

[2003 Fall A24] Thoracic epidural analgesia: Influences on time to first experience of pain

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Background: Measuring the quality of post-operative pain relief is a difficult parameter to measure. Assessment tends to be subjective, uses surrogate measures and does not take account of the dynamic, rapidly changing nature of pain(1). This prompted a rigorous examination of every item of epidural data in order to determine the incidence, severity, onset, duration and completion of all events recorded over a nine year period from 1993 to 2001.

Methods: Epidural data was recorded for 1359 continuous patients over 72,000 epidural hours as worst hourly pain score (verbal rating score 0-3), infusion rate, respiratory rate, sedation score, blood pressure, motor block and nausea. Additional data included age, ASA status, gender, year of insertion, duration of anaesthesia and surgery, type of abdominal procedure, site of epidural insertion, epidural opioid bolus, start time of epidural infusion and pain status before commencing epidural, local anaesthetic/opioid composition of epidural and mode of delivery. As the time to first post-operative experience of pain, first experience of pain relief and duration of epidural followed a survival distribution, statistical analysis was performed by survival regression analysis (Cox regression) for univariate parameters and is demonstrated graphically by Kaplan-Meier survival plots. Multivariate survival regression modelling was then used to identify the principal influences on the initial pain free period. Data are presented as the regression coefficients (95% CI:) where Relative Risk = e^{β} Data analysis was performed using Number Cruncher Statistical Systems (NCSS, Utah)

Results: Parameters from univariate survival analysis associated with prolongation of initial post-operative pain relief (Time to first pain score 1,2 or 3) included increased age, β -0.01488 (95%CI: -0.01908 to -0.01068) $p < 0.01$, low initial infusion rate, β 0.047634 (95%CI: 0.028901 to 0.066367) $p < 0.01$, shorter surgical times, β 0.000744 (95%CI: 0.000047 to 0.001441) $p < 0.01$, epidurals inserted in 2001 compared to 1993, β 0.279008 (95%CI: 0.060271 to 0.497745) $p < 0.01$, 1994 and 1996, vascular surgery compared to gastro-oesophageal surgery, β 0.431793 (95%CI: 0.219711 to 0.643875) $p < 0.01$, thoracic compared to lumbar epidurals and epidural solutions containing bupivacaine 0.1%, diamorphine 25 μ g/ml compared to bupivacaine 0.06%, fentanyl 4 μ g/ml, β 0.33006 (95%CI: 0.179407 to 0.480713) $p < 0.01$. Multivariate analysis showed the best predictors of prolonged time to first pain to be increased age, low initial infusion rate and year of insertion. The predictive model is Relative Risk = $\text{Exp}(-1.31\text{E-}02 \cdot \text{Age} + 3.07\text{E-}02 \cdot \text{Initial_rate} + \text{factor} \cdot \text{Year})$.

Conclusion: Time to first experience of post-operative pain follows a survival distribution during thoracic epidural analgesia. The most prominent influences on the duration of the initial post-operative pain free period are increased age, low initial requirement for local anaesthetic/opioid mixture and year of insertion. Other significant univariates prolonging post-operative pain relief are shorter surgical times, vascular surgery and diamorphine containing epidural solutions