Sports Clearance for Children with Heart Disease

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Physical Activity for Children with Cardiac Disease

- Many children with congenital heart disease may participation in sports
- Sports participation based on the cardiac disease and the activities the child wishes to participate in
- Cardiac status should be assess at rest and during exercise

16th and 26th Bethesda Conferences

- Cosponsored by the American College of Cardiology and the American College of Sports Medicine
  - Classification of
    - Sports
    - Levels of activities
    - Cardiac diseases
- Extensive work was done to define sports by type of stress involved to the patient

26th Bethesda Conference

Also discusses

- Legal Issues
- Ethical Issues
- Physician's Role

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Legal Issues

- If athlete referred by school/team
  - Make sure the patient knows ***before*** the exam that the findings will be shared with referring party
- If athlete initiates visit
  - Information can NOT be released without patient or family's approval

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Physician's role

- Patient's best interest should be the primary focus
- DOCUMENT in writing the discussion with patient and family

Classification of Sports

- Type of exercise
  - Dynamic
  - Static
- Level of intensity
  - Low
  - Medium
  - High
- Danger of bodily collision *
- Increased risk if Syncope occurs #

Atrial Septal Defect

Unrepaired

- Small defects - No pulmonary hypertension

Can participate in all competitive sports

- Pulmonary hypertension

Low intensity sports only (Class IA)

Atrial Septal Defect

Post-closure

- 6 months after closure if;
  - No pulmonary hypertension
  - No arrhythmias
  - No evidence of myocardial dysfunction

Can participate in all competitive sports

ASD Closure

Ventricular Septal Defect

Unrepaired

- Small, restrictive defects

Can participate in all competitive sports

- Large VSD
  - If no pulmonary hypertension - VSD closure recommended

Low intensity sports only (Class IA)

Ventricular Septal Defect

Post-closure

- 6 months after closure if;
  - No residual defect small residual defect
  - No pulmonary hypertension
  - No evidence of myocardial dysfunction

Can participate in all competitive sports

Mild Valvar Pulmonary Stenosis

(Gradient < 40 mm Hg)

- Normal RV pressure and ECG

Can participate in all competitive sports

- Annual reevaluation

Moderate Pulmonary Stenosis

Gradient 40 to 70 mmHg mm Hg

Low intensity sports only (Class IA)

- Refer for Balloon Valvuloplasty

Balloon Valvuloplasty
Pulmonary Valve Stenosis

Post-operative or Post Balloon Valvuloplasty

- If adequate relief and normal ventricular function
  - Balloon Valvuloplasty
    - resume after one month
  - Surgical Valvotomy
    - resume after 3 months

Can participate in all competitive sports

Mild Aortic Stenosis

(gradient $\leq$ 20 mm Hg)

- Normal ECG
- Normal exercise tolerance
- Asymptomatic
  - No history of exercise related chest pain, syncope, or arrhythmia

Can participate in all competitive sports

Moderate Aortic Stenosis

(gradient 21-40 mm Hg)

- Mild LVH by echocardiography
- No LV strain on ECG
- Normal exercise test without ischemia or arrhythmia

Low static/ low to moderate dynamic
(Class IA & IB)

Moderate static/ low dynamic
(Class IIA)

Severe Aortic Stenosis

(gradient $\geq$ 50 mm Hg)

NO competitive sports

Aortic Stenosis Criteria also applies to discrete (membranous) subaortic stenosis and supravalvar stenosis

Coarctation of the Aorta

- Mild coarctation
  - No severe collateral vessels
  - No severe aortic root dilation
  - Normal exercise test
  - Small pressure gradient at rest
  - Peak systolic blood pressure < 230 mm Hg with exercise

Can participate in all competitive sports

Coarctation of the Aorta

- Systolic arm to leg gradient > 20 mm Hg or
- Peak systolic blood pressure > 230 mm Hg with exercise

Low intensity sports only
(Class IA) until treated

Coarctation of the Aorta

Post operative

- Participation in sports 6 months after treatment if
  - Systolic arm to leg gradient < 20 mm Hg at rest
  - Normal peak systolic blood pressure at rest and with exercise

NO high intensity static exercise
(class IIIA, IIIB, IIIC)
No contact sports during first post-operative year

