

Early Mobilization and Breathing Exercise After Tricuspid Valve Repair: A Case Report

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Abstract

Background: Tricuspid valve repair may be followed by respiratory impairment, reduced activity tolerance, and functional dependence. Case based descriptions of progressive physiotherapy after tricuspid valve repair remain limited.

Objective: To describe the clinical course of one patient receiving progressive early mobilization and breathing exercise after tricuspid valve repair, with serial observations across intensive care, high care, and ward settings.

Methods: This descriptive case report involved a 41-year-old man who underwent tricuspid valve repair on 16 September 2025. Physiotherapy progressed from positioning, deep breathing exercise, and ankle pumping to active range of motion, sitting, effective coughing, sit to stand training, and walking. Outcomes were recorded on postoperative days 1, 2, and 7.

Results: Respiratory rate decreased from 28 to 22 breaths/min, estimated activity capacity increased from 1 to 5 metabolic equivalents, Modified Borg Dyspnoea Scale scores decreased from 3 to 1, and Barthel Index scores increased from 3 to 12. Oxygen saturation remained 98% to 100%, while New York Heart Association class remained II. No adverse events or unexpected responses were reported during physiotherapy.

Conclusion: The case describes concurrent respiratory and functional progression during inpatient rehabilitation. Because this was a single uncontrolled case, the observed changes cannot establish treatment effectiveness or causality.

Keywords

Tricuspid Valve Insufficiency; Rehabilitation; Early Ambulation; Breathing Exercises; Physical Therapy Modalities

Introduction

Tricuspid regurgitation is characterized by incomplete coaptation of the tricuspid valve and systolic backflow from the right ventricle to the right atrium. Clinically significant disease may be associated with right atrial and right ventricular enlargement, venous congestion, impaired cardiac performance, heart failure, hospitalization, and mortality.^{1,2} Tricuspid regurgitation may arise from primary structural abnormalities or functional mechanisms related to ventricular remodeling and altered cardiopulmonary loading.^{3,4}

For selected patients with severe symptomatic disease or progressive right ventricular involvement, surgical treatment may be considered when clinical circumstances and valve anatomy support intervention. Tricuspid valve repair is generally preferred when preservation of the native valve is feasible.¹ The postoperative period, however, may involve pain, impaired respiratory mechanics, reduced mobility, deconditioning, and temporary dependence in daily activities. Contemporary perioperative cardiac care therefore incorporates rehabilitation strategies intended to facilitate recovery.⁵

Respiratory impairment after cardiac surgery may reflect the combined effects of anesthesia, mechanical ventilation, postoperative pain, reduced thoracic expansion, diaphragmatic dysfunction, and difficulty clearing secretions. Prolonged inactivity may further reduce physical capacity and functional independence.^{5,6} Progressive mobilization and respiratory exercise are consequently used in many cardiac rehabilitation pathways. Evidence from broader cardiac surgery populations suggests that early mobilization may support physical recovery, while respiratory exercise and respiratory muscle training may influence postoperative respiratory outcomes.⁶⁻⁹

Interpretation of this evidence requires attention to clinical context. Most available studies involve heterogeneous cardiac surgery populations rather than isolated tricuspid valve repair.⁶⁻¹⁶ The physiological profile of right sided valve disease, the timing of surgery, and the patient's postoperative condition may influence how rehabilitation is progressed.^{5,16} A detailed case description can therefore contribute clinically useful information when the intervention sequence, patient response, and timing of assessment are transparently reported.¹⁷

Functional recovery in the acute postoperative setting can be described through complementary domains. In this case, respiratory rate and oxygen saturation were recorded alongside perceived dyspnoea, estimated activity capacity, functional classification, and independence. The Modified Borg Dyspnoea Scale was used to document perceived breathlessness, whereas the Barthel Index described functional dependence.¹⁸ New York Heart Association class was retained as a clinical classification, and metabolic equivalent values were used as activity based estimates according to the activities recorded in the physiotherapy assessment.

Case reports cannot determine treatment effectiveness. Their value lies in transparent documentation of the clinical course, therapeutic management, timing, and observed outcomes while acknowledging natural recovery and concurrent care. The present report therefore describes the progression of early mobilization and breathing exercise from the intensive care unit to the ward after tricuspid valve repair, together with serial changes in respiratory status, activity capacity, dyspnoea, functional classification, and independence. The objective was descriptive and did not seek to establish a causal treatment effect.

