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# EARLY VERSUS DELAYED MOBILIZATION AFTER VALVE SURGERY: IMPACT ON RECOVERY AND LENGTH OF HOSPITAL STAY: A RETROSPECTIVE STUDY

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## INTRODUCTION

Enhanced postsurgical recovery in cardiac surgery aims to reduce complications, promote early physical function, and shorten hospitalization. Early mobilization has emerged as a key component of cardiac rehabilitation and enhanced recovery pathways, contributing to improved functional outcomes and reduced morbidity after major cardiothoracic procedures.[1–3] Early mobilization helps counteract postoperative deconditioning, reduces pulmonary complications, improves muscle strength, and accelerates return to baseline activity.[4–6] Despite these known benefits, the adoption of structured mobilization protocols in resource-limited settings remains inconsistent due to staffing constraints, lack of standardized guidelines, and varying postoperative hemodynamic stability in patients.[7]

Several international studies have demonstrated the benefits of early mobilization following cardiac surgery. Phillips et al. (2013) reported improved functional capacity and reduced pulmonary complications in patients mobilized within 48 hours of surgery.[8] A systematic review by Fagan et al. (2022) concluded that early mobilization significantly enhances physical recovery and shortens hospital stay.[9] Similarly, Tadyanemhandu et al. (2020) found that early physiotherapy interventions were associated with shorter ICU duration and reduced postoperative complications.[10] A meta-analysis by Ferreira et al. (2020) also supported early mobilization, demonstrating improvements in functional outcomes and reduced length of stay.[11]

Specific evidence for valve surgery populations is emerging. Funamoto et al. (2021) reported improved early ambulation and shorter hospitalization after structured mobilization in valve surgery patients.[12] In another study, Vahlberg et al. (2023) emphasized that early physical therapy improved strength and reduced postoperative pulmonary events in valve replacement patients.[13]

However, despite increasing global evidence, data on early mobilization in Indian cardiac surgery—particularly valve surgery—remain limited. Variability in rehabilitation practices, patient demographics, and institutional resources creates a gap in understanding real-world outcomes. Therefore, the present study aims to compare early versus delayed mobilization after valve surgery in a tertiary care centre, focusing on recovery time, hospital stay, and postoperative complications. This

study may provide valuable region-specific evidence to support structured early rehabilitation practices in cardiac surgery programs.

## MATERIALS AND METHODS

This retrospective observational study was conducted at a tertiary care centre in India and included consecutive patients who underwent valve surgery between January 2022 and December 2024. A total sample of **240 adult patients** (age ≥18 years) was analyzed. Eligible patients included those who underwent mitral, aortic, tricuspid, double, or combined valve procedures and were hemodynamically stable in the immediate postoperative period. Patients requiring re-exploration for bleeding, presenting with preoperative mechanical ventilation, pre-existing neurological deficits, or severe postoperative hemodynamic instability were excluded. Based on the timing of mobilization, patients were categorized into two groups: **Early Mobilization**, defined as initiation of mobilization within 48 hours post-surgery, and **Delayed Mobilization**, defined as initiation after 48 hours. Data collected from medical records included demographic characteristics, type of valve surgery, time to independent ambulation, length of hospital stay, and postoperative complications such as pulmonary complications (atelectasis or pneumonia), wound infections, and arrhythmias including atrial fibrillation or ventricular tachycardia. Continuous variables were summarized as mean ± standard deviation, while categorical variables were expressed as proportions. Statistical analyses were performed using Student's t-test for continuous variables and the chi-square test for categorical variables, with a significance threshold set at $\mathbf{p < 0.05}$.

## RESULTS

A total of 240 patients were included, with 118 in the early mobilization group and 122 in the delayed mobilization group. **Table 1** summarizes the baseline characteristics. Both groups were comparable in terms of age, sex distribution, and type of valve surgery performed. The mean age was 49.8 ± 11.6 years in the early group and 51.3 ± 12.1 years in the delayed group ($p = 0.32$). The proportion of males was similar between groups (58.4% vs. 56.5%, $p = 0.78$). There were no notable differences in the distribution of mitral, aortic, tricuspid, or combined valve surgeries, indicating that both groups were demographically and clinically comparable at baseline.

**Table 2** presents the primary postoperative outcomes. Patients mobilized within 48 hours demonstrated significantly better recovery metrics. The mean hospital stay was significantly shorter in the early mobilization group (7.1 ± 1.9 days) compared with the delayed group (9.4 ± 2.6 days) ($p < 0.001$). Similarly, time to independent ambulation was earlier in the early mobilization group (3.2 ± 1.1 days vs. 5.1 ± 1.4 days, $p < 0.001$). These findings highlight the substantial benefit of earlier mobilization on recovery speed and functional outcomes.

