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Inadvertent Corneal Intrastromal Injection of Trypan Blue and Air, During Cataract Surgery

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Abstract: *Trypan Blue used to stain the anterior capsule in the step of capsulorrhexis inadvertently stained the cornea intrastromally in a 44-year-old male patient. It resulted in pockets of blue dye and air in the corneal stroma. Case was postponed in view of poor visibility for performing further steps. Stromal edema and bluish discoloration almost completely disappeared on 15th day following conservative management with topical antibiotic-steroid, sodium chloride eye drops, and cycloplegics. The patient was operated after 15 days and had a good postoperative vision. This was a rare complication of cataract surgery that occurred due to improper paracentesis, when Trypan Blue was injected under air bubble by placing the cannula at the edge of the wound.*

Keywords: *anterior capsule, capsulorrhexis, paracentesis, stromal edema, trypan blue*

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I. Introduction

"Trypan Blue is a vital diazo dye used to stain anterior capsule of the lens while doing capsulorrhexis in cataract surgery," [1]. Being bulky and highly negatively charged stain, it does not cross the intact plasma membrane barrier in live cells. The dye penetrates the dead cells and binds to intracellular proteins, thereby imparting the blue color. "Trypan blue is much superior to fluorescein as fluorescein is a smaller molecule that diffuses in lens and vitreous," [2]. The dye stains the anterior capsule by dye exclusion method. The dye can be injected into the anterior chamber beneath the air bubble. This allows the formation of dye lake and prevents the dilution of dye by aqueous, facilitating better staining of peripheral anterior capsular rim and lack of contact with corneal endothelium. We have reported a case where dye as well as air inadvertently got injected into corneal stroma.

II. Case Report

A 44-year-old male driver by occupation presented with a history of painless progressive diminution of vision in left eye for six months. At presentation, the best corrected visual acuity in the left eye was 20/125. Hence, the patient was posted for cataract surgery in left eye. During surgery, the side port was made at 2 o'clock via 3.2 mm Angled Keratome and Trypan Blue [0.06%] was injected under air bubble. Immediately, bluish discoloration of cornea was noted, along with the air bubbles in corneal stroma involving the pupillary area obscuring the fundal glow; hence, the case was postponed [fig. 1]. The paracentesis was extended by fully introducing the Keratome and a thorough anterior chamber wash was performed. The case was closed. The following day, vision in left eye was hand movements close to face. On slit lamp examination, cornea showed diffuse stromal edema and bluish discoloration. However, stromal air pockets disappeared within 24 hours [fig. 2 and 3]. Corneal endothelium could not be evaluated due to stromal edema. Iris details were hazy. Lens showed lenticular opacity with blue staining of anterior lens capsule. There was absence of red fundal glow. Intraocular pressure measured by applanation tonometry was 10 mmHg. However, it may not be reliable due to corneal edema as it can give a falsely low reading but intraocular pressure measured digitally was also normal. The patient was started on antibiotic-steroid eye drops two hourly, cycloplegics thrice a day, and 5% sodium chloride eye drops five times a day. On follow-up, after five days, vision improved to finger counting up to 3 meters. The bluish discoloration and stromal edema was much reduced [fig. 4]. On the 15th day, bluish discoloration had disappeared completely but mild stromal haze persisted. Vision recorded was 20/200 and intraocular pressure by applanation tonometry was noted to be 12 mmHg. The patient was operated after 15 days. Intraoperative and postoperative course was uneventful [fig. 5].

III. Discussion

"Trypan Blue is used to enhance the visualization of the anterior capsule during cataract surgery in cases of white cataract and cataracts with corneal opacity," [3]. Staining of anterior capsule is necessary where red reflex is poor or the visualization of capsule is compromised as in cases of asteroid hyalosis, corneal edema, scarring, and dark brunescent nucleus. Also, it can be used by beginners in cases of immature cataract to better outline the capsulorrhexis margin.

"Trypan Blue has been used for staining epiretinal membrane and internal limiting membrane in cases of vitreoretinal surgery," [4,5,6,7].

A 0.025% concentration has been reported to be safe without endothelial toxic effects. "Higher concentration has been found to be associated with impairment of hexagonal structure of corneal endothelial cells and intercellular junction and its staining. There were disorganization of inner retinal layers at concentration of 0.15% and 0.25%," [8].

"Some authors have reported inadvertent staining of intraocular lens and posterior capsule," [9, 10]. In our case, Trypan Blue along with the air got inadvertently injected in corneal stroma; however, corneal status improved within 15 days with conservative management. Corneal staining could be due to improper paracentesis [size as well as depth], wrong site of injection. In our case, small wound size and large bore cannula led to improper placement of cannula at the edge of the wound. Injection at this stage gave rise to stromal hydration, stromal staining, and separation of stroma by multiple air bubble pockets.

