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SHEARIN & WIENTZEN

Clinical Adolescent Medicine

Morbidity and Mortality

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PREFACE

We have attempted in this book to analyze all of the major conditions associated with significant morbidity and mortality in the adolescent population. An understanding of factors contributing to adolescent suffering and death will, we hope, help physicians to diagnose and treat patients in this age group more effectively.

The book is organized into three parts: clinical, reproductive, and psychosocial. In the clinical section, specialists address the particular needs of adolescents faced with a variety of disorders: asthma, hepatitis, cancer, dysrhythmias, and autoimmune disease, to name a few. Part II covers reproductive aspects of adolescent morbidity and mortality, including birth control options and counseling, pregnancy management, and sexually transmitted diseases. In the third section of the book, experts examine the psychosocial aspects of adolescent life and relate them to the clinical practice of adolescent medicine. They discuss topics such as accidents, substance abuse, and mental illness, as well as the impact of the media on adolescent health and the role of the physician who manages patients in the juvenile justice system. In addition, the appendix reveals very disturbing statistics on violence as a cause of death in this age group.

Although not exhaustive in its coverage of adolescent health care, this book does address topics previously neglected in the literature or scattered throughout many sources. Moreover, it seeks to fill the interstices left by adolescent medicine books that cover *either* clinical or "counseling" material, but not both. Our aim was to strike a balance between the science and the art of adolescent medicine, in the hope that readers would begin to view adolescents within a broader frame of reference than was likely heretofore.

This book, then, was written as a supplement to standard textbooks of pediatrics, family medicine, and adolescent medicine. We hope it proves useful to physicians and other professionals involved with adolescents and their health care.

To our families, patients, and colleagues who by their actions teach us adolescent medicine

R. B. S.
R. L. W.

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PART I

CLINICAL ASPECTS

Chapter One

Cardiovascular Diseases

Seymour I. Hepner

Cardiovascular problems that affect adolescents are common. Some are retrospective, a few current, and others prospective. The retrospective ones are related to congenital disease of the heart; some may have been recognized before the adolescent years and others not. For many of those recognized earlier, surgical therapy is not necessary. Those requiring surgery may leave the adolescent with residual difficulties. The current problems are relatively few, and include dysrhythmias and acute rheumatic fever. Prospective problems are associated with adulthood, such as systemic hypertension and atherosclerotic coronary artery disease.

PROPHYLAXIS AGAINST INFECTIVE ENDOCARDITIS

Patients with the congenital heart lesions discussed in this chapter should receive antibiotic prophylaxis before and after certain surgical procedures. The American Heart Association does not require prophylaxis for patients with an atrial septal defect (before surgery) or those who have undergone ligation of a patent ductus arteriosus. The following regimens are recommended for adults by the Committee on Prevention of Rheumatic Fever and Bacterial Endocarditis of the American Heart Association:[3]

1. For dental procedures and upper respiratory tract surgery
   a. Aqueous crystalline penicillin G, 1 million U mixed with procaine penicillin G, 600,000 U IM 30 min to 1 hr prior to the procedure. Starting 6 hrs after the procedure, penicillin V, 500 mg q. 6 h. x 2 days
   b. Penicillin V, 2 gm p.o. 30 min to 1 hr prior to procedure; then 500 mg q. 6 h. x 2 days
   c. If allergic to penicillin, erythromycin, 1 gm p.o. 1½ to 2 hrs prior to procedure, then 500 mg q. 6 h. x 2 days

2. For surgery or instrumentation of the genitourinary or gastrointestinal tracts
   Aqueous crystalline penicillin G, 2 million U IM or IV; or ampicillin, 1 gm IM or IV, plus gentamicin, 1.5 mg/kg IM or IV (not to exceed 80 mg); or streptomycin, 1 gm IM 30 min to 1 hr prior to procedure. Post-procedure: penicillin (or ampicillin) and gentamicin in the same dose q. 8 h. x 2 doses. If streptomycin was used, then use similar doses of penicillin (or ampicillin) and streptomycin q. 12 h. x 2 doses. If allergic to penicillin, vancomycin, 1 gm IV over 30 to 60 min, plus streptomycin, 1 gm IM 30 to 60 min prior to procedure. Repeat the same dose once in 12 hrs.

