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Case Report

Intracranial iodinated contrast medium deposits 50 years following a previous myelography: A case report and literature review ☆

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ABSTRACT

Before the advent of CT and MRI, and since the early 1920s, myelography has been used for the diagnosis of spinal cord lesions and lumbar disc herniations. We report a case of an 86-year-old man with a migration of lipiodol in the intracranial subarachnoid spaces. The patient had undergone a myelography in the early 1970s, 50 years earlier. Lipiodol, an iodized oil, was widely used as a contrast agent in conventional myelography for years and provided excellent radiographic visualization of the subarachnoid spaces. Although rare, images of its residues may still be encountered in modern radiographic imaging. Neurosurgeons and radiologists should be aware of this imaging appearance, and be able to differentiate it from possible pathologies.

Introduction

We report a case of an unusual intracranial migration of lipiodol 50 years following a myelography, in line with care criteria [1].

Since its introduction by the noted American neurosurgeon Walter Dandy in 1919, myelography has quickly occupied an important place in medical practice, especially in the diagnosis of spinal cord lesions, tumors, and lumbar disc herniations [2,3].

In his first publication in 1919, he described pneumoencephalography and its use in diagnosing intracranial tumors and hydrocephalus after the injection of air into the spinal canal. In the same paper, he noted that this technique could be used to localize spinal cord tumors, with the air column extending up to the level of the lesion [4].

In 1922, French physician, Jean-Athanese Sicard, and his student, Jacques Forestier, reported the use of iodized poppy seed oil, Lipiodol, which was used widely for years, providing at that time excellent radiographic visualization of the subarachnoid space [5].

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Many physicians, especially young neurosurgeons, and radiologists, do not have enough information and experience with this type of contrast media. The presence of iodinated oil-based contrast media residues in the subarachnoid spaces after a previous myelography has been most commonly reported in the lumbar and thoracic spines [6–8]. However, CT images of intracranial locations have been exceptionally documented [9], reason why we describe the following case.

Case report

History and presentation

We report a case of an 86-year-old veteran who presented to the emergency department complaining of sudden onset dizziness and headache. Medical history revealed that he had undergone a herniated disc surgery in 1972. Additionally, he was under antihypertensive and antidiabetic drugs. His familial medical history was unremarkable. The initial examination found a conscious patient, with equal and reactive pupils and a low lumbar midline scar. Body temperature was 36.4°C; the pulse rate was 75 beats per minute; the respiratory rate was 17 breaths per minute and the blood pressure was 165/80 mm Hg. The physical and neurological examinations were unremarkable.

An urgent brain CT was performed without the use of contrast medium to exclude a hypertensive intracerebral hemorrhage given the patient's cardiovascular history.

The brain CT showed multiple rounded hyperdense images with metallic density in the supra and infra-tentorial subarachnoid spaces, and cisterns (Fig. 1). No other abnormalities were noted, namely of the ear and cerebello-pontine angles. MRI was not performed.

The patient was re-interviewed, and reported having undergone a previous myelography using lipiodol as a contrast medium in 1972.

Based on the characteristic imaging findings and the given history of myelography, the diagnosis of residual Lipiodol in the intracranial cerebrospinal fluid (CSF) spaces was made.

The patient was managed conservatively and did not undergo any surgical interventions. He received symptomatic

