



## Original Research Article

## A study on post-operative change in intraocular pressure and anterior chamber depth after retinal detachment surgery

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## ABSTRACT

**Background:** Effect of these procedures on the intra-ocular pressure has not received much attention, so it shall be the endeavour of this study to see how different steps in the surgical procedure for retinal detachment surgery influence the intraocular pressure both on the table and in the immediate post-operative period along with changes induced in the anterior segment.

**Aim & Objective:** We have added an attempt to evaluate the post operative changes in the intra-ocular pressure and anterior chamber depth was analysed.

**Materials and Methods:** The study was conducted in 50 consecutive cases of both phakic and aphakic retinal detachments, attending the retinal services at Dr VRK Womens Medical College & Tertiary Hospital during the year June 2018 – May 2019.

**Results:** The preoperative and immediate post operative intra ocular pressure and anterior chamber depth were measured and serial changes tabulated and analysed.

**Conclusion:** We conclude that, No significant change in anterior chamber depth and width of the angle of the anterior chamber is observed.

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### 1. Introduction

Current surgical treatment of retinal detachment is cryopexy with scleral indentation by local buckle/encircling/combination of both with or without sub-retinal fluid drainage. Here I have studied 3 procedures with SRF drainage.

These procedures alter the anatomical configuration of the globe, and there by affect. 1. Intra-ocular pressure. 2. Anterior chamber depth 3. Scleral rigidity.

The intra-ocular pressure rises, the scleral rigidity decreases and the depth of AC decreases if no SRF drainage is done after these procedures. The AC depth does not change if SRF drainage is done in other procedure.<sup>1-4</sup>

Effect of these procedures on the intra-ocular pressure has not received much attention, so it shall be the endeavour of this study to see how different steps in the surgical procedure for retinal detachment surgery influence the

intraocular pressure both on the table and in the immediate post-operative period along with changes induced in the anterior segment. We have added an attempt to evaluate the post operative changes in the intra-ocular pressure and anterior chamber depth, in 50 consecutive cases of both phakic and aphakic retinal detachments, attending the retinal services at Dr VRK Womens Medical College & Tertiary Hospital during the year June 2018 – May 2019.

The preoperative and immediate post operative intra ocular pressure and anterior chamber depth were measured and serial changes tabulated and analysed.

### 2. Aim of the study

In the case of retinal detachment the intraocular pressure is low. The mechanism lying in it is the retinal detachment is more than one quadrant. When the detachment is secondary to the tumour, haemorrhage or inflammation the intraocular pressure is frequently raised.

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It is stated by Arruga in 1934 that the intraocular fluid will leave through the hole because loss of the continuity of the retina where the retinal hole is present leading to decrease of the intraocular tension. Dobbie in 1963 found that the normal secretion of the aqueous in retinal detachment cases will be decreased.

In this process when the production is reduced and the drainage is through the hole and suprachoroidal space is increased, these two processes will lead to decreasing of the intraocular tension in retinal detachment cases. In retinal detachment surgery the indentation and shortening of the length of the globe will result in reduce in the volume of the globe, this process results in increasing in the intraocular pressure, leading to appearance of the intraocular tension at normal level. In various levels of the surgical procedures the anatomical configuration of the eye will be changed leading to the increasing of the intraocular tension by.

1. Ciliary body and iris lens diaphragm is pushed forwards
2. Obstruction of drainage of aqueous at papillary area and indentation of the sclera leading to aqueous drainage obstruction at that level and change in angle leading to obstruction to aqueous out flow.
3. Post operative edema leading to obstruction to aqueous outflow due to obstruction to the episcleral veins.

### 3. Materials and Methods

#### 3.1. Study population & location

50 consecutive patients of retinal detachment admitted in retinal clinic in Dr VRK Womens Medical College & Hospital. Hyderabad was taken for this study.

#### 3.2. Study period

During period 2018 - 2019.

