

Early Implementation of Intrathoracic Plating: A Retrospective Analysis of Rib Surgical Stabilization Approaches

Introduction:

- Stabilization of rib fractures can reduce pain acutely, resulting in better respiratory function, chest wall dynamics, and possibly a reduction in chronic pain.
- New intrathoracic rib fixation system allows for a minimally invasive approach with the potential for improved outcomes.

Objective:

Evaluate operative times and short-term post operative pain control for patients undergoing intrathoracic versus extrathoracic rib fixation

Methods:

- Retrospective, single center chart review to include all patients undergoing surgical stabilization of rib fractures at a Level 1 trauma center from 2016-2022
- Patients were divided by rib plating techniques as:
 - Extrathoracic (Extra)
 - Intrathoracic (Intra)
- Operative time was defined as first incision to skin closure
- Post operative pain management was assessed using oral morphine milligram equivalents (MME) given postoperatively.
- Medians were compared using the non-parametric Wilcoxon Rank Sum Test.

Results:

Table 1: Patient demographics and clinical characteristics.

Item	Intrathoracic	Extrathoracic
Patient Demographics	(n=9)	(n=121)
Male, % (n)	66.7 (6)	75.2 (91)
Age, avg (SD)	47.6 (16.5)	52.1 (15.2)
BMI, avg (SD)	28.7 (5.4)	28(5.3)
Trauma Activation, % (n)	88.9 (8)	86.0 (104)
Isolated thoracic injury, % (n)	33.3 (3)	37.2 (45)
Blunt Mechanism of Injury, % (n)	100 (9)	98.3 (119)
ISS score, avg (SD)	18.7 (7.8)	19.2 (8.2)
ICU LOS, avg (SD)	6.2(6.8)	8.7(7.1)
Hospital LOS, avg (SD)	14.7(8.4)	14.4(10.3)
Ventilator days, avg (SD)	7(7.1)	11.2(8.4)
Empyema	0	6(5)
On-Q-Pain Pump, % (n)	33.3(3)	35.5(43)
PCA Pump pre-op, % (n)	0	17.4(21)
PCA Pump post-op, % (n)	33.3(3)	18.2(22)
Rib Blocking, % (n)	66.7(6)	48.8(59)
Rib Taping, % (n)	11.1(1)	39.7(48)

Figure 1: Extrathoracic rib fixation system



Figure 2: Intrathoracic rib fixation system



Figure 3: MME for Intrathoracic (n=5) and Extrathoracic (n=48)

