*Case report*

# Accidental sub-retinal migration of TrypanBlue during pars plana vitrectomy in a human eye

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## Introduction

An epiretinal membrane (ERM) is a transparent, avascular, fibro-cellular structure that develops on or above the retinal surface. Contraction of the membrane leads to visual symptoms primarily due to retinal wrinkling and distortion of foveal anatomy. Although mild cases may be asymptomatic, significant membranes cause blurring of vision and metamorphopsia. Surgical removal of the membrane via pars plana vitrectomy is indicated in such cases to eliminate visual distortion. Visual improvement commonly does not occur for several months after surgery.

TrypanBlue (0.18%) is an azo dye used in surgery for reversible staining of the ERM[1]. The dye does not cross living cell membrane. Its osmolality is equal to the extracellular fluid (300 mOsmol/kg) and is denser than water. There have been several reported cases of chorioretinal atrophy and retinal thinning following accidental sub-retinal migration of TrypanBlue[2,3,4,5]. Another study has mentioned no toxicity if contact is short lived[6]. We report a case of sub-retinal migration of TrypanBlue during vitrectomy for an ERM and steps taken to mitigate toxicity.

## Case report

A 67 year old Welsh gentleman presented to the eye department with a 5 year history of visual deterioration in his right eye. He was concerned about recent onset metamorphopsia. His Best Corrected Visual Acuity (BCVA) was 6/24 in the right eye and 6/6 in the left eye. Anterior segment examination showed mild cortical cataract in both eyes and intra ocular pressures were normal. Posterior segment examination revealed a cellophane reflex over the right macular area extending to the supero-temporal retina. The OCT of the affected area confirmed the presence of an ERM in the form of a hyper-reflective layer and increased central foveal thickness of 382 microns. There was no clinically detected retinal break or a Posterior Vitreous Detachment (PVD). The left fundus appeared normal.

Standard 23G three port pars plana vitrectomy was performed. Following separation of the posterior hyaloid, the ERM was stained using TrypanBlue 0.18% (Figure 1). During attempted removal of the dye, a three-disc diameter area of sub-retinal dye was noted the infero-temporal to the fovea (Figure 2). A retinal break was suspected. Attempted removal of sub-retinal due using a silicone tipped flute needle failed. ERM was successfully peeled. Air fluid exchange was performed followed by SF6-air exchange (Figure 3). Patient was instructed to maintain a face down posture.

On the first post-operative clinic visit 2 days after surgery showed an attached retina, 75% gas fill and a faint blue area in the infero-temporal retina. A week later, visual acuity was 6/36 with no distortion. Ocular coherence tomogram (OCT) revealed a retinal break infero-temporal to the fovea but no sub-retinal fluid (Figure 4). OCT also confirmed the absence of an ERM. Vision had improved to 6/18 with no distortion after one month. Retinal examination including red free photography showed no visible retinal changes at the site of previous sub-retinal TrypanBlue. Post-operative OCT across the area of retinal break showed spontaneous closure of retinal break (Figure 5). After one month of surgery, OCT across the same area showed spontaneous closure of the retinal break (Figure 5).