#### 3.3. Procedure

The retinal breaks were covered with cryopexy procedures

1. An encircling/buckling/both carried out in every case using silicon band sizes 2 - 2 1/2 mm.
2. The thickness of encirclement and local buckle and combination of both the distance from limbus and the shortening procedures were noted. Sub retinal fluid was drained in all the cases.
3. Intraocular pressure was recorded by Schiottz and applanation tonometer (Perkins) and scleral rigidity also measured pre-operatively.
4. Anterior chamber depth is measured by Haag - Streit attachment I & II preoperatively
5. Gonioscopy done pre-operatively

6. Intraocular/Pressure were taken daily in post-operative period with Schiottz tonometer
7. Applanation tonometry being done on 7th post operative day
8. Scleral rigidity determined by using Friedenwald nomogram
9. Anterior Chamber depth also measured with pachometer (i & ii) post operatively on 7th day.
10. Gonioscopy done on 7th post operative day

#### 3.4. Surgery of retinal detachment (encircling/buckling/combination of both)

##### 3.4.1. Principle

The aim of the surgery is to close break to the neurosensory retina by approximating attracted sticking retinal pigment epithelium to break and releasing vitreous traction. If possible the simplest and safest operation with the greatest probability of success should be chosen. In this operation there are four steps are described.

1. Localisation of retinal hole.
2. Cryopexy.
3. Scleral buckling/Encircling/Combination of both
4. Drainage of sub retinal fluid.

Occasionally drainage of large amounts of sub retinal fluid may result in a soft eye which in turn may lead to complications such as choroid detachment. Choroidal haemorrhage and hyphaema in order to avoid these complications saline has to be injected into the vitreous cavity through the pars-plana. Encircling buckles are produced by using a silicon strap of 2 - 2.5 mm width placed on the sclera behind the rectus muscle insertions, and held in position by retaining sutures.

This may be used where the retina detachment is more than one quadrant and no hole is visible, and multiple holes are seen, when the proliferative vitreoretinopathy requiring reduction in intraocular volume to allow retinal reapposition. This may be supplemented by radial sponge, explants are solid silicone tyres when required.

##### 3.4.2. Pre-operative mydriasis

10% phenylephrine and atropine drops.

##### 3.4.3. Anaesthesia

Adults by local anaesthesia, supplemented by pre-anaesthetic medication like injection phentidine and injection phenergan.

Children by general anaesthesia.

##### 3.4.4. Preparation

1. Consent of the patient.
2. Preparation of the eye.
3. Lacrimal test.

4. Draping of the eye.
5. Lid sutures.

#### 3.4.5. Procedures

The conjunctiva is opened by using limbal incision, opens both Tenon's capsule and conjunctiva. Concurrently releasing incisions are made at 3'o' clock and 9'o' clock position. The conjunctiva and Tenon's capsule separated from the sclera.

The rectus muscles are isolated from the tensions capsule. The four rectus muscles are applied with traction sutures, the muscles are not detached from the globe.

The globe is rotated in the required position of the surgeon for reexamination of the fundus with indirect ophthalmoscopy and scleral indentation.

Cryo applied over the sclera corresponding to the retinal break and monitored with the help of indirect ophthalmoscopy. Ice ball formation over the retina is avoided choroidal blanching is the guide line for cryoreaction i.e. optimum reaction.

Scleral buckling/encircling/combination of both done by approximate size explants. This may be a silicone sponge local explant or encircling band. Encircling bands are often supplemented by solid silicone gutter or tyres, radially placed silicon sponges.

Sub retinal fluid drainage: A radial scleral incision is made of approximately 2 - 3 mm in length down to the choroid. A 5/0 non absorbable matters sutures is sutured across, the incision. Sub retinal fluid is drained at desired level by panturing the choroid.

Conjunctiva is sutured at releasing incisions and around the limbus, followed by injection gentamycin is given subconjunctally and pad and bandage green to both eyes.

## 4. Results

The following is brief report of the incidence of rhegogenous detachment and its nature observed during period of one year 1988-89 in this institution

**Table 1:** Total number of out patients

Sex	No. of cases	Percentage
Males	124272	52
Female	94960	38
Children	38100	10
Total	255087	100

**Table 2:** Number of cases diagnosed as retinal Detachment

Sex	No. of cases	Percentage
Males	150	65
Female	90	35
Total	240	100

In the present study, there is a male preponderance

**Table 3:** Ratio of PHAKIC/APHAKIC

	No. of cases	Percentage
Phakic	15	30
Aphakic	35	60

Retinal detachment is more common in aphakic individuals

**Table 4:** Age wise incidence of primary retinal detachment

Age group	No. of Cases	Percentage
5-10	-	-
11-10	-	-
21-30	8	16
31-40	4	8
41-50	4	8
50 and above	34	68

In the present study, series of cases there is 68% of retinal detachment cases are above the 50 years age group.

