REHABILITATION IN CARDIOVASCULAR DISEASES

IInd Chair and Clinic of Cardiology

HISTORY

Several thousand years B.C. chinese emperor Hoong-Ti organized health tournaments to keep silhuette in shape.

Diocles of Carystus in 4th century B.C. recommended exercise for the healthy life-style

Hippocrates in the work „On surgery” said: „exercise strengthens and leisure weakens body”

Heberden and Parry w 18th century noticed that exertion makes anginal pain less frequent

Brothers August and Theodor Schott founded famous cardiology resort in Bad Nauheim in 19th century which still exists

History

In the late 30s Mallory and al.. described pathologic evolution of myocardial infarction as a 6 weeks process.

In the late 60s acute myocardial infarction was treated by absolute immobilisation throughout 4-6 weeks, and hospitalisation lasted for 3-4 months (fear of heart rupture, aneurysms and sudden death)

In 1944 Dock published article,,The evil sequele of complete bed rest ‘’ revealing adverse sequele of immobilisation in MI

In 1955 Gottheiner started ambulatory treatment with exercise after myocardial infarction

History – Polish accent

In the 50s Mściwój Semrau- Siemianowski recommended his patients after hospitalization for myocardial infarction ,,walks on steeper and steeper paths'' – 1949 founded a rehabilitation section of Polish Society of Internal Medicine.

Polish Cardiac Rehabilitation School crated by Askanas and Rudnicki in 1960 in Cardiology Institute of Medical University in Warsaw

Cardiac rehabilitation models: Gdańsk, Poznań, Bydgoszcz (dr Walery Więcko)

Cardiac rehabilitation in patients with acute myocardial infarction

Definition: Cardiac rehabilitation (re- „again”, habilis- „fit”)

- “Cardiac rehabilitation services are comprehensive, long-term programs involving medical evaluation, prescribed exercise, cardiac risk factor modification, education, and counselling.These programs are designed to limit the physiologic and psychological effects of cardiac illness, reduce the risk for sudden death or re-infarction, control cardiac symptoms, stabilize or reverse the atherosclerotic process, and enhance the psychosocial and vocational status of selected patients.”(Cardiac Rehabilitation/Secondary Prevention Performance Measures Writing Committee)
- „Comprehensive and coordinated use of medical resources, social, educational, economic and professional in order to adapt to the new life of the patient and allow him to obtain the highest possible efficiency”.(WHO)

Influence of physical exertion on cardiovascular system

- Sedentary life style connected with scarce physical activity results in 2-fold higher incidence ofischemic heart disease
- Increased physical activity reduces risk of death from cardiovascular causes
- Individuals suffering from coronary artery disease benefit from endurance training by improvement of physical fitness, increase of chest pain threshold and decreased shortness of breath in case of heart failure.

Rehabilitation and hemodynamic disorders

- Physical training improves fitness in chronic heart failure patients by the delay of onset of anaerobic metabolism
- Physical exercises do not improve ejection fraction of the left ventricle but they improve function of the skeletal muscles. (Increase in oxidative enzymes activity)
- Endurance training causing loss of 2000 kcal weekly may lead to atherosclerotic plaque reduction confirmed by coronary artery angiogram

Improvement achieved by exercise training in patients with congestive heart failure diminishes after its termination!

Cardiac rehabilitation and metabolism of glucose and lipids and hypertension

Frequent physical activity leads to:

- Increase of HDL cholesterol: 2 mg/dl
- Decrease of LDL cholesterol: 5-10 mg/dl
- Decrease of triglycerides
- Improvement of lipids metabolism by the improvement of tissue insulin receptors sensitivity
- Reduction of systolic blood pressure by 6-10 mmHg, and diastolic by 2- 5 mmHg

Task of rehabilitation

- Fighting symptoms of stress and depression
- Improvement of physical fitness
- Alleviation of disease symptoms
- Cardiovascular event recurrence reduction
- Coronary artery disease risk factors identification and modification
- Shortening of hospitalization period

Task of rehabilitation

In cardiac rehabilitation participate:

- Doctors (GPs, cardiologists, cardiosurgeons)
- Trained nurses
- Rehabilitants
- Physiotherapists
- Psychologist
- Dietetician
- Social workers

Personnel supervising rehabilitation programmes must be able to conduct resuscitation.

