Case report

Intracerebellar hematoma following thoracoabdominal aortic repair: an unreported complication of cerebrospinal fluid drainage

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Received 14 April 2003; received in revised form 23 June 2003; accepted 3 July 2003

Abstract

Cerebrospinal fluid (CSF) drainage is a routinely used adjunct in thoracoabdominal aortic aneurysm (TAAA) surgery which may reduce the incidence of perioperative paraplegia by improving the spinal cord perfusion. However, a small but evident complication rate of lumbar drainage should be considered. We present two rare cases of intracerebellar hematoma possibly due to excessive CSF drainage after TAAA repair.

1. Introduction

The incidence of irreversible neurological deficit following surgical repair of thoracoabdominal aortic aneurysm (TAAA) is currently reported to be 4.2–10% [1,2]. Cerebrospinal fluid (CSF) drainage is hypothesized to decrease the intrathecal pressure thus increasing medullary perfusion and minimizing potential spinal cord ischemia [3]. We describe two cases of intracerebellar hematoma (IH) following TAAA repair; we speculate this complication is due to an excessive CSF drainage that stretches and transiently occludes the posterior fossa veins with subsequent vascular disruption and haemorrhage.

2. Case report

2.1. Case no. 1

A 71-year-old woman was operated on for a descending aortic aneurysm of 7-cm extending from four centimetres distal to the origin of the left subclavian artery to level T 10. The anesthetic and the surgical techniques have been previously described [1]; briefly, after induction of anaesthesia, two intrathecal catheters, one for monitoring the intrathecal pressure, one for drainage of CSF (80 cm lumbar catheter, 5 F, Integra NeuroSciences) were placed via the second and third lumbar interspaces. The catheter for the passive CSF drainage was connected to a closed collecting system. Continuous and unlimited CSF drainage was performed throughout the procedure (± 250 ml) and at least 24 h postoperatively (another ± 250 ml) in order to keep the CSF pressure at approximately 10 mmHg. The drainage, about 10–15 ml each time, was stopped manually if the CSF pressure was below 10 mm Hg. The functional integrity of the spinal cord was monitored by intraoperative recording of myogenic-evoked responses after transcranial electrical stimulation (tc MEP) and somatosensory-evoked potential (SEP) monitoring. The aortic aneurysm was replaced with the use of a 22 mm Dacron tube graft extending from 4 cm distal to the origin of the left subclavia artery to T 10 level. Distal aortic perfusion with a left atrial-to-left femoral artery bypass (BioMedicus pump) was used to provide distal perfusion. The procedure was uneventful. The patient was awake a few hours after the operation in the ICU and was extubated. She responded well to the commands and was able to move all four extremities. On day-2 postoperatively, however, the patient suddenly lost consciousness. After tracheal intubation a computed tomography (CT) scan was performed. This showed an acute IH in both left and right hemispheres with collection
of blood in the lateral ventricles and which was associated with acute hydrocephalus (Fig. 1). At the moment of the event the total CSF leakage was 500 ml. No coagulation disorders were present. An emergent external ventricular drainage with hydrocephalus resolution was carried out by the neurosurgeons. Following surgery the patient made a gradual and complete recovery.

2.2. Case no. 2

A 61-year-old woman was operated on for type II thoraco-abdominal aortic aneurysm extending three centimetres distal to the origin of the left subclavian artery to 2 cm distal to the origin of the two renal arteries. The management of the induction of anesthesia and insertion of the intrathecal catheters as well as the duration of the CSF drainage and the control of the drained volume, were the same as the patient # 1. Operative measures to control spinal cord integrity including MEP and SEP and the use of left atrial to left femoral bypass were the same as in the first case. A few hours after the operation, she awoke and did not show any neurological deficit; she was extubated. Approximately 36 h after the procedure, however, the patient suddenly collapsed and did not respond to pain stimuli. The neurological examination showed absent pupil responses but present corneal reflexes. Coagulation tests were normal. A CT scan, immediately performed, showed an acute IH in the left cerebellar hemisphere with collection of blood within the fourth ventricle, around the tentorium and the left insula; a concomitant hydrocephalus was detected (Fig. 2). At the moment of the event the total CSF leakage was 600 ml (± 250 ml drained during surgery and ± 350 ml postoperatively). An emergent external ventricular drainage with hydrocephalus resolution was carried out by the neurosurgeons. Following surgery the patient fully recovered.
3. Discussion

A recent review of Coselli et al. [3] suggests that an 80% relative risk reduction in paraplegia and paraparesis may be obtained with CSF drainage in patients undergoing TAAA resection. CSF drainage, however, is not free from complications. Although there is plenty of literature describing these complications, so far an intraparenchymal hematoma of the cerebellum after TAAA has never been described. We are inclined to think that an overaggressive CSF drainage together with a change in patient position, that is from supine to semi-sitting to improve the ventilation of the lungs, must play a central role in the pathophysiological development of IH. The venous anatomy of the posterior fossa has been extensively described by Rhoton and colleagues [4]. The venous drainage of the tentorial surface is cephalad, via short bridging veins into the tentorium, troncula, and transverse sinus and via the bridging superior vermian vein and the vein of the cerebellomesencephalic fissure into the basal vein of Rosenthal [4]. When a substantial CSF loss occurs, the cerebellum 'sags' away from the tentorium [5]. This may cause a stretching and transient occlusion of these veins, increasing the intraparenchymal venous pressure and creating an appropriate environment for venous haemorrhage [6,7]. Yoshida et al. [5] reported an IH in three patients with epidural drains during neurosurgery operations, whereas Tozek et al. [8] implied epidural drains in four cases. Moreover, the loss of CSF volume within the cisterns and ventricles is likely to draw interstitial fluid into these compartments, thus increasing hydrostatic pressure within the cerebellar parenchyma; this may further predispose the parenchyma to venous haemorrhage [9].

The consequent hydrocephalus that our two patients developed, can be explained as follows: a posterior fossa hematoma may compress the fourth ventricle or extending in the supratentorial area, may compress the aqueduct of Sylvius posteriorly and causes hydrocephalus [10].

Although subtraction of a large amount of CSF could be associated with painful headache, it did not occur in our two patients because the CSF drainage was performed gradually for at least 24 h postoperatively and during this period the patients were sedated and mechanically ventilated. Mostly the patients are extubated some hours after removal of the spinal catheters if the pulmonary situation is stabilized. Although they are uncommon, life threatening complications related to drainage catheter are possible. Therefore the management of CSF drainage must be accurate and should not be taken lightly. Outcome of patients with a posterior fossa haemorrhage depends on early diagnosis and prompt neurosurgical treatment.

Acknowledgements

We would like to thank the Department of Neurosurgery of University Hospital of Utrecht in which the cerebral complications of our two patients have been treated successfully.

References