**Table 5:** Sex incidence

Sex	No. of cases	Percentage
Males	46	92
Female	4	8
Children	-	-

It is more common in males

**Table 6:** Eye incidence

Eye	No. of cases	Percentage
Right eye	33	66
Left eye	17	34

It is more common in right eye

**Table 7:** Incidence of type of retinal detachment & No. of holes

Type of hole	No. of cases	Percentage
Round or oval holes	30	60
Horse-shoe hole	15	30
Dialysis	5	10

Most of the patients i.e. 60% of them are with round of oval holes.

**Table 8:** Tonometry

Level of IOP in mm hg	No. of Cases	Percentage
0-5	10	20
6-10	25	50
11-20	15	30
21-25	-	-

In this series of cases the intra-ocular pressure is pre-operatively (i.e. 10 mm/Hg) in 70% of the cases and it is normal in 30% of the cases.

70 % of the cases are total detachment in those cases the intra-ocular pressure is 4-10 mm Hg. This is low tension.

In 30% of the cases partial detachment is seen in them, the intra-ocular pressure is 10 – 12.2 mm Hg.

**Table 9:** Intra- Ocular recorded 1<sup>st</sup>, 3rd and 7th P.O. period.

Post-operative day	No. of cases	Level of the pressure	Percentage
Ist day	50	17.3-21.9 mm Hg	100
3 <sup>rd</sup> day	25	17.3-19.00mm Hg	50
Dialysis	5	10.2-14.6 mm Hg	100

In this series of cases immediate post-operative day there is a rise of intra-ocular pressure. After 48 hours there is a fall of tension in 50% and came to normal intra- ocular pressure on 7th day in all the cases.

**Table 10:** Scleral rigidity(Before surgery) (Normal sclera rigidity: 0.246-0.0493)

Below Cases	Percentage	Normal Cases	Percentage	Above normal Cases	Percentage
3	6	40	80	7	14

In this series of cases the normal scleral rigidity is noted pre-operatively.

**Table 11:** Scleral rigidity (Post surgery)

Below Cases	Percentage	Normal Cases	Percentage	Above normal Cases	Percentage
50	100	-	-	-	-

Post operatively all the cases have shown (100%) low sclera rigidity.

**Table 12:** Aerior chamber depth (Normal A.C. depth: 2.4 mm-3.2 mm)(Pre-operative)

Phakic A.C Depth	No. of cases	Percentage	Aphakic No. of cases	Percentage
Shallow	5	10	-	-
Normal	15	30	20	40
Deep	-	-	10	20

**Table 13:** Aerior chamber depth (Normal A.C. depth : 2.4 mm-3.2 mm)(Pre-operative)

S. No	A.C Depth	No. of cases	Percentage	No. of cases	Percentage
1.	Shallow	5	10	-	-
2.	Normal	15	30	20	40
3.	Deep	-	-	10	20

Post operatively there is no significant change of anterior chamber depth is observed.

**Table 14:** Aerior chamber depth (Normal A.C. depth : 2.4 mm-3.2 mm)(Post-operative)

S. No	A.C Depth	No. of cases	Percentage	No. of cases	Percentage
1.	Shallow	5	10	-	-
2.	Normal	15	30	20	40
3.	Deep	-	-	10	20

Post operatively there is no significant change of anterior chamber depth is observed.

**Table 15:** GOINOSCOPY

Nature of the angle	No. of cases	%
Open (Grade- (III-IV)	50	100

All the 4 angles of anterior chamber are open pre and post operatively. There is no significant change in width of angle of anterior chamber.

