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Audit

Successful surgery and institutional incidence of rhegmatogenous retinal detachments in Teaching Hospital, Kurunegala, Sri Lanka

3-year results from a tertiary care centre in North-Western province of Sri Lanka

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Abstract

Introduction: *Rhegmatogenous retinal detachment (RRD) is a potentially blinding condition if not treated. Major proportion of RRDs in Teaching Hospital were complex RRDs.*

Objectives: *To assess the surgical success (reattachment) and other characteristics of RRD repairs and to determine the yearly institutional incidence of RRDs in Teaching Hospital, Kurunegala, Sri Lanka.*

Methods: *Observational study of retrospective case review of RRDs operated by single vitreoretinal surgeon from 30.09.2018 to 30.09.2021. Retinal reattachment is the primary outcome measure. Modalities of treatment were either pars planar vitrectomy (TPPV) or scleral buckling (SB). Perfluoropropane or Silicone oil 1000cst was used as tamponading agent indicated by the complexity of RRD. All the cases were performed without endolaser, or a wide-angle viewing system and cryopexy used for primary sealing of tears. When indicated TPPV was combined with SB. Failed SBs reoperated with TPPV and tamponade.*

Results: *Study involved 309 eyes of 306 patients where 248 (80.26%) eyes of 246 offered TPPV and 61 (19.74%) eyes out of 60 offered SB. Mean age was 51.32y (7-80y) and 198 (65%) males and 108 (35%) females. Mean number of surgical interventions 1.608 (1-6). Overall surgical success over 3 years in TPPV group was 87.096% (216/248) and in SB group 77.049% (47/61) and average surgical success in both groups was 82.072% (263/309). Steady rise in surgical success in TPPV group observed over years achieving 93.55% in 2021. Average institutional incidence of RRDs was 1.346 per 100 eye admissions to eye unit.*

Conclusion: *In a low facility setup for vitreoretinal services high success rate achieved has helped to prevent blindness due to RRD.*

Key words: Complex rhegmatogenous retinal detachment, pars planar vitrectomy (TPPV), scleral buckling (SB), surgical success of RRDs, incidence of RRD

Rhegmatogenous retinal detachment (RRD) is neurosensory retinal separation from retinal pigment epithelium due to inflow of vitreous fluid through a retinal break[1]. Retinal detachment is a potentially blinding condition if not treated promptly and an ophthalmological emergency as well[2-4]. Incidence of rhegmatogenous retinal detachment varies widely globally. Average incidence of rhegmatogenous retinal detachment in systematic review of population based studies is 10.5 per 100,000 population per annum[1]. In individual studies it varies from 6.3 to 17.9 per 100,000 population per year[1,5-8]. A population based survey done in South India close to Sri Lanka in the region shows blindness due to retinal disease is 12.7%[9]. Two standard modalities of treatment to rhegmatogenous retinal detachment are buckling procedure (external approach)[5,7,8] and pars planar vitrectomy with tamponade either with perfluoropropane gas or silicone oil 1000cst (internal approach)[10,11].

Rhegmatogenous retinal detachments become complex when it is associated with multiple tears, giant retinal tears, inferior breaks, macula holes, proliferative vitreoretinopathy, traumatic detachments, dropped lenses or pieces of lens in cataract surgery complications and high myopes with RRD[2,10,12-15].

There are no population-based studies done before in Sri Lanka at national level to find out the incidence of rhegmatogenous retinal detachment and the burden of the disease. Teaching Hospital, Kurunegala being the third largest hospital by bed strength in Sri Lanka

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is the vitreo retinal service provider to a population of 2 million in the North-Western province and other catchment areas of the hospital by a single vitreo-retinal surgeon (Figure 2). This study aims to find out the anatomical outcome (retinal reattachment or surgical success) over 3 years and to determine the institutional incidence of RRD repairs among eye admissions to eye unit of Teaching Hospital, Kurunegala, Sri Lanka in both 2019 and 2020.

