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Intubation and cervical spine injury

To the Editor:

I write concerning the Occasional Review by Suderman *et al.*¹ From their retrospective review of the neurologic outcome in 150 patients with unstable cervical spine injuries they concluded that "the admonition to avoid oral tracheal intubation in spine-injured patients remains unfounded," and that oral tracheal intubation performed after induction of general anesthesia "remains an excellent option for elective airway management" in these patients. I suspect that those conclusions will run contrary to the beliefs of many clinicians, and I think that those readers whose practices are challenged will be helped in evaluating those conclusions by some additional information about the patient population.

Many of us have been taught that laryngoscopy in an awake patient is inherently less hazardous than laryngoscopy performed in a patient who is anaesthetized and paralyzed. It has been my training that there are two potential (though unproven) benefits of awake techniques: access to the patient's subjective and objective neurologic response to the intubation manoeuvres, which provides the best possible warning of impending neurologic injury; and muscle tone, especially when there is pain/spasm, which serves as a physiologic splint. Before adjusting my practices on the basis of the report by Suderman *et al.*, I would like to know how the decision to intubate a patient awake or anaesthetized was made. It is my belief that the patients at greatest risk are those with an upper cervical, especially an atlanto-occipital, injury who are submitted to laryngoscopy and intubation in an anaesthetized state. The authors' latitudes with respect to drawing conclusions may be reduced considerably if those patients with high cervical column injuries and/or those patients perceived to have the most unstable injuries were "filtered off" and submitted to awake techniques. The readership might also be helped by a definition of "unstable." It is my understanding that there are radiologic patterns that are indicative of a potentially unstable injury but that in many instances confirmation of instability requires provocative manoeuvres.

Reduced to its simplest terms my question is: were there enough patients with *bona fide* high risk, unstable injuries who were intubated in the anaesthetized state to permit a firm conclusion that laryngoscopy and intubation under

anaesthesia do not entail a risk of cord injury? It may well be that it is only a small subset of patients with "unstable" cervical spine injuries who are at significant risk if direct laryngoscopy is performed under anaesthesia. However, quadriplegia is a devastating complication (no matter how low the incidence) and I am reluctant to see promulgated the idea that it is acceptable to put "all comers" with cervical spine injuries to sleep for their laryngoscopy unless the available data clearly excluded the presence of a subset whose risk of neurologic injury would be diminished by awake intubation.

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REPLY

Thank you for the opportunity to respond to Dr. Drummond's letter. He raises issues that are of concern to many clinicians. Traditional teaching has advanced and reinforced the tenet that awake laryngoscopy and intubation is less likely to result in secondary neurological injury in cervical spine-injured patients than the same procedure performed in an anaesthetized and paralyzed patient. However, given that no outcome data have been advanced in support of this doctrine, perhaps it is time to evaluate the principles on which it is based.

The belief that muscle pain and spasm serve as an effective spinal "splint" and prevent secondary neurological injury is not supported by clinical data documenting a high incidence of such injury in patients who are not recognized to have a cervical spinal injury at presentation and who do not have spinal immobilization performed at the outset. Failure to limit neck movement results in secondary injury in patients who are not subjected to laryngoscopy, intubation and surgery. Thus, there is no good evidence to suggest that the cervical muscles provide effective cord protection and this cannot be advanced as a justification for awake intubation.

We do not know what data Dr. Drummond would cite to support his belief that the level of injury is an independent predictor of instability following neck injury. We are not aware of data that suggest higher level injuries of the same magnitude are inherently more unstable than those in the lower cervical spine. In fact, cord injury appears to be more frequent in surviving trauma victims with cervical injuries below C₂ compared with those with injuries between C₁ and C₂ suggesting, perhaps, that the inverse is true.^{1,2} Anatomically, this may be explained by the greater luminal area in the upper cervical spine relative to cord size than in the lower cervical spine.

No patients were "filtered off" from our review. The care offered to the patients was not restricted by any protocol and was

thus dependent upon both the assessment and practice of the attending anaesthetist/neurosurgeon team. The care of all spine-injured patients with good neurological function cared for in our institutions during the relevant time period was reviewed.

We agree that access to the patient's subjective and objective neurological response to the intubation manoeuvres may provide useful clinical information. Presumably, clinicians who cite this as an advantage to awake intubation would also insist that the patient remain awake after tracheal intubation until properly positioned (including and especially if the patient is to be operated upon in the prone position for posterior stabilization). Failure to do so makes insistence on awake intubation alone illogical.

Dr. Drummond makes reference to the power level in our review which was well discussed in our paper. The outcomes in our review were compared with those of others. The incidence of untoward outcomes was very low and comparable with other studies including those assessing elective spinal surgery in non-trauma patients. Clearly, based on current outcome reports, very large numbers of patients would have to be reviewed to discover small, albeit important, differences in outcome, if they exist.

Finally, we do not subscribe nor do we seek to promulgate the notion that it is appropriate to anaesthetize "all comers" indiscriminately before performing laryngoscopy and tracheal intubation. We reported that patients who undergo tracheal intubation after induction of general anaesthesia do not appear to have an increased incidence of new neurological deficit when compared with patients whose tracheas are intubated while awake. Thus, we concluded that oral laryngoscopy and tracheal intubation after induction of general anaesthesia and muscle paralysis remains a prudent and safe option in cervical spine-injured patients. We do advocate careful assessment of the patient's injuries and determination, with the neurosurgical consultant, of the degree of spinal instability. Appropriate instruments for tracheal intubation can then be selected as well as a technique that will appropriately maintain spinal alignment.

In addition, we reject the sentiment that clinicians who choose intubation after anaesthesia do so because they do not possess skills to perform awake intubation.

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Uncommon laryngeal mask obstruction

To the Editor:

Broderick *et al.*¹ and Payne² have previously reported a 10% incidence of partial airways obstruction in spontaneously breathing patients using the laryngeal mask. We have experienced a specific cause for this problem in a paralysed patient.

A Brain laryngeal mask was used as part of an elective cholecystectomy in an ASA III patient. A size #4 laryngeal mask was inserted easily after complete relaxation and IPPV was commenced immediately using a Servo 900D (Siemens). In spite of adequate chest expansion, normal auscultation, end-tidal CO₂ (Datex) and oxygen saturation (Nellcor), the airway pressure was noted to be 2.5 kPa, and an air leak occurred around the mask. Fibreoptic laryngoscopy (Pentax) was performed through the laryngeal mask. This confirmed partial airway obstruction by upward displacement and infolding over the cords of large aryepiglottic folds. The laryngeal mask was removed and an oral endotracheal tube passed. Direct laryngoscopy showed a normal glottic aperture with large pediculated arytenoids back in their normal position. Anaesthesia then continued without further complication.

When obstruction occurs with the laryngeal mask, most are caused by downfolding of the epiglottis ($n = 10$;¹ $n = 3$,²). Although frequent, downfolding of the epiglottis generally does not cause airway obstruction.³ Some are due to forward displacement of the posterior circoid area and infolding of large aryepiglottic folds ($n = 2$,²). We have reported the latter in a paralysed patient, and believe that displacement of prominent aryepiglottic folds was caused by inflation of the laryngeal mask cuff as suggested in the radiological study of Nandi *et al.*³ and relaxation of the laryngeal musculature may have contributed. The use of fibreoptic laryngoscopy via the lumen of the laryngeal mask is relatively simple and enabled us to confirm mechanical airway obstruction. We encourage familiarisation with this technique for the diagnosis of airway difficulty with the laryngeal mask as previously recommended.³

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