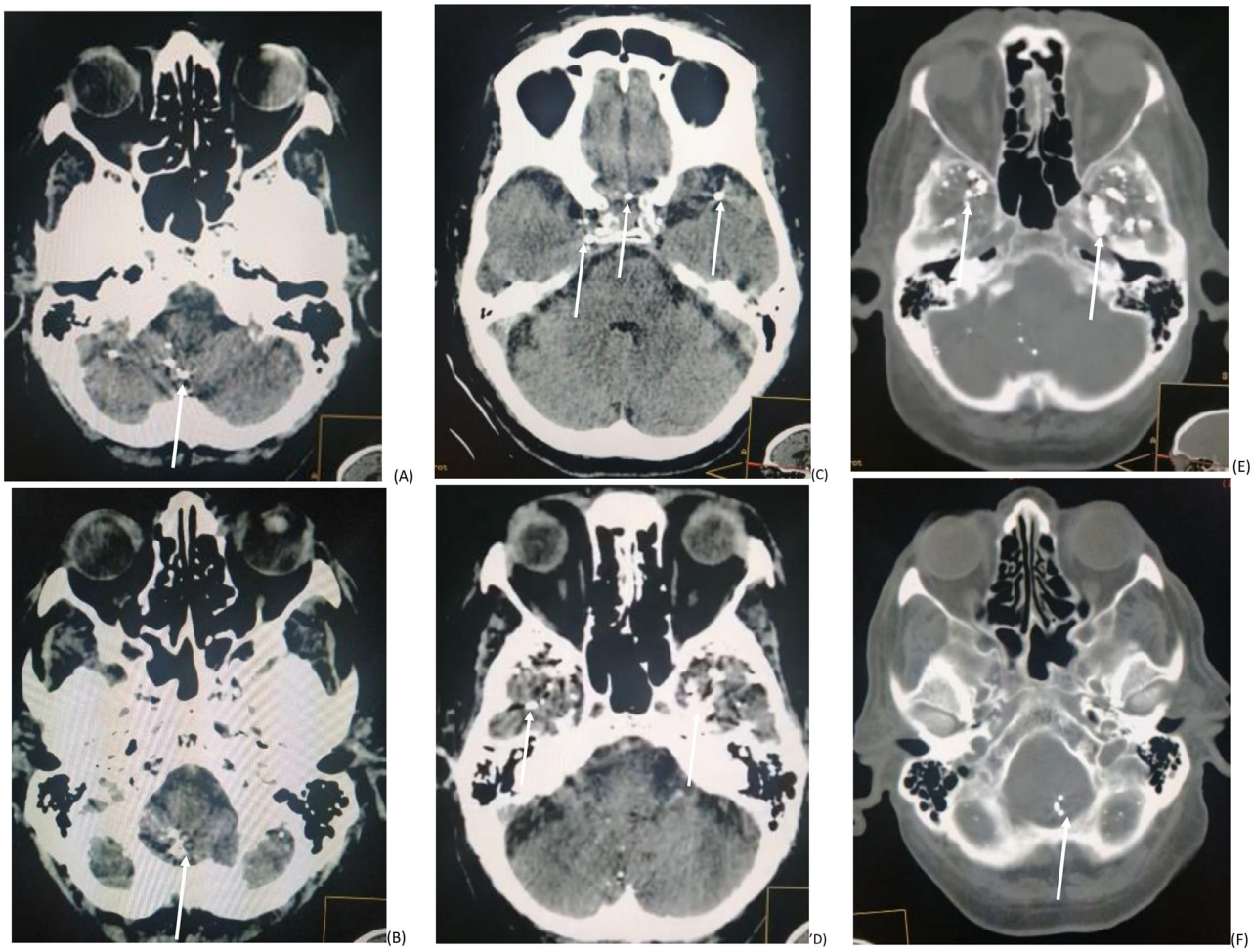

Fig. 1 – Nonenhanced axial brain CT parenchymal (A,B,C,D) and bone window (D,E) images show multiple small foci of hyperattenuating material scattered in the CSF circulation spaces at the cerebellar folia, basal cisterns (A,B,F) and temporal fossa (C,D,E) (White arrows). The hyperattenuating material has a metallic density and generates streak artifacts.

treatment with paracetamol and acetylleucine. The patient was symptoms free after 10 days, and was diligently followed up at the outpatient department. He was satisfied with our care and management.

Discussion

As far as we know, this is the first case report of intracranial deposits of Lipiodol visualized on CT 50 years following a myelography.

Lipiodol was developed in 1901 and has a history that deserves to be described as it can surprise. Lipiodol was originally marketed for therapeutic applications in syphilis, pulmonary (asthma) and cardiovascular diseases (angina, pericarditis), impetigo, and rheumatism [10].

Nowadays, Lipiodol is most commonly used for mixing with N-butyl cyanoacrylate (NBCA)–based glues for vessel embolization or in cancer treatment in combination with cytotoxic drugs, exemplified by conventional transarterial chemoembolization (cTACE) [11,12].

Conventional transarterial chemoembolization (cTACE) is commonly used to treat large unresectable hepatocellular carcinoma (HCC) or multiple HCCs. Although various complications of cTACE have been reported, cerebral lipiodol embolism after cTACE is rare, and few cases have been described [13,14]. In this context, CT demonstrates bilateral intensely hyperdense lesions [15]. The "ultradense sylvian artery'' is an exceptional but unequivocal sign, due to the presence of intravascular Lipiodol deposits of iodine [16].

An intracardiac right-to left shunt via a patent foramen ovale or intrapulmonary arteriovenous shunt can lead to cerebral lipiodol embolism. Patients with advanced liver disease are likely to have a pulmonary arteriovenous shunt [17].