IV. Figures

Fig. 1

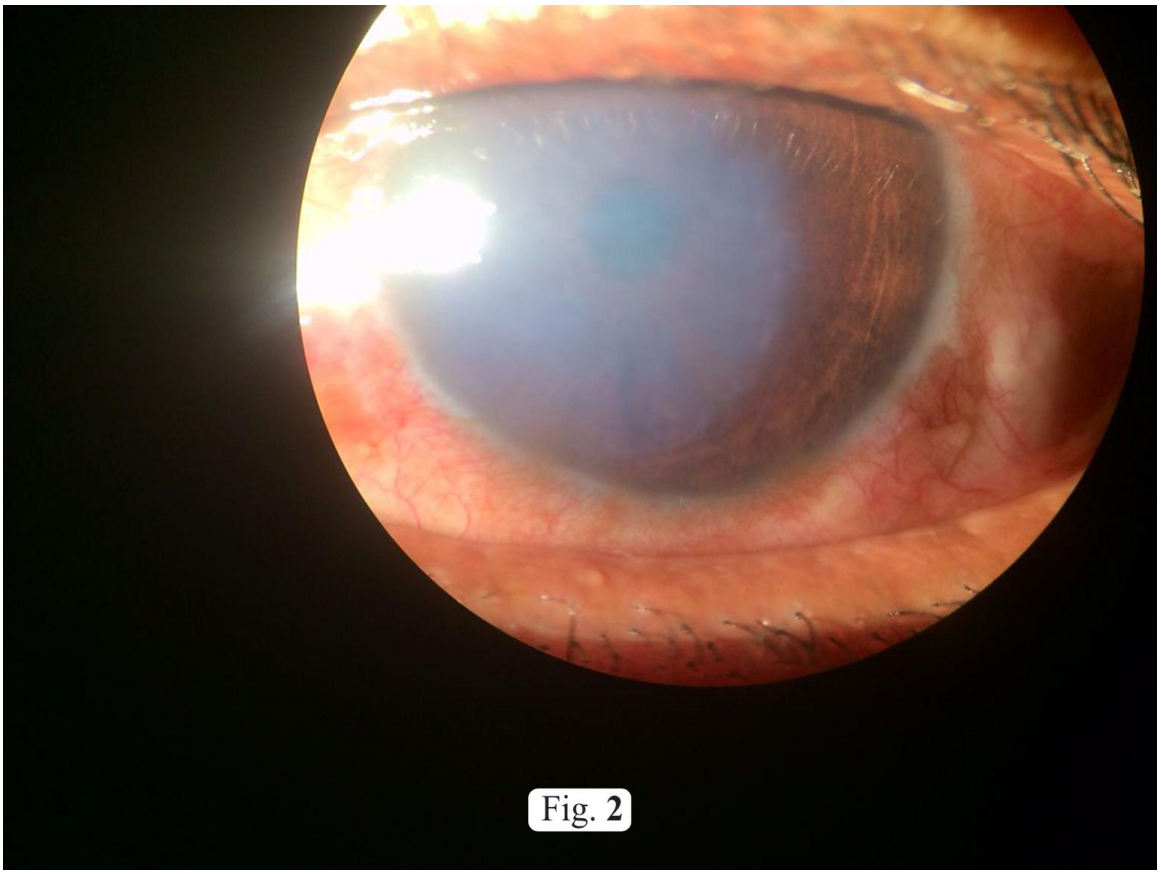

Fig. **2**

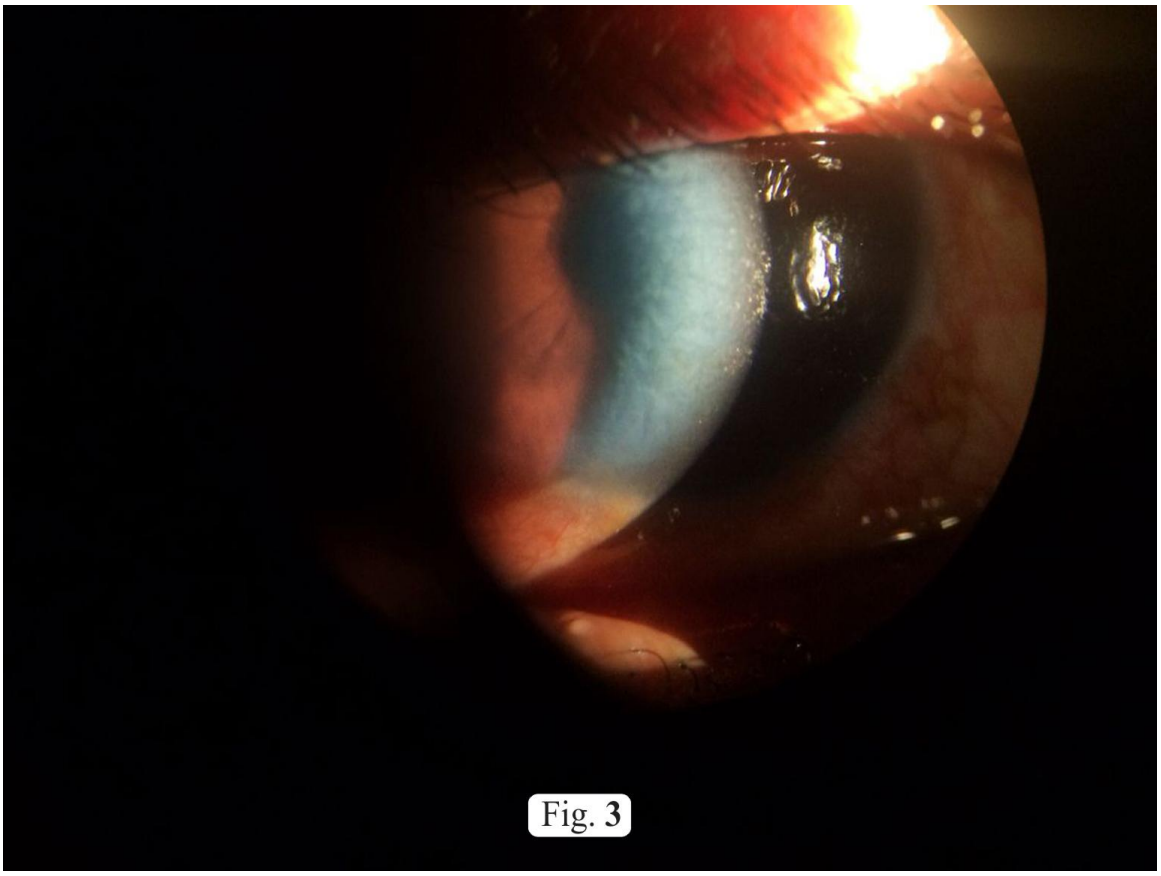

Fig. **3**

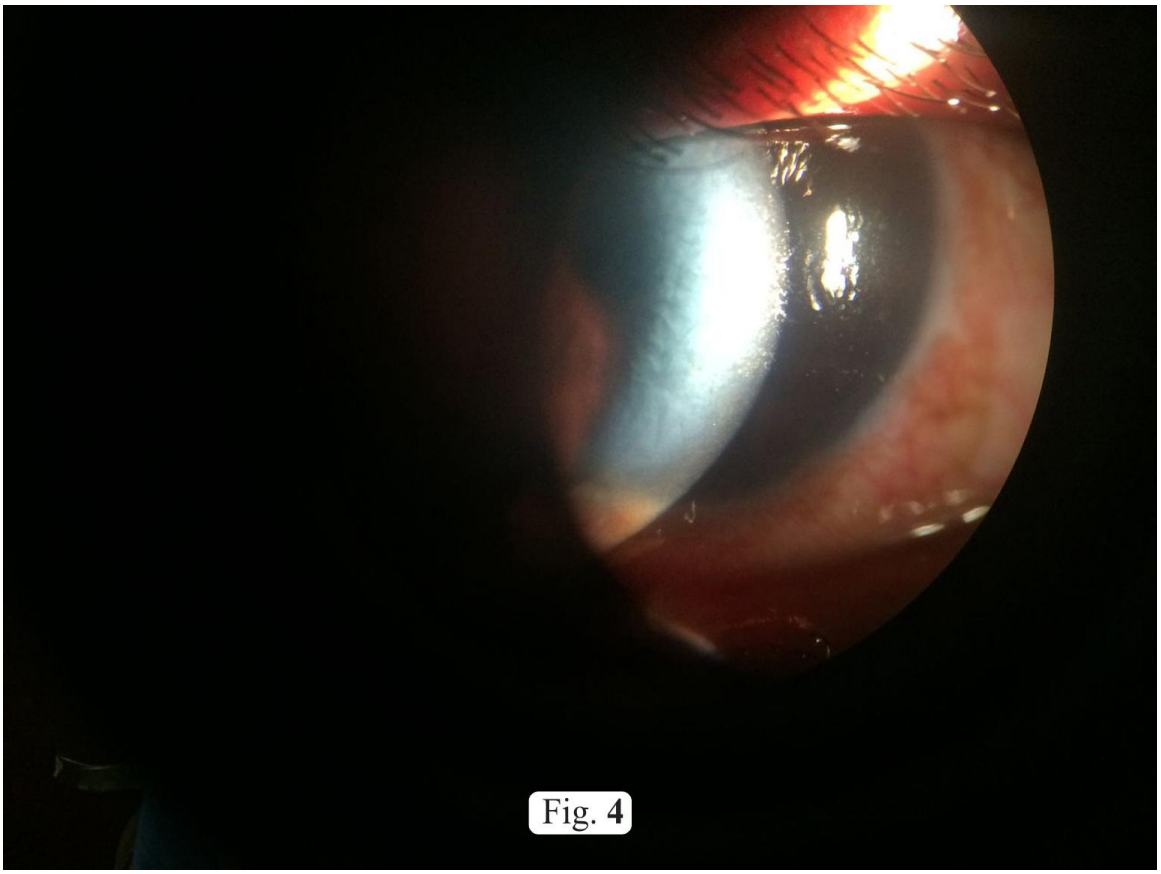

Fig. **4**

