

Longitudinal FEV1 Changes After Repeated Hepatopancreatobiliary Surgery

Chang Hyun Lee¹, Min Kyung Park¹, Tae Sung Park², Myung Jun Shin³



¹Department of Rehabilitation Medicine, Biomedical Research Institute, Pusan National University Hospital

²Department of Convergence Medical Institute of Technology, Department of Biomedical Research Institute, Pusan National University Hospital

³Department of Rehabilitation Medicine, Biomedical Research Institute, Pusan National University Hospital, Pusan National University School of Medicine

Introduction

Repeated abdominal surgeries may impose cumulative physiological stress and influence ventilatory function; however, longitudinal ventilatory trajectories following sequential hepatopancreatobiliary (HPB) surgeries remain poorly characterized. This study aimed to investigate within-subject longitudinal changes in ventilatory function, focusing on forced expiratory volume in one second (FEV1), in patients undergoing repeated HPB surgeries.

Participants and Methods

A retrospective longitudinal analysis was conducted on patients referred to the Department of Rehabilitation Medicine between March 2016 and December 2025. Among 2,773 patients who underwent pulmonary function, respiratory muscle strength, and physical capacity assessments, 118 had undergone HPB surgery. Among these, four patients who received two sequential HPB surgeries were identified and included in a within-subject longitudinal analysis (Table 1). Serial pulmonary function tests were collected at perioperative timepoints, and ventilatory function was evaluated using FEV1% predicted. Individual trajectories were examined to explore patterns of functional change following repeated surgical exposure.

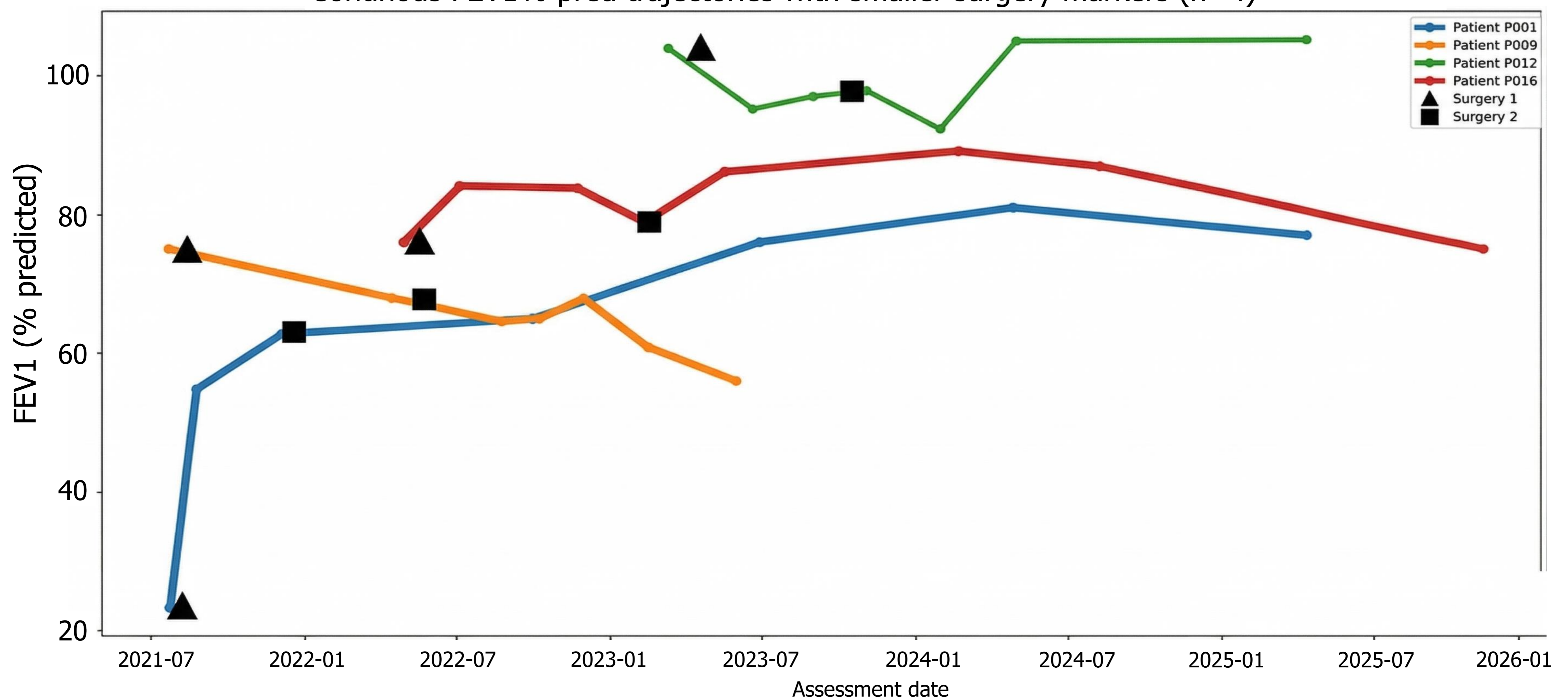
Table 1. Clinical Characteristics and Surgical History of Patients Undergoing Sequential HPB

Number	Sex	Age	Diagnosis	Organ	Surgery	Date
1 (P001)	F	74	Malignant neoplasm of endocrine pancreas	Pancreas	Laparoscopic cholecystectomy	2021.08.06
					Spleen-Preserving Distal Pancreatectomy	2021.12.17
2 (P009)	M	58			S5/6 segmentectomy	2021.08.12
					Right hemihepatectomy	2022.05.23
3 (P012)	M	86	Hepatocellular carcinoma	Liver	Laparoscopic modified central bisectionectomy	2023.04.17
					Laparoscopic lateral sectionectomy of liver	2023.10.17
4 (P016)	M	75			Laparoscopic Central bisectionectomy	2022.05.16
					Laparoscopic S2 wedge resection	2023.02.16

Results

Changes in FEV1% predicted were observed following both surgical episodes in all patients; however, the patterns of change varied across individuals. Some patients demonstrated additional postoperative decline after the second surgery, whereas others showed recovery or maintenance of ventilatory function (Figure 1). These findings suggest heterogeneous ventilatory responses following repeated HPB surgery rather than a uniform pattern of cumulative decline.

Continuous FEV1% pred trajectories with smaller surgery markers (n=4)



Individual longitudinal trajectories of FEV1 (% predicted) in four patients undergoing sequential hepatopancreatobiliary(HPB) surgeries. Each colored line represents an individual patient. Triangles indicated the first surgery, and squares indicate the second surgery.

Fig 1. Heterogeneous ventilatory function trajectories following sequential HPB surgeries

Conclusion

Ventilatory function trajectories following sequential HPB surgeries may exhibit heterogeneous patterns that cannot be fully explained by simple cumulative deterioration. These findings highlight the importance of individualized functional assessment and longitudinal pulmonary monitoring in patients undergoing repeated abdominal surgeries and may inform perioperative rehabilitation strategies.