Case report

Cardiac Rehabilitation after BENTALL surgery: Case report with literature review

Abstract

Background:
Cardiac rehabilitation is designed to improve cardiovascular health in patients with cardiovascular diseases and is recommended by guidelines as Class IA. In cardiac surgery, cardiac rehabilitation is associated with a lower 2-year mortality. The aim of the present editorial is to highlight the role of cardiac rehabilitation in cardiac surgery in improving cardiorespiratory performance in this patient profile

Case report
we report the case of a 65-year-old male patient, a weaned ex smoker with intercostal herpes zoster treated 5 years ago, who underwent BENTALL surgery for degenerative aortic disease with severe aortic insufficiency, moderate aortic narrowing and aneurysmal dilatation of the ascending aorta with placement of a Dacron tube and replacement of the aortic valve with a biological prosthesis. the patient was recruited 4 weeks post-operatively for cardiovascular rehabilitation, the program included 20 sessions at a rate of 3 sessions per week. started gently with muscle-strengthening sessions emphasizing the inspiratory and peripheral muscles and progressive physical training 'interval training' which began with a low load of 5 watts for 40min the first session until reaching 75watts at the end of the 20th session. We noted an improvement in cardiorespiratory capacity. VO2max increased from 11.8ml/kg/min to 14.7ml/kg/min, i.e. 62% of the predicted value, maximum Fc from 120bpm to 113bpm and VE/VCO ratio from 31 to 27 at the end of the sessions. Control LVEF was 48% comparing to 30% initially, and even on quality of life, lifestyle, assessment of cardiovascular risk factors and therapeutic optimization.

Conclusion
Patients after heart surgery, especially the group described after a Bentall type surgery, are a minority in each rehabilitation department. Therefore, there is a need to intensify cooperation between rehabilitation centres in order to develop a joint programme of additional scientific research for this group of patients.

Key words: Cardiac rehabilitation, Cardiac surgery, Bentall, Cardiopulmonary exercise testing, Early mobilization, Treatment

Introduction:

Cardiac surgery includes a variety of procedures with coronary artery by-pass grafting, valve replacement, aortic, mitral and tricuspid valve replacement or reconstruction, heart transplantation and Bentall surgery being the most frequent among them. Patients present a loss of cognitive and exercise capacity[1], muscle mass[2] and quality of life[3,4] after cardiac surgery due to anesthesia, surgical incision, duration of cardiopulmonary bypass, and mechanical ventilation. These complications, along with pulmonary complications after surgery, lead to extended intensive care unit and hospital length of stay and significant mortality rates [5]. Physical inactivity remains high after cardiac surgery, reaching up to 49% in these patients. Moreover, physical inactivity, even late after cardiac surgery, is associated with increased long-term mortality [6].

CASE PESENTATION

This is 65 years old male patient, chronic smoker weaned in 2006 with a history of intercostal herpes zoster treated 5 years ago. Admitted for management of NYHA stage III exertional dyspnea associated with episodes of paroxysmal nocturnal dyspnea, in whom cardiovascular exploration on TTE revealed degenerative aortic disease with predominantly receding aorta; severe aortic insufficiency SOR at 0. 3cm² and RV 66ml and aortic narrowing moderately tight aortic surface 1.4cm², mean gradient 26mmHg, the LV is dilated (DTDVG/DTSVG: 71mm/57mm), seat of a predominantly global hypokinesia in with severe systolic dysfunction LVEF 32% in simpson biplane and the ascending aorta dilated to 48mm. Thoracic Langioscan confirmed aneurysmal dilatation of the ascending aorta (aortic ring 28mm, sino-tubular junction 35mm, ascending aorta 50mm). The therapeutic decision was a BENETALL-type surgical procedure with placement of a biological valve at the patient's request. Preoperative coronary angiography showed angiographically normal arteries. The patient underwent successful surgery with a biological prosthesis type Epic number 25mm and Dacron tube number 36mm. The postoperative evolution was marked by the development of low cardiac output in relation to severe sepsis with pulmonary origin, which responded well to antibiotic therapy, and a poorly tolerated tachyAF reduced by external electric shock, which slowed down well with beta-blockers. The patient was recruited for a cardiac rehabilitation program consisting of 20 sessions at a rate of 3 sessions per week, started 4 weeks postoperatively after a thorough physical examination, especially of the sternotomy