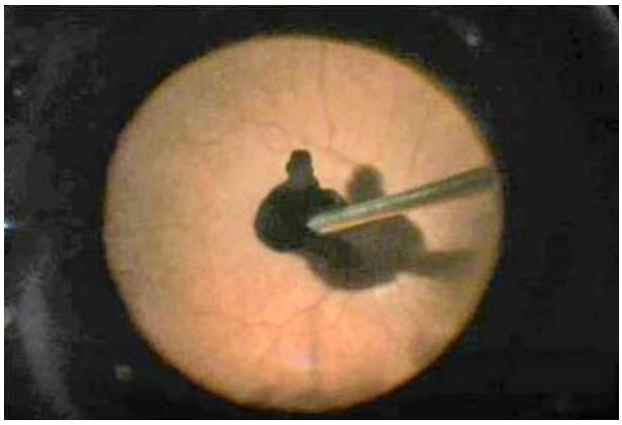

**Figure 1.** *Staining of epiretinal membrane in right eye.*

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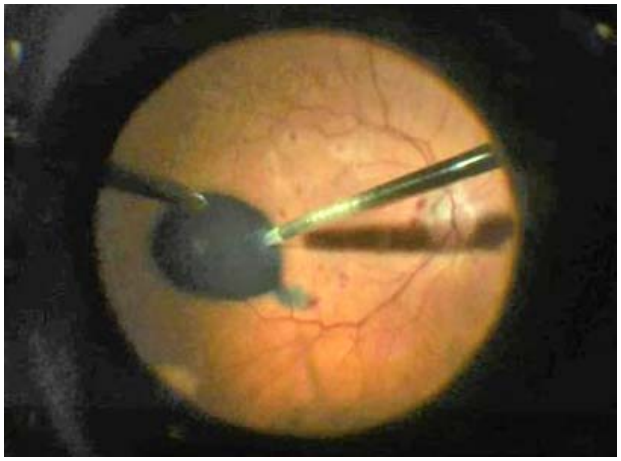