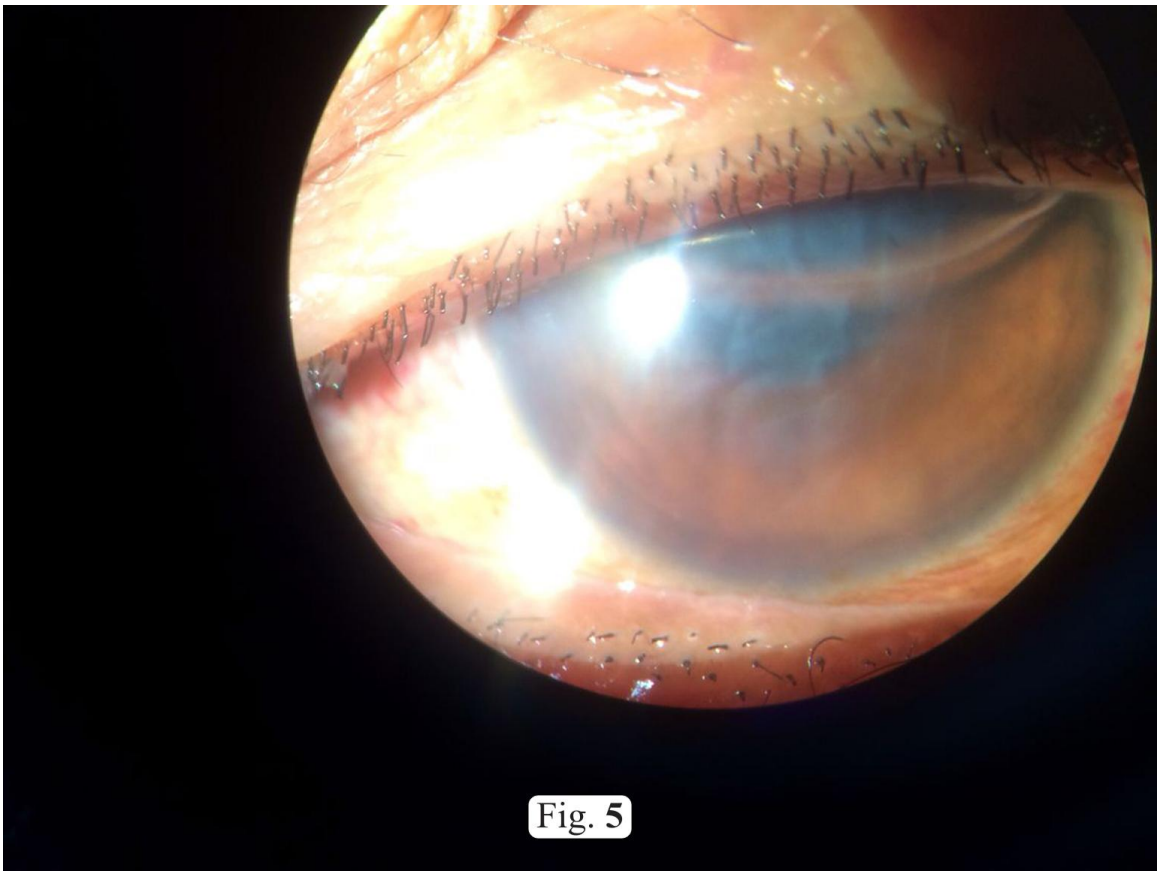

Fig. **5**

V. Conclusion

Our case emphasizes that there should be full-thickness paracentesis with sharp keratome and the tip of the cannula should be visible in anterior chamber while injecting the dye. This step should not be taken lightly as one would not know whether injection has occurred in anterior chamber or in stroma.

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