

## Original Research Article

# Visual outcome in patients undergoing minimally invasive vitrectomy surgery in rhegmatogenous retinal detachment

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## ABSTRACT

**Background:** Micro-incision vitrectomy surgery otherwise called minimally invasive vitrectomy surgery (MIVS) is undoubtedly one of the most impressive evolutions in the surgical retina field of the past decade. This self-healing suture less procedure is safe and reliable with rapid visual recovery. The present study enlightens the visual outcome following MIVS for rhegmatogenous retinal detachment.

**Methods:** This prospective study was done in 68 patients who underwent MIVS for rhegmatogenous retinal detachment. A detailed ocular examination of the patients undergoing MIVS was done. Outcome of the surgery was assessed in terms of functional and anatomical success after one week, 6 weeks and third month.

**Results:** Of the 68 patients, maximum number of patients was in the age group of 51-60 years. Risk factors were previous cataract surgery in 28%, lattice degeneration in 26%, trauma in 22%, myopia in 18% and no specific risk factors in 6%. Mean preoperative BCVA was log MAR 2.16±0.37 and mean post-operative BCVA was log MAR 1.22±0.35 with p value of <0.001 on paired t test indicating the difference was statistically significant. Functional success was achieved in 58% and anatomical success in 94% patients.

**Conclusions:** Visual outcome following MIVS was good for rhegmatogenous retinal detachment. Secondary glaucoma and development or progression of cataract was found to be the major complication following MIVS. MIVS is a suture less safe surgery facilitating early visual recovery and associated with minimal complications.

**Keywords:** MIVS, Rhegmatogenous, Retinal detachment, Functional success

## INTRODUCTION

Micro-incision vitrectomy surgery otherwise called minimally invasive vitrectomy surgery (MIVS) with 25- or 23-gauge instrumentation is undoubtedly one of the most impressive evaluations in the surgical retina field of the past decade. As of today, majority of retina surgeons prefer MIVS with 23G or 25G as a standard treatment of choice for not only simple vitreoretinal pathologies but also complex cases, including complications associated with advanced PDR.<sup>1,2</sup> In contrast to 20G ports, the smaller-gauge ports of 23 and 25G can be created transconjunctivally without the need for suture placement to close when angled incisions are applied.<sup>3</sup>

MIVS facilitate early visual recovery, reduce ocular surface irregularities, decrease patient discomfort, postoperative inflammation, and surgically-induced astigmatism. However, wound-sealing related complications, such as hypotony, choroidal detachment, and endophthalmitis are major concerns of MIVS. This self-healing suture less procedure is a safe, reliable adjunct for managing these complications with rapid visual recovery. The present study enlightens the visual outcome following MIVS for rhegmatogenous retinal detachment.

## METHODS

This prospective study was conducted at Regional Institute

of Ophthalmology, Government Medical College, Thiruvananthapuram, Kerala, a tertiary eye care center in South India.

#### **Inclusion criteria**

All patients undergoing minimally invasive vitrectomy surgery for rhegmatogenous retinal detachment from a period of May 2014 to April 2015 were included in the study.

#### **Exclusion criteria**

Those with age less than 10 years, combined RD, those with significant anterior segment diseases affecting visual acuity like cataract, corneal opacity etc., those who were not willing to take part in the study and those who were lost follow up were excluded from study.

Patients satisfying the inclusion criteria were included in the study after getting informed consent. Baseline data were collected using questionnaire. A detailed examination of the patients undergoing MIVS was done which included recording the initial best corrected visual acuity, slit lamp examination, fundus examination with indirect ophthalmoscopy and 90 D including fundus drawing and ultrasound bio-microscopy or CT whenever needed. Outcome of surgery was assessed in terms of functional and anatomical success after one week, after six weeks, and at third month. Intraoperative complications and early and late postoperative complications were assessed. Causes of poor visual outcome after surgery also were assessed.

The data was entered into database and was analyzed using SPSS version 16 software.

