Aneurysm rupture

To The Editor: We read with interest the article by Tsuang and colleagues2 (Tsun FY, Su IC, Chen JY, et al: Hyperacute cerebral aneurysm rupture during CT angiography. Clinical article. J Neurosurg 116:1244–1250, June 2012), in which they described 21 aneurysm patients with active contrast extravasation from a ruptured aneurysm during initial cerebral CT angiography (CTA). They divided these patients with “reruptured” aneurysms into two subgroups: those with a good initial neurological status who showed rapid neurological deterioration, and those with a poor neurological status. The former may still have a favorable outcome if they undergo timely and successful decompressive surgery and appropriate aneurysm obliteration; there is no effective treatment for the latter.

We recently surveyed a series of patients with SAH who underwent CT perfusion (CTP) with 18-phase dynamic-enhanced CT. We could observe rerupture from an aneurysm by the extravasation of contrast material in the source image, and reported that active bleeding from an aneurysm was observed with increasing enhancement in 25.5% (13 of 51 cases).3 All CTP results in patients with extravasation were obtained within 2 hours of its onset. Moreover, the incidence of active bleeding in patients scanned within 2 hours was 42.3% (11 of 26 cases).

We believe that bleeding from a ruptured aneurysm is arrested immediately when the intracranial pressure is increased to the level of the systolic blood pressure.1 We could observe rerupture from an aneurysm by the extravasation of contrast material from the aneurysm on intraarterial angiography in patients with marked changes in vital and neurological signs. We have encountered many patients with extravasation of contrast material during CTA and CTP without marked neurological deterioration, which may reflect the inclusion of patients with continuous bleeding, as seen with other systematic injuries. It is time to recognize that extravasation from an aneurysm on CTA and CTP does not always mean rerupture and that bleeding from an aneurysm is not arrested immediately.

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Disclosure

The authors report no conflict of interest.

References


Response: In their article, Suzuki and colleagues stated that active bleeding was observed with increasing enhancement in 25.5% of patients (13 of 51).1 All patients with extravasation had Claassen Grade 3 or 4 and World Federation of Neurosurgical Societies (WFNS) Grade III, IV, or V. The other group without extravasation included patients in all grades. In our series of patients with acute extravasation on CTA, those who presented with a good neurological status initially, mainly those with WFNS Grade I or II, had the chance for a favorable outcome if timely and successful decompressive surgery and appropriate aneurysm obliteration were done. Those who showed a poor neurological status at presentation died no matter what kind of treatment they received.

In our article, the group with favorable outcomes that had presented with a good neurological status experienced rebleeding from the aneurysm during CTA, and thus further neurological deterioration was reasonable. Patients who had an initial poor neurological status showed extravasation during CTA, indicating that primary active bleeding of the aneurysms had not been stopped yet or that those aneurysms bled again, but this could not be clarified. Their neurological status remained poor throughout the clinical course.

The time from ictus to the CT suite also matters. If that period is relatively long and if neurological status deteriorates abruptly during the examination, rebleeding is more likely. There must be another small group of patients whose primary bleeding was not stopped and whose bleeding was so minimal that we could detect the primary bleeding on CTA with intra-examination neurological deterioration.

If the extent of extravasation is great and the time from ictus to CTA examination is long, then rebleeding is more likely; if the time from ictus to examination is short, then extravasation might indicate either primary bleeding or rebleeding. At that time, the best indicator for differentiation is whether the clinical neurological status deteriorates. Our article emphasized that timely intervention might offer better outcomes for any patients with acute extravasation, except those who present with a poor neurological status initially.

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Intracranial pressure monitoring and traumatic brain injury


Severe traumatic brain injury (TBI) often leads to a high mortality rate. Therefore, intensive monitoring of intracranial pressure (ICP) or imaging studies is crucial to save the patient’s life. Farahvar et al.1 used a massive, prospectively enrolled database to identify the effect of ICP monitoring on the 2-week mortality of patients with severe TBI. They found that several parameters, including age, initial Glasgow Coma Scale score, low blood pressure, and CT findings, were correlated with the 2-week mortality. Moreover, patients of all ages who underwent ICP monitoring had decreased mortality at 2 weeks (p = 0.02) compared with those who did not have ICP monitoring.

Since this is not a randomized controlled trial, it would be unavoidable not to have some potential interfering factors, such as family decision on whether or not to resuscitate the patient, comorbidities, associated major trauma, and the extent of primary underlying brain injury,2 that contribute to mortality.

Despite these minor limitations, the authors’ study has called on neurosurgeons to pay more attention to performing ICP monitoring to improve the outcome in patients with severe TBI. Further large-scale randomized controlled trials for consideration of ICP monitoring in patients with severe TBI are warranted to reduce the mortality rate.

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References


Response: We thank Peng and colleagues for the letter on our paper. Our study was a prospective severe TBI study, but patients were not randomized. The neurosurgeons in the respective trauma centers made a decision to monitor ICP or not. In order to address known parameters that independently affect 2-week mortality, we adjusted for Glasgow Coma Scale score, hypotension, age, pupil examination findings, and CT parameters. After this adjustment, patients treated without ICP monitoring had a significantly higher mortality than those treated with ICP monitoring. Patients who had a do not resuscitate order or lacked brainstem reflexes were not included in the analysis.

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The lucid interval and the role of Benjamin Bell

To The Editor: Ganz2 is to be congratulated on his detailed description of our evolving understanding of the lucid interval following skull trauma in which he kindly acknowledges my careful reading over of the text (Ganz JC: The lucid interval associated with epidural bleeding: evolving understanding. Historical vignette. J Neurosurg 118:739–745, April 2013). However, this was not as careful as it should have been, as I must take issue with the statement that in Benjamin Bell’s A System of Surgery “there is absolutely no mention of a symptom-free lucid interval between injury and deterioration.” Nor is it true to say that “There is nothing in his A System of Surgery to show he understood the time element separating concussion and compression.”

Bell describes the lucid interval on more than one occasion in chapter 4 of his A System of Surgery,1 expressing the concept on page 171 in section 5, when he writes “In every case, indeed, of injuries done to the head, in which the symptoms do not commence till several days after the accident, as it is clear that the cause of the disorder has not originally affected the brain or its membranes, for if it did so its effects would be immediate, it is probable that it operates almost solely by forming some effusion externally between the pericranium and the skull.”

Bell appreciated the dangers of posttraumatic cerebral compression, for when describing on page 117 “cases of extravasation,” he goes on to say, “A patient, in such circumstances, we suppose to be in great hazard, from the brain being compressed in one part or another: unless this compression be removed by an operation, he must in all probability die.”

Bell describes on page 115 circumstances when the trepan is indicated “without any appearance either of fracture or depression” and states that “The sole object of the operation of the trepan is to remove compression from the brain.” As other surgeons like Pott would only trepan in the presence of a fracture, I would argue that Bell did indeed appreciate the mechanics and time scales of posttraumatic compression and the need for its relief by operation.

Bell’s A System of Surgery was popular and influen-