Intraventricular Silicone Oil

A Case Report

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Abstract: Intracranial silicone oil is a rare complication of intraocular endotamponade with silicone oil. We describe a case of intraventricular silicone oil fortuitously observed 38 months after an intraocular tamponade for a complicated retinal detachment in an 82-year-old woman admitted in the Department of Neurology for a stroke. We confirm the migration of silicone oil along the optic nerve. We discuss this rare entity with a review of the few other cases reported in the medical literature.

INTRODUCTION

Retinal detachment occurs when there is a separation of the neurosensory retina from the retinal pigment epithelium with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intraocular tamponade with accumulation of subretinal fluid, in the presence of 1 or more retinal breaks: in the absence of treatment, it may cause severe visual loss.1 For ~40 years, silicone oil has been accepted as a safe and effective treatment used as an intr
spongiform appearance of the proximal optic nerve due to focal loss of myelin and axons (with the preservation of septa), the process of infiltration of silicone within the optic nerve is called “pseudo-Schnabel’s cavernous degeneration”; this phenomenon may be due to an increase of the intraocular pressure; it was also proposed that deep cupping of the optic disk may allow the silicone oil to enter the subarachnoid spaces (by breaking through the cerebral pia). By finding silicone bubbles in the optic nerve (and subarachnoidal spaces surrounding this nerve) after having analyzed an enucleated eye treated with silicone oil, it was confirmed that silicone may infiltrate the central nervous system. However, the frequency of the intracranial migration of intraocular silicone oil seems to be very low, as showed in a study where no case of intracranial silicone oil was observed in a series 19 consecutive patients several months (minimum delay of 2 months) after intraocular injection of silicone oil. To date, with ours, only 12 cases of intracranial migration of silicone oil were reported (Table 1). In 10 patients, the silicone oil was present in the ventricles, always in lateral ventricles and sometimes in the third (1 patient) and fourth ventricles (2 patients); only half of the patients (6) presented high density of the optic nerve (1 patient had optic nerve hyperdensity without intraventricular silicone oil); the time for the observation of silicone oil (mostly fortuitous) varied from 6 to 120 months. Sometimes, patients presented with a specific headache or dizziness; 1 patient presented with seizures. In all cases, there was no surgery. In our patient, an intraocular silicone oil injection was performed 38 months earlier by using a particularly viscous fluid (1300 centistokes). On brain CT-scans the silicone oil was observed not only in the left ocular globe and the cerebral ventricles, but also along the left optic nerve, suggesting a

### TABLE 1. Cases of Intracranial Silicone Oil Migration After Endotamponade With Injection of Silicone Oil

| References          | Intracranial Localization of Silicone Oil | Intraocular Endotamponade Time |
|---------------------|------------------------------------------|--------------------------------|
| Williams et al (1999) | ×                                        | 8 months                       |
| Eller et al (2000)   | ×                                        | 6 months                       |
| Fangtian et al (2005)| ×, ×                                     | 8 months                       |
| Eckle et al (2005)   | ×                                        | 12 months                      |
| Yu & Apte (2005)     | ×                                        | 12 months                      |
| Kuhn et al (2006)    | ×                                        | 72 months                      |
| Chen et al (2011)    | ×                                        | 23 months                      |
| Tatewaki et al (2011)| ×                                        | ND                             |
| Campbell et al (2013)| ×                                       | ND                             |
| Chang et al (2013)   | ×, ×                                     | 120 months                     |
| Cosgrove et al (2013)| ×                                        | ND                             |
| Our observation      | ×                                        | 38 months                      |

ND = no data; OC = optic chiasma; ON = optic nerve; V = ventricle.