Coarctation of the Aorta

Post operative

- After first year

All sports except powerlifting if

- Asymptomatic
- Normal blood pressure at rest and exercise

Cyanotic Heart Disease

Unoperated

- Most patients have exercise intolerance and progressive hypoxia with increasing effort

- The rare patient who wants to participate can usually tolerate low intensity sports only (Class IA)

Cyanotic Heart Disease

Palliated

- Arterial saturation above 80%
- No symptomatic arrhythmias
- No ventricular dysfunction
- Near-normal capacity by exercise testing

Can participate in low intensity sports
(Class IA)

Tetralogy of Fallot

- Normal or near normal right heart pressure
- Only mild RV volume overload
- No residual left to right shunt
- No rhythm abnormality by Holter or exercise study

Can participate in all competitive sports

Tetralogy of Fallot

- Residual right ventricular hypertension
  - Peak systolic pressure $\geq$ 50% systolic pressure
- Marked pulmonary regurgitation

- Rhythm abnormality by Holter or exercise study

Can participate in low intensity sports (Class IA)

Transposition of the Great Arteries

- Normal heart size
- No residual defects
- Normal ventricular function
- Normal exercise study
- No arrhythmias

Can participate in all competitive sports
<u>HOWEVER</u> - high static sports with severe isometric effort (Class III A, III,B,IIIC) should be discouraged

Fontan Operation

- Systemic veins connected pulmonary arteries
  - no right sided pumping chamber
- Usually have limited exercise capacity
- Post operative arrhythmias associated with significant morbidity and mortality

Marfan's Syndrome

Marfan's Syndrome

- No evidence of aortic root dilation
- No mitral regurgitation
- No family history of sudden death

Can participate in low and moderate static/ low dynamic sports (Class IA and IIA)
<u>NO CONTACT SPORTS</u>

- Follow-up every 6 months with echocardiographic measurement of aortic root dimension

Marfan's Syndrome

- Aortic root dilation

Can participate in low intensity sports
(Class IA)

- Follow-up every 6 months with echocardiographic measurement of aortic root dimension

Mitral Valve Prolapse

- Prevalence in general population ~ 5%
- Generally a benign disorder
- Some experience
  - palpitations, dizziness, and arrhythmias, syncope due to orthostatic hypotension
- Sudden death has been reported but rare

Mitral Valve Prolapse

- No history of syncope
- No history of arrhythmias
- No family history of sudden death associated with MVP
- Only mild mitral insufficiency
- No prior embolic event

Can participate in all competitive sports

Benign Arrhythmias

- Sinus Arrhythmia*
- Sinus Bradycardia*
- Junctional Escape beats*
- Premature Atrial Contractions
- Wandering Atrial Pacemaker
  - Normal variant
  - No further necessary testing unless symptoms

*Common in trained athlete

First Degree AV Block

- If QRS is normal - *No further evaluation*

  Can participate in all competitive sports

- If QRS is abnormal or PR interval > 0.3 sec
  - Exercise study
  - 24 hour Holter
  - Echocardiogram
  - Possible EP Study

Type 1 Second Degree AV Block

Wenckenbach

- Can be present in normal, well trained athletes
  - 24 hour Holter
  - Exercise study
  - Echocardiogram
  - EP Study if co-existing bundle branch block

- If Asymptomatic and AV block does not worsen with exercise

  Can participate in all competitive sports

Type 1 Second Degree AV Block

Wenckenbach

- Without symptoms *but*
- AV block appears or worsens with exercise
  - may require a pacemaker

Can participate in low intensity sports

(class IA)

- Treated with pacemaker

Can NOT participate in competitive sports that engage in bodily collision

Type 2 Second Degree AV Block

- Can progress to Complete Heart Block
- Treatment the same as complete heart block

Can NOT participate in competitive sports

until treated with permanent pacemaker

Congenital Complete Heart Block

- Structurally normal heart and function
- No history of syncope or near syncope
- Narrow complex QRS
- Ventricular rates at rest > 40-50 bpm
  - increases with exercise
- No ventricular ectopy during exercise

Can participate in all competitive sports

Congenital Complete Heart Block

- History of syncope or near syncope
- Symptoms of fatigue
- Ventricular arrhythmias

