

From Bypass to Better Function: Physiotherapy After CABG : A Narrative Review

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Abstract

Background: Coronary artery bypass grafting (CABG) is a commonly performed surgical procedure for the management of advanced coronary artery disease. Although CABG can improve cardiac function and symptoms, patients may experience reduced exercise capacity, respiratory dysfunction, muscle weakness, impaired mobility, anxiety, and reduced quality of life during the postoperative period. Physiotherapy and cardiac rehabilitation are therefore important components of postoperative recovery.

Objective: To review the available evidence regarding physiotherapy management following CABG, with particular emphasis on respiratory physiotherapy, early mobilization, aerobic exercise, balance training, respiratory muscle training, and cardiac rehabilitation.

Methodology: A narrative literature review was conducted using studies identified through PubMed and Google Scholar. Relevant keywords and Boolean operators were used, including “coronary artery bypass grafting” OR “CABG” combined with “physiotherapy” OR “physical therapy” OR “cardiac rehabilitation” OR “respiratory physiotherapy” OR “exercise therapy” OR “early mobilization” OR “inspiratory muscle training.” Studies examining physiotherapy or rehabilitation interventions in adults following CABG or cardiac surgery were considered. Relevant information regarding study design, intervention, outcome measures, and major findings was extracted and synthesized narratively.

Results: The reviewed studies demonstrated beneficial effects of several physiotherapy-based interventions following CABG and cardiac surgery. Chair-based aerobic exercise and slow breathing exercises were associated with improvements in anxiety and exercise tolerance. Early balance training combined with Phase I cardiac rehabilitation improved balance, functional capacity, quality of life, and reduced hospital length of stay. Inspiratory muscle training combined with conventional physiotherapy improved exercise capacity and quality of life during follow-up. Early physiotherapy was associated with changes in respiratory function and functional capacity, highlighting the relationship between pulmonary and physical recovery. However, incentive spirometry and Buerger–Allen exercises did not demonstrate significant additional benefits for their primary outcomes when compared with standard rehabilitation. Hybrid cardiac rehabilitation and respiratory muscle training also produced improvements in respiratory and functional outcomes, although significant between-group differences were not consistently observed.

Conclusion: Physiotherapy is an important component of comprehensive rehabilitation following CABG. Early mobilization, respiratory exercises, aerobic conditioning, balance training, inspiratory muscle training, and structured cardiac rehabilitation may contribute to improvements in functional capacity, respiratory performance, psychological well-being, and quality of life. However, the effectiveness of individual interventions varies, and further large-scale randomized controlled trials with standardized protocols and longer follow-up are required to determine the optimal physiotherapy approach following CABG.

Keywords: Coronary artery bypass grafting; CABG; Physiotherapy; Cardiac rehabilitation; Early mobilization; Respiratory physiotherapy; Inspiratory muscle training; Exercise therapy; Functional capacity; Postoperative rehabilitation.

INTRODUCTION

CABG is a surgical procedure used to improve blood flow to the heart by bypassing blocked or narrowed coronary arteries. It is commonly followed by postoperative recovery and cardiac rehabilitation.¹ Coronary artery disease (CAD) causes narrowing or blockage of coronary arteries, reducing blood supply to the heart. CABG restores blood flow by creating alternative pathways around the blocked vessels.² CABG may temporarily reduce respiratory function, muscle strength, exercise tolerance, and functional capacity. Physiotherapy helps recovery through