points, a complete biological workup and a postoperative TTE showing a biologic prosthesis in good aortic position with no leakage or stenosis, moderate mitral insufficiency (SOR 0. 2cm², RV 23ml), dilated LV with LV dysfunction (LVEF 30%), dry pericardium. We noted also an improvement in cardiorespiratory capacity. The maximum charge has increased from 60 watts to 80 watts. VO2max increased from 11.8ml/kg/min to 14.7ml/kg/min (62% of the predicted value), maximum Fc from 120bpm to 113bpm, VE/VCO ratio from 31 to 27 and the 6min walk test went from 370m to 468m at the end of the sessions. Control LVEF after the and of cardiac rehabilitation was 48% comparing to 30% initially and even on quality of life based on HAD score which decreased significantly from 20 to 11 at the end of the program, lifestyle, assessment of cardiovascular risk factors and therapeutic optimization.

Discussion

Cardiac rehabilitation is designed to improve cardiovascular health in patients with cardiovascular diseases and is recommended by guidelines as Class IA [7,8]. In cardiac surgery, cardiac rehabilitation is associated with a lower 2-year mortality [9]. Early mobilization should be considered as an important preventive and treatment method for intensive care unit acquired weakness in patients after cardiac surgery and should be adjusted to each patient's functional capacity, initiating from passive mobilization such as stretching, splinting, passive movements and neuromuscular electrical stimulation (NMES), and increasing the functional status with simple active range of motion and resistance exercises including sitting in a chair, leg press, squats from sitting position, walking, biking on an exercise bike, walking on stairs and inspiratory muscle training [10,11]. Our patient benefited from muscle-strengthening sessions and physical training 'interval training' on an ergo metric bicycle. Beyond all its beneficial effects, early mobilization of cardiac surgery patients requires close monitoring in the intensive care unit due to possible side effects, including significant hemodynamic changes [12-13]. As a result, expert multidisciplinary team approach and individualized rehabilitation program, adjusted to the patient's functional status, are necessary in order to minimize adverse events [14]. Recent studies have demonstrated that prehabilitation seems to improve functional capacity and enhance postoperative recovery in patients undergoing cardiothoracic surgery, The particularity of Bentall intervention is that patients are faced with several additional problems: open chest surgery is often associated with a decrease in respiratory capacity in the immediate period after the operation, pain during breathing and raising arms, reduction in body weight due to catabolism caused by major trauma and a decline in muscle strength as a result of anemia. The adaptation after a cardiac chirurgical intervention is mainly aimed at restoring the pre-opératoire and preventing post-operative complications such as pneumonia or thrombosis of deep veins [15-16]. our patient improved his cardiorespiratory capacity in terms of maximum load, Vo2max, heart rate, VE/VCO2 ratio and even his quality

of life: his HAD depression score went from 20 to 11. It is recommended to perform at least 2 echocardiographic examinations - the first during the postoperative period, the second at the end of the first phase of rehabilitation. In the case we describe, this condition has been met. In the first phase of rehabilitation, it is usually suggested to start with lower intensities of exercise and mostly work on both frequency and duration of each session, rather than intensity [17]. In the case we describe, we used a soft program with 3 sessions per week, starting with a 5-watt load for 40 minutes of interval training and reaching 75 watts towards the end of the sessions.

Conclusion:

Cardiac rehabilitation requires a multidisciplinary approach and includes physical activity promotion, health education, cardiovascular risk management and psychological support, personalized to the individual needs of patients after cardiac surgery. CPET remains the gold standard method for the prescription of optimal aerobic exercise intensity. However, new innovations are required in order to increase rates of patients' participation and create ideal individualized protocols for each patient.