Can NOT participate in competitive sports until treated with permanent pacemaker

Can NOT participate in competitive sports that engage in bodily collision

Acquired Complete Heart Block

Can NOT participate in competitive sports until treated with permanent pacemaker

Can NOT participate in competitive sports that engage in bodily collision

Wolff-Parkinson-White Syndrome

Required testing

- 12 Lead ECG
- 24 hour Holter Monitor
  - recorded during athletic activity
- Exercise test
- Echocardiogram

- EP studies may be required in some with palpitations

Wolff-Parkinson-White Syndrome

- Episodes of tachycardia should be treated prior to sports participation
- Successful Post Ablation
  - No Symptoms
  - No inducible arrhythmias
  - No recurrence in 3-6 months

Can participate in all competitive sports

Premature Ventricular Contractions

- 12 lead ECG
- Echocardiogram
- 24 hour Holter monitor
- Exercise Test

Can participate in all competitive sports

Unifocal PVCs

PVCs disappear with exercise

Premature Ventricular Contractions

- With Structural Heart Disease

Can participate low intensity sports only
(Class IA)

Congenital Long QTc Syndrome

- Corrected QT interval of 440 to 450 msec
  - upper limit of normal
- Diagnosis requires
  - history of symptoms
  - family history of sudden death

- ECG changes

Congenital Long QTc Syndrome

- <u>High risk of sudden death with activity or emotional stress</u>

Should be restricted from all competitive sports and strenuous activities
(Recreational sports with a buddy)

www. SADS.org - for a list of drugs to avoid

Kawasaki Disease

Risk Level I

<u>No coronary artery changes</u>

- No cardiac follow-up after first year

No Restrictions after acute illness (6-8 weeks)

Risk Level II

<u>Transient Coronary Artery Ectasia</u>

- No cardiac follow-up after 1-3 years

No Restrictions after acute illness (6-8 weeks)

Risk Level III

<u>Small or medium solitary aneurysm</u>

- Long term antiplatelet therapy
  - (3-5 mg/kg aspirin)
- No restrictions after 6-8 weeks (< age 10 years)
- Annual Cardiac follow-up
- Exercise test every other year - with or without perfusion scan after age ten

Competitive contact sports with endurance training discouraged

Risk Level IV

Giant coronary aneurysms / multiple aneurysms

- Long term antiplatelet therapy
  - (3-5 mg/kg aspirin)
- No restrictions after 6-8 weeks (< age 10 years)
- Annual Exercise testing with perfusion scan

Competitive contact sports with endurance training and weight training

STRONGLY discouraged

Risk Level V

Coronary obstruction confirmed by angiography

- Long term antiplatelet therapy
  - ? Adjunctive therapy with Warfarin
- Cardiac follow-up every 6 months
  - ECG & 2D Echo
- Annual 24 hour Holter monitor
- Annual Exercise testing with perfusion scan
  - Pharmacologic study for younger patients and those unable to perform dynamic exercise

Non-contact, non-competitive recreational sports based on exercise test results

KD & Lipid Profiles?

Public Health Guidelines for Lipid Testing

Children > two years of age tested if;

- One parent - Total cholesterol ≥ 240 mg/dl
- History of early MI or CVA
  - (< 55 years of age) in a parent, grandparent, aunt, or uncle
- OR if family history unavailable

High Risk Approach

High

- TC ≥ 240 mg/dl
- LDL ≥ 160 mg/dl

Borderline

- TC > 200 mg/dl
- LDL > 130 mg/dl

References

- *Classification of Sports*
  - J.H. Mitchell et al JACC Vol. 24 Oct 1994

- *Task Force 1: Congenital Heart Disease*
  - T.P.Graham JR et al JACC Vol. 24 Oct 1994

- *Task Force 2: Acquired Valvular Heart Disease*
  - M.D.Cheitlin et al JACC Vol. 24 Oct 1994

References

- *Task Force 3: Hypertrophic Cardiomyopathy, Myocarditis and Other Myopericardial Disease, and Mitral Valve Prolapse*
  - M.J. Maron et al JACC Vol. 24 Oct 1994

- *Task Force 4: Systemic Hypertension*
  - N.M. Kaplan JACC Vol. 24 Oct 1994

- *Task Force 6: Arrhythmias*
  - D.P. Zipes et al JACC Vol. 24 Oct 1994

References

- *Guidelines for Long-term Management of Patients with Kawasaki Disease*
  - *Dajani, AS et al - Circulation 1994;89:916-922*