Mini Review
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Cardiac rehabilitation in athletes after valve surgery. a quick review

Abstract

Following aortic or mitral valve replacement or valvuloplasty surgery, a personalised, gradual approach to rehabilitation is required, particularly for athletes. Initially, low-to-moderate-intensity aerobic or endurance training (e.g. brisk walking or light weightlifting) should be commenced under supervision. Heavy lifting and high-intensity cardiovascular endurance training should be avoided for six to eight weeks. Progressing gradually is important in order to improve physical fitness and manage symptoms such as fatigue and breathlessness, while also listening to your body. The aim is to improve quality of life and safely return to physical activity. Personalised monitoring and management of cardiovascular risk factors under continuous medical and specialist guidance are key to achieving optimal results. In this brief review, the author outlines the basic concepts and shares their personal insights based on over 30 years' experience of medically supervising elite athletes. This is an overview of the cardiac rehabilitation programme designed for athletes who have undergone valve surgery. This brief overview offers a straightforward, practical approach to managing athletes of all abilities during cardiac rehabilitation after heart valve surgery. It is based on many years of personal experience.

Keywords: cardiac rehabilitation, athletes, sport injury, heart valve disease, training

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Massimo Bolognesi
Massimo Bolognesi, Internal and Sport Medicine Specialist, Head of the Centre for Sports Cardiology, Ausl della Romagna, Districit of Cesena, Italy

Correspondence: Massimo Bolognesi, Internal and Sport Medicine Specialist, Head of the Centre for Sports Cardiology Ausl della Romagna – Districit of Cesena, Via Ungaretti 494 47521 Cesena (FC), Italy, Tel- +39054764507

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Background

This manuscript aims to illustrate practical cardiac rehabilitation methods from the perspective of physical activity. It is based on current research and literature, as well as the personal experience of a scholar and physician who specialises in this field. Cardiac rehabilitation is a complex, multi-component procedure that requires multidisciplinary knowledge. This includes promoting physical activity, providing health education, managing cardiovascular risk and offering psychological support tailored to patients' individual needs after cardiac surgery.

Cardiac rehabilitation (CR) for athletes after heart valve surgery is a specialised, medically supervised programme designed to help athletes safely return to sport. It focuses on rebuilding strength, fitness and self-belief through personalised exercise, education and support.[1–5] CR programmes recognise the unique needs of athletes, whose performance and intensity goals are higher than those of general programmes. 5 Personalised plans are created based on specific cardiac conditions such as heart valve surgery.[6–8] These plans use baseline testing to gradually increase intensity, and monitoring of heart rate and blood pressure ensures safe progression. CR programmes often incorporate advanced techniques and tele-rehab to help athletes overcome barriers and improve their outcomes.[9]

Introduction

Cardiac rehabilitation (CR) following valve replacement surgery — particularly transcatheter aortic valve implantation (TAVI), or replacement with a mechanical or biological prosthesis — has been shown to significantly improve exercise capacity, quality of life, and functional independence.[6-8] All of these factors are crucial for athletes. Studies suggest that CR can increase the distance covered in the six-minute walk test by around 13 metres and improve Barthel Index scores. Although data on athletes undergoing valve replacement surgery is limited, evidence suggests that personalised CR programmes can deliver substantial improvements. This highlights the importance of integrating CR protocols for this patient group to optimise and accelerate functional recovery.[9,10] For example, relevant studies have demonstrated significant improvements in exercise capacity and functional independence among patients who participated in personalised CR programmes following TAVI.The fundamental principles are as follows.[10,11]

Personalised assessment: The first step is a thorough assessment, which includes electrocardiograms (ECGs) and echocardiograms at rest and during physical exertion, as well as stress tests to estimate maximum exercise capacity. This enables us to personalise the programme.

Gradual progression: Start slowly and gradually increase the duration and intensity of the programme based on your tolerance. Initially, focus on physical healing, psychological aspects and gradual strengthening.

Supervised programmes: Cardiac rehabilitation classes provide essential monitoring (ECG, echocardiogram and vital signs) and expert guidance.

When returning to sport, athletes with aortic root problems should potentially avoid high-intensity isometric exercises and weightlifting such as deadlifts and heavy squats. Instead, they should favour light to moderate activity that is safe and beneficial.

Discussion

Physical inactivity remains high following cardiac surgery, with rates reaching 50%. Patients experience significant reductions in functional capacity and muscle strength after surgery due to anaesthesia, surgical incisions, the duration of cardiopulmonary bypass and mechanical ventilation. These factors impact patients' quality of life. These complications, alongside pulmonary complications following surgery, result in longer stays in intensive care and hospital, as well as higher mortality rates. Despite the well-known benefits of cardiac rehabilitation, this treatment strategy is not widely adopted by patients after cardiac surgery.