In order to fight against iodine deficiency the essential cause of endemic goiter and cretinism, several health organizations promoted campaigns of iodinated oil (Lipiodol) intramuscular administration. However, oral administration is preferable, since its efficacy has been found equivalent to the intramuscular route by controlled clinical trials [18].

The use of Lipiodol for tubal flushing during hysterosalpingography examination has recently been proposed for the management and fertility enhancement of unexplained infertility in women [19,20].

In 1922, the French physician, Jean-Athanese Sicard, and his student, Jacques Forestier, reported on the intrathecal use of iodized poppy seed oil, Lipiodol, for diagnosing spinal masses. Lipiodol was known to be radiopaque and Sicard was injecting the product into lumbar muscles or epidural spaces to treat sciatica.

It was by accident that his student injected lipiodol into the thecal sac. On the fluorescent screen, Sicard saw that the Lipiodol had descended to the bottom of the spinal canal. He then placed the patient in the Trendelenburg position and was able to see the cranial flow of Lipiodol within the dural sac.

In 1932 Sicard and Forestier published a book entitled "The Use of Lipiodol in Diagnosis and Treatment." Out of 37 patients who underwent lipiodol-based myelography, there was only 1 case in which the neurosurgeon M. Robineau did not find the tumor in the location indicated by Sicard, making the laminectomies more reduced and well targeted [5,21,22].

Lipiodol (ethiodized oil) was widely used as a contrast agent for myelography in addition to pantopaque (iofendylate) until the 1980s. Some authors used aspiration cannulas to remove the contrast medium following myelography [23]. The remnants of oil-based contrast medium in the subarachnoid spaces following myelography has been reported in the lumbar and thoracic spines. Intracranial localizations however have rarely been recorded in the literature. Our literature search found 2 case repots of intracranial Myodil (also known as pantopaque) retention following myelography [9]. Images of the remnants may be encountered in recent dental practice, and the intracranial oil-based contrast medium-related radio-opacities were incidentally discovered on panoramic radiography and cone-beam computed tomography (CBCT) [24].

The spinal remnants may cause numerous complications including lumbar arachnoiditis, spinal cord compression, nerve damage, low-back pain, weakness in the lower limbs, and sensory changes. The intracranial remnants may lead to chronic arachnoiditis, headache, hydrocephaly, meningitis, imbalance, and vertigo. The symptoms may develop as late as 4 decades after the injection and often have a gradual and progressive presentation. It has been explained that the slow clearance rate and prolonged presence of the remnants can cause irritation [6,24,25].

Water-soluble contrast media have been developed for rectifying these shortcomings, as the risk of complications following myelography appears to be greater with oil-based contrast media than with water-soluble contrast media. Nowadays, water-soluble, rather than oil-based contrast media are widely used for myelography [26,27].

The typical appearance of subarachnoid remnants of oil-based contrast on conventional radiographs is small droplets of radiopaque material in the spinal canal or skull. On CT scans, it appears as multiple hyperdense spots of varying sizes in the subarachnoid spaces of the spine or skull. On MRI, the appearance is hyperintense on T1-weighted images and iso- to hyperintense on T2-weighted images without gadolinium enhancement. These persistent residual findings may arise in daily practice and be misinterpreted as lipomas, hemorrhages, or hemangiomas on routine X-rays, computed tomography, and magnetic resonance exams.

Our patient presented with non-specific dizziness. The actual mechanism of his symptoms was uncertain, but since the CT scan revealed no other abnormalities, namely of the ear nor cerebello-pontine angles, we hypothesized that the intracranial remnant of lipiodol may lead to a gradient in intracranial CSF pressure due to chronic arachnoiditis and cause temporary hydrocephalus.

Removal of the residual intracranial deposits of iodinated contrast medium by pneumoencephalography have been reported before, however, there is no clear consensus on the indications for surgical removal [28,29]. For spinal localizations, a surgical intervention may be required for symptomatic patients with severe arachnoiditis, spinal cord compression, or syringomyelia [6,7].

Conclusion

This case serves as a reminder to diagnosticians of the historical use of lipiodol as a contrast agent, with evidence of its residual effects that can still be encountered in today's practice. Although disappearing with time, the occurrence of uncommon brain CT findings with multiple hyperdense spots should prompt suspicion and inquiry regarding the history of Lipiodol use.

Patient consent

Written, informed consent for publication was obtained from the patient

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