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CE - MEDICAL ILLUSTRATION

Intracranial migration of silicone oil: a mimic of intracranial hemorrhage

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A 75 year old veteran presented to the emergency room after a fall. He had a history of remote left retinal detachment treated by silicone tamponade, and right retinal detachment treated with a scleral buckle. At baseline, his left eye was blind. On physical exam he was alert and oriented. He had abrasions to his forehead, but no focal neurological deficits. A head CT was ordered to evaluate for traumatic intracranial injury. Findings consistent with intraventricular migration of silicone oil were present (see Fig. 1).

Silicone oil administration into the vitreous body of the eye is used for intraocular tamponade to treat disorders such as retinal detachment. Intracranial migration of silicone oil has been described in case reports as a rare complication after intraocular silicone injection for treatment of retinal detachment [1]. The exact mechanism of silicone oil migration is unclear since the vitreous body has no normal communication with the subarachnoid space of the optic nerve, but it has been hypothesized that increased intraocular pressure, optic pits or deep cupping of the optic disk play a role [1, 2]. Importantly, cranial nerve two—the optic nerve—is derived from the diencephalon. Therefore, it is a part of the central nervous system and is covered by the three layers of meninges. Further, the optic nerves join at the optic chiasm, where fibers originating from the nasal side of the retina decussate, and continue posteriorly as the optic tracts. Hence, it is proposed that silicone oil can migrate from the vitreous of the globe into the subarachnoid space of the optic nerve and extend posteriorly and intracranially.

Intracranial migration of silicone oil can mimic intracranial hemorrhage [3]; however, intracranial hemorrhage is an emergency that must be quickly identified to allow for appropriate treatment, while silicone oil is not believed to be a chemical irritant and may not necessitate additional treatment or studies. Therefore, it is important to be aware of intracranial migration of silicone oil and to understand the key differences on imaging between it and intracranial hemorrhage. Differences between intracranial silicone oil and hemorrhage on CT should especially be discussed since CT is rapid, widely available and the initial study of choice to evaluate for intracranial hemorrhage. Both intracranial hemorrhage and silicone oil are hyperattenuating on CT. However, it is important to be aware that blood within the ventricular system is dependent since it is more dense than cerebrospinal fluid, while silicone oil floats since it is less dense than cerebrospinal fluid. Patients typically undergo head CT in the supine position, thus posterior is dependent and anterior is non-dependent. This may be useful as the patient could be imaged in different positions to confirm the expected mobility and non-dependent location of intraventricular silicone oil [4]. Of course, the patient must have a history of intraocular silicone, which can be readily identified on CT, and evidence of subarachnoid extension of the silicone oil along the optic apparatus should be present, as indicated by the hyperattenuating optic nerve sheath complex in the case provided. If the diagnosis is uncertain (i.e. metastases, lymphoma, subependymoma and other etiologies can present as intraventricular lesions) then MRI can be obtained as signal intensities and chemical shift of intraventricular silicone oil have been described and can cinch the diagnosis [5, 6]. Incorrectly interpreting intracranial silicone oil as intracranial hemorrhage can lead to unnecessary imaging and procedures and has even been reported to delay life-saving surgical management [7]. The patient presented