The essential components of exercise are as follows:[12]

Aerobic training: walking, cycling or arm ergometry. Aim for a moderate intensity (RPE 4–6/10) and gradually increase the duration.

Resistance training: start with light exercises (10–15 repetitions) in the pool or gym after about eight weeks. Focus on muscle fatigue rather than excessive effort and avoid overhead lifts or extremely heavy weights initially. It is essential to warm up and cool down, so athletes should do 5–10 minutes of light movement (such as walking or shoulder rotations) before and after sessions. Specific considerations apply to athletes. Particular attention must be paid to the health and normality of the aortic root. For athletes with a history of aortic pathology, activities involving weightlifting or intense effort, such as the Valsalva manoeuvre, must be carefully evaluated to prevent complications such as aortic dissection.

Decisions should always be made in collaboration with a sports cardiologist and cardiac surgeon in order to balance the objectives of rehabilitation and returning to sport.

The main objectives are to improve cardiorespiratory capacity (VO_2 max), manage symptoms such as fatigue and breathlessness, enhance psychosocial functioning, and minimise rehospitalisation and mortality. The ultimate goal is a safe return to physical activity and sport.

Here is a simple, practical example of the key components of rehabilitation.

The assessment involves thorough physical examinations, ECGs, echocardiograms and stress tests to determine capacity and risk.

Gradual exercise:

During the initial phase (weeks 0–8), the focus is on healing, so lifting weights of more than 4.5 kg or doing exercises that put strain on the chest and arms should be avoided. Light walking and breathing exercises are recommended instead.

During the intermediate phase (weeks 9–16), supervised aerobic training (e.g. cycling or walking) and light resistance training (10–15 repetitions) are recommended two to three times a week. The intensity is gradually increased.

The advanced phase involves a gradual return to sport-specific training, which is closely monitored with the aim of achieving 150 minutes of activity per week.

Intensity should be monitored using the Borg scale (RPE 4–6/10) or heart rate, and adequate warm-up and cool-down periods should be ensured.

Holistic care should address issues related to lipids, blood pressure, diabetes and mental health, as well as providing psychosocial support.

Specific considerations for athletes:

Return to sport: Aim to return to full, unrestricted activity after complete recovery. However, this requires clearance from your cardiologist and a personalised progression plan.

Caution: Initially, avoid high-risk isometric exercises, overhead lifts and extreme exertion.

Shared decision-making: Work with your doctor to find the right balance between taking part in high-level sports and looking after your heart in the long term. There is scientific evidence supporting physical activity for people in this group.

The overall goal is to:

1. improve physical capacity;
2. manage symptoms;
3. enhance quality of life.

With the right medical support, it is also possible to safely return to high-level athletics.

Case reports

Over the last five years, I have worked with 10 elite and amateur athletes who have undergone aortic valve replacement surgery and mitral valve repair. Five of these were young adults with severe aortic insufficiency due to a bicuspid valve and right coronary cusp prolapse. The other five were elderly adults with mixed aortic valve due to a bicuspid valve with severe stenosis or regurgitation. I also observed an equal number of amateur athletes practising various sports, primarily endurance activities such as running and cycling. These athletes underwent mitral valve repair via annuloplasty and chordae tendineae replacement due to severe valve insufficiency caused by mitral flail and prolapse. In all cases, after an initial adjustment period of at least two months, the athletes gradually resumed their sport at moderate cardiovascular intensity. After six months, they had made a full recovery, despite a slight increase in transvalvular aortic gradients in two cases due to valve mismatch (size 23 ON-X mechanical aortic valve).

Conclusion

In practical terms, incorporating CR into post valvular surgery care can speed up recovery and minimise the risk of postoperative complications and mortality. Research indicates significant improvements in functional capacity after surgery, which are crucial for athletes wishing to return to high-performance activities. Although findings relating specifically to athletes are limited, the broader implications of CR for physical ability are promising.

Key point: Cardiac rehabilitation is a medically supervised programme designed to maintain or improve cardiovascular health. It is an important treatment strategy for patients who have undergone cardiac surgery. It has multiple beneficial effects on functional capacity, endothelial and skeletal muscle function, and quality of life. In recent decades, advances in cardiac rehabilitation have included the use of artificial intelligence, simulation, telemedicine, and virtual rehabilitation, all of which improve patient compliance. Consequently, modern healthcare systems experience fewer hospital readmissions and reduced costs.

Conflict of interest

The author declares no conflicts of interest.

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