Effect of the localisation of the CT scanner during trauma resuscitation on survival—A retrospective, multicentre study

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Abstract

Introduction: Whole-body computed tomography (WBCT) is increasingly becoming the standard diagnostic technique during the resuscitation of severely injured patients. However, little is known about the ideal localisation of the CT scanner within the emergency setting. We intended to analyse the potential effect of the localisation of the CT scanner on outcome.

Patients and methods: In a retrospective multicentre cohort study involving 8004 adult blunt major trauma patients out of 312 hospitals, we analysed the effect of the distance of the trauma room to the CT scanner on the outcome. Three groups were built: 1. CT in the trauma room 2. CT equal or less than 50 m away and 3. CT more than 50 m away. Using data derived from the 2007–2011 version of TraumaRegister DGU® and the structure data bank of the TraumaNetzwerk DGU® (trauma network, TNW; German Trauma Society, DGU) we determined the observed and predicted mortality and calculated the standardised mortality ratio (SMR) as well as logistic regressions.

Results: n = 8004 patients fulfilled the inclusion criteria: their mean age was 46.4 ± 21.0 years. 72.8% of them were male and the mean injury severity score (ISS) was 28.6 ± 11.8. The overall mortality rate was 16.0%. The mean time from hospital admission to whole-body CT was 17.1 ± 12.3 min for group 1, 22.7 ± 15.5 min for group 2 and 27.7 ± 17.1 min for group 3, p < 0.001. Risk adjusted SMR was 0.74 (CI 95% 0.67–0.81) in group 1, 0.81 (CI 95% 0.76–0.87) in group 2, and 0.88 (CI 95% 0.79–0.98) in group 3. SMR group 1 vs. SMR group 2: p = 0.130. SMR group 2 vs. SMR group 3: p = 0.170. SMR group 1 vs. SMR group 3: p = 0.016. SMR groups 1 + 2 vs. SMR group 3: p = 0.046. Comparable data were found for the subgroup analysis of Level-I trauma centres only.

Logistic regression confirmed the positive effect of a closer localisation of the CT to the trauma room. The odds ratio (OR) was lowest for the localisation of the CT in the trauma room (OR 0.68, CI 95% 0.54–0.86, p < 0.001).

Conclusions: It was proven for the first time that a close distance of the CT scanner to the trauma room has a significant positive effect on the probability of survival of severely injured patients. The closer the CT is located to the trauma room, the better the probability of survival. Distances of more than 50 m had a significant negative effect on the outcome. If new emergency departments are planned or rebuilt, the CT scanner should be placed less than 50 m away from or preferably in the trauma room.