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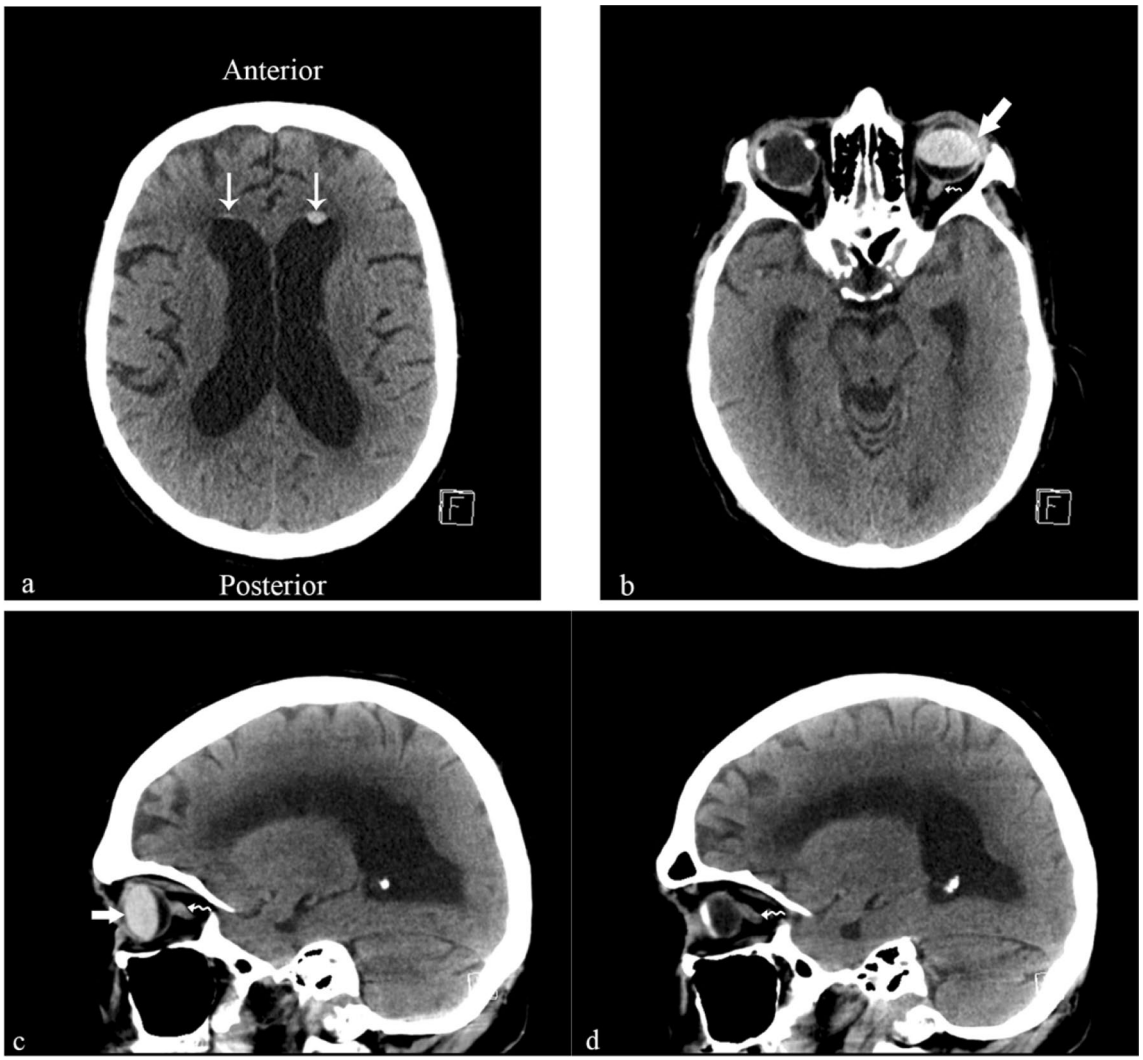

Fig. 1 Axial and sagittal images from a non-contrast head CT show intraventricular migration of silicone oil. Axial images at the level of the **a** lateral ventricles and **b** orbits show hyperattenuating silicone oil floating within the non-dependent anterior portions of the left greater than right lateral ventricles (thin arrows), as well as hyperattenuating silicone oil in the vitreous body of the left globe (thick arrow) for treatment of prior retinal detachment and increased attenuation of the left optic nerve-sheath complex (wavy arrow). Sagittal images better demonstrate the increased attenuation of the **c** left optic nerve-sheath complex as compared with the **d** right (wavy arrows) related to migration of silicone oil to the subarachnoid space of the left optic nerve. Thick arrow in **c** indicates silicone in the vitreous body from treatment of prior retinal detachment

was evaluated by both neurosurgery and ophthalmology and conservative management was agreed upon as the imaging findings correlated with his benign clinical status.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Statement of human and animal rights This article does not contain any studies with human participants or animals performed by any of the authors.

Informed consent For this type of study formal consent is not required.

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