Secondary outcomes are shown in **Table 3**. Pulmonary complications were significantly lower in the early mobilization group (9.3%) compared with the delayed group (18.8%) ($p = 0.03$). Rates of wound infection (4.2% vs. 5.7%, $p = 0.56$) and arrhythmias (11.0% vs. 13.1%, $p = 0.62$) did not show statistically significant differences between groups. This indicates that early mobilization does not increase cardiac or surgical complications.

Overall, the findings demonstrate that patients mobilized within 48 hours experienced faster recovery, earlier functional independence, shorter hospitalization, and fewer pulmonary complications, while maintaining a similar safety profile compared to delayed mobilization.

## DISCUSSION

This study demonstrates that early mobilization significantly improves postoperative outcomes in valve surgery patients, particularly in reducing hospital stay, accelerating functional recovery, and lowering pulmonary complications. These findings align closely with international literature that highlights early mobilization as an essential component of enhanced recovery following cardiac surgery. Phillips et al.[8] previously reported that early mobilization improves functional capacity and significantly reduces pulmonary complications, which parallels our observation where pulmonary

events were nearly halved in the early mobilization group (9.3% vs. 18.8%).[14] Likewise, Fagan et al.[9] concluded in their systematic review that early postoperative physical activity contributes to shorter hospitalization duration, consistent with our results showing a reduction from 9.4 days in the delayed group to 7.1 days in early mobilization patients.[15]

Furthermore, Moradian et al.[15] demonstrated improved physical performance and faster recovery through structured early rehabilitation programs following valve surgery.[16] The shorter time to independent ambulation in our early group (3.2 vs. 5.1 days) mirrors these findings and reinforces the role of early postoperative mobilization in restoring physical function. The reduction in pulmonary complications noted in our study may be attributed to improved lung expansion, enhanced airway clearance, and early initiation of targeted physiotherapy—all widely recognized mechanisms supporting postoperative respiratory stability.

Importantly, the absence of significant differences in arrhythmias such as atrial fibrillation or ventricular tachycardia between groups corresponds with the observations by Tadyanemhandu et al.[10] who reported that mobilization timing had no major impact on rhythm disturbances following cardiac surgery.[17] This suggests that early mobilization does not exert excessive cardiovascular stress and remains safe even in postoperative cardiac patients.

Overall, this study provides valuable real-world Indian evidence supporting the implementation of structured early mobilization protocols after valve surgery. Given that many Indian tertiary centres are high-volume and resource-constrained, demonstrating feasibility and safety is crucial. Early mobilization may significantly enhance recovery, reduce complications, and shorten hospitalization. Incorporating standardized early rehabilitation strategies should therefore be encouraged as part of routine postoperative care in cardiac surgical practice.

## CONCLUSION

Early mobilization after valve surgery significantly reduces hospital stay, accelerates recovery, and minimizes pulmonary complications without increasing wound or arrhythmic events. The incorporation of structured early mobilization protocols should be encouraged in postoperative cardiac care pathways.

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**Table 1. Baseline Characteristics of the Study Population**

| Variable | Early Mobilization (n = 118) | Delayed Mobilization (n = 122) | p-value |
|---|---|---|---|
| **Mean Age (years)** | 49.8 ± 11.6 | 51.3 ± 12.1 | 0.32 |
| **Male (%)** | 58.4% | 56.5% | 0.78 |
| **Type of Valve Surgery** | Similar distribution in both groups | Similar distribution in both groups | |

**Table 2. Primary Outcomes**

| Outcome | Early Mobilization | Delayed Mobilization | p-value |
|---|---|---|---|
| **Hospital Stay (days)** | 7.1 ± 1.9 | 9.4 ± 2.6 | <0.001 |
| **Time to Independent Ambulation (days)** | 3.2 ± 1.1 | 5.1 ± 1.4 | <0.001 |

**Table 3. Secondary Outcomes**

| Complication | Early Mobilization | Delayed Mobilization | p-value |
|---|---|---|---|
| **Pulmonary Complications** | 9.3% | 18.8% | 0.03 |
| **Wound Infection** | 4.2% | 5.7% | 0.56 |
| **Arrhythmias (AF/VT)** | 11.0% | 13.1% | 0.62 |