FIGURE 1. Day 0 (A, B) and day 2 (C, D) axial noncontrast-enhanced brain CT scans (same sections: A = C; B = D) showing moving intraventricular hyperdensities (arrows) and a cerebral infarction (star). E: hyperdensity of the left optic nerve (arrow) and the left ocular globe. CT = computed tomography.
migration of silicone oil in intracerebral ventricles along the optic nerve. Intraventricular silicone oil has a lower specific gravity as compared to cerebrospinal fluid (CSF), explaining its free-floating nature. Because of a high surface tension, its intraventricular configuration is usually spherical, conversely to hemorrhage that presents a fluid-fluid level. Silicone oil is transparent but radiodense, with a CT attenuation of 106 to 139 HU that is supposedly slightly higher than in hemorrhages (50–90 HU). However, and similarly to other clinical cases, even in the ocular globe this type of discrimination was not possible for us to achieve, given the fact that silicone oil density was inferior to 100 HU. One hypothesis to explain this relatively low density is a dilution of the silicone oil with CSF. Due to cardiac pacing, we were unable to perform brain MRI in our patient; that much said, brain imaging could confirm the previously mentioned migration diagnosis. Brain MRI may detect small droplets of silicone of 1 mm³ (or larger) that are hyperintense on T1-weighted images but with a variable signal intensity on T2-weighted images (iso-, hypo-, or hyperintense).

Intraventricular migration of intraocular silicone oil has to be known of neurologists, ophthalmologists, and radiologists, even if it is of rare occurrence. It is a rare complication due to the migration of this material along the optic nerve, as shown in our case. Brain imaging may lead to the good diagnosis by demonstrating high attenuation on CT-scan (and hyperintensity on T1-weighted MRI) and a moving pattern when imaging is repeated: the recognition of this unusual combination of imaging characteristics may help to distinguish it from tumor or hemorrhage.

REFERENCES
1. Saw SM, Gazzard G, Wagle AM, et al. An evidence-based analysis of surgical interventions for uncomplicated rhegmatogenous retinal detachment. Acta Ophthalmol Scand. 2006;84:606–612.
2. Nazemi PP, Chong LP, Varma R, et al. Migration of intraocular silicone oil into the subconjunctival space and orbit through an Ahmed glaucoma valve. Am J Ophthalmol. 2001;132:929–931.
3. Grzybowski A, Peczekny J, Ascaso FJ. Neuronal complications of intravitreal silicone oil: an updated review. Acta Ophthalmol. 2014;92:201–204.
4. Shields CL, Eagle RC Jr. Pseudo-Schnabel’s cavernous degeneration of the optic nerve secondary to intraocular silicone oil. Arch Ophthalmol. 1989;107:714–717.
5. Fangtian D, Rongping D, Lin Z, et al. Migration of intraocular silicone into the cerebral ventricles. Am J Ophthalmol. 2005;140:156–158.
6. Papp A, Toth J, Kerenyi T, et al. Silicone oil in the subarachnoidal space—a possible route to the brain? Pathol Res Pract. 2004;200:247–252.
7. Kilgaard JF, Milea D, Logager V, et al. Cerebral migration of intraocular silicone oil: an MRI study. Acta Ophthalmol. 2011;89:522–525.
8. Williams RL, Beatty RL, Kanal E, et al. MR imaging of intraventricular silicone: case report. Radiology. 1999;212:151–154.
9. Eller AW, Friberg TR, Mah F. Migration of silicone oil into the brain: a complication of intraocular silicone oil for retinal tamponade. Am J Ophthalmol. 2000;129:685–688.
10. Kuhn F, Kover F, Szabo I, et al. Intracranial migration of silicone oil from an eye with optic pit. Graefes Arch Clin Exp Ophthalmol. 2006;244:1360–1362.
11. Eckle D, Kamik A, Hintshich C, et al. Visual field defect in association with chiasmal migration of intraocular silicone oil. Br J Ophthalmol. 2005;89:918–920.
12. Yu JT, Apte RS. A case of intravitreal silicone oil migration to the central nervous system. Retina. 2005;25:791–793.
13. Chen JX, Nidecker AE, Aygun N, et al. Intravitreal silicone oil migration into the subarachnoid space and ventricles: a case report and review of literature. Eur J Radiol Extra. 2011;78: e81–e88.
14. Chang CC, Chang HS, Toh CH. Intraventricular silicone oil. J Neurol. 2013;118:1127–1129.
15. Tatewaki Y, Kurihara N, Sato A, et al. Silicone oil migrating from intraocular tamponade into the ventricles: case report with magnetic resonance image findings. J Comput Assist Tomogr. 2011;35:43–45.
16. Campbell G, Milbourne S, Salman UA, et al. Ocular silicone oil in the lateral cerebral ventricle. J Clin Neurosci. 2013;20:1312–1313.
17. Cosgrove J, Djoukhadar I, Warren D, et al. Migration of intraocular silicone oil into the brain. Pract Neurol. 2013;13:418–419.