Methods

This descriptive case report involved one patient who underwent tricuspid valve repair at the Integrated Heart Center of Dr. Wahidin Sudirohusodo General Hospital, Makassar, Indonesia. The operation was performed on 16 September 2025. Physiotherapy observations were documented during inpatient care in the intensive care unit, high care unit, and cardiac ward. The report was prepared with reference to CARE reporting principles.¹⁷

The patient was a 41-year-old man who worked as a car driver. He reported dyspnoea and palpitations for approximately five years, a history of smoking, and previous abdominal pain followed by swelling. He was diagnosed with congenital heart disease in 2019 and subsequently underwent further assessment until tricuspid regurgitation was established. Surgical valve repair was recommended following clinical evaluation.

Available echocardiographic findings indicated massive tricuspid regurgitation due to uncoaptation, a giant right atrium with right ventricular dilatation, and preserved right and left ventricular systolic function. Available laboratory findings included leukocytosis, neutrophilia, and lymphocytopenia. Preoperative electrocardiography showed sinus rhythm with an average heart rate of 80 beats/min, regular rhythm, normal axis, P wave duration of 0.06 s, PR interval of 0.16 s, QRS duration of 0.08 s, and no ST T changes. Detailed operative technique and cardiopulmonary bypass information were not available in the source documentation.

At the initial postoperative physiotherapy assessment, the patient was hemodynamically stable but had dyspnoea, postoperative sternal pain, and functional limitation. Baseline findings included a heart rate of 78 beats/min, respiratory rate of 28 breaths/min, oxygen saturation of 100%, and blood pressure of 135/78 mmHg. The physiotherapy diagnosis recorded by the treating team was cardiovascular functional activity impairment characterized by dyspnoea and limitation in activities of daily living associated with tricuspid regurgitation after tricuspid valve repair. Clinical reasoning was based on dyspnoea, increased respiratory rate, postoperative pain, low activity capacity, and marked functional dependence.

Physiotherapy progressed according to the patient's clinical condition. The program included positioning, deep breathing exercise, ankle pumping, active range of motion exercise, sitting in bed, edge of bed sitting, effective coughing, sit to stand training, and walking. Deep breathing exercise consisted of controlled deep breaths within patient tolerance. Effective coughing was instructed to facilitate sputum clearance. Sit to stand training progressed from sitting to standing according to ability and tolerance. Walking was progressed according to activity tolerance, with a recorded distance of 7 m and a duration of 5 min when walking was performed.

The documented dose was 8 repetitions of deep breathing exercise for 3 to 5 sets over approximately 5 min, 5 repetitions of effective coughing for 2 sets over approximately 5 min, 8 repetitions of ankle pumping for 1 to 2 sets over approximately 5 min, 5 repetitions of sit to stand training for 1 set over approximately 5 min, and 8 repetitions of active range of motion exercise for 1 to 2 sets over approximately 5 min. Positioning and sitting activities were progressed according to the recorded clinical condition. The available documentation did not specify a separate numerical dose for every component at every time point.

Progression was based on hemodynamic stability, dyspnoea, activity tolerance, and the patient's ability to participate. On postoperative day 1, persistent dyspnoea, sternal pain, and functional limitation supported bed based activity. On postoperative day 2, reduced dyspnoea, improved general condition, and increased activity tolerance supported progression to sitting in bed and active range of motion. By postoperative day 7, hemodynamic stability supported edge of bed sitting, sit to stand training, and walking. Exercises were modified according to the patient's clinical response. The source documentation did not provide numerical thresholds for termination; therefore, no unrecorded stopping criteria were introduced into this report.

Outcomes were assessed at three inpatient time points: T1 in the intensive care unit on 17 September 2025, corresponding to postoperative day 1; T2 in the high care unit on 18 September 2025, corresponding to postoperative day 2; and T3 in the ward on 23 September 2025, corresponding to postoperative day 7. Hemodynamic variables included heart rate, respiratory rate, blood pressure, and oxygen saturation. The same outcome domains were recorded at each time point, although the exact timing relative to the completion of each exercise session was not documented.

