



**ORIGINAL RESEARCH PAPER**

**Ophthalmology**

**A CLINICAL STUDY OF TRYPAN BLUE DYE ASSISTED CAPSULORHEXIS IN CATARACT SURGERY**

**KEY WORDS:** Cataract, Trypan, Anterior

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**ABSTRACT**

From the past several years there have been dramatic improvement in the methods of cataract surgery. The refined micro-surgical procedure needs an adequate and perfect anterior capsule opening. In this study the efficacy of 'Trypan Blue' in cataract surgery is evaluated. Methodology: Total of 100 cases of cataract was included. They were divided into two groups 1<sup>st</sup> control group (50cases) where no dye was used and 2<sup>nd</sup> group (50cases) where Trypan Blue was used. All the data were summarized and analysed. Result & Conclusion: The CCC could be completed in 96% cases in Trypan Blue group as compared to only 76 % in the control group. Trypan Blue stains only the anterior capsule and enhances its visibility and makes capsulorhexis easier. Improves cortical clean up and IOL Implantation.

**INTRODUCTION:**

From the past several years there have been dramatic improvement in the methods of cataract surgery from ICCE to phacoemulsification. For this refined micro surgical procedure there is a need for an adequate and perfect anterior capsule opening. The old capsulotomy techniques were adequately fulfilling the aim of removing the central part of anterior capsule with a disadvantage of peripheral tear. This difficulty was overcome with the advent of continuous curvilinear capsulorhexis (CCC) by Gimbel HV(1), that enabled us to perform In-the-Bag phacoemulsification and In-the-Bag IOL implantation. Thus CCC has become the ideal anterior capsulotomy for planned ECCE and phacoemulsification CCC also offers other advantages such as better cortical clean up and hydro-procedure, long term centration of IOL etc. The poor visibility in mature and hypermature cataract causes irregular capsule tearing which is difficult to control. To aid in achieving the ideal capsulotomy in such cases various techniques have been described such as endoillumination, coaxial illumination, radio-frequency diathermy, haemocolouration etc. Staining of the lens capsule with various dyes is another alternative. Dye such as fluorescein, methylene blue, indocyanine green, trypan blue etc have been used for staining the anterior capsule. Trypan blue is proved to be the most effective, safe and acceptable dye for capsulorhexis, used by almost all the surgeons in white cataract and especially by beginners for learning surgical steps easily and safely. In this study we want to evaluate the efficacy and safety of one such dye "Trypan Blue" in cataract surgery.

**AIMS & OBJECTIVE:**

To study the effect of staining of anterior capsule by Trypan Blue on performing CCC.

To study the intra operative and post operative complications of Trypan Blue.

To assess surgical advantages of Trypan Blue in performance of capsulorhexis in white cataracts.

**MATERIAL & METHOD:**

This prospective study was conducted in the Department of Ophthalmology GRMC, Gwalior (M.P.) and AIMS, Bangar, Dewas (MP).

100 consecutive cases of cataract were divided in to two groups of 50 cases each. 1<sup>st</sup> Control group- No dye used for CCC and 2<sup>nd</sup> Trypan Blue group- Dye used for CCC.

Pre operative evaluation: Patients were admitted 24 hours prior to surgery and a complete ophthalmic and systemic examination was done. Preoperative corneal curvature was recorded. A-scan biometric analysis was done to calculate the

IOL power. Detailed fundus examination of the other eye for reference was done. Patients were prepared for surgery and maximum mydriasis was achieved. An informed written consent was taken.

Patients with corneal decompensation, increased intraocular pressure, uveitis and subluxated lens were excluded.

Surgical Steps: Wire lid speculum was applied and superior rectus suture was given. Fornix based conjunctival flap was made to expose the sclera at the site of tunnel incision usually at 12 o'clock position. A 2.8 mm corneo-scleral/clear corneal incision was given in Phacoemulsification and Scleral incision of 6-9.00 mm in SICS with PCIOL. A side port was made.

Trypan Blue Staining: 0.1 to 0.2 ml of 0.8/ml concentration Trypan blue was injected over the anterior capsule under the air bubble through the side port incision. After 10 to 30 seconds the anterior chamber is thoroughly irrigated with ringer lactate to wash out the excess dye. Viscoelastic substance was injected in to the anterior chamber and the capsulorhexis was performed.

Capsulorhexis and IOL implantation: With Utrata forceps and in some cases with 26 G needle rhexis is performed. Size of the capsulorhexis was 5-6 mm central and circular. In some cases where the rhexis could not be completed or extended to peripherally, it was converted into a can opener capsulotomy. The blue stain of the anterior capsule at the outline of the capsulorhexis was clearly visible and distinguished from the underlying grayish - white lenticular tissue. After capsulorhexis the internal corneal incision was made with a 3.2mm angled keratome.

A routine gentle hydro-dissection/ hydro-delineation were performed by injecting ringer lactate solution. With stop and chop technique nucleus is aspirated (in Phacoemulsification). Using the viscoexpression technique the nucleus was removed out of the anterior chamber (in ECCE with PCIOL). Irrigation and Aspiration of remaining cortex and epinucleus was removed with the help of the two way simcoe cannula. PCIOL of adequate power was implanted in the capsular bag.

Postoperative Care and follow up: All the patients received post operative medicines. All patients were subjected to visual acuity testing and slit lamp examination. The follow up was done on day 1, 7, 30 and 45 days.