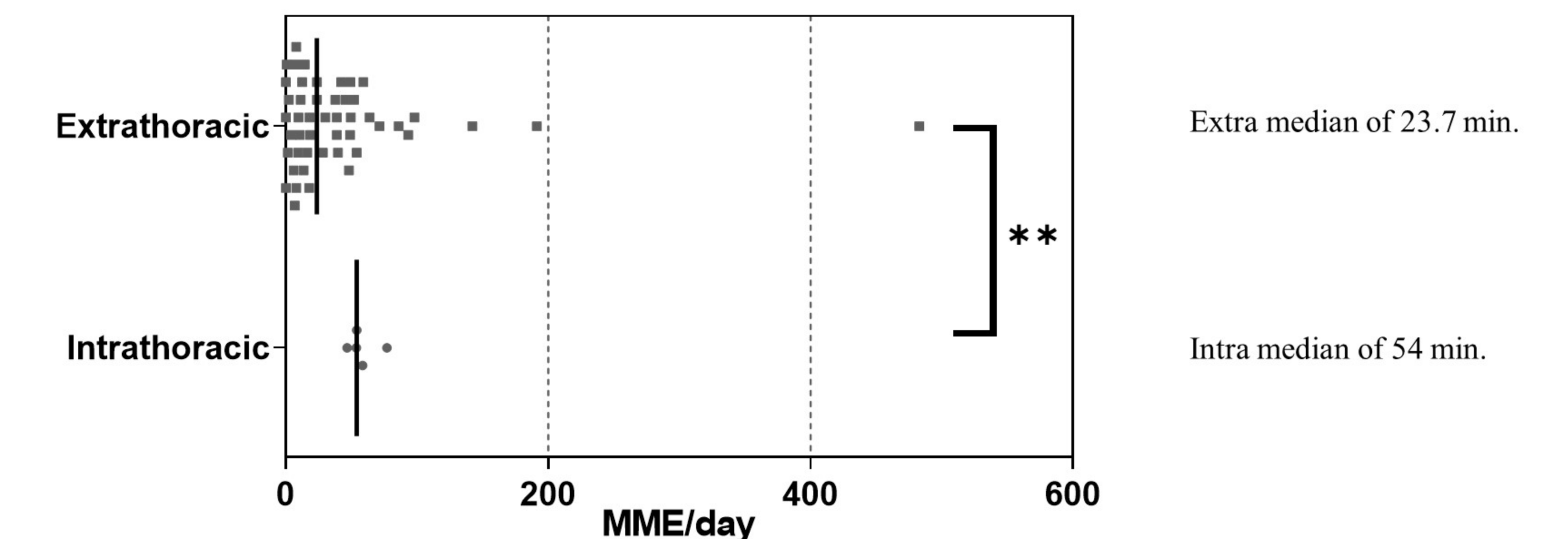
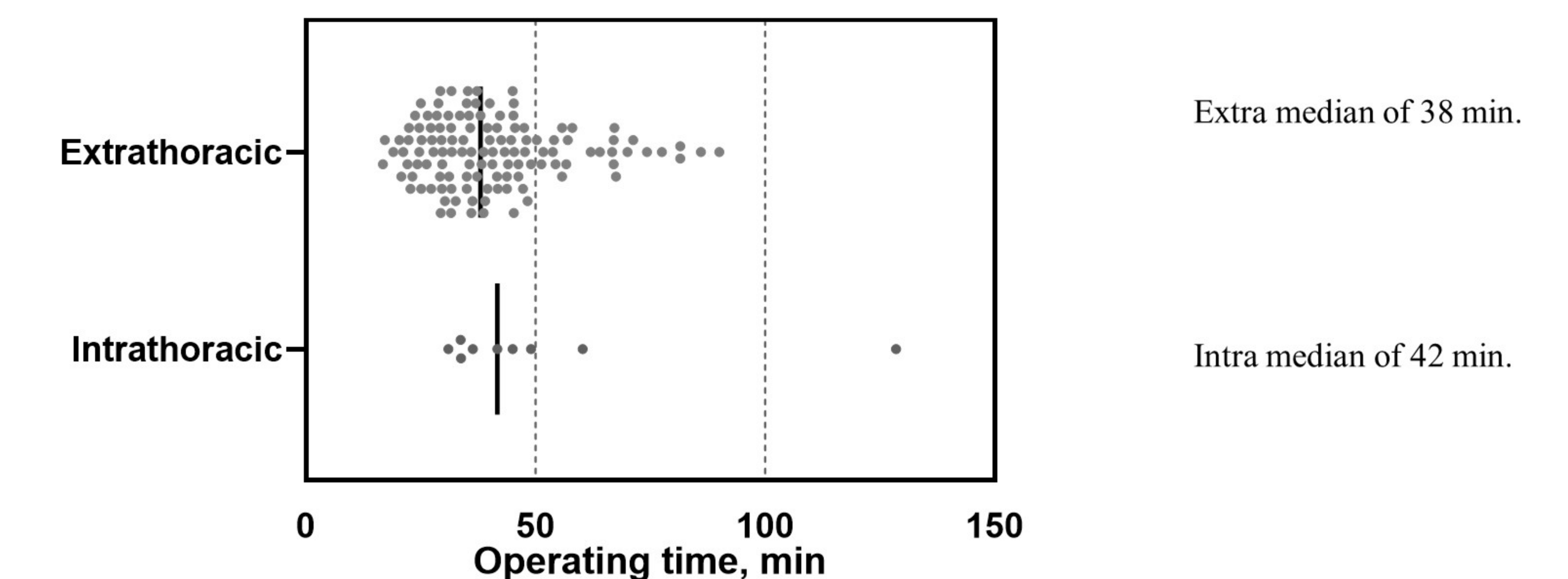


Figure 4: Plating time per rib for Intra (n=9) and Extra (n=121).



Discussion:

- Early implementation at our center shows a statistically significant difference in short term pain management and no difference in operative plating time
- Limitations due to small small ITP cohort and challenges of applying a novel operative technique
- Need for evaluation of other metrics of surgical treatment methods such as
 - direct chest wall dynamics
 - long-term patient disability and functionality