Estimated activity capacity was recorded as 1 metabolic equivalent at T1 while lying, 4 metabolic equivalents at T2 while sitting, and 5 metabolic equivalents at T3 during standing and slow walking. These values should therefore be interpreted as activity-based estimates derived from the documented activity state rather than as results of a formal exercise test. New York Heart Association class II was recorded at each time point based on physiotherapy assessment and the medical record.

Perceived dyspnoea was assessed using the Modified Borg Dyspnoea Scale from 0 to 10. Scores were obtained from the patient's subjective rating during evaluation and were 3 at T1, 2 at T2, and 1 at T3. Functional independence was assessed using the Barthel Index, with scores of 3, 6, and 12 recorded at T1, T2, and T3, respectively. The available documentation did not specify the version of the Barthel Index or identify a separate assessor for each outcome.

During rehabilitation, heart rate, respiratory rate, blood pressure, oxygen saturation, dyspnoea, hemodynamic stability, and activity tolerance were monitored. No adverse event or unexpected response was reported during the physiotherapy program. The patient was able to progress without reported clinical signs requiring cessation. Because explicit numerical safety thresholds were not documented, the report describes only the monitoring and progression criteria that were available.

Data were analyzed descriptively by comparing recorded values across the three time points. No inferential statistical analysis, effect size calculation, or causal estimation was performed because the report concerned a single patient. Written informed consent for publication of the case report and clinical information was obtained from the patient. The case was conducted as part of routine clinical care, and no formal ethical approval was recorded; therefore, no ethics approval number is available.

Results

The clinical timeline began with tricuspid valve repair on 16 September 2025. T1 was recorded in the intensive care unit on postoperative day 1, T2 in the high care unit on postoperative day 2, and T3 in the ward on postoperative day 7. Table 1 presents the timeline, clinical status, and rehabilitation progression.

Table 1. Clinical Timeline and Physiotherapy Progression from Postoperative Day 1 to Day 7

Time point	Date and postoperative day	Setting and clinical status	Physiotherapy progression
Surgery	16 September 2025	Tricuspid valve repair	Operative technique not available in source documentation
T1	17 September 2025, POD 1	ICU; hemodynamically stable, dyspnoea, postoperative sternal pain, functional limitation	Positioning, deep breathing exercise, ankle pumping
T2	18 September 2025, POD 2	HCU; dyspnoea reduced, general condition improved, activity tolerance increased	Sitting in bed, approximately 70-degree Semi Fowler positioning, deep breathing exercise, active range of motion, ankle pumping
T3	23 September 2025, POD 7	Ward; hemodynamically stable, chest pain during coughing, sputum present	Edge of bed sitting, deep breathing exercise, effective coughing, sit to stand training, walking

POD, postoperative day; ICU, intensive care unit; HCU, high care unit.

The recorded course shows progression from bed based respiratory and limb activities to upright mobility as the documented clinical condition and activity tolerance improved. The timeline does not establish the effect of any individual intervention. The intervention dose and operational details are summarized in Table 2 to improve reproducibility while preserving the limits of the source documentation.

Table 2. Documented Dose and Procedure of Physiotherapy Interventions During Inpatient Rehabilitation

Intervention	Documented dose	Procedure or progression
Deep breathing exercise	8 repetitions; 3 to 5 sets; approximately 5 min	Controlled deep breathing according to tolerance; used across inpatient phases
Effective coughing	5 repetitions; 2 sets; approximately 5 min	Patient instructed to cough effectively to facilitate sputum clearance
Ankle pumping	8 repetitions; 1 to 2 sets; approximately 5 min	Bed based limb exercise according to tolerance
Active range of motion	8 repetitions; 1 to 2 sets; approximately 5 min	Progressed after improvement in clinical condition and activity tolerance
Sit to stand training	5 repetitions; 1 set; approximately 5 min	Gradual transfer from sitting to standing according to ability and tolerance
Walking	7 m according to tolerance; approximately 5 min	Gradual walking progression in the ward according to activity tolerance

Dose information reflects the data confirmed by the author. A separate frequency per day and numerical stopping thresholds were not documented.

Table 3 summarizes serial hemodynamic and respiratory findings across the three postoperative observations.