CONGENITAL HEART DISEASE

Congenital diseases of the heart make up the largest group of lesions that affect the preadolescent patient. In the adolescent years the patient may have residua of an ongoing problem or one affected by surgical intervention.[1]

Acyanotic congenital heart diseases make up the largest group.[1] Among these are patients with left-to-right shunts. Ventricular septal defect (VSD) is the most common, but by adolescence many will have diminished in size or closed spontaneously. The patient with a small defect requires no surgical intervention and there need be no activity restrictions. Prophylaxis against infective endocarditis should be undertaken, and patients should be monitored periodically by a cardiologist to watch for the development of complications (infective endocarditis, aortic insufficiency, etc.). Those with moderate defects should be monitored more closely. In addition to the above precautions, consideration should be given to invasive diagnostic studies (cardiac catheterization with angiography) to assess defect size and pulmonary vascular resistance. Surgery should be considered if the pulmonary:systemic flow ratio is greater than or equal to 2:1 or there is significant pulmonary hypertension. It is unusual to see an adolescent with a large ventricular septal defect, as today most would have been repaired earlier in life. If not, a complete cardiac work-up is indicated in preparation for surgical therapy. Only severe pulmonary vascular disease should keep one from recommending operative repair. Those with fixed pulmonary hypertension are not operative candidates and should be restricted from strenuous activities.

Many more patients with a repaired VSD will be seen in the adolescent period in the future. Those with a completely closed defect and normal pulmonary artery pressure require periodic follow-up and they should continue to receive antibiotic prophylaxis against infective endocarditis. Those with a residual VSD and normal rhythm should be treated as the respective unoperated defect noted above.

Patent ductus arteriosus is rare in adolescents. When seen, its mere presence should indicate surgical therapy. The only exception would be the unusual patient with severe pulmonary vascular disease who is not an operative candidate and therefore should receive penicillin prophylaxis against infective endocarditis and be restricted from moderately strenuous activities.

Atrial septal defect is a lesion that may escape detection in earlier childhood.[2] If small or moderate in size, surgical therapy depends on measurements taken at the time of cardiac catheterization. The patient with a large defect should be referred for surgery. Postoperatively, the patient should be able to participate in normal activities. Antibiotic prophylaxis as recommended previously is optional.[3]

Obstructive lesions of the heart involve the outflow of blood from one or both ventricles. Pulmonic stenosis causes an elevation of systolic pressure in the right ventricle; the condition generally does not worsen with age.[4] Patients with mild valvular stenosis do not require surgical therapy, need no activity restriction, and should receive prophylaxis against infective endocarditis. Patients with moderate stenosis (peak systolic gradient 50 to 75 mm Hg) should have a complete cardiac work-up including invasive diagnostic studies. Consideration for surgical intervention has recently been recommended.[5] They should receive the usual antibiotic prophylaxis, but activity restrictions are generally not indicated. Those with severe pulmonic stenosis should be referred for surgery. A patient who has had previous surgical therapy for this lesion should be treated as noted above according to the respective residual gradient.

Aortic stenosis is primarily a disease of males.[6] Unfortunately, many of the affected patients are athletically active and may be at risk for sudden death or other less severe complications of exercise.[7] The patient with a bicuspid aortic valve or mild stenosis usually does not require activity restriction. Antibiotic prophylaxis against infective endocarditis is important. Aortic stenosis may progress in severity[8] and should be monitored carefully. Those patients with a moderate degree of stenosis (peak valvular systolic gradient of 50 to 75 mm Hg) should be restricted from competitive sports. For severe stenosis, surgical therapy is indicated regardless of whether or not the patient is symptomatic. Postoperative treatment should be as noted above according to the residual gradient. Coexisting postoperative aortic insufficiency may present a problem in clinical management. Prophylaxis against infective endocarditis should be administered for life.

Occasionally, one sees an adolescent with coarctation of the aorta that has escaped clinical detection earlier in life. The natural history of this lesion is such that surgical therapy is required.[9] One should look carefully for the coexistence of a bicuspid aortic valve. Postoperatively, the patient should be treated according to the presence or absence of residual systemic hypertension. Prophylaxis against infective endocarditis should be practiced for life.

Mitral valve prolapse is an extremely acyanotic congenital heart defect.[10] It is often not recognized until adulthood, but better knowledge of the defect has caused earlier clinical detection. Most patients are asymptomatic, but those with symptoms should be treated accordingly. They require occasional cardiac evaluation and prophylaxis against infective endocarditis. Chest pain may require therapy with beta blockers. Palpitations may require appropriate therapy for the supraventricular or ventricular dysrhythmia that may be present.

Hypertrophic cardiomyopathy (asymmetric septal hypertrophy, idiopathic hypertrophic subaortic stenosis) is another lesion being recognized with increasing frequency. If it is nonobstructive, the patient may not need activity restrictions. If it is obstructive, the patient should be restricted from strenuous exercise, as this is a common cause of sudden death in young adults.[11] All patients should receive prophylaxis against infective endocarditis.

