Traumatic aneurysm resulting from insertion of an intracranial pressure monitor

Case illustration

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A fiberoptic intracranial pressure (ICP) monitor (microsensor bolt; Codman, Raynham, MA) was placed through a twist-drill hole into the right frontal region of a 30-year-old man who had sustained a severe, closed head injury. The dura mater was opened using an 18-gauge needle and the monitor was inserted without any obvious bleeding. The monitor was removed 7 days later. A cranial computerized tomography (CT) scan obtained several hours postinjury did not reveal skull fracture or hematoma in the right frontal area, and a magnetic resonance (MR) image obtained 17 days postinjury did not demonstrate any hemorrhage at the site where the monitor had been placed (Fig. 1 left; arrow). The patient was transferred to our hospital for further care. A routine CT scan obtained 25 days postinjury revealed the presence of intraparenchymal hemorrhage beginning at the site of monitor insertion and extending down into the lateral ventricle (Fig. 1 center). There was no change in the patient’s clinical condition. Angiography demonstrated a 3-mm-wide fusiform aneurysm arising from a cortical branch of the right anterior cerebral artery (ACA) immediately underneath the twist-drill hole (Fig. 1 right; arrow). The aneurysm was excised via a small craniotomy, and the hematoma was evacuated. Histopathological examination of the aneurysm revealed complete disruption of all three layers of the arterial wall and a false aneurysm (the wall of which consisted of fibrous tissue) arising from the torn edges and blending into a large hematoma with chronic inflammation, hemosiderin-laden macrophages, and decaying blood products (Fig. 2). The degree of fibrous tissue formation was consistent with the aneurysm’s arising at the time of monitor insertion.

Most cases of iatrogenic aneurysm present with intracranial hemorrhage (ICH), although 20% have been discovered incidently and 30% after various other symptoms or because vascular injury was suspected in the absence of hemorrhage.1,2 Intracranial hemorrhage at the time of the inciting event has only been noted in two thirds of cases.1,2 Postoperative hemorrhage leading to diagnosis has occurred, on average, 81 days later, if a single case presenting 16 years later is excluded. The reported mortality rate is 14%.1,2 The inciting pathophysiological event is direct injury to one or more layers of the arterial wall. We postulate that in the present case, the needle used to open the dura mater or the ICP monitor itself lacerated all layers of the arterial wall. The lack of obvious bleeding at the time of monitor placement may indicate that the monitor itself tore the artery and then partly occluded the tear, stopping the bleeding. This case documents a previously undescribed complication of ICP monitor placement and supports the need for angiography in patients who display delayed ICH after head injury.

References


Fig. 1. Left: A T2-weighted gadolinium-enhanced image. Center: A CT scan. Right: Right internal carotid artery angiogram.

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