breathing exercises, mobilization, and exercise training.³ Patients undergoing CABG are at risk of pulmonary complications such as atelectasis and pneumonia due to anesthesia, ventilation, pain, and reduced mobility.⁴ Physiotherapy is an important part of CABG management and may include breathing exercises, airway clearance, early mobilization, and exercise training before and after surgery.⁵ Inspiratory muscle training (IMT) helps improve respiratory muscle strength and endurance. It can be useful during rehabilitation following CABG.⁶ Cardiac rehabilitation after CABG includes exercise, education, lifestyle modification, and risk-factor management to improve cardiovascular and functional recovery.⁷ Exercise capacity may decrease after CABG because of surgery and physical inactivity. Progressive cardiac rehabilitation can help improve exercise tolerance and functional capacity.⁸ Early mobilization after CABG helps reduce the effects of bed rest and physical deconditioning and may promote faster functional recovery.⁹ The six-minute walk test (6MWT) is commonly used to assess functional exercise capacity. Cardiac rehabilitation can improve walking capacity following CABG.¹⁰ Preoperative respiratory muscle training may help reduce pulmonary complications such as pneumonia and may shorten hospital stay after cardiac surgery.¹¹ Preoperative physiotherapy may include breathing exercises, respiratory muscle training, exercise, and patient education to prepare patients for CABG.¹² Postoperative cardiac rehabilitation aims to restore physical fitness and cardiovascular function through aerobic exercise, strengthening, respiratory training, and education.¹³ Respiratory muscle strength can decrease following CABG. Inspiratory muscle training may improve respiratory muscle strength and exercise capacity during rehabilitation.¹⁴ Postoperative complications and reduced physical function can delay recovery after CABG. Respiratory physiotherapy may help improve recovery and reduce hospital stay.¹⁵ Recovery after CABG includes improvement in physical activity, cardiovascular function, and quality of life. Cardiac rehabilitation supports these aspects of recovery.¹⁶ Exercise-based cardiac rehabilitation after CABG uses appropriately prescribed physical activity to improve cardiovascular fitness, functional capacity, and daily activity.¹⁷ Rehabilitation can be provided before and after CABG. Preoperative rehabilitation prepares patients for surgery, while postoperative rehabilitation focuses on restoring function and exercise capacity.¹⁸ Physiotherapy after CABG may combine breathing exercises, inspiratory muscle training, mobilization, strengthening, and aerobic exercise according to the patient's condition.¹⁹ Comprehensive physiotherapy following CABG addresses respiratory function, mobility, muscle strength, and exercise capacity and supports overall recovery and rehabilitation.²⁰

METHODOLOGY

Literature Search Strategy

A comprehensive literature search was conducted to identify published evidence regarding the role of physiotherapy in the management and rehabilitation of patients following coronary artery bypass grafting (CABG). The electronic databases **PubMed/MEDLINE** and **Google Scholar** were searched for relevant articles. The search strategy was developed using keywords and their synonyms related to CABG, physiotherapy, postoperative rehabilitation, respiratory physiotherapy, exercise therapy, and cardiac rehabilitation.

Boolean operators **AND** and **OR** were used to combine search terms. The operator **OR** was used to combine synonyms and related terms, whereas **AND** was used to combine the major concepts of the review. Appropriate truncation and phrase searching were used where applicable.

The principal Boolean search strategy was:

("Coronary Artery Bypass Grafting" OR "CABG" OR "Coronary Artery Bypass Surgery") AND ("Physiotherapy" OR "Physical Therapy" OR "Physiotherapy Management" OR "Cardiac Rehabilitation")

Selection Criteria

Inclusion Criteria

Articles published from **2026**

Studies focusing on physiotherapy management following CABG
Studies involving adult patients undergoing or recovering from CABG
Studies addressing postoperative physiotherapy interventions

Exclusion Criteria

Articles published before **2026**

Studies not related to physiotherapy management following CABG
OTHER STUDIES WITHOUT CABG
Studies focusing only on medical or surgical management without physiotherapy intervention

