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Reference Article: Upchurch, C et. al. "Comparison of Etomidate and Ketamine for Induction During Rapid Sequence Intubation of Adult Trauma Patients" *Annals of Emergency Medicine* 69.1 (2017); 24-33

PICO Question: Is there a difference between the morbidity and mortality after trauma when it comes to the use of etomidate vs ketamine?

Introduction: In the past there has been concern about the use of etomidate in the use of trauma patients for reasons regarding adrenal suppression. There are numerous articles cited regarding the effect of etomidate on adrenal function after RSI in the ED, however many of them are based only on 30 patients or so, and the article specifically cited from the *Journal of Trauma* does not conclusively state that etomidate results in increased morbidity, although it was a prospective randomized trial.

Methods: Retrospective study at Vanderbilt ED of a 4 year period from January 2011-December 2014 in which for the first two years etomidate was used as the RSI drug and then after 2 years they simply switched to using ketamine. The data was analyzed with primary outcome of mortality and secondary outcomes of ICU-free days, ventilator free days, and days alive free of vasopressor support, as well as several others. They adjusted for age, vital signs, injury severity, and mechanism.

**Exclusion criteria: No blunt or penetrating trauma mechanism, OOH etomidate or ketamine, other inductions agents used, no induction agent, age < 18y, unknown induction agent, both etomidate and ketamine

Results: Overall, etomidate and ketamine produce similar outcomes in trauma patients across all subgroups and across nearly all outcomes. Ketamine had fewer vasopressor free days but higher likelihood of hospital acquired sepsis. There were no differences in peri-intubation outcomes. There was no difference in overall hospital mortality trends during the period. The difference in administration of steroids to patients between groups was also not significantly different.

Discussion: Studies with this type of outcome must always be taken with a grain of salt. At the end of the day, it turns out to be a non-superiority trial. There was no mortality benefit between the two agents, even when broken down by subgroup analysis. The study was conducted under with the thought of adrenal suppression associated with etomidate in mind, however there was no difference in the need for steroid administration between the two groups. It is always difficult to say that it is OK to change your practice based on a one-center study that is retrospective and did not find any statistically significant difference in outcomes between the two groups of interest.

Limitations: Retrospective study, one center, non-superiority outcome, two different drugs not concurrently studied temporally. I thought it was interesting that in the introduction they mention the concern about ketamine increasing ICP, but then selected their sub groups based on TBI patients for concerns regarding these patients being sensitive to adrenal suppression and never mention the concerns regarding increased ICP with ketamine. The smaller outcome that was of interest to me was the need for steroid administration, which was found to be not statistically significant between the groups. They do not mention criteria for the deployment of steroid dosing, which could be a confounder if different clinicians are using different criteria for steroid use.

Bottom Line: One study at one center that shows no significant difference between etomidate and ketamine for use in trauma patients with both $ISS > \text{ or } = 15$ and $ISS < 15$. Should not let this study alter what you are doing currently, and it is still OK to use etomidate.
