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Case Report

Multiple Intracranial Calcifications as a Complication of External Ventricular Drain Placement

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The authors present a case of multiple intracranial calcifications after the procedure of external ventricular drain placement in a 50-year-old man with pericallosal artery aneurysm. We believe that calcifications formed dust that had fallen into the track during the external ventricular drain procedure. The clinical features and radiological findings are presented with review of literature.

KEY WORDS : Intracranial calcification · External ventricular drainage (EVD).

INTRODUCTION

External ventricular drainage (EVD) is a commonly used procedure in the neurosurgical practice for the management of raised intracranial pressure. The main complications of EVD are ventriculitis and intracerebral hemorrhage along the insertion tract. After the neuroendoscopic procedure, several cases of intracranial hypertrophic calcification were reported[2]. However, intracranial calcification after EVD procedure is an extremely rare complication.

CASE REPORT

A 50-year-old man was admitted on emergency basis with complaints of sudden bursting headache and vomiting. The brain computed tomography (CT) demonstrated a diffuse subarachnoid hemorrhage in the basal and sylvian cisterns and an obliteration of the cortical sulci, but there was no evidence of abnormal calcification in brain parenchyme and ventricles (Fig. 1). The cerebral angiography showed a saccular aneurysm on the left pericallosal artery.

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Operation and postoperative course

We made a rectangular shaped craniotomy on the left fronto-parietal area to perform the conventional interhemispheric approach. To achieve relaxation of the left hemisphere, a right frontal burr hole was made 1cm anterior to the coronal suture in the midpupillary line by using a Hudson's drill. The EVD tube was then introduced into the frontal horn of the right lateral ventricle. We kept the EVD tube for 7 days. Before removal of the EVD tube, axial non-enhanced CT was checked. The CT scan demonstrated resolution of subarachnoid hemorrhage and part of EVD tube in frontal horn of the lateral ventricle, but radiopaque structures were not present (Fig. 2). Following surgery the patient made an excellent recovery without any signs of

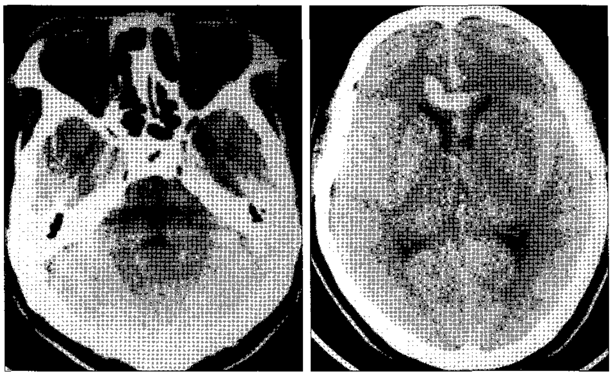

Fig. 1. Preoperative non-enhanced brain computed tomography shows a diffuse subarachnoid hemorrhage in the basal and sylvian cisterns without intraventricular hemorrhage and intracranial calcifications.

Fig. 2. Postoperative follow-up computed tomography demonstrates resolution of subarachnoid hemorrhage and part of external ventricular drainage tube (black arrow) in frontal horn of the lateral ventricle, but radiopaque structures are not present.

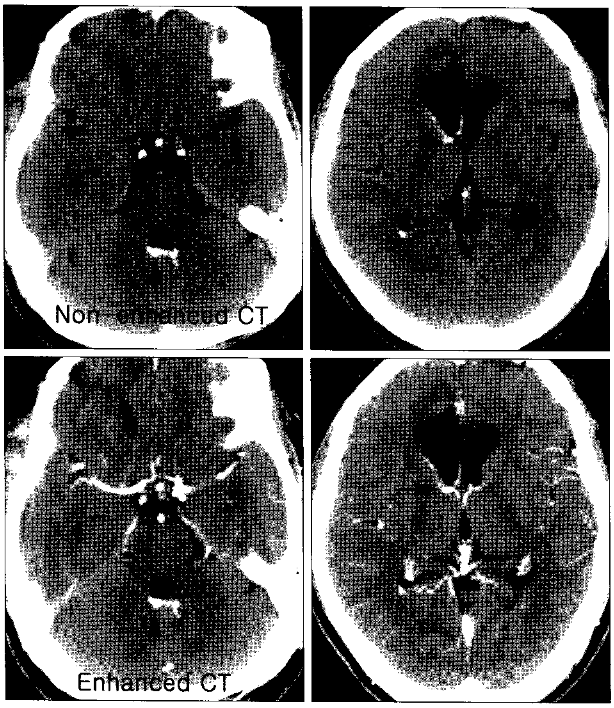

Fig. 3. Enhanced brain computed tomography at 12 months following surgery reveals the development of non-enhancing radiopaque lesions (black arrow) in the right frontal horn of the lateral ventricle, the 3rd and the 4th ventricles.

Fig. 4. The follow-up brain computed tomography obtained 18 months after surgery shows that the calcification mass did not change in size and shape (black arrow).

infection.

A contrast enhanced brain CT on 12 months following the surgery revealed the development of non-enhancing radiopaque lesions in the right frontal horn of the lateral ventricle, 3rd and 4th ventricles (Fig. 3). After 18 months, a follow-up brain CT showed that these lesions did not change in size and shape (Fig. 4).

DISCUSSION

Extraventricular drainage is a well-established procedure in the management of increased intracranial pressure, with its common complications include infection and hemorrhage. Most neurosurgeons usually make a long subcutaneous tunnel to decrease the risk of infection and use a blunt-tipped ventricle tap needle to prevent intracranial hemorrhage. We experienced multiple intracranial calcifications as a rare complication of extraventricular drainage. As shown in the report of Alorainy[1], it is possible to inadvertently push small pieces of bone or bone dust from the calvarium after drilling for the external ventricular drain into the brain parenchyma or ventricles during insertion of the drainage tube. Bone dust can contain viable osteoblasts that are capable of dividing and laying down bone when implanted into vascular tissue. For example, this is used to seal burr holes and encourage fusion in the spine. In our case, multiple intracranial calcifications arising from the ventricle wall were seen on routine follow-up brain computed tomography (CT) 1 year post-operatively. These lesions were not visible on CT 2 weeks post-operatively. In our case, the pathogenesis may have been due to bone dust introduced into the highly vascularized cerebral cortex or the choroid plexus during insertion of the tube, as suggested by Thomson et al.[2], who reported three cases of intracranial hypertrophic calcification in the frontal and occipital horns of the lateral or third ventricle walls after sealing third ventriculostomy burr holes with bone dust. In our case, the calcifications were in the frontal horn of the lateral, third, and fourth ventricle walls. Although we had no chance to study the progression of these calcifications between 2 weeks and 1 year postoperatively, Thomson et al.[2] showed that the calcifications enlarged progressively in two cases within 1 year after the operation. In our case, there has been no further change in the size or shape of the calcifications seen on brain CT obtained 1 year and 18 months postoperatively. We suggest that these calcifications resulting from bone dust developed and enlarged within the first postoperative year, but did not enlarge after 1 year. After experiencing this complication, we now perform saline irrigation several times to remove any bone dust from the burr hole before inserting the drainage tube. No similar complication has been observed since we modified our procedure.

CONCLUSION

It is possible that small bone dust can inadvertently be pushed into the brain parenchyma or ventricle during the external ventricular drain insertion. We recommend cleaning the burr hole area before the insertion of drain tube to prevent possible postoperative intracranial calcification.

References

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