What Is Your Diagnosis?

Figure 1—Left lateral (A) and dorsoventral (B) radiographic views of the skull of a 10-year-old spayed female German Shepherd Dog evaluated because of a sudden and progressive onset of signs of depression and anorexia of 48 hours' duration. The dog had undergone a transfrontal craniectomy to debulk a left frontal lobe meningioma 5 weeks earlier.

History

A 10-year-old spayed female German Shepherd Dog was evaluated because of a sudden and progressive onset of signs of depression and anorexia of 48 hours' duration. The dog had undergone a transfrontal craniectomy to debulk a left frontal lobe meningioma 5 weeks earlier. Postsurgical recovery had been uneventful; no abnormalities were detected on neurologic examination after surgery.

At the time of this evaluation, however, neurologic examination revealed that the dog had a depressed mental status and severe postural reaction deficits on the right thoracic and pelvic limbs. The dog was circling to the left and lacked a menace response bilaterally. These neurologic findings were consistent with a diffuse prosencephalic lesion, affecting the left side more severely. Radiographs of the skull (Figure 1) were obtained with the dog under general anesthesia.

Determine whether additional imaging studies are required, or make your diagnosis from Figure 1—then turn the page →

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Diagnostic Imaging Findings and Interpretation

On the lateral radiographic view, a crescent-shaped gas opacity in the central aspect of the cranial vault, coincident with the location of the lateral ventricles, is evident. Rostral to the lateral ventricles, there is an air-filled tract that appears to connect the ventricular system and the frontal sinus. Polymethylmethacrylate used to repair the frontal bone defect is visible as an increased mineral opacity superimposed over the frontal bone and dorsal aspect of the frontal sinuses, but no signs of periosteal reaction or bone lysis suggestive of infection are present. On the dorsoventral view, the gas is less evident as a result of superimposition of the petrous temporal bone.

Polymethylmethacrylate used to repair the frontal bone defect is visible as an increased mineral opacity superimposed over the frontal bone and dorsal aspect of the frontal sinuses, but no signs of periosteal reaction or bone lysis suggestive of infection are present. On the dorsoventral view, the gas is less evident as a result of superimposition of the petrous temporal bone.

On MRI images, marked dilation of both lateral ventricles and a signal void consistent with air is observed in all sequences. On the transverse T2-weighted images, there is air within the lateral ventricles that clearly defines an air-fluid level. The hyperintense signal of the CSF on the T2-weighted image is observed in the ventral part of the lateral ventricles, whereas the signal void from air accumulation is seen dorsally as a result of patient positioning (sternal recumbency) during MRI. Mass effect from the distended lateral ventricles is also observed compressing the thalamus (black asterisks). In the parasagittal T1-weighted image, the sinus-ventricular fistula is present in the rostral part of the lateral ventricle (white arrow). Cerebellar compression secondary to lateral ventricular dilation (ie, mass effect) is observed (arrowhead).
Treatment and Outcome

The patient underwent reconstructive surgery to seal the dural defect. Gross evaluation revealed bulging, air-filled brain tissue herniated through an osteodural defect. Gentle fine-needle aspiration of air was performed, and the dural defect was repaired with a synthetic dural substitute. The dog was discharged from the hospital a week later. Two months after surgery, the dog's neurologic condition had resolved; follow-up radiography of the skull revealed complete resolution of the pneumocephalus.

Comments

Pneumocephalus is the accumulation of air within the cranial cavity. Tension pneumocephalus (in which air is under pressure within the nondistensible cranium) is an uncommon but potentially life-threatening complication in human and veterinary neurosurgery. In veterinary medicine, tension pneumocephalus has been described in patients that have undergone cranial surgery or rhinotomy as well as after head trauma. Potential sites of gas accumulation within the cranial vault include epidural, subdural, subarachnoid, cerebral, and intraventricular locations.

In the case described in the present report, survey radiographs were useful to detect air within the cranial vault because of the large amount of air present within the ventricular system. Small amounts of intracranial gas could be missed on conventional radiography; thus, advanced imaging techniques such as MRI or CT might be necessary. Furthermore, other intracranial diseases (i.e., abscess, meningitis, or tumor regrowth) can be ruled out on MRI or CT evaluation. Evidence of high intracranial pressure may also be detected by these advanced imaging techniques and could provide essential information for surgical planning.

Tension pneumocephalus is a neurologic emergency, and early recognition and treatment often result in a satisfactory outcome. Skull radiography can be a fast screening tool in emergency situations when MRI or CT is not available, and radiographs of the skull can be obtained without general anesthesia in an unstable patient. Typically, general anesthesia is recommended for skull radiography, but the duration of general anesthesia is certainly shorter than that required for CT or MRI.


b. Vet-MR, 0.2-T open magnet, Esaote, Genova, Italy.
c. Lyoplant, B Braun, Barcelona, Spain.