope. Sudden noise or temperature change (eg diving into pool may precipitate ventricular tachycardia in the long QT Syndrome (LQTS).
- Deafness may be part of the LQTS as the underlying biochemical defect also affects the cochlear.
- Family history of sudden death (HCM, LQTS, RVAD)

The examination is usually normal. A mid systolic click and mitral regurgitant murmur may be present in mitral valve prolapse (MVP) but this is an exceptional disorder in childhood. If the patient is experiencing palpitations at the time of the examination it is helpful to assess the rate, whether the rhythm is regular or not and obtain an ECG rhythm strip (limb leads only are acceptable although a 12 lead ECG is preferable) to document the relationship between rhythm and symptoms.

2. Investigations

In those without a worrying history the 12 lead ECG is usually the only investigation required as it eliminates most of the common problems and is also reassuring to the patients. Assessment of anaemia or thyroid status is unnecessary unless the history or examination is suspicious.
Most physicians view interpreting a paediatric ECG with trepidation however the main difficulty is assessing the significance of voltage levels in the V leads which is not an issue when looking for rhythm problems. In addition most ECG machines now calculate time intervals automatically. Time intervals can be also calculated manually - one little square on the ECG (1mm) represents 40ms of time.

A useful method of analyzing the ECG is as follows:

Check
- heart rate – during a tachyarrhythmia rates are usually 200 bpm or more
- p wave precedes each QRS complex
- p-r interval - normal range is 90 - 200 ms
- QTc interval – QT interval corrected for rate - normal less than 440 ms
- abnormal Q waves (for age group experiencing palpitations more than 30 ms duration & 4 mm deep)

Even the best physicians may have difficulty in interpreting an ECG. Remember in such cases – a problem shared is a problem halved. Faxing the ECG to the Children’s Medical Institute (779 7486) will rapidly give you a second opinion.

3. Normal Spectrum

In the absence of any worrying features in the history the vast majority of patients with palpitations have a heart rhythm within acceptable limits. As children grow older they become more aware of their bodily functions. They may perceive as abnormal things that are part of the normal spectrum. When they mention symptoms to their parents they may make the parents very anxious as they may have elderly relatives with degenerative heart disease and palpitations that may be life threatening. Exploring these areas helps when explaining to the family at the end of the consultation.

Minor abnormalities which can be considered part of the spectrum of normal are:
- **Sinus Arrhythmia** may be marked and the patient may notice the irregularity of the heart rate. Ascertaining that the heart rate varies with respiration is the key and the ECG is confirmatory.

- **Atrial and Ventricular Ectopic Beats.** The compensatory pause is usually noticed and interpreted as the heart thumping in the chest – the compensatory pause allows greater cardiac filling and thus a
larger ejection volume for the next beat. They may be very frequent and also cause alarm to the examining doctor! However it is very uncommon for even frequent ventricular beats to be significant – a good test is to get the child to jump up and down for a few minutes and listen again as exercise eliminates benign ectopic beats. Ectopic beats may be exacerbated by caffeine and other stimulants and reducing intake may be helpful.

♥ Exercise Palpitations may be a source of concern to teenagers. Usually they are just an awareness of the normal physiological response to exercise. If there are no other symptoms or concerns and the ECG is normal then asking the patient to run around to reproduce the symptoms and then repeating the ECG may be all that is necessary for reassurance. Otherwise referral for a formal exercise test on a treadmill will be necessary.

4. Acute Arrhythmia

If you are unfortunate enough to have a child in front of you in tachycardia then it is important to obtain a 12 lead ECG (or rhythm strip from the limb leads) in order for the diagnosis to be made (either at the time or retrospectively with specialist help). The vast majority of children will be experiencing SVT and not be haemodynamically compromised. They will however feel better lying or sitting down. Vagal maneuvers should be tried – ask the child to blow out by using their thumb as a whistle or rub the carotid sinus. If these do not help specialist advice should be sought.

Specialist Care

Much can therefore be done with a history, examination and an ECG without the need for specialist referral. In those with a significant history or abnormal ECG more specialist investigations are necessary which are likely to include an echocardiogram to assess if the heart is structurally normal, a 24 hour ambulatory ECG (Holter monitoring) in those with frequent symptoms to capture the event or issuing an “event recorder” to the patient to trigger a recording whilst symptoms are experienced. These tests will usually elucidate the problem if it is significant.
Supraventricular Tachycardia (SVT)

The typical history is a child of 7 years of age who experiences sudden episodes of a rapid heart beat unrelated to any apparent triggers. They may feel a little sick or dizzy. The palpitations may last only a few seconds or an hour or two and gradually subside. The parents often notice the heart beating rapidly (too fast to count) and forcefully. The commonest mechanism is a re-entrant tachycardia due to an accessory pathway which may be visible on the surface ECG in sinus rhythm as a delta wave (arrow) as found in Wolff Parkinson White syndrome or concealed in which case the ECG is normal.

Acute Management

Adenosine is the drug of choice in arrhythmias. It must be given rapidly intravenously in a dose of 100 micrograms/kg. It is metabolized within a few seconds and so if a lower dose is ineffective a higher dose (maximum 300 micrograms/kg) may be given. If conversion to sinus rhythm occurs and a stable rhythm prevails then no further treatment is often necessary and the patient can often go home (if it is not their first episode).

Long Term Management

Most patients do not require long term treatment especially as SVT is rarely life threatening. The indications for treatment include frequent or prolonged attacks that interfere with lifestyle. Common drugs used are β blockers (atenolol, sotalolol), calcium channel blockers (verapamil, ditiazam) and flecainide. Digoxin is rarely used in the older age group as it can facilitate very rapid ventricular rates in some circumstances. Those patients with persistent and troublesome attacks may prefer radiofrequency ablation of the accessory pathway as this is likely to effect a cure in 90% of patients. It does however carry risks with heart block requiring a pacemaker being the most serious.
Ventricular Tachycardia (VT)

VT is extremely uncommon in children. Clues to its occurrence include previous cardiac surgery, syncopal episodes, a family history of HCM, LQTS, RVAD or sudden death. In the LQTS the QTc is increased with bizarre T wave morphology and in HCM pathological Q waves are usually present.

Acute Management

This depends upon the degree of haemodynamic compromise. If the patient is shocked DC cardioversion should be undertaken otherwise a pharmacological approach may be used.

Long Term Management

Once the aetiology is established then avoidance of risk factors (for example alarm clocks in LQTS) is important along with maintenance treatment to suppress arrhythmic potential.

Subsequent Joint Care

Once the treatment path is decided upon then the majority of the subsequent care can be provided by the family practitioner. For those with infrequent symptoms not requiring medication the main role is reassurance when attacks. For those on treatment then regular visits to assess the efficacy of therapy is required and the drug dosage may need to be adjusted to take account of growth, frequency of attacks and serum drug levels.

Specialist advice can be obtained over the phone or by correspondence if problems arise or the treatment strategy needs to be changed and of course the specialist is always ready to reassess the situation personally should that be required.