Intravitreal Triamcinolone Acetonide Presents a Diagnostic Challenge on Noncontrast Computed Tomography

Kinza T. Ahmad\textsuperscript{a}  Michelle L. Huynh\textsuperscript{a}  Ramakrishnaiah Raghu\textsuperscript{b}  Mohamed Kamel Soliman\textsuperscript{c}  William Henry\textsuperscript{a}  Ahmed Sallam\textsuperscript{a}

\textsuperscript{a}Jones Eye Institute, University of Arkansas for Medical Sciences, Little Rock, AR, USA; \textsuperscript{b}Division of Neuroradiology and Pediatric Radiology, Arkansas Children’s Hospital, Little Rock, AR, USA; \textsuperscript{c}Department of Ophthalmology, Faculty of Medicine, Assuit University, Assuit, Egypt

Keywords
Triamcinolone acetonide · Intravitreal injections · Computed tomography · Imaging

Abstract
Triamcinolone acetonide (TA) is a widely used corticosteroid for various ophthalmological indications. We report a case of a 27-year-old female presented with upper eyelid edema and punctate corneal erosions and haze of the left eye, 1 week after pars plana vitrectomy with silicone oil (SO) tamponade and intravitreal TA for diabetic tractional retinal detachment. The condition persisted despite topical and systemic therapy. Computed tomography (CT) scan of the orbits was obtained to exclude postoperative SO migration. The scan showed a hyperintense lesion in the vitreous cavity of the left eye with no SO migration. The radiographic appearance of the lesion mimicked a foreign body; however, history and recent operative note excluded this possibility. A CT scan of various TA preparations revealed that the lesion’s density is similar to those of TA. Improvement of corneal haze confirmed that the lesion was consistent with intravitreal TA. The patient developed eyelid edema of the right eye and later was diagnosed with nephrotic syndrome after further investigation. In conclusion, it is important to be familiar with the radiographic appearance of TA on CT to avoid incorrect diagnosis.

Presentation: The abstract for this manuscript was accepted for a poster presentation at the Women in Ophthalmology Meeting, August 20–23, 2020, Amelia Island, FL, USA.
Introduction

Triamcinolone acetonide (TA) is a corticosteroid with a wide range of uses in ophthalmology, including treatment of several types of chorioretinal diseases [1]. Following intravitreal injection, TA can persist in the vitreous cavity for over 4 months [2]. It is also used surgically to stain the vitreous during vitrectomy to allow enhanced visualization [3, 4]. To our knowledge, there is no published literature on the radiologic properties of intravitreal TA. Familiarity with the radiographic properties of injectable pharmacologic agents is important to avoid misdiagnosis. We report a case that posed a diagnostic challenge due to the peculiar radiographic appearance of TA.

Case Presentation

A 27-year-old female with uncontrolled type 1 diabetes mellitus received a left pars plana vitrectomy procedure for complex tractional diabetic retinal detachment. During the surgery, diluted TA (10 mg/mL) was used to stain the vitreous and tractional membranes. At the conclusion of the procedure, 4 mg in 0.1 mL of TA (Triesence®; Alcon, Ft. Worth, TX, USA) was administered into the silicone oil (SO) filled (1,000 cs) vitreous cavity to help decrease postprocedural inflammation.

Left upper eyelid edema and moderate punctate corneal erosions were observed at the 1-week postoperative visit. Her intraocular lens implant (IOL) was secured in place. The posterior segment view was hazy due to corneal pathology. She was prescribed erythromycin ointment but returned after 5 days with worsening of the eyelid edema. She was then prescribed 40 mg of oral prednisone, but there was no improvement at the 10-day follow-up; a noncontrast computed tomography (CT) scan of the orbits was obtained to evaluate for possible postoperative SO migration. The CT scan showed a hyperintense lesion in the posterior segment of the left eye with bilateral pre-septal soft tissue swelling (Fig. 1a). No SO was observed in the orbit or eyelid. Because of its oval and hyperattenuating appearance, the lesion in the CT scan initially seemed to resemble an IOL implant that dislocated posteriorly into the vitreous cavity (Fig. 1a). The Hounsfield unit (HU) provides a quantitative scale for measuring radiodensity of tissues or objects. The radiographic attenuation of the lesion was determined to be 351 HU, while our patient’s contralateral eye IOL implant was 26 HU (Fig. 1a). This was also different from the intraocular SO present in the same eye that was much less hyperattenuating and measured 79 HU. We suspected that TA may be responsible for the hyperintense lesion on CT scan, thus we conducted a noncontrast CT scan to determine the density of various TA preparations. We found that Triesence ranged between 242 and 330 HU (Fig. 1b), which was within the margin of error of the lesion’s density (351 HU). The following day, the patient presented to the emergency room with new onset right eyelid edema (Fig. 2). She also had accompanying dyspnea, cough, and fever. The patient was diagnosed with nephrotic syndrome after being admitted to the hospital for further investigation. Her eyelid swelling resolved after diuresis with intravenous furosemide during her 5-day admission.

