

## References

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*In Reply:*—Dr. Calder considers that tracheal intubation was not the cause of spinal cord injury in our report of two patients.<sup>1</sup> Rather, he suggests that intraoperative hypotension resulted in spinal cord ischemia. We consider this hypothesis unlikely.

Neither patient sustained hypotension during anesthesia and surgery, and in this regard we do not share Dr Calder's surprise. The patient with bilateral femoral fractures was injured 24 h before transfer to our institution, and internal fixation of the fractures was undertaken on a non-emergent basis in a hemodynamically normal patient. Contrary to Dr. Calder's belief, hypotension is an uncommon complication after an abdominal gunshot wound, which results in isolated small intestinal injury as occurred in our second reported case. On average, our institution treats 2,500 victims of penetrating torso trauma per year.<sup>2</sup> Only 8.2% require admission to the intensive care unit, 2.4% as a result of protracted hypotension.<sup>3</sup> Of this latter group, less than 1% have sustained isolated small intestinal injury. Further, in 10 years of treating more than 3,000 critically injured patients, we have encountered only one instance of spinal cord injury presumed to be the result of hypotension.

We agree that direct laryngoscopy produces little movement below C3. Our statement concerning maximal movement and extension of the entire cervical spine is meant to indicate that during tracheal intubation, maximal movement of the cervical spine occurs at the time of direct laryngoscopy.<sup>4</sup> It must be emphasized, however, that all studies of cervical spine movement during tracheal intubation in living humans have been performed in patients without injury. The motion of a fractured spine is unknown.

In the absence of post-mortem findings, which were fortunately not available in either patient, the etiology of spinal cord injury remains speculative. Indeed, we emphasized that a number of reasons may have accounted for neurologic damage. As noted by Dr. Calder, spinal cord blood flow is at risk because of cervical spine injury, and any movement of the cervical spine may compromise perfusion. The

precise nature of the lesion is irrelevant. The undeniable lesson to be learned from our report is that patients with undiagnosed fractures of the cervical spine are at high risk of spinal cord injury if adequate precautions are not undertaken during tracheal intubation. Academic debate as to the pathophysiology is no substitute for ensuring that the cervical spine is cleared before intubation, and if this is not possible, every attempt must be made to minimize the risk of neurologic injury.

**David J. J. Muckart, F.R.C.S.**  
Department of Surgery  
University of Natal  
Durban, South Africa  
muckartd@med.und.ac.za

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