

# OPTIMAL TIME TO RIB FIXATION IN PATIENTS WITH FLAIL CHEST

Devanshi Patel, MD

**Introduction:** Flail chest after blunt trauma is associated with significant morbidity and prolonged hospitalizations. The goal of this study was to examine the impact and timing of rib fixation (ORIF) on pulmonary morbidity and mortality in patients with flail chest using a large, national dataset.

**Methods:** Flail chest patients were identified from the Trauma Quality Improvement Program (TQIP) database over 3-years, ending in 2019. Demographics, severity of injury, severity of shock, time to ORIF, pulmonary morbidity, and mortality were recorded. Youden's index identified optimal time to ORIF. Patients were stratified by ORIF and time to ORIF and compared. Multivariable logistic regression (MLR) determined predictors of pulmonary morbidity and mortality.

**Results:** 20,457 patients were identified: 3,347 (16.4%) underwent ORIF. The majority were male (73%) with median age and ISS of 58 and 22, respectively. Patients undergoing ORIF were clinically similar to those managed non-operatively, but had increased pulmonary morbidity (27.6 vs.15.2%,  $p<0.0001$ ) and reduced mortality (2.9 vs 11.7%,  $p<0.0001$ ) compared to those managed non-operatively. After adjusting for age, severity of injury, severity of shock, and ORIF, MLR identified ORIF as the only modifiable risk factor significantly associated with reduced mortality in patients with flail chest (OR:0.26; 95%CI:0.21-0.32,  $p<0.0001$ ). Youden's index identified the optimal time to ORIF as 4 days post-injury: EARLY ( $\leq 4$  days) and LATE ( $>4$  days). The EARLY ORIF group was clinically similar to the LATE group, but had significantly decreased ventilator days, ICU length of stay (LOS), hospital LOS, and pulmonary morbidity, with no difference in mortality (Table).

**Conclusions:** ORIF increased pulmonary morbidity but reduced mortality in patients with flail chest. EARLY ORIF significantly reduced pulmonary morbidity, without impacting the mortality benefit associated with ORIF. Thus, for patients with flail chest, ORIF should be performed within 4 days post-injury to reduce pulmonary morbidity, LOS and mortality.

	EARLY (n=1681)	LATE (n=902)	p
Ventilator Days	0 (0-3)	5 (0-13)	$<0.0001$
ICU LOS	3 (0-7)	11 (6-19)	$<0.0001$
Hospital LOS	8 (4-14)	14 (11-19)	$<0.0001$
Pulmonary Morbidity	324 (19.3%)	381 (42.2%)	$<0.0001$
Mortality	53 (3.2%)	24 (2.7%)	0.483

**One Liner:** Optimal time to rib plating for flail chest is within 4 days of injury to reduce pulmonary morbidity, length of stay, and overall mortality.