Images

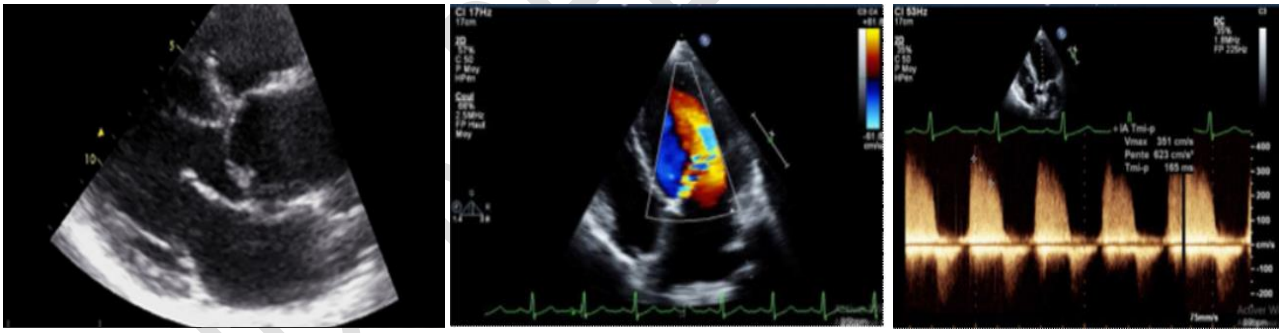

Fig1: TTE before BENTALL procedure showing severe aortic insufficiency, dilated LV (LVEF 32%) and ascending aorta.

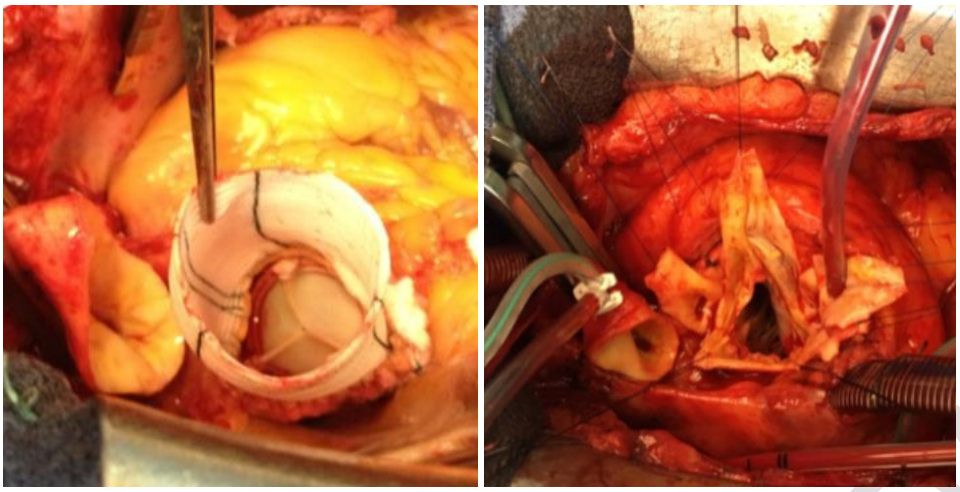

Fig2 : Bentall procedure with placement of biological prosthesis and Dacron tube.

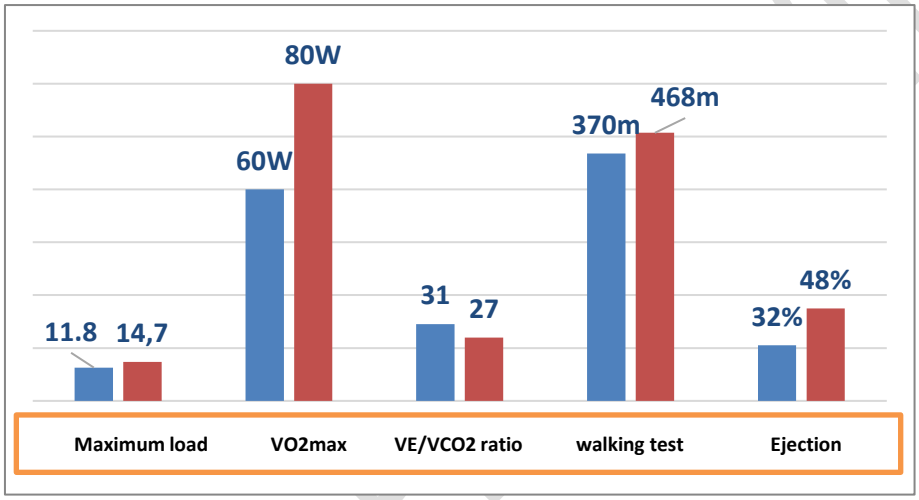

Fig3 schematization of load values, VO2max, VE/VCO2 ratio, walking test and improvement of FEVG before and after cardiac rehabilitation

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