Outcome after ultrasound-guided thoracic paravertebral catheters for rib fractures: A retrospective analysis of 4 years' practice at a UK major trauma centre

J. Womack, B. Goodman, N. Stephens, I. Walker, J. Pearson
Royal Victoria Infirmary, Newcastle upon Tyne, United Kingdom

jonathan.womack@nuth.nhs.uk
@NUSGRARVI

Background and Aims:

Rib fractures incur significant pain, morbidity and mortality.

Ultrasound-guided (USG) thoracic paravertebral catheter (PVC) insertion has been described for thoracic cage analgesia.¹

Little published evidence on safety of PVCs exists beyond case studies and small case series.

Previous observational studies of rib fracture mortality and regional analgesia have not used analysis to adjust for survivor bias.²

Methods:

Following institutional approval, we conducted a retrospective observational study.

All patients treated with a PVC over a 4-year period were included.

Data from the Trauma Audit and Research Network (TARN) database on all patients admitted with rib fracture was used to compare those treated with PVCs to systemic analgesia.

Observed mortality was compared with mortality predicted by the TARN Probability of Survival 2017 equation.

Patients were managed according to a blunt chest trauma protocol including acute pain team review and consideration of USG PVC with a continuous infusion of Levobupivacaine 0.25%.

Table 1: Multivariate Cox proportional hazard regression for hospital mortality treating PVC insertion as a time-dependent covariate

Covariate	Hazard ratio (95% CI)	p value
Age	1.010 (1.000-1.020)	0.054
> 5 rib fractures	1.582 (1.030-2.429)	0.036
Predicted mortality %	1.045 (1.039-1.052)	< 0.001
PVC	0.579 (0.257-1.304)	0.187

Results:

A total of 314 consecutive PVCs were received by 290 patients. The rate of minor complications was 0.95% (1 pleural breach during insertion, 2 possible LA toxicity).

The proportion of rib fracture patients treated with PVCs increased from 8% in the first 6 months of study to 75% in the fourth, and observed:predicted mortality ratio fell from 1.09 to 0.45 (see Chart 1).

Multivariate regression demonstrated reduced mortality with PVC. However, this became statistically non-significant with time-dependent analysis to adjust for immortal time bias (see Table 1 for final analysis after removing non-significant covariates).

Chart 1: Percentage of rib fracture patients treated with a paravertebral catheter vs. adjusted mortality

Conclusions:

We present the largest cohort of USG PVCs to include safety data.

Paravertebral catheters are a safe and effective treatment for rib fracture analgesia.

Mortality fell as our PVC provision rate increased. However, our data were insufficient to demonstrate statistical significance.

References

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