Premises chosen for rehabilitation exercises must be equipped in resuscitation appliances

Elements of rehabiliation program

Individual adjustment of physical training including:

- Static and dynamic exercises
- Force and endurance exercises
- Physical activity on treadmill or bicycle ergometr
- Jogging, swimming, team games

Elements of rehabiliation programme

Psychologic, social and occupational rehabilitation

Influence on behaviour: helping patients to cope with the new and often incomprehensible situation in their live (fear, depression, social isolation, unemployment); councelling healthy life style and abandoning harmful habits.

Phases of cardiac rehabilitation

Phase I – in-patient

Includes gradually increased physical activity and education. Begins on the first day of hospitalization with psychotherapeutic approach which is meant to reduce emotional stress and therefore to decrease sympathetic activation. Physical activities begin after acute symptoms of myocardial infarction

Phases of cardiac rehabilitation

Phase II – early outpatient rehabilitation

- Should begin in the first two weeks after discharge and includes period from discharge till return to work or untill regaining good mental and physical state which enables patient to live by him/herself
- Rehab ward, health resorts, specialistic rehab centers, ambulatory

Phases of cardiac rehabilitation

Phase III – outpatient rehabilitation

- Begins when patient's status is stable, confirmed by exercise stress test, well-controlled blood pressure and heart rate
- In groups or individually

Phases of cardiac rehabilitation

Phase IV

- So called healthy training performed in order to maintain achieved effects, in this phase patient continues exercises (without supervision), leads healthy lifestyle.

INDICATIONS TO BEGIN CARDIAC REHABILITATION

- Stable angina pectoris, especially with modifiable risk factors of IHD or with poor exercise tolerance (<6 METs)
- After uncomplicated myocardial infarction
- After CABG
- After heart transplantation
- Heart failure
- After PTCA
- After valve replacement

Absolute contraindications to begin exercise in rehab program

- Unstable agina
- SBP > 200 mmHg lub DBP > 110 mm Hg at rest
- Moderate and severe aortic valve stenosis
- Uncontrolled arrhythmia
- Overt congestive heart failure
- Complete atrioventricular block without implanted stimulator
- Active myocarditis or endocarditis
- ST segment depression or elevation exceeding 3mm at rest
- Thrombotic events
- Acute conective tissue disease or fever
- Uncontrolled diabetes
- Orthopedic diseases

Types and effects of physical training

Endurance exercise

- Walking, running, riding a bike, volleyball, swimming
- These are exercises of large group of muscles, well tollerated by patients
- Endurance exercise increases parasymathetic system activity, and therefore makes heart work more effective
- The exercise strain should be counted for 200-300 kcal during one exercise session and 1000-1500 kcal per week

Types and effects of physical training

Strength exercises

- Increase dynamic muscular strength which improves ability for exercise with maximum workload and stamina in submaximal workload.
- Only sporadically leads to myocardial ischaemia

Types and effects of physical training

- The most advantageous is physical training taking place at least 3 times a week, lasting for at least 12 weeks
- Exercise should take 20-40 minutes and heart rate should reach 70-85% of MHR
- Physical training decreases myocardial muscle oxygen consumption resulting in double product reduction (heart rate x systolic blood pressure)
- Decreases angina in patients with ischemic heart disease
- Decrease dyspnoe and fatigue in patients with congestive heart failure

Types and effects of physical training

Influence of physical training on haemodynamic parameters of cardiovascular system

- Decreases ischemia on exertion which was confiremed in exercise tests and holter monitoring
- Leads to advantageous changes in skeletal muscles in patients with heart failure by means of: increasing the numbers of capillars, decreasing oxydation enzymes activity, increasing myoglobin and number and size of mitochondria in muscle cells
- Does not directly influence regression of atherosclerotic lesions
- Has no impact on left ventricular ejection fraction
- Has no impact on collateral circulation

Summary

- Cardiac rehabilitation improves significantly parameters of physical capacity without substantial cardiovascular complications
- Patients with stable coronary artery disease may take part in both endurance and resistance exercise
- Cardiac rehabilitation in coronary artery disease decreases myocardial ischemia on exertion
- Rehab training reduces ischemic and heart failure symptoms

Summary

- Physical activity is recomended for patients with moderate and severe left ventricular disfunction
- Training improves physical capacity in patients after heart transplantation
- No adverse events and complications of physical training were observed in elderly
- Education, counselling and influence on lifestyle make 25% patients give up smoking

Summary

- Combination of physical activity, dietary interventions and hipolipidemic agents results in (angiography proved) regression of atherosclerotic plaque formation in coronary arteries; helps to lose weight and keep it off; normalizes blood lipids level and lowers arterial blood pressure.