Material and methods

This is a single centre observational study which involved retrospective case review of all the rhegmatogenous retinal detachment repairs (both internal and external approaches) by a single consultant vitreo-retinal surgeon in Teaching Hospital, Kurunegala, Sri Lanka from 30.09.2018 to 30.09.2021. Retinal reattachment is the primary outcome measure by single or multiple surgical interventions recorded as at the last follow up visit in the Retina Clinic. Internal tamponade was achieved by either 14% C3F8 gas (perfluoropropane) or 1000cst silicone oil depending on the complexity of the rhegmatogenous retinal detachment at the discretion of the vitreo-retinal surgeon[17]. As there is no endolaser facility in the hospital, primary sealing of the retinal breaks was achieved by cryopexy. When indicated pars planar vitrectomy was combined with the buckling procedure either with 277 or 279 silicone tires, 240 encircling band alone or 240 encircling band combined with either 277 or 279 silicone tires[10]. All the vitrectomies were performed with Alcon Constellation vision system (Tabletop version with no laser module). All the surgeries were undertaken with an old Topcon OMS 610 microscope using corneal condensing stick on lenses (Volk direct image mid field (ACS) corneal contact lens, Volk direct image high magnification corneal contact lens (ACS) and Volk direct image AFX (ACS) corneal contact lens) as there was no wide-angle viewing system facility either Occulus BIOM or Zeiss Resight[17]. All the cases were followed up by the consultant vitreo-retinal surgeon at regular intervals (Day one post op, one week post op, one month post op, 3 months post op and 6 months post op) or early and more frequently if there are any complications. Cases with incomplete records and lost to follow up were excluded from the study in determining the surgical success but included in the calculation of institutional incidence of RRDs. Failed scleral buckling procedures were recruited to TPPV group for second intervention and they were not counted twice in the calculation of final count. SPSS 21 software was used in data analysis and Chi-square test was used in qualitative data analysis. Institutional ethical clearance was granted for the study.

Results

This study includes 309 eyes of 306 patients (3-bilateral RRDs). Out of 306 subjects 198 were males (65%) while 108 were females (35%). Operated 160 were right eyes (51.17%) and 149 were left eyes (48.22%) n=309 eyes. Total of 248 pars planar vitrectomies (TPPV) (80.26%, 248/309) were performed in 246 subjects (2-bilateral RRD) while 61 (61/309, 19.74%) buckling procedures (Drain, Cryo, Explant under general anaesthesia) were carried out in 60 subjects (1-bilateral RRD). Mean age for the TPPV group is 61.117y (7-80) while 41.553y (7-77) in the buckling group. Overall mean age of the study population is 51.325y. Mean number of surgical interventions undertaken in the study population is 1.608 (1-6). In the TPPV group silicone oil 1000cst was used in 75% of cases (186/248 eyes) while 25% of cases (62/248) perfluoropropane (C3F8) gas was used for the internal tamponade. Rate of silicone oil removal as at the last date of study period is 29.03% (54/186). 24.19% of cases undergone TPPVs combined with buckling procedures (60/248).

Overall outcome or surgical success over 3 years (retinal reattachment) in TPPV group after single or multiple surgical interventions is 87.096% (216/248) while in Buckling group is 77.049% (47/61). Therefore, overall success in both groups (TPPV and Buckling group) is 82.072% (263/309). In TPPV group surgical success in 2019 is 83.15%, in 2020 87.10% while in 2021 surgical success is 93.55% (Figure 1). There is no difference on surgical success in the TPPV group depending on the tamponading agent used (Chi-square value = 0.76, df=1, $p<0.1$) (Table 1). Majority of the cases 59.55% (184/309) were complex RRDs (Table 3).

Average institutional incidence of rhegmatogenous retinal detachment in both 2019 and 2020 is 1.346 per 100 eye admissions to eye unit of Teaching Hospital, Kurunegala, Sri Lanka. In 2019 institutional incidence of RRDs is 1.085 per 100 eye admissions (110/10134) while in 2020 1.806 per 100 eye admissions (109/6034) (Table 2).

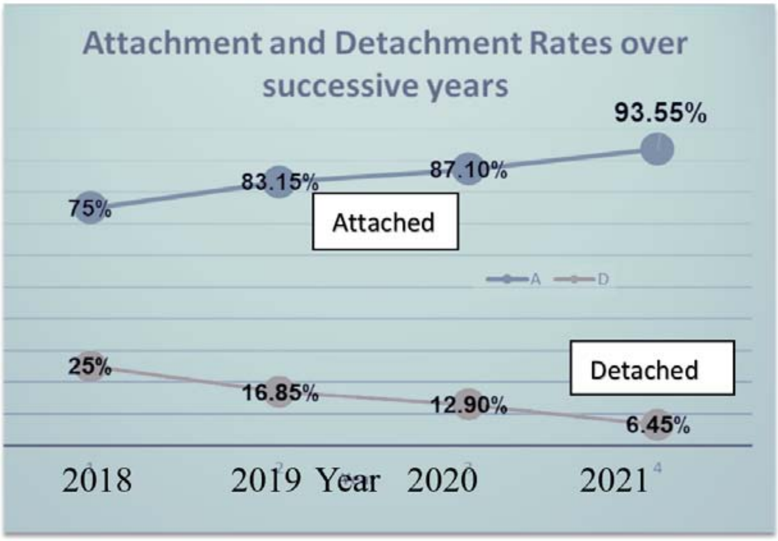

Figure 1. *Surgical success rate (Reattachment) of RRDs over years in Teaching Hospital, Kurunegala, Sri Lanka (Top line – Attached Retina/Surgical success rate, Bottom line – Detached Retina/ Failure rate).*