## **RESULTS**

A total of 68 patients who underwent MIVS for rhegmatogenous retinal detachment were included during one year of study. Of the 68 patients diagnosed as rhegmatogenous retinal detachment, age range was 17 to 76 years with maximum number of patients in the age group 51-60 years (Table 1). Of the 68 patients 41 were male and 27 were female (Table 2). Most of the patient presented with sudden onset of painless defective vision. Flashes and floaters are associated in more than one third cases.

Peripheral lattice degeneration was present in 26% of cases. History of trauma was in 22% cases. History of previous cataract surgery in 28% cases of which 18 cases were pseudo phakic and 10 cases were aphakic. Myopia contributed to 18% of cases. Trauma and myopia were responsible for RD in young patients. In the elderly, lattice degeneration and previous cataract surgery contributed to majority of cases. No specific risk factors were found in 6% cases (Table 3).

**Table 1: Age distribution.**

Age group (year)	No. of cases
10 -20	1
21-30	1
31-40	2
41-50	4
51-60	31
61-70	16
71-80	12

**Table 2: Gender distribution.**

Sex ratio	No. of patients	Percentage (%)
Male	41	60
Female	27	40

**Table 3: Risk factors for RRD.**

Risk factors	% (No. of patients)
Lattice	26 (18)
Myopia	18 (12)
Pre cataract surgery	28 (19)
Trauma	22 (15)
No specific risk factors	6 (4)

Pre-operative visual acuity in more than 80% cases were log MAR value of 1.5 or more (Table 4). RD was total in 28%, subtotal in 14%, temporal in 16%, superotemporal in 17%, inferior half in 11%, superior in 6%, inferotemporal in 5% and lesser contribution from other areas. Breaks were detected preoperatively in 78% cases. In the remaining patients breaks were detected during surgery. Breaks were single in 52% multiple in 48%. Majority of breaks located in superotemporal (46%) followed by inferotemporal (32%) superonasal (12%) and inferonasal quadrant (10%). 75% cases presented within 2 months of onset of symptoms (Table 5). Macula was off in 92% cases. PVR was found in various grades in 52% cases (Table 6). Most of the patients had IOP between 10 and 14 mm of Hg. IOP was low in 11% cases.

**Table 4: Preoperative visual acuity.**

BCVA log MAR	No. of patients (%)
>2.1	41 (28)
1.5-2.1	44 (30)
1.0-1.5	15 (10)
<1.0	0

**Table 5: Duration of symptoms.**

Duration (months)	No. of patients (%)
<1	63 (43)
1-2	11 (7)
2-6	18 (12)
>6	8 (5)

**Table 6: PVR grading.**

PVR grade	No. of patients (%)
A	38 (26)
B	10 (7)
C	4 (3)

Functional success was defined as an attached retina with improvement of final better visual acuity of log MAR value 1 or less at the end of 3 months follow-up. Anatomical success was defined as an attached retina at 3 months regardless of visual acuity (Table 7). Mean preoperative BCVA was log MAR 2.16±0.37 and mean postoperative BCVA was log MAR 1.22±0.35 with p value of 0.001 on paired t test indicating the difference was statistically significant (Table 8). Secondary glaucoma (4 cases) and cataract (13 cases) were found to be the major complications associated with the surgery. Visual acuity was assessed in patients with silicone oil in vitreous cavity. Hence visual acuity is expected to improve further after the removal of silicone oil.

**Table 7: Post-operative visual acuity.**

BCVA log MAR at 3 months	No. of patients (%)
0-0.3	0
0.3-0.6	0
0.6-0.9	6 (9)
0.9-1.2	33 (48.5)
1.2-1.5	21 (30.5)
1.5-1.8	8 (12)

**Table 8: Surgical outcome.**

Surgical outcome	No. of patients (%)
Functional success	58 (39)
Anatomical success	94 (64)

## DISCUSSION

In the present study a total of 68 patients underwent MIVS for primary rhegmatogenous retinal detachment during one year of study.