**Figure 2.** *Sub-retinal TrypanBlue – attempted removal with silicone tipped flute needle.*

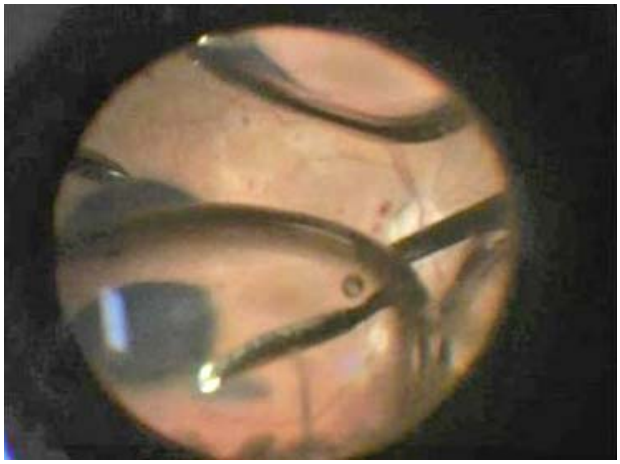

**Figure 3.** *Fluid air exchange.*

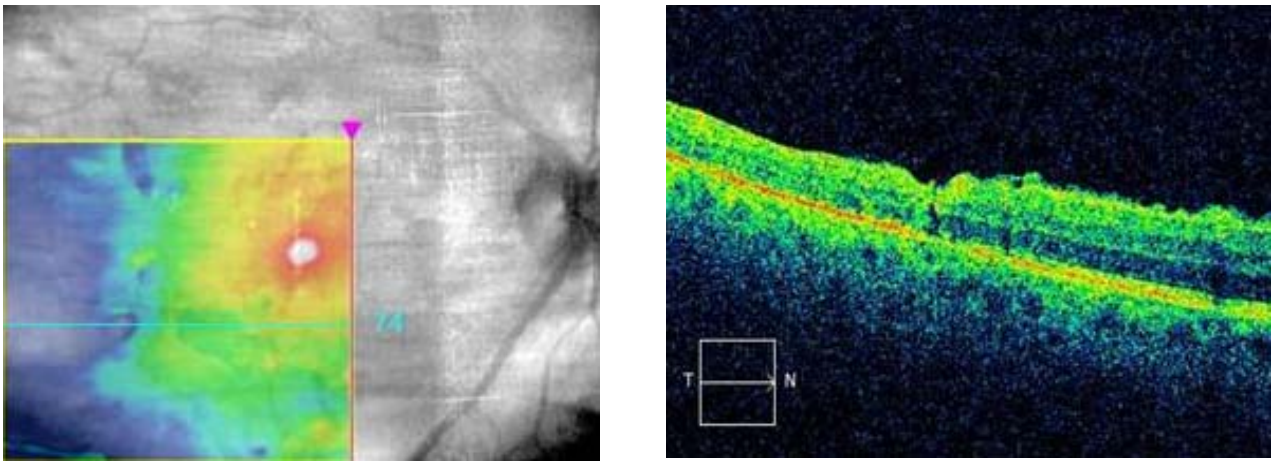


**Figure 4.** *Post-operative OCT showing retinal break infero-temporal to the fovea with no sub-retinal dye.*

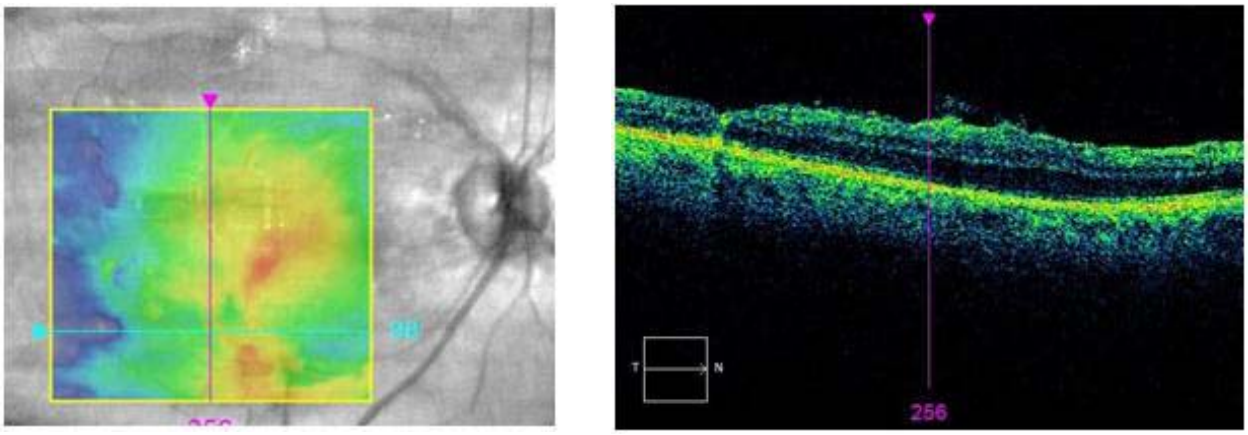


**Figure 5.** *OCT across the area of sub-retinal TrypanBlue after one month of surgery showing spontaneous closure of retinal break.*

## Discussion

Reversible staining with TrypanBlue is useful in identifying ocular tissues such as ERMs[1]. Retinal toxicity due to Indocyanine Green has been well documented. The effect of sub-retinal migration of TrypanBlue was first described by Uno et al.,[2] in 2006 where retinal pigment epithelial changes were noted corresponding to the area of sub-retinal dye. Fluorescein angiography showed a window defect. Various mechanisms were postulated including mechanical trauma, localised retinal detachment caused by sub-retinal dye, chemical toxicity of the dye or possible enhanced endo-illuminator induced photo toxicity due to the photodynamic properties of the dye.

In a subsequent interventional study, sub-retinal injection of 0.15% TrypanBlue had successfully been used to identify retinal breaks. Jackson et al.,[6] describe 5 cases of rhegmatogenous retinal detachment where it was not possible to identify a retinal break intra-operatively. Injection of TrypanBlue into the sub-retinal space followed by flattening of the retina with perfluorocarbon liquid helped identify the break by visualising the site of egress of TrypanBlue into the vitreous cavity. The authors concluded that short term contact is not harmful[6].

However, several subsequent case reports have demonstrated chorioretinal atrophy following inadvertent sub-retinal migration of TrypanBlue during surgery for macula holes and ERMs[3,4,5]. Studies done in animals highlight sub-retinal TrypanBlue results in significant histological damage to the neurosensory retina and RPE[9,10].

A review of our video recording in this case showed that while injecting the dye, the tip of the cannula was within the dye (Figure 1). Therefore it was not possible to identify whether the tip was abutting the retinal surface. We suggest that the injecting cannula should be well away from the retina. Furthermore, the injection should be slow. One must avoid producing a jet stream which could possibly result in iatrogenic retinal breaks. Retinal break was confirmed on OCT in our case. The basis of tamponading the retina with gas and maintaining a face down posture was to permit the sub-retinal dye to escape from the retinal break thereby minimising contact time with the sub-retinal space. It was also interesting to note subsequent spontaneous closure of the retinal break.

We acknowledge that although there were no clinically discernible changes in the retina, fluorescein angiography, microperimetry or electrodiagnostic testing may have picked up subtle retinal changes that were not readily visible.

## References

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