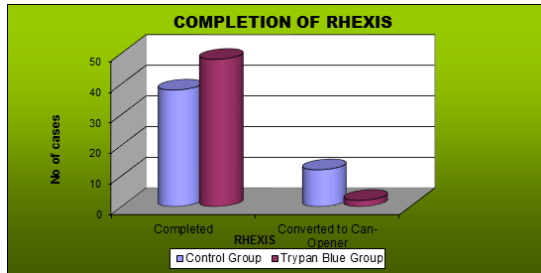
**OBSERVATION AND RESULTS:**

**Table - 1 Completion of Capsulorhexis**

Capsulorhexis	Control Group		Trypan blue group	
	No.	%	No.	%
Complete	38	76	48	96
Incomplete	12	24	2	4
Total	50	100	50	100

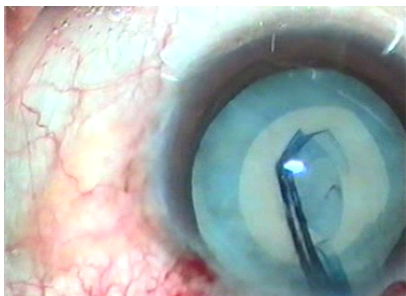
**Complete capsulorhexis was achieved in 76% of the cases in control group and 96% of cases in trypan blue group.**

**GRAPH - 1**



Completion of capsulorhexis is good in Trypan blue group and more number of cases converted to Can-Opener in control group.

**IMAGE - 1**



**CCC (continuous curvilinear capsulorhexis) completed using Trypan blue dye and Utrata forceps**

**DISCUSSION:**

In the present study 60% cases were males and 40% were females in both the groups. Majority of cases in both groups were aging between 51 – 60 years i.e. 36% in the control group 48% in the trypan blue group.

Majority of cases belong to senile mature cataract i.e. 60% in both groups. In control group 16% were senile hypermature, 16% senile immature, 4% traumatic cataract with intact capsule and 4% were developmental cataract. In Trypan Blue group 20% were senile hypermature, 12% senile immature, 4% traumatic and 4% developmental cataract. Thus, majority of cases (84%) had white cataract in control group and 88% in Trypan Blue group.

In our study, about 0.1 cc of 0.8 mg/ml trypan blue was used for 10 seconds. Melles et al<sup>(2)</sup> used 0.1% trypan blue for a few seconds. Agrawal et al<sup>(3)</sup> used 0.06% for a minute or two while Chang YS<sup>(4)</sup> used 0.1% trypan blue for 10-15 seconds. Kothari et al<sup>(5)</sup> also used 0.1% trypan blue for 5-10 seconds. Thus, 0.8mg/ml concentration of the dye used for about 10 seconds is a safe and effective concentration of trypan blue for the purpose of staining the anterior capsule.

Capsulorhexis with Utrata forceps was done in 88% of cases in both groups, while 26G needle was used in 12% of cases in both groups. Capsulorhexis with Utrata forceps was found to be more controlled and safe method because Utrata forceps provided a better hold and control of the flap particularly in the cases where the rhexis had a tendency to escape or where the intralenticular pressure was high as in Intumescent and white cataracts. Most common problem encountered was shallow anterior chamber. In all cases Hydroxypropyl methylcellulose solution (2%) was used for formation of anterior chamber during capsulorhexis. Kothari et al<sup>(5)</sup> used a modified Utrata forcep and had a complete capsulorhexis in 100 % of the cases.

Capsulorhexis could be completed in 76% cases in control

group, and 96% cases in the trypan blue group. This difference was because the staining of the anterior capsule allowed an easy recognition of the blue coloured capsular flap against the white background of the lens matter.

Staining of the anterior lens capsule was done with trypan blue (0.8mg/ml) under a single large uniform air bubble. Melles et al<sup>(2)</sup> advocated the use of an air bubble in anterior chamber with the injection of dye between the air bubble and the anterior capsule to prevent its dilution.

We used only supracapsular staining method in our series and found no difficulty even in hypermature cataracts.

Intra operative problems: Commonest problem encountered in our control group is peripheral extension 24% as compared to 4% in Trypan Blue group comparable with study of Goldman J.M<sup>(6)</sup>. It is more common in mature developmental and traumatic cataracts without staining because of absent red reflex while staining helps in visualizing anterior capsule from rest of the lens and thus made capsulorhexis easier.

Other problems encountered in our study were small capsulorhexis in control group 8% while it was 4% in Trypan Blue group.

An interesting observation we made was that the stained anterior capsule after using trypan blue becomes a little bit crispy and less force is required to initiate the tear for performing CCC.

Trypan blue is known to be a photo-sensitizer so it can make the lens capsule sensitive to light and cause it to stiffen.

**CONCLUSION:**

In cataract surgery the opening of the anterior lens capsule is one of the most critical maneuvers, since an uncontrolled "capsulorhexis" may cause cascade of complications. To better visualize the lens capsule use of a vital dye Trypan Blue has become a world standard technique. The purpose of staining the anterior capsule with Trypan Blue is to enable the surgeon to safely perform a phacoemulsification in particular in the presence of a dense or mature cataract. For many series of dye's, 'Trypan Blue' was chosen because it was most effective in a relatively low concentration, it was known for its biocompatibility with the corneal endothelium and it had been used intra -ocularly without side effects.

Trypan Blue stains anterior capsule as it is a tissue dye that enhances its visibility and makes capsulorhexis easier, improves cortical clean up and IOL implantation. So Trypan Blue is helpful in performing capsulorhexis in mature cataracts with absent red reflex where capsulorhexis is not only difficult but presents with many problems in a controlled manner with less complications intra operatively.

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