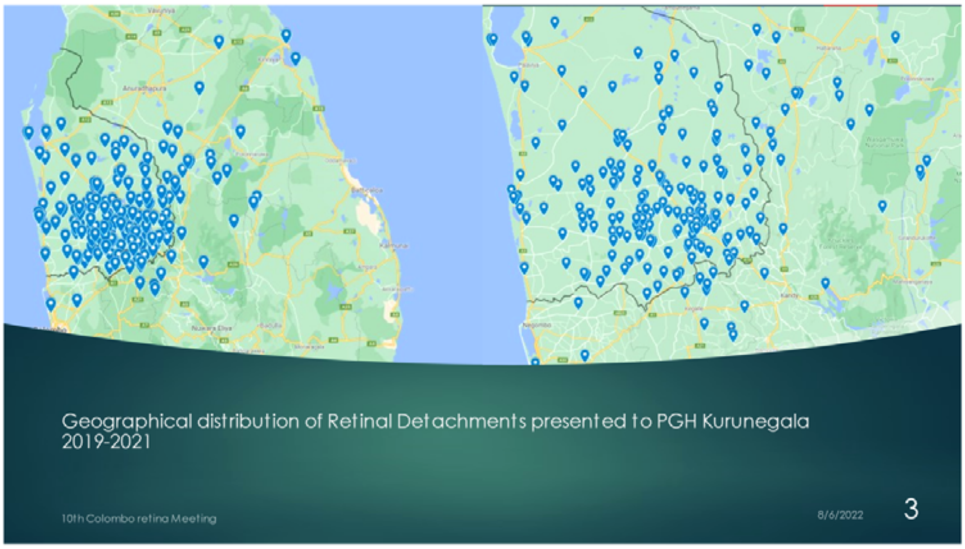

Figure 2. *Geographical distribution of rhegmatogenous retinal detachment cases in North-Western Province of Sri Lanka (area-7888 km^2, population 2 million) and other draining areas of Teaching Hospital, Kurunegala from 2019-2021.*

Table 1. Surgical success between C3F8 gas and silicone oil 1000cst as the tamponading agent in TPPV group (Chi-square value 0.76, df=1, p>0.1)

Tamponading agent	*Retina attached*	*Retina detached*	*Total*
C3F8 Gas	52 (83.87%)	10 (16.13%)	62
Silicone oil 1000cst	164 (88.17%)	22 (11.82%)	186
Total	216	32	248

Table 2. Yearly Institutional incidence of RRDs in Teaching Hospital, Kurunegala, Eye Unit

Year	*Total RRD repairs*	*Total yearly eye admissions*	*Incidence per 100,000 eye admissions*	*Incidence per 100 eye admissions*
2019	110	10134	1085.454	1.085
2020	109	6034	1806.43	1.806
2021 (Until 30.09.2021)	69	6008	1148.47	1.148

Table 3. Characteristics of rhegmatogenous retinal detachments (59.55% of cases (184/309) are complex RRDs)

Characteristics of RRDs	*Number (%)*
Giant retinal tears	15 (4.85%)
Multiple retinal tears	11 (3.56%)
Inferior breaks	20 (6.47%)
Macula hole and RRD	27 (8.74%)
High myope and RRD	14 (4.53%)
PVR grade B and above	56 (18.12%)
Traumatic RRDs/gloge rupture	10 (3.24%)
Choroidal effusion and RRD	13 (4.21%)
Tractional elements and RRD	16 (5.18%)
Dropped or retained lens matter and RRD	2 (0.65%)
Uncomplicated RRDs	125 (40.45%)
Total	309

