Short report

Distant extradural haematoma complicating removal of frontal tumours

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SUMMARY The authors report two patients who developed occipito-parietal extradural haematomas following removal of large frontal meningiomas. In both, CT scanning aided diagnosis and subsequent management. Although rare, this complication should be considered when patients deteriorate or fail to improve after removal of frontally situated tumours or inexplicable brain swelling is encountered at the time of original surgery.

Extradural haematoma formation is an unusual but well recognised complication of ventricular drainage.¹ However, there has been only one previous report of a posteriorly situated extradural haematoma developing after removal of a frontally sited tumour.² All of these previously reported cases³⁻⁹ had a degree of hydrocephalus pre-operatively; the causative mechanism of haematoma formation was attributed to a rapid fall in intracranial pressure following ventricular decompression. We now report two patients who developed posteriorly situated extradural haematomas following removal of frontal tumours, neither of whom had pre-existing ventricular dilation.

Case reports

Case 1

A 32-year-old man was admitted with a six month history of occipital headaches, lethargy and personality change. He was alert and orientated with no abnormal neurological signs. A CT scan (fig 1a) revealed a large well defined mass in the right anterior fossa extending across the midline, enhancing markedly and homogeneously with intravenous metrizamide. The right lateral ventricle was compressed and displaced towards the left, but there was no evidence of ventricular dilation. Carotid angiography revealed a vascular tumour supplied by the right ophthalmic artery.

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Before operation he was given phenytoin and dexamethasone. During the operation the patient was supine with his head supported on a horse shoe head rest. CSF drainage was not used, nor was mannitol. Through a bifrontal craniotomy the tumour (confirmed to be a meningioma) was resected together with the anterior quarter of the superior sagittal sinus to ensure removal of the origin. At the end of the resection the brain was slack; however, during dural closure the brain started to swell and as no haematoma was evident this was attributed to reactive swelling. Twenty grams of mannitol was given intravenously but the swelling persisted, necessitating a partial right frontal lobectomy. At the end of the procedure the dura was left widely open and the bone flap could not be replaced. In the immediate post-operative period the patient was able to obey commands, make incomprehensible sounds but had a marked left hemiparesis. No further improvement over the following five days led to a further CT scan which revealed a large right occipito-parietal extradural haematoma completely divorced from the site of the previous craniotomy flap (fig 1b). A second craniotomy was therefore performed and a large extradural haematoma evacuated; no active bleeding point was seen. Over the following twenty-four hours the patient's conscious level improved and he became alert and orientated with only a minimal left hemiparesis. One month after operation the hemiparesis had resolved and his personality returned to its pre-morbid state.

Case 2

A 24-year-old man was admitted with an 8 month history of early morning headaches and personality change; a grand mal seizure occurring 3 weeks prior to admission. He was alert and orientated but had bilateral papilloedema. A CT scan (fig 2a) revealed a large irregularly enhancing area of increased density overlying the convexity of the left frontal lobe, compressing the ventricles and displacing the midline towards the right. Angiography was not performed and

Fig 1 (a) Case 1. Pre-operative metrizamide CT scan demonstrating a right frontal meningioma with compression and displacement of the right lateral ventricle to the left. (b) Metrizamide CT scan on the fifth post-operative day revealing a right occipito-parietal extradural haematoma.

Fig 2 (a) Case 2. Pre-operative metrizamide CT scan demonstrating a left frontal meningioma compressing the ventricles and displacing the midline towards the right. (b) Metrizamide CT scan on the twelfth post-operative day revealing an isodense left sided parietal extradural haematoma.

before operation the patient was given dexamethasone and phenytoin. During the operation the patient was supine with his head supported in a horse shoe head rest. Neither CSF drainage nor mannitol was used. Through a left frontal craniotomy the tumour, confirmed to be a meningioma, was

removed. At the end of the resection the brain was noted to be slightly tense but the dura was closed and the bone flap replaced without difficulty.

In the immediate post-operative period the patient was alert and orientated and had no focal neurological signs. He did, however, complain of persistent headache. A CT scan on the fourth post operative day revealed a small left parietal extradural haematoma well beyond the edge of the craniotomy flap. His headaches persisted and a further CT scan on the twelfth post operative day showed that the extradural haematoma had increased in size causing antero-medial displacement of the trigone (fig 2b). The haematoma was evacuated through two left parietal burr holes following which his headache rapidly resolved and he returned to his pre-morbid state.

Discussion

Extradural haematoma formation is a well recognised complication of ventricular drainage.³⁻⁹ In 1972 three patients were reported and the details reviewed in a further twenty-two.¹ All had several factors in common; they tended to be young, had long standing lesions and pre-existing ventricular dilation. During the surgical procedure the patients underwent some form of CSF drainage, either lumbar or ventricular, and all developed anteriorly situated haematomas. In 1974 the development of an occipito-parietal extradural haematoma following removal of a sub-frontal tumour was reported.² In this patient ventricular dilatation was also present before operation; at the time of surgery CSF drainage was not performed although mannitol was infused during opening. Both patients reported from this centre were young adults, probably with long standing lesions and raised intracranial pressure. However, in contrast to those cases previously reported^{1,2} neither had evidence of pre-existing ventricular dilation. During surgery both patients were supine; neither underwent CSF drainage or mannitol infusion. The extradural haematomas that developed, occurred on the same side as the tumour resection but distant to the craniotomy site.

The mechanism of extradural haematoma formation in our two patients is not clear. In retrospect, from Case 1, we think there is little doubt that the extradural haemorrhage occurred during the original craniotomy. In neither patient did the dural detachment from the skull extend to the site of the original bone flap thereby excluding a direct cause. Previous workers² postulated that a sudden reduction in intracranial pressure at the time of craniotomy, or tumour

removal or ventricular drainage may cause traction on the dural bridging veins which in turn may strip the dura from the inner table of the skull causing haemorrhage from extradural vessels. Vessel laceration and formation of an extradural pocket of blood would then create a hydraulic press effect⁹ in which the input pressure would be transmitted throughout the haematoma and multiplied. This would then cause further dural detachment with subsequent haematoma expansion. In our patients it is possible that release of intracranial pressure at the time of the craniotomy may have resulted in a sudden forward shift of the brain and subsequent dural detachment despite the gravitational pull in the opposite direction.

In the past extradural haematoma formation complicating ventricular drainage or tumour removal was accompanied by a high mortality. Previous authors^{1,7} reported death rates of between 50 and 54%, presumably partly related to diagnostic delay. With the availability of CT scanning diagnostic delay should not now be a problem. Clinicians should be aware therefore, that extradural haematoma formation may not only complicate ventricular drainage but may also follow frontal tumour resection. The haematoma may develop at the time of the original surgery and therefore unexplained cerebral swelling during operation or delayed post operative recovery should be actively investigated by CT scanning.

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