Cyanotic congenital heart lesions are most frequently seen in adolescents after surgical intervention. The most common defect is tetralogy of Fallot.[12] It would be unusual today to see a patient in this age group who has not at least had palliative surgery. Most would have had a primary repair of their defect. Anyone not operated on should be fully evaluated with an eye toward surgical therapy. Those who have had palliative surgery (e.g., a Blalock-Taussig shunt, Waterston or Potts anastomosis) should also be considered for primary repair along with dismantling of the shunt. This is important to avoid long-term complications of the primary defect (e.g., brain abscess). The patient who has had primary repair of tetralogy should be treated and followed according to the success of the surgery. Those with a small residual VSD and/or mild to moderate right ventricular outflow tract obstruction should receive endocarditis prophylaxis and no activity restriction. Patients with a moderate or large residual VSD and/or significant right ventricular outflow tract obstruction should be considered for reoperation. Postoperative rhythm problems should be treated accordingly.

Patients with transposition of the great vessels rarely lived to the adolescent years in the past.[13] With the advent of surgical procedures to repair this defect, the physician caring for adolescents will be seeing more patients with this lesion. The long-term outlook for surgically treated patients is not well known, but the patient will need to be monitored periodically depending on the results of the surgery and the cardiac rhythm. Exercise prescriptions need to be individualized. All patients should receive prophylaxis against infective endocarditis.

There are many other types of cyanotic congenital heart diseases that may be seen in adolescents, but they are less common than those noted. Improved surgical techniques have enabled these patients to survive to an age previously unobtainable. Monitoring should be done with the assistance of a cardiologist expert in following these lesions.

DYSRHYTHMIAS

After infancy, the most common time in childhood and adolescence for dysrhythmias to occur is in the teenage years.[14] The reason for this is not clear, however, there is speculation that hormonal or emotional factors[14] contribute, but this has not yet been firmly established. Most patients will present with symptoms of palpitations, near syncope, or syncope. Occasionally, the diagnosis will be made on clinical examination. A routine

electrocardiogram is often insufficient to make the diagnosis of a rhythm disorder, and one must obtain a 24-hour ambulatory monitor (Holter monitor) to ascertain the patient's rhythm. Another useful tool is the graded submaximal treadmill exercise test to simulate the patient's normal activities.

Rhythm disorders in adolescents are generally unrelated to other diseases of the heart.[14] The most common coexisting lesion today would be a repaired congenital heart defect (e.g., VSD, D-transposition of the great vessels, or tetralogy of Fallot). Patients with an unoperated defect such as Ebstein's anomaly or l-transposition of the great vessels may have complicating rhythm disorders. In addition to congenital defects, one should consider other causes, such as hormonal diseases, cardiac tumors, infections, or cardiomyopathy.

Rhythm disorders may be categorized as tachyarrhythmias and others. When dealing with a tachyarrhythmia it is important to differentiate supraventricular from ventricular dysrhythmias. Paroxysmal supraventricular tachycardia is the most frequent clinically significant tachyarrhythmia in this age group. It is usually idiopathic and may be controlled with one or a combination of medications. Atrial flutter is much less common and more often associated with underlying congenital heart disease. Atrial fibrillation is extremely uncommon in this age group.

Approximately one-half of patients with the Wolff-Parkinson-White syndrome experience episodes of paroxysmal supraventricular tachycardia.[15] This is generally due to reentry with antegrade conduction to the ventricles down the atrioventricular (AV) node, and retrograde conduction up the accessory connection. Treatment may be difficult; in this age group, the beta blockers would be drugs of choice. Occasionally, a patient with refractory tachycardia might need surgical therapy to interrupt the accessory pathway.[16]

Ventricular tachycardia (three or more ventricular premature beats in succession) is often idiopathic. Patients are surprisingly symptom free in many instances. This is fortunate, since treatment is difficult, with many patients being refractory to the more common antidysrhythmic medications.

Other rhythm abnormalities include premature beats and bradycardia. First degree heart block (prolonged PR interval) is often seen in patients on digitalis therapy and may occur in those with atrial septal defect. Second degree heart block is not common. Mobitz I (Wenckebach) type rhythm is characterized by a progressive prolonged PR interval leading to intermittent complete AV block. With Mobitz II there is no change in the PR interval. One may see either of these in patients with myocarditis, cardiomyopathy, or digitalis toxicity.

Third degree heart block is usually iatrogenic.[17] Although the incidence of surgically induced complete AV block has diminished with better operative techniques, there are some patients who still have this complication. Congenital complete heart block may be seen.