Discussion

Vitreoretinal services first started in Teaching Hospital, Kurunegala, Sri Lanka from July 2018. Since then, the presenting author had to work hard in getting vitrectomy facilities, training the nursing staff in handling and sterilization of expensive vitreoretinal instruments and equipment, and educating the nursing staff about fundamentals of post op nursing care in vitreoretinal surgery. Treating retinal detachments in a minimum facility setup is a challenging task because surgeon has to consider various factors such as cost-effectiveness of offering treatment to chronic detachments with severe proliferative vitreoretinopathy and funnel retina, whether to go ahead or not with RRDs with giant retinal tears due to non-availability of laser, extensive globe ruptures with poor corneal clarity to go ahead with surgery or to combine it with a corneal graft or to postpone the surgery until a corneal graft is done and availability of theatre time and space and availability of surgical consumables. All these cases were performed with no endolaser facility and without a wide-angle viewing system. Viewing of the peripheral retina was achieved with indentation and direct visualization under the microscope. On the other hand majority of the cases of rhegmatogenous retinal detachments presenting to Teaching Hospitals of Sri Lanka were complex RRDs (RRD with macula holes, RRD in high myopes, RRD with multiple retinal tears in different planes, RRD with proliferative vitreo-retinopathy (PVR) especially posterior PVR, RRD with giant retinal tears (GRT)[14,18], RRD after globe rupture repairs and following trauma, RRD after complicated cataract surgery with dropped lens pieces and RRD with tractional elements (Table 3). Therefore, majority of our study cohort consisted of complex rhegmatogenous retinal detachments (Table 3). Rate of primary retinal reattachment in literature is 80-98% in uncomplicated cases[6] and 60-70% in high risk cases while 5% has permanent anatomical and functional failure[3,6,7,19]. Therefore, achieving an overall success of 87.096% (216/248) in TPPV group is within international standards for uncomplicated RRDs. In 2021 alone the surgical success was improved to 93.55% (58/62) (Figure 1) is perhaps due to urgent referrals for vitreoretinal interventions from peripheral ophthalmologists as fresh detachments, and increased awareness among public to seek eye care as soon as possible if they lose vision, improved people movements to health care after the COVID-19 crisis lockdowns improved awareness on post operative positioning and management among patients and nursing staff and improved vitrectomy facilities in the unit over years with lot of hard work with authorities. On the other hand, authors have adopted a policy to give priority for RRDs since 30.09.2018 where RRDs were operated within the same day or the following day of presentation to eye unit.

Success rate of buckling procedure as the primary intervention in RRDs is 77.049% (47/61) in this study cohort. 19.74% (61/309) of cases had buckling procedure as the primary mode of treatment in RRDs. Scleral buckling is a cost-effective technique with less morbidity and early mobilization of the patient and the preferred choice over TPPV in uncomplicated RRDs where there is no media opacity or significant PVR with a single or multiple anterior equatorial tears within 2 clock hours in the same plane, no posterior vitreous detachment (PVD), retinal dialysis and single round hole inferior detachments in young[5,11,20]. It has further advantages over TPPV as there is no need for positioning, early recovery and back to normal life shortly, low cost, no need of costly vitreoretinal equipment, less time consuming, no risk of cataract formation and no need for a second surgical intervention for silicone oil removal[5,20]. In this study cohort buckling procedure rate is comparatively higher than reported in recent literature[19] (12.5%,27/212) is perhaps due to low facility setup and pressing demand for theatre space and time with the high vitreoretinal workload in Teaching Hospital, Kurunegala. Surgical success rates for scleral buckling is 76%-83% in the recent literature[20]. This study cohort's surgical success (77.049%) of scleral buckling as a primary mode of treatment for RRDs is within international standards.

Up to now there are no epidemiological studies done in Sri Lanka to find out the incidence of RRDs and to identify the characteristics of RRD in Sri Lankan population. This study gives some insight to the burden of the disease in Sri Lanka because the average institutional incidence of RRDs in 2019 and 2020 if extrapolated to 100,000 eye admissions island wide it amounts to 1346 cases per year. In a situation where the Ministry of Health is the main vitreoretinal service provider to the country each of the 11-government employed vitreoretinal surgeons would receive a case burden of 122.36 of RRDs per year and this number will increase when yearly readmissions to eye units is excluded. Availability of vitrectomy machines of all types in the country is 1 per 1.19 million population (14 in government sector and 5 in private sector) and sadly there are 5 vitreoretinal surgeons without a vitrectomy machine to operate in 5 centres. Therefore, this study emphasizes the need to improve the vitreoretinal facilities in peripheral stations of Sri Lanka and the importance of maintaining a national database of retinal detachments in Sri Lanka, to identify the burden of the disease and to prevent blindness from retinal disease.

Conclusion

Urgent vitreoretinal intervention even with minimum facilities for repair of complex rhegmatogenous retinal detachments (RRDs) in Teaching Hospital, Kurunegala over 3 years (2019-2021) achieved a good surgical success rate going in parallel with international standards and prevented blindness from blinding retinal disease.

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