**Table 16:** Visualacuity(Preoperative)

S. No	No. of Cases	Visual acuity	Percentage
1	5	PL	20
2	40	HM	80

**Table 17:** Post operatively on 7th day

S. No	No of cases	Visual Acuity	%
1	5	6/18	10
2	5	6/36	10
3	5	6/60	10
4	25	4 mts.	50
5	10	5 mts	20

**Table 18:** Intra-ocular pressure in relation to extent of theretinal detachment

S.No	Retinal detachment	IOP mm Hg	No. of Cases	%
1	Total	4-10	35	70
2	3 Quadrants	10-13	10	20
3	2 Quadrants	13 and above	5	10
4	1 quadrants	-	-	-

## 5. Discussion

Buckling Procedure alter the anatomical configuration of the ball a result in change in the intro-ocular pressure. The depth of the anterior chamber may get reduced (Shallow) due to the temporary displacement ciliary body by the operative procedures.<sup>5,6</sup> After forty eight hours post operatively the relaxation iris ciliary diaphragm will revert the lens to its original position, as the physiological re-adjustment of retina takes place.

The scleral rigidity is found to be significantly lowered post-operatively in all the cases, probably because in all the cases sub-retinal fluid drainage procedure has been adapted. A similar finding is noted by A. Sinha et al.<sup>7</sup>

In the present series of 50 consecutive cases the range of intra-ocular pressure pre-operatively was 4 - 12.2 mm Hg. During the 1st post operative day the intro-ocular pressure was ranging from 17.3 - 21.9 mm Hg. A similar finding has been reported by Sinha et al.<sup>7</sup>

During the 7th post operative period the intra-ocular pressure normalized due to the tissue adjustments and haemodynamics of the eye ball. The day to day intra-ocular pressure recording suggested that the adjustment of the tissue rigidity takes place after 48 hours. Since the 3rd post operative day there is a fall of intra-ocular pressure comparative to 1<sup>st</sup> post operative day i.e. 12.2 - 19.3 mm Hg. Final reading was taken on 7th post operative day with Schiotz and Applanation (perkins) tonometers has shown ranging 10.2 - 14.6 mm Hg Schiotz, Applanation.<sup>8-10</sup>

Anterior Chamber depth 2.4 - 3.2 mm and post operatively ranging from ranging from 2.4 - 3.2 mm. Hence there is no significant change in Anterior chamber depth present series of case Probably because a wet type of surgery has been performed in all the cases .it is believed that the change in anterior chamber depth occurs only when there is dry type of surgery due to forward movement of Iris lens diaphragm (A.S inha et al)<sup>7</sup> Scleral rigidity is normal in 90% of the cases Pre-operatively and it ranging from .0230 to .0498 and during post operative period on

7th post operative day ranging from .0055 - .00176. So it is Observed from this data that there is decreased scleral rigidity.<sup>7</sup> Gonioscopically there is no change in width of the angle of the anterior chamber from pre to post operative period in present series probably due to wet type of surgery. There was an alteration of the width of the angle of the anterior chamber in certain cases of Sinha et al.<sup>7</sup> Probably due to the dry type of surgery (without sub-retinal fluid drainage) adapted in same cases. There was no significant difference in the changes seen in intra-ocular pressure. In both aphakic and phakic retinal detachments and this signifies that presence or absence of lens has no role in the above observations.

In this series of cases the total retinal detachment is 70% of cases are having intra-ocular pressure ranging 4 - 10 mm Hg (low intra-ocular pressure). Partial retinal detachment is seen in 30% of the cases are having the intra-ocular pressure ranging from 10 mm Hg and above. The fall of intra-ocular pressure is seen in proportionate to the extent of retinal detachment. There is an improvement of visual acuity ranging from 4 mt to 6/1.8 post operatively. The visual improvement could not be restored normal in certain cases because of long duration and macular changes, and also some extent proliferative vitreo retinal changes as in the case prior to surgery.

## 6. Conclusions

1. All the cases showed low intra-ocular pressure pre-operatively, during 1st post - operative day there is definite rise of intra-ocular pressure.
2. The intra-ocular pressure restored to normal on 7th post - operative day and adjustment of tissue rigidity and haemodynamics, commence from 3rd post operative day.
3. All the cases have showed normal scleral rigidity pre-operatively and post operatively the scleral rigidity decreased.

4. No significant change in anterior chamber depth and width of the angle of the anterior chamber is observed.

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## 8. Conflict Interest

None

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