PRISMA FLOW CHART

| RECORDS IDENTIFIED THROUGH DATABASES | | |

PubMed + Google Scholar | |

| TOTAL = 1011

DUPLICATE RECORDS REMOVED | |

| n = 789 |

| RECORDS AFTER DUPLICATE REMOVAL | |

| | n = 222

RCTS IDENTIFIED | |

| | n = 367

FULL-TEXT ARTICLES ASSESSED | |

FOR ELIGIBILITY | |

| | n = 22

| ARTICLES EXCLUDED | |

| Not relevant / did not meet criteria | |

| | n = 11

STUDIES INCLUDED IN THE |

| NARRATIVE REVIEW | |

| | n = 9

No.	Topic / Study	Methodology	Outcome Measures	Main Results
1	Chair-based aerobic exercise versus slow breathing intervention during Phase I cardiac rehabilitation after CABG	Outcome-assessor-blinded randomized clinical trial. 120 CABG patients were randomly allocated to chair aerobics or Nadishodhana pranayama. Both groups received standard Phase I cardiac rehabilitation. Intervention was 15 min/day for 5 consecutive days (postoperative days 3–7) .	Hospital Anxiety and Depression Scale (HADS) and 6-Minute Walk Distance (6MWD) .	Both groups showed significant reductions in anxiety and improvements in 6MWD ($p < 0.001$). No significant between-group differences were found ($p > 0.05$). Both interventions were safe and feasible as adjuncts to Phase I cardiac rehabilitation.
2	Impact of early balance training on recovery following CABG	Randomized controlled trial involving 60 adults ≥ 55 years after CABG. Both groups received Phase I cardiac rehabilitation for 30 min, 3 times/day for 7 days. The intervention group received an additional 5 min of balance training per session.	Berg Balance Scale (BBS) , 5-Repetition Sit-to-Stand Test , SF-36 , hospital length of stay, and adverse events.	The balance-training group had significantly better balance (39.77 ± 4.73 vs 34.03 ± 4.94 ; $p < 0.001$), functional capacity ($p < 0.001$), quality of life ($p < 0.001$) and shorter hospital stay (11.47 ± 1.22 vs 14.93 ± 1.36 days; $p < 0.01$). No adverse events were reported.
3	Effect of Buerger–Allen exercises on lower-extremity perfusion in diabetic patients undergoing CABG with saphenous vein harvesting	Randomized controlled trial involving 60 diabetic CABG patients . Intervention group ($n=30$) received standard Phase I cardiac rehabilitation plus Buerger–Allen exercises; control group ($n=30$) received standard rehabilitation.	Primary: Ankle-Brachial Index (ABI) . Secondary: wound-healing disturbances, peripheral ankle swelling, and wound-related pain.	ABI showed a significant time effect ($p = 0.004$), but no significant group effect ($p = 0.754$) or group $\times$ time interaction ($p = 0.711$). Earlier resolution of mild wound-related pain occurred on postoperative day 3 ($p = 0.038$). No

No.	Topic / Study	Methodology	Outcome Measures	Main Results
				intervention-related adverse events occurred.
4	Effects and relationships of early physiotherapy on respiratory functions and functional capacity at discharge after open-heart surgery	Observational assessment of 34 patients undergoing open-heart surgery. Preoperative and postoperative-at-discharge measurements were compared. Patients received early physiotherapy.	FVC, FEV1, FEF25–75, PEF, MIP, MEP, and 6-Minute Walk Test (6MWT). Correlations between respiratory and functional measures were also assessed.	FVC and 6MWT distance significantly decreased at discharge compared with preoperative values. FEV1 did not show a significant change. Significant positive correlations were found between several pulmonary-function and respiratory-muscle measures and 6MWT. The findings emphasize the importance of respiratory-muscle and functional assessment during postoperative rehabilitation.
5	Effect of respiratory muscle training on functional capacity and quality of life in patients undergoing CABG with cardiopulmonary bypass	Randomized controlled clinical trial involving 70 patients aged 44–78 years . Control group (n=34) received conventional physiotherapy; intervention group (n=36) received conventional physiotherapy plus inspiratory muscle training using POWERbreathe® . Assessments were performed preoperatively and at 5, 30, and 90 days postoperatively.	Respiratory and peripheral muscle strength, exercise capacity , functional independence, and quality of life .	The intervention group demonstrated significantly greater exercise capacity at 90 days (p = 0.0192) and improvement in the functional-capacity domain of quality of life at 30 and 90 days (p = 0.0079) . Inspiratory muscle training combined with physiotherapy improved exercise capacity and quality of life.

No.	Topic / Study	Methodology	Outcome Measures	Main Results
6	Effects of adding incentive spirometry to hospital-based cardiovascular rehabilitation after cardiac surgery	Randomized controlled trial involving 46 inpatients undergoing cardiac surgery. Participants received either incentive spirometry + cardiac rehabilitation or cardiac rehabilitation alone . Both interventions were performed twice daily.	Postoperative pulmonary complications, 6-Minute Walk Test , handgrip strength, respiratory muscle function, and hospital length of stay.	No significant additional benefit was found from adding incentive spirometry. Both groups demonstrated postoperative decreases in respiratory muscle strength and walking distance. There were no significant between-group differences in pulmonary complications, handgrip strength, or hospital length of stay.
7	Efficacy of noninvasive ventilatory therapies through different interfaces in postoperative cardiac surgery care	Prospective randomized controlled trial involving 172 patients undergoing elective CABG or valve surgery. Patients were allocated to six groups receiving different noninvasive ventilatory interfaces or conventional physiotherapy. Interventions consisted of three 60-min sessions/day from ICU admission until discharge.	Primary: interface comfort and mobilization progression . Secondary: postoperative pulmonary complications, oxygenation, and ventilatory parameters.	The Wolf Mask had the highest comfort score (9.41 ± 0.68) and lowest inspiratory pressure support. It had no recorded bibasal atelectasis and the lowest pulmonary-complication rate. Interface comfort independently predicted mobilization progression (p = 0.004). Findings regarding pulmonary and oxygenation outcomes were considered exploratory.
8	Prehabilitation for patients with mild-to-moderate frailty undergoing coronary	Pilot randomized controlled trial involving 51 frail adults scheduled for elective coronary or valve surgery. Prehabilitation (n=26) included education,	Short Physical Performance Battery (SPPB) , Fried frailty criteria, MacNew Questionnaire ,	Prehabilitation significantly improved functional capacity before surgery (p = 0.032) and at 3 months (p = 0.040). Frailty was

