# Postoperative computerized tomography

Patient management following elective cranial surgery often includes routine postoperative head computed tomography (CT).

Postoperative patient management following elective cranial surgery varies substantially between different neurosurgical institutions. The common objective in this crucial period is to avoid or detect any early postoperative complications such as postoperative intracranial hemorrhage, cerebral ischemia, or brain edema. Since the introduction of computed tomography (CT) in the 1970s, postoperative head CT within the first hours after neurosurgery has been advocated [1].

These imaging studies are often ordered even in the absence of unexpected neurological findings in order to rule out complications. In many departments patients are not transferred to the wards until they have been “cleared” by CT scanning. This practice of routine head CT scanning has not been substantiated by any prospective evidence, but is perpetuated by common procedural standards and training background of the neurosurgeons [2] [3].

However, there is growing evidence from retrospective series that routine head CT may not be necessary after neurosurgical cranial procedures [4] [5].

Early postoperative head CT scanning is routinely performed following intracranial procedures for detection of complications, but its real value remains uncertain: so-called abnormal results are frequently found, but active, emergency intervention based on these findings may be rare.

Results of recent studies and clinical reasoning argue that repetitive neurological examination and surveillance is key for detection of complications with the need for return to the operating room (OR). Early termination of anesthesia and early extubation is, of course, mandatory for a thorough neurological examination. Today most neurosurgical patients are awakened directly postoperatively in the OR for clinical assessment. Still, some institutions—at least within Europe—prefer a delayed extubation with parameter focused monitoring on the intensive care unit (ICU) over an early extubation in the OR with clinical-neurological monitoring of the awakened patient. The concerns for latter strategy may originate from a fear of too much cardiopulmonary and metabolic distress to the just trephined patient caused by an immediate (“forced”) awakening and extubation with potential sequelae (e.g. postoperative hemorrhage, brain swelling). No evidence from prospective studies exist to support these assumptions.

Early extubation combined with close neurological monitoring is safe and omits the need for routine postoperative CT. Patients not extubated within one hour do need early CT, since they had a significantly increased risk of requiring emergency neurosurgical intervention [6].

The study of Schär et al as well as previous and recent reports dealing with the utility of repeat head CT have demonstrated that this effort is feasible and compatible with patient safety [7] [8] [9]

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Fontes et al retrospectively analyzed 892 intracranial procedures followed by an early postoperative CT scan performed over a 1-year period at Rush University Medical Center and classified these cases according to postoperative neurological status: baseline, predicted neurological change, unexpected neurological change, and sedated or comatose. The interpretation of CT results was reviewed and unexpected CT findings were classified based on immediate action taken: Type I, additional observation and CT; Type II, active nonsurgical intervention; and Type III, surgical intervention.

Results were compared between neurological examination groups with the Fisher exact test.

Patients with unexpected neurological changes or in the sedated or comatose group had significantly more unexpected findings on the postoperative CT ($p < 0.001$; OR 19.2 and 2.3, respectively) and Type II/III interventions ($p < 0.001$) than patients at baseline. Patients at baseline or with expected neurological changes still had a rate of Type II/III changes in the 2.2%-2.4% range; however, no patient required an immediate return to the operating room.

Over a 1-year period in an academic neurosurgery service, no patient who was neurologically intact or who had a predicted neurological change required an immediate return to the operating room based on early postoperative CT findings. Obtaining early CT scans should not be a priority in these patients and may even be cancelled in favor of MRI studies, if the latter have already been planned and can be performed safely and in a timely manner. Early postoperative CT scanning does not assure an uneventful course, nor should it replace accurate and frequent neurological checks, because operative interventions were always decided in conjunction with the neurological examination [10].

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Clinically significant abnormalities on immediate postoperative computed tomography scans in lateral skull base surgery were rare, as were cases of neurological decline. Further prospective studies could determine a more cost-effective algorithm for routine use of postoperative imaging [11].

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