Discussion

Our case highlights the peculiar radiographic appearance of TA. In comparison to SO that has been shown to be hyperdense relative to the extraocular muscles but hypodense relative to the orbital bone, and has as attenuating measure of 130 HU or less [5], we found that TA is
more hyperattenuating (similar to bone) and ranges between 242 and 330 HU. Due to poor view of the fundus, it was difficult to distinguish the lesion that was revealed on CT scan, and it was thought to be responsible for the patient’s unusual postoperative course. The radiographic appearance of the lesion in the vitreous cavity mimicked a dislocated IOL or foreign body [6]. However, the later complications were ruled out based on the absence of history of recent trauma, slit-lamp examination, and unremarkable operative record. Fundus examination after improvement of the corneal haze confirmed that the lesion on CT scan corresponds to TA precipitate.

Intravitreal triamcinolone can present a diagnostic challenge in the setting of radiologic imaging of the orbit. Therefore, it is important to be familiar with the radiographic appearance of TA on noncontrast computed tomography to avoid incorrect diagnosis.

**Statement of Ethics**

The authors have no ethical conflicts to disclose. Written informed consent was obtained from the patient for publication of this case report and any accompanying images. This study protocol review and approval were waived by the University of Arkansas for Medical Sciences Institutional Review Board (policy 1.4; section D).

**Conflict of Interest Statement**

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.
Funding Sources

The authors have no funding support to disclose.

Author Contributions

Kinza T. Ahmed: design of the work and drafting the work. Michelle L. Huynh: acquisition, analysis of data, and drafting the work. Ramakrishnaiah Raghu: acquisition, analysis of data, and drafting the work. Mohamed Kamel Soliman: revising the content and final approval of the version to be published. William Henry: acquisition, analysis of data, and drafting the work. Ahmed Sallam: design of the work, revising the content and final approval of the version to be published.

Data Availability Statement

All the data that were used to present this case report are included in this article. Further enquiries can be directed to the corresponding author.

References

1 Jonas JB, Kreissig I, Degenring R. Intravitreal triamcinolone acetonide for treatment of intraocular proliferative, exudative, and neovascular diseases. Prog Retin Eye Res. 2005;24(5):587–611.
2 Vedantham V, Kolluru C, Ramasamy K. Persistent depot of triamcinolone acetonide after a single intravitreal injection. Indian J Ophthalmol. 2005;53(1):65–6.
3 Sakamoto T, Miyazaki M, Hisatomi T, Nakamura T, Ueno A, Itaya K, et al. Triamcinolone-assisted pars plana vitrectomy improves the surgical procedures and decreases the postoperative blood-ocular barrier breakdown. Graefes Arch Clin Exp Ophthalmol. 2002;240(6):423–9.
4 Peyman GA, Cheema R, Conway MD, Fang T. Triamcinolone acetonide as an aid to visualization of the vitreous and the posterior hyaloid during pars plana vitrectomy. Retina. 2000;20(5):554–5.
5 Nojima T, Obara T, Tsukahara K, Naka A, Naito H. Unrecognized orbital images cause diagnostic confusion: silicone oil and implanted silicone encircling bands. Case Rep Emerg Med. 2021;2021:9940395.
6 Seigle RS, Sell J, Magnus DE. CT appearance of traumatic dislocated lens. AJNR Am J Neuroradiol. 1988;9(2):390.