Table 3. Serial Hemodynamic and Respiratory Findings Across the Three Inpatient Time Points

Outcome	T1, POD 1 ICU	T2, POD 2 HCU	T3, POD 7 Ward
Heart rate, beats/min	78	87	104
Respiratory rate, breaths/min	28	26	22
Blood pressure, mmHg	135/78	128/85	106/83
SpO ₂ , %	100	98	98

Respiratory rate decreased from 28 to 22 breaths/min, whereas heart rate increased from 78 to 104 beats/min as activity progressed. Oxygen saturation remained between 98% and 100%. Blood pressure changed across the observation period, but no adverse event or clinical sign requiring cessation of physiotherapy was reported.

The serial functional outcomes are presented in Table 4.

Table 4. Serial Activity Capacity, Dyspnoea, Functional Classification, and Independence Outcomes

Outcome	T1, POD 1 ICU	T2, POD 2 HCU	T3, POD 7 Ward
Estimated activity capacity, METs	1, lying	4, sitting	5, standing and slow walking
Modified Borg Dyspnoea Scale, 0 to 10	3, moderate	2, mild	1, very mild
NYHA class	II	II	II
Barthel Index	3, total dependence	6, severe dependence	12, mild dependence

METs, metabolic equivalents; NYHA, New York Heart Association.

Across the three observations, estimated activity capacity increased from 1 to 5 METs, perceived dyspnoea decreased from 3 to 1, and the Barthel Index increased from 3 to 12. NYHA class remained II. These values describe serial changes during inpatient recovery and concurrent physiotherapy.

Discussion

This case documented progressive respiratory and functional change during the inpatient period after tricuspid valve repair. From postoperative day 1 to day 7, respiratory rate decreased from 28 to 22 breaths/min, perceived dyspnoea decreased from 3 to 1 on the Modified Borg Dyspnoea Scale, estimated activity capacity increased from 1 to 5 METs according to the recorded activity states, and the Barthel Index increased from 3 to 12. The rehabilitation sequence progressed from bed based exercise in the intensive care unit to edge of bed sitting, sit to stand training, and walking in the ward. Oxygen saturation remained stable at 98% to 100%, while NYHA class remained II.

These observations are consistent with the clinical need for progressive rehabilitation after cardiac surgery, where respiratory impairment and temporary functional dependence may occur during early recovery.^{5,6} Deep breathing exercise and effective coughing were used to address respiratory symptoms and secretion clearance, while progressive mobility was intended to increase activity exposure and reduce the consequences of immobility. Evidence from broader cardiac surgery populations supports the use of respiratory exercise and progressive mobilization as components of postoperative rehabilitation.^{6–9,19,20} However, the evidence base is not specific to this individual patient or to isolated tricuspid valve repair, and the present report cannot determine whether these interventions produced the observed changes.

The improvement in respiratory rate and dyspnoea occurred while breathing exercise was continued across the three phases. This temporal pattern may be clinically meaningful, but it has several alternative explanations. Recovery from anesthesia and surgery, changes in pain, spontaneous improvement in respiratory mechanics, medical management, removal of lines or drains, and increased mobility could all have contributed. The absence of a control condition prevents separation of these influences. The respiratory findings should therefore be interpreted as part of the observed clinical course rather than as evidence of treatment efficacy.

Similarly, the increase in estimated activity capacity and functional independence occurred alongside a gradual increase in mobility demands. Previous research has reported associations between early mobilization, cardiac rehabilitation, physical function, and recovery after cardiac surgery and valve procedures.^{7,8,10–13,16} In this case, the progression from lying to sitting and then standing and slow walking provides a practical description of the changing activity level. Nevertheless, the MET values were activity based estimates rather than formal exercise test results. Their increase should not be interpreted as a standardized measure of cardiorespiratory fitness.

NYHA class remained II at all time points despite improvement in other recorded outcomes. This difference is not necessarily contradictory because NYHA classification reflects a broader clinical characterization of functional limitation, whereas respiratory rate, perceived dyspnoea, activity state, and the Barthel Index may change over shorter inpatient intervals.²¹ In addition, NYHA class in this report was derived from physiotherapy assessment and the medical record rather than a newly performed diagnostic classification procedure.

