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Response Letter Regarding "Utility of CT angiography in screening for traumatic cerebrovascular injury"

Dear Editor,

We thank Dr. Malhotra and his colleagues for their interest in our recent article entitled "Utility of CT Angiography in screening for traumatic cerebrovascular injury" [1]. Their comments are valuable, and we are happy to respond to their inquiries.

Prompted by a marked increase in CTA utilization over time and our section's anecdotal perceptions, we originally designed this project with the expectation to find CT angiography (CTA) to be over-utilized for detecting traumatic cerebrovascular injury (TCVI). We were surprised that our results did not support this hypothesis and thus suggested that the increase in CTA utilization at our institution was reasonable. However, we hope a careful reading of our discussion should clarify that we do not argue that these results alone warrant more widespread screening.

Accordingly, we support the concern raised by Dr. Malhotra et al. that screening bias can influence the measured performance of screening studies like CTA. Our trauma service follows a protocol based largely on the Denver Screening Criteria. Naturally, there are occasional deviations from this protocol in the real world. For example, there are patients at our institution who do not undergo CTA despite these criteria, such as some patients with type 2 and 3 LeFort fractures. Conversely, in our paper we identified a small subgroup of patients who would not have met our trauma service's criteria. It is difficult, then, to precisely assign our cohort to specific selection criteria. In fact, our subgroup analysis demonstrates that the yield of CTA varies according to presenting risk factors and even identifies a small subgroup of patients where CTA did not yield a single true-positive case—clearly our results argue against screening CTA in these patients.

Dr. Malhotra et al. note that CTA has a false positive rate up to 45% for traumatic cerebrovascular injury (TCVI). While reviewing the literature, we found the accuracy of CTA when compared to the gold standard of digital subtraction angiography (DSA) to be highly variable with 45% likely represent an upper extreme [2,3]. Data in our own cohort is more encouraging. Of the 70/200 (35%) of patients that underwent DSA after a positive CTA, DSA was normal in 17 patients (24.3%). Conversely, of the 23/1090 (2.1%) of patients that underwent DSA after a negative CTA, DSA was positive in 1/23 (4.3%). We note, however, that selective use of DSA also introduces bias into measurement of false-positive and false-negative rates of CTA. These comparisons are further compounded by ongoing rapid improvements in CT scanner technology and the low likelihood that a prospective trial will now be run comparing DSA in all unselected patients undergoing screening CTA for TCVI.

Our study has the conventional limitations of retrospective data from a single institution, and a prospective trial would help to more thoroughly assess the utility of CTA for TCVI. Concerns have been raised on whether in some cases antithrombotic therapy for asymptomatic TCVI might cause more harm than good (e.g., [4]), and we would argue that a trial of CTA for TCVI should investigate clinical outcomes, ideally following randomization either to CTA or not, or if not feasible to treatment or not based on the CTA findings. Such a paradigm has been enormously useful in identifying candidates for endovascular thrombectomy in patients with acute ischemic stroke [5], and a similar approach might be helpful for patients at risk of TCVI. We hope that our results may inform such future prospective investigations.

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