Most common age group in RRD was 50-60 years with slight male preponderance. Trauma, high myopia, aphakia and pseudophakia and lattice degeneration were found to be the major risk factors for development of RRD. Traumatic RRD was more common in youth and aphakic and pseudo-phakic RRD was more common in elderly. The incidence of aphakic or pseudo-phakic RD increases when there is posterior capsule rupture, vitreous loss, after YAG capsulotomy by Mitry et al.<sup>4</sup>

Preoperative visual acuity in more than 80% cases was log MAR value of 1.5 or more. Proliferative vitreoretinal changes, duration of RD and macular involvement were the important pre-operative factors affecting visual acuity.

In the present study mean preoperative best corrected visual acuity was log MAR 2.16±0.37 and mean postoperative best corrected visual acuity was log MAR 1.22±0.35 with p value of 0.001 on paired t test indicating the difference is statistically significant. Functional success was attained with improvement of final better visual acuity of log MAR value 1 or less in 58% at the end of 3 months follows up. Anatomical success was 94% at 3 months regardless of visual acuity.

In the study Anatomic and visual outcomes of 23-G vitrectomy without scleral buckling for primary rhegmatogenous retinal detachment by Figueroa et al, a total of 133 eyes of 118 patients were included.<sup>5</sup> Mean visual acuity improved significantly from 20/50 to 20/30 with no statistically significant differences between phakic and pseudo-phakic eyes (p=0.233). Visual acuity improved to 20/40 or better in 104 eyes (78.2%). The primary anatomic success rate was 96.2%. Four eyes required a second surgical procedure and one eye a third to achieve retinal reattachment. Cataract progression in phakic eyes made cataract surgery necessary within 1 year of vitrectomy in 12/50 (24%) eyes.

Romano et al study on primary 23-gauge sutures less vitrectomy for rhegmatogenous retinal detachment, anatomical success was achieved in 82% of cases.<sup>6</sup> Mean visual acuity improved from log MAR 0.48 (SD 0.36) to 0.26 (SD 0.31), p<0.001. Two cases with ocular hypotony, defined as an intraocular pressure ≤6 mmHg, that were associated with a choroidal detachment were seen.

Another study primary 23-gauge vitreoretinal surgery for rhegmatogenous retinal detachment by Yanyali et al reattachment was achieved with a single operation in 47 (95.9%) of 49 eyes.<sup>7</sup> In two eyes (4.1%), retinal redetachment due to new breaks was successfully treated with reoperation using the 23-G TSV system. Mean log MAR visual acuity was 2.01±0.47 preoperatively and 1.3±0.5 postoperatively (p<0.001, paired t test). Iatrogenic peripheral retinal break was observed in 1 eye (2.0%) intraoperatively. No sutures were required to close the scleral or conjunctival openings, and no eyes required conversion of surgery to 20-G vitrectomy.

A study by El-Batarny outcome of 30 consecutive cases, the mean overall preoperative visual acuity was 20/1053 and final acuity was 20/78 (p=0.001).<sup>8</sup>

In the study by Khanduja et al, 11 showed the rate of retinal tears discovered during sutureless vitreous surgery has been reported to be between 0 and 24%, with most series reporting an incidence of less than 5%.<sup>9</sup> After 23-G vitrectomy 57.4% of the scleral wounds closed at one month and 61.1% at three months postoperatively by Gupta et al.<sup>10</sup>

Secondary glaucoma (4 cases) and cataract (13 cases) were found to be the major complications associated with the surgery for RD. PVR, Cataract development and ERM

formation were found to be the major causes of poor visual outcome following RD surgery.

The main limitation of this study was visual acuity assessment was done with silicone oil in vitreous cavity. Hence visual acuity is expected to improve further after the removal of silicone oil.

## CONCLUSION

Visual outcome following MIVS was good for rhegmatogenous RD. Secondary glaucoma and development or progression of cataract were found to be the major complication following MIVS. No choroidal detachment or endophthalmitis occurred in any of the patients. Minimally invasive vitrectomy is a suture less, safe surgery, facilitating early visual recovery and associated with minimal complications.

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