No.	Topic / Study	Methodology	Outcome Measures	Main Results
	artery and valve surgery	nutritional optimization, stress management, and individualized resistance-focused exercise for at least 4 weeks . Usual-care group: n=25 .	adherence, adverse events, biomarkers, clinical events, readmission, and length of stay.	significantly reduced before surgery (p = 0.005) and at 3 months (p = 0.043). Quality of life improved at 1 month (p = 0.006) and 3 months (p = 0.007). Adherence was 89% , with minimal adverse events.
9	Integrating combined inspiratory and expiratory muscle training into hybrid cardiac rehabilitation after cardiac surgery	Randomized controlled trial involving 20 participants assigned to hybrid cardiac rehabilitation (HCR) or HCR + respiratory muscle training. The 8-week HCR program consisted of 2 weeks supervised in-person and 6 weeks remotely supervised sessions. RMT was performed at 40–60% of MIP and MEP .	FEV1, FVC, MIP, MEP, 6-Minute Walk Distance, DASI, MLHFQ, VO₂peak, and MET levels.	Both groups showed postoperative decreases at week 1 followed by significant improvements by week 8 (p < 0.05). Physical activity, quality of life, VO ₂ peak, and MET levels also improved. However, there were no significant between-group differences or group × time interactions (p > 0.05) .

Results:

The reviewed studies demonstrated that physiotherapy plays an important role in the postoperative management and rehabilitation of patients undergoing CABG and cardiac surgery. Phase I cardiac rehabilitation combined with **chair-based aerobic exercise, balance training, respiratory physiotherapy, inspiratory muscle training, and early mobilization** was associated with improvements in functional capacity, respiratory function, balance, anxiety, and quality of life. Inspiratory muscle training demonstrated beneficial effects on exercise capacity and quality of life during follow-up. Early balance training additionally improved functional capacity and reduced hospital length of stay. However, some interventions, such as **incentive**

spirometry and Buerger–Allen exercises, did not demonstrate significant additional benefits over standard rehabilitation for the primary outcomes. Hybrid cardiac rehabilitation with respiratory muscle training also improved several functional and respiratory outcomes, although significant between-group differences were not observed.

Conclusion:

Overall, the available evidence suggests that **individualized, early and progressive physiotherapy-based cardiac rehabilitation** is an important component of recovery following CABG. A comprehensive program incorporating **early mobilization, respiratory exercises, aerobic exercise, balance training, inspiratory muscle training, and functional exercise** may support improvements in exercise capacity, respiratory function, functional independence, psychological well-being, and quality of life. However, the effectiveness of individual interventions varies, and some techniques may not provide additional benefits when added to standard cardiac rehabilitation. Further well-designed randomized controlled trials with larger sample sizes and longer follow-up are required to establish optimal physiotherapy protocols following CABG.

Discussion

The present narrative review examined the available evidence regarding physiotherapy management following coronary artery bypass grafting (CABG). The findings indicate that postoperative physiotherapy is an important component of recovery because patients commonly experience reduced exercise tolerance, impaired respiratory function, decreased muscle strength, anxiety, and limitations in functional mobility after surgery. The studies reviewed investigated a range of interventions, including early mobilization, aerobic exercise, balance training, respiratory exercises, inspiratory muscle training, incentive spirometry, non-invasive ventilatory support, and cardiac rehabilitation.

Several studies support the use of structured Phase I cardiac rehabilitation during the early postoperative period. Chair-based aerobic exercise was associated with improvements in anxiety and walking capacity, while slow breathing exercises produced similar improvements. The absence of a significant difference between the two interventions suggests that different low-intensity approaches may be useful during the early inpatient phase when patients may not yet tolerate conventional exercise. These findings also highlight the importance of selecting an

intervention according to the patient's clinical condition, tolerance, and rehabilitation goals rather than relying on a single exercise technique.

Early balance training appears to be another useful component of postoperative rehabilitation. Patients receiving additional balance exercises along with conventional Phase I cardiac rehabilitation demonstrated better balance, functional performance, and quality of life, together with a shorter hospital stay. This may be particularly relevant because prolonged hospitalization, reduced physical activity, and postoperative weakness can affect mobility after cardiac surgery. Incorporating simple balance and functional activities into early rehabilitation may therefore help patients regain independence more efficiently.

