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# Intraoperative Corneal Incision Evaluation with Trypan Blue Technique

***Ozcan Kayikcioglu[1], Sinan Bilgin[2]* and Mahmut Oguz Ulusoy[1]***

[1]*Department of Ophthalmology, Faculty of Medicine, Celal Bayar University, Manisa 45000, Turkey*

[2]*Department of Ophthalmology, Faculty of Medicine, Sifa University, Izmir 35290, Turkey*

***Corresponding author:** *Sinan Bilgin, Department of Ophthalmology, Faculty of Medicine, Sifa University, 103/1 sk. No:3 35290 Goztepe, Izmir, Turkey, Tel: +905054321725, Fax: +902324442002, E-mail: drsinanbilgin@yahoo.com*

## Abstract

In this report, we aimed to determine wound leakage by instillation of trypan blue onto main incision and side port incisions during phacoemulsification surgery with clear corneal incision technique. Thirty-four eyes with cataract of 34 patients, who were operated by phacoemulsification method were included in the study. Incision points were hydrated by balanced saline solution and leakage was controlled at the end of the surgery. Trypan test revealed minor leakage in 23 out of 34 eyes (67.6%). All of these leakages occurred at the side-port incisions. Trypan blue technique based on the logic of Seidel test seems to be an effective and simple method for demonstrating unnoticed wound leakages.

## Keywords

Corneal incision, Phacoemulsification, Trypan blue, Wound leakage

## Introduction

Phacoemulsification surgery is a method which requires small incision and leads to lesser wound site problems compared to surgical procedures with larger incisions [1]. In this method, side insertions are hydrated, the main insertion hole heals spontaneously following clear corneal incision technique. Wound site leakage is a known risk factor for early postoperative complications including shallow anterior chamber and acute endophthalmitis [2]. These leakages are mostly checked by classical methods intraoperatively and the surgery is finalized in case of non-leakage. The aim of our study was to determine leakages by trypan blue instillation onto main and side insertion holes after phacoemulsification surgery.

## Patients and Methods

The observational case series included 34 eyes with cataract of 34 patients. All patients underwent routine phacoemulsification with clear corneal incision and all had a posterior chamber intraocular lens (PCIOL) implantation with injection through the main incision. In this procedure, side port incisions were made by 20-gauge MVR/stiletto and main incisions were made by 3.0 mm keratome. All of the incisions were hydrated by balanced saline solution at the end of the procedure. Anterior chamber stability was controlled visually. Then incisions were controlled for leakage with the help of a cotton swab. When a leakage was observed, corneal stroma were hydrated until the leakage stopped. When there was no leakage observed, trypan blue was instilled onto main and side insertion holes for final leakage control. A leakage was defined as a clear line in blue background clearance of the dye on aqueous surface (Figure 1). After the test, trypan blue was irrigated from surface by balanced saline solution.

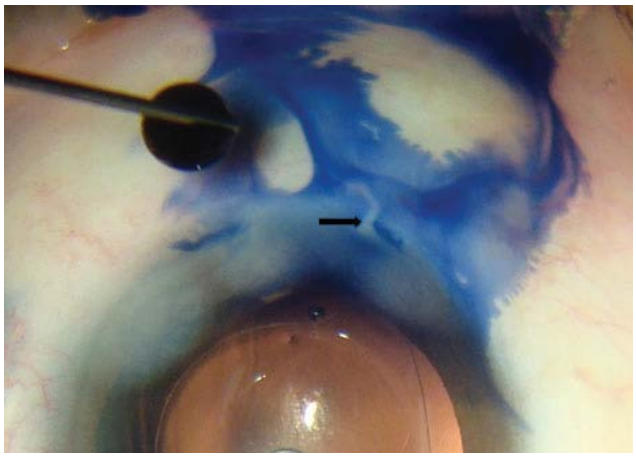

**Figure 1:** This intraoperative photograph reveals leakage of aques from the side port incision, visible on application of trypan blue. Clear fluid is distinctly seen streaming into a pool of trypan blue.

## Results

Of the studied eyes, 13 were right eye and 21 were left eye. Trypan test revealed leakage in 23 of the 34 eyes (67.6%). All leakages occurred from the side-port incision sites. Leakage was determined from both incision points in 9 eyes, from nasal side incisions in 6 eyes, and from temporal side incisions in 8 eyes. None of the patients showed leakage from the main incision sites. Considering the total wound sites, leakage occurred from 26 of the 102 (25.4%) wound sites. Trypan blue did not enter anterior chamber in any of the patients.

## Discussion

Wound site leakage is the leading etiological factor for development of toxic anterior segment syndrome (TASS), and of endophthalmitis, the most serious complication of cataract surgery [2]. It has been shown in many studies, surface liquids may enter into globe because of intraocular pressure alterations [3,4]. Srinirvasan *et al.* reported anterior chamber contamination in 46% of the patients [5].

Wound integrity may vary as a function of intraocular pressure. The clear corneal wound remains self-sealing if the intraocular pressure exceeds a certain threshold, exerting an outward force on

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the cornea thereby sealing the wound [6]. Whether leakage occurs passively through wound leaks or actively via the squeezing action of the upper lid on the globe or both is not known with any certainly. Also not only may these wound leaks serve as a portal of entry for pathogens and toxic substances but the resulting reduced intraocular pressure may also drop below the threshold enabling gaping of the unhealed wound [6].

Chee *et al.* in their study, used 5% povidone iodine in order to evaluate wound leakage and suggested that this method was effective for determining wound leakage. In addition, they stated that leakage is high when the corneal main incision is short, and wound site stability is high when the tunnel is long and incision is square shaped [7]. In our study, a 2 mm main insertion hole parallel to iris plane was made by using 3 mm keratome in all patients by the same surgeon. None of the patients showed leakage from the main insertion holes.

Use of cellulose sponge is another frequently practiced method, but this is a contact technique and the product is required solely for the purpose of testing wound integrity. Use of trypan blue to aid visualization of wound leakage is, in principle, similar to the Seidel's test, which employs a strip of fluorescein, applied to the wound. Both test are positive when the dye is washed away from the wound by egress of aqueous. This technique has a few advantages over the use of fluorescence. For instance, we use trypan blue routinely for capsula staining so there is a source of trypan blue ready to be used. Secondly blue contrast shows leakage readily without use of cobalt blue light for floresence.

In conclusion, this observational series suggest that small wound leakage, especially from the side-port incision, may occur in a large number of eyes and remain asymptomatic. Although these micro leaks are of not high significance in routine cases but in case of high risk for infection as in blepharitis, surgeon should be more careful and spend more time on wound construction and sealing. Trypan blue technique based on the logic of Seidel test seems to be an effective and simple method for demonstrating unnoticed wound leakages, and this non- touch technique can be used to detect even minor wound leakage more readily and more distinctly.

## Statement of Ethics

This case report description followed the Helsinki Declaration criteria, and written informed consent was obtained from the patient for publication of this article and any accompanying images. The Institutional Review Board and Ethics Committee ruled that approval was not required for this study.

## Disclosure Statement

Each author warrants that he/she has no commercial associations that might pose a conflict of interest in connection with the submitted article.

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