Anatomical outcome