DEM Journal Club

Article Appraisal

Article: Delayed Sequence Intubation: A Prospective Observational Study

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Resident Reviewer Name(s) and Residency Affiliation: Dr. John Taylor, RCPS Resident

Faculty Methodology/Bio-statistics Resource Person: Dr. Corinne Hohl

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Background and Study Objective(s):

Preoxygenation is a key step during rapid sequence induction (RSI) to protect the patient from hypoxia during the apneic period. Patients with altered mental status are sometimes difficult to preoxygenate and prepare for RSI. Ketamine is an induction agent that maintains airway reflexes and spontaneous respirations, and could be used to provide limited sedation and dissociation to enable procedures required for preoxygenation. The objective of this study was to describe a delayed sequence intubation (DSI) approach, in which an induction agent (ketamine) is delivered several minutes in advance of the paralytic agent, in order to facilitate the preparation of uncooperative patients for intubation.

Study Design:

This was a prospective, multi-centre observational study. The authors described it as a cohort study but we believe it is actually designed as a case-series. Patients were enrolled based on the investigators discretion that they may benefit from DSI. Inclusion criteria were: >18yrs, spontaneously breathing, not predicted to be a difficult airway and uncooperative. Attempts were made to preoxygenate by normal means and if this failed they were given ketamine until dissociation (1mg/kg then extra 0.5mg/kg aliquots) to facilitate preoxygenation and peri-intubation procedures. After 3 minutes the paralytic agent was give (succinylcholine or rocuronium). The primary outcome was the oxygen saturations when decision was made to use DSI, compared to those 3 minutes after induction agent. Secondary outcomes were pre-post DSI saturations for patients with initial oxygen saturations <93%, those undergoing NG tube placements, or exposed to high flow oxygen for 3 minutes. Complications such as apnea, emesis, and cardiac arrest were recorded. Results were compared using a paired T-test.

Results:

A total of 64 patients were eligible, 2 were excluded due to inability to measure oxygen saturations post DSI. An average of 1.4mg/kg of ketamine was used. The mean oxygen saturation increased from 89.9% to 98.8% using DSI. The mean difference in oxygen saturations was 8.9% (95% CI 6.4-10.9). All patients with initial oxygen saturations <93% increased their saturations. Four NG tubes were placed. There were no complications.

Validity of Results:

Some of the limitations of the study included: the patients and timing of the DSI was hand picked by investigators who believe strongly in DSI. The same patients were used for the intervention group and their

own control (pre DSI) which may have minimized confounding, however could be biased by the fact the investigators picked the timing of their intervention. The study was small and rare complications would not have been seen. The journal club group also questioned the substantial increase in oxygen saturations among many of the patients that were hypoxic pre-DSI as this seemed out of keeping with our experience. Despite the limitations we thought that this case series showed promising results with minimal downsides or major complications.

Generalizability of Results:

The population described in this paper is a very unique group that is challenging to manage, very sick, and traditionally there have been few good options to optimize them peri-intubation. They are seen commonly in the emergency department. While the study authors were very experienced in DSI, the technique they describe seems fairly straightforward to replicate in our population. It is difficult to know if there were additional factors that were involved in patient selection that were not explicit in the paper.

The Bottom Line:

For patients that do not tolerate preoxygenation and peri-intubation procedures by traditional means, DSI appears to be safe and effective alternative to optimize physiology. While this study is small and has some limitations it is a pioneering step in a very challenging patient population. We believe that a randomized controlled trial needs to be done to test the efficacy and collect further safety data on this procedure.