Respiratory physiotherapy remains particularly relevant after cardiac surgery because surgical procedures, anesthesia, pain, and reduced postoperative activity can affect pulmonary function. The reviewed study examining patients after open-heart surgery demonstrated a reduction in FVC and six-minute walking distance at discharge compared with preoperative measurements. The relationship observed between respiratory variables, respiratory muscle strength, and walking capacity suggests that respiratory and functional recovery are closely connected. Consequently, assessment of respiratory muscle performance together with functional capacity may provide useful information when planning an individualized physiotherapy program.

Inspiratory muscle training showed encouraging findings in patients undergoing CABG. The addition of inspiratory muscle training to conventional physiotherapy was associated with improvements in exercise capacity and the functional component of quality of life during follow-up. These findings suggest that respiratory muscle training may have benefits extending beyond pulmonary function by supporting overall physical performance. However, the results should be interpreted in relation to the duration and intensity of training, as the benefits may become more apparent during later stages of recovery rather than immediately after surgery.

Not all respiratory interventions demonstrated additional benefits when combined with standard cardiac rehabilitation. The study investigating incentive spirometry found no significant difference between cardiac rehabilitation with incentive spirometry and cardiac rehabilitation alone for pulmonary complications, hospital stay, handgrip strength, or functional recovery. Similarly, Buerger–Allen exercises did not produce a significant improvement in ankle-brachial index among diabetic patients undergoing CABG with saphenous vein harvesting. These findings

indicate that an intervention being simple and clinically feasible does not necessarily mean that it will provide an additional measurable benefit over an established rehabilitation program.

The findings regarding non-invasive ventilatory support suggest that the method of respiratory support and patient comfort may influence postoperative mobilization. Different interfaces were associated with differences in comfort and ventilatory performance, and greater comfort was related to better progression of mobilization. This is clinically relevant because discomfort from respiratory equipment may reduce patient participation in rehabilitation. Therefore, physiotherapists and other members of the cardiac rehabilitation team should consider both physiological effectiveness and patient tolerance when selecting respiratory support strategies.

Prehabilitation provides another important perspective on physiotherapy management. The study involving patients with mild-to-moderate frailty demonstrated improvements in functional capacity, frailty status, and health-related quality of life following a structured preoperative program. High adherence and few adverse events also indicated that an individualized exercise-based approach can be feasible before cardiac surgery. These findings support the concept that rehabilitation should not necessarily begin only after surgery; appropriate preoperative conditioning may help patients enter surgery with better functional reserves.

Hybrid cardiac rehabilitation combined with respiratory muscle training also demonstrated improvements in respiratory function, respiratory muscle strength, functional capacity, physical activity, and quality of life over the postoperative follow-up period. However, the lack of significant differences between the intervention groups suggests that the additional respiratory muscle training did not produce a clear advantage over the rehabilitation program alone in that particular study. This may indicate that comprehensive cardiac rehabilitation itself provides substantial benefits and that the additional effect of an individual component can be difficult to demonstrate.

Taken together, the reviewed evidence suggests that physiotherapy following CABG should be viewed as a **multidimensional rehabilitation process** rather than as a single intervention. Early assessment, respiratory care, progressive mobilization, aerobic conditioning, strengthening, balance activities, and appropriate patient education can be integrated according to the individual's clinical status. The intensity and progression of treatment should be guided by postoperative stability, symptoms, exercise tolerance, and functional performance.

There are also limitations within the current evidence. The reviewed studies differed considerably in sample size, intervention type, duration, outcome measures, and follow-up periods. Some studies included patients undergoing cardiac surgery in general rather than CABG specifically, which may limit direct application of their findings to CABG populations. Several trials also involved relatively small samples and short follow-up periods. Therefore, comparisons between individual physiotherapy interventions should be made cautiously.

Future research should focus on larger randomized controlled trials using standardized physiotherapy protocols and clinically meaningful outcome measures. Longer follow-up would also help determine whether early improvements are maintained after hospital discharge. Further research is needed to establish the optimal timing, intensity, frequency, and combination of physiotherapy interventions throughout the different phases of CABG rehabilitation.

Overall, the evidence reviewed supports the integration of **early, progressive, individualized physiotherapy within comprehensive cardiac rehabilitation after CABG**. The greatest clinical value may come from combining interventions according to individual patient needs rather than considering any single physiotherapy technique as universally superior.

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