The documented hemodynamic data also provide context for rehabilitation progression. Heart rate increased from 78 to 104 beats/min, respiratory rate decreased, oxygen saturation remained preserved, and blood pressure changed across the three observations. The patient continued to participate in progressive activity without a reported adverse event or unexpected response. However, the report does not provide predefined numerical thresholds for continuing, modifying, or stopping exercise. Accordingly, the findings should not be used to infer a universal safety threshold for postoperative tricuspid valve rehabilitation.

The clinical value of this case lies in the combination of timing, intervention detail, and multidimensional observation. Earlier documentation lacked postoperative timing and intervention dose, whereas the additional source information allowed the course to be anchored to postoperative days 1, 2, and 7 and enabled reporting of repetitions, sets, approximate duration, and walking distance. This improves transparency and reproducibility, although not all intervention components had phase specific dose data and the provider's identity and professional qualifications were not available.

Several methodological limitations remain. This was a single patient without a comparator, and causal inference is therefore not possible. The observation period was limited to inpatient care, with no post discharge follow up. Natural recovery, medical treatment, pain reduction, changing postoperative restrictions, and other multidisciplinary care may have influenced the observed outcomes. The exact surgical technique was not available. The Barthel Index version and the precise timing of outcome measurement relative to exercise were not documented. MET values were estimated from recorded activity states rather than obtained from a formal exercise test. In addition, no numerical stopping thresholds or frequency per day were available, and the identity and qualification of the intervention provider were not documented.

Patient perspective was available in a limited form. During inpatient care, the patient reported that dyspnoea felt reduced while he performed breathing exercises, and this subjective experience coincided with a progressive reduction in recorded respiratory rate. This perspective should be interpreted as the patient's reported experience and not as evidence that breathing exercise caused the change.

Three practical lessons emerge from the case. First, rehabilitation after tricuspid valve repair can be documented as a staged progression from bed based respiratory and limb exercises to upright mobility when clinical stability and tolerance permit. Second, serial assessment across respiratory, symptom, activity, and independence domains may provide a broader description of recovery than any single outcome.¹⁶ Third, improvement in a single case must be interpreted in the context of natural postoperative recovery and concurrent clinical care rather than being attributed to one intervention.

Future case series and comparative studies should report standardized intervention frequency, session timing, progression criteria, safety thresholds, measurement procedures, provider characteristics, and post discharge outcomes.^{16,17} Such reporting would improve reproducibility and allow the contribution of specific rehabilitation components after tricuspid valve repair to be evaluated more rigorously.¹⁷

Conclusion

In this single patient who underwent tricuspid valve repair, progressive inpatient physiotherapy was accompanied by serial changes in respiratory and functional outcomes from postoperative day 1 in the intensive care unit to postoperative day 7 in the ward. Respiratory rate decreased from 28 to 22 breaths/min, estimated activity capacity increased from 1 to 5 METs according to the documented activity states, perceived dyspnoea decreased from 3 to 1 on the Modified Borg Dyspnoea Scale, and the Barthel Index increased from 3 to 12. Oxygen saturation remained between 98% and 100%, while NYHA class remained II. The intervention progressed from positioning, deep breathing exercise, and ankle pumping to sitting, effective coughing, sit to stand training, and walking according to the patient's recorded clinical condition, hemodynamic stability, dyspnoea, and activity tolerance. No adverse events or unexpected responses were reported during physiotherapy. These findings describe observed clinical progression during inpatient recovery and do not establish the effectiveness or causal contribution of early mobilization or breathing exercise. Further case series and controlled studies with standardized intervention delivery, explicit safety criteria, validated and consistently administered outcome measures, documented provider characteristics, and post discharge follow up are needed to determine reproducibility and clinical effectiveness.

Author Contribution

Ismail Muhammad: Validation; Investigation; Writing, review and editing; Supervision.

Salki Sadmita: Conceptualization; Methodology; Validation; Writing, review and editing; Supervision.

Andi Dea Aulia: Conceptualization; Methodology; Formal analysis; Investigation; Data curation; Writing, original draft; Visualization; Project administration.

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Conflict of Interest Statement

The authors declare no conflict of interest.

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Ethics Statement

This case report was conducted as part of routine clinical care and did not require formal ethical approval. Written informed consent was obtained from the patient for participation in the case report and publication of anonymized clinical data, in accordance with ethical principles for case reporting.

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