Editorial

Traumatic brain injury and postoperative CT

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The classic teaching of neurosurgery residents has always emphasized the importance of the neurological examination in medical decision making. This is particularly true when deciding whether the postoperative patient requires an unplanned return to the operating room. The threshold for a return to the operating room to evacuate a hematoma or correct an unforeseen surgical issue is necessarily high, because such a return significantly increases the risk of untoward outcomes. It is therefore not terribly surprising that the analysis of the institutional experience reported in this paper by Fontes et al. should find that no patient whose neurological examination demonstrated either no deficit or an expected deficit required additional, unplanned neurosurgical procedures. In other words, a routine postoperative head CT scan appeared to have no additional value in the absence of an unexpected neurological deficit (that would have ordinarily prompted an imaging study anyway). Fontes et al.’s findings add to a growing body of evidence that supports a reduction in the reliance on routine postoperative imaging. The authors argue that the added cost of such studies, as well as the incremental radiation risk, is simply not justified by the data.

Although this study should provide a level of comfort for neurosurgeons trying to reduce their reliance on routine radiological imaging in the postoperative patient, it is important that the limitations of this study be kept in mind. First and foremost, the patient cohort reported here was treated in a large, busy, and well-staffed academic medical center. This may not reflect the resources available in other health care environments. A smaller hospital with fewer dedicated neurosurgical staff available to care for these patients may need to rely more on rotating staff, who may have less experience in detecting and managing changes in the neurological examination. In these smaller hospitals, CT scans may have greater utility in alerting staff to patients with a higher risk of deterioration. In addition, it is important to keep in mind the retrospective nature of this study. Interpretation of neurological findings, done retrospectively, may well influence how patients were grouped. This type of bias may easily affect the findings of the analysis and cannot be avoided, despite the best intentions of the authors. Finally, the definition of relevant neurosurgical intervention used by the authors excluded such procedures as repositioning of ventricular catheter tips based on imaging findings. It may be argued that patients who had such minor interventions were spared more significant sequelae as a result. Obtaining a CT scan that in retrospect does not appear to influence the management of the patient is very different from not doing the study in the first place.

The authors of this study are to be commended for performing a detailed analysis of their large experience, and for documenting it thoroughly and thoughtfully. They do provide the reader with food for thought. However, despite the findings of this study, I suspect that routine postoperative CT scans will continue to be performed. In an era of high patient acuity and increasing prevalence of work-hour restrictions and handoffs, there is a greater potential that the significance of a neurological finding would be lost in the postoperative course. A patient who is initially only slightly drowsy after emerging from an anesthetic could be cared for by a series of physicians and midlevel providers who were previously unfamiliar with the patient, and who may miss a slow deterioration in the patient’s sensorium. Although this study argues that this has not been the case in a large institutional cohort, the retrospective nature of the data may have influenced how patients were grouped. Only a large, prospective study could answer the question of the utility of routine head CT scans definitively.

One could argue that the performance of routine CT scans is partly a reflection of the advent of faster and more portable CT equipment, and partly a response to the pressures posed by the increasing “rotation” of the medical team caring for the postoperative patient. It provides the medical team with objective data on the patient’s status easily transportable from one practitioner to the next. Whether or not this is borne out in reality, routine scanning appears to protect the patient from the increasingly fragmented nature of the medical team in the immediate postoperative period. Although data from the Rush University study argue that this protection is more virtual than real, I suspect that this practice will continue for some time to come. (http://thejns.org/doi/abs/10.3171/2014.2.JNS14380)

Disclosure

The author reports no conflict of interest.
Reference


Response

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We thank Dr. Sagher for his insightful comments on our work. We share his concerns with ongoing changes in the work structure of neurosurgical services, including an increased number of handoffs and care of the critical neurosurgical patient by nonspecialized nurses, midlevel practitioners, and intensivists. Dr. Sagher is correct in pointing out that the results of our study may not be generalizable to all neurosurgical services, particularly in the context of a general surgical intensive care unit (ICU) whose personnel may be dealing with many diverse patients at any given time. At Rush, we have the luxury of a Neurosciences ICU staffed with 100% specialized personnel—from care technicians to intensivists. Our colleagues who work at smaller hospitals face the problem described by Dr. Sagher on a daily basis; that is, that the threshold for changes in results of neurological examination necessary to trigger a CT scan is far lower (in the words of one of them, the CT scan may act as a “dose of neurosurgical triazolam”), so that the staff and the neurosurgeon, who is frequently not present in the hospital but can analyze the CT result online, may rest assured that the patient does not require an emergency intervention. As correctly indicated by Dr. Sagher, this issue of external validity may ultimately be addressed only with a prospective, multicenter study involving institutions with different types of postoperative care setups.

We would like to emphasize, however, that we are not advocating the end of the postoperative imaging procedure but rather abandoning another example of a “blanket order” in favor of a more rational approach, especially when another imaging modality (MR) is already scheduled. Furthermore, correcting weaknesses in one arm of the binomial equation of neurological examination and imaging findings by overstressing the other component is not a durable alternative. Over time, the accumulating cost of increasing numbers of tests will destroy medicine as we know it. Hopefully, hospital administrators will understand that the cost of training midlevel practitioners and intensivists in properly examining a neurosurgical patient is quickly offset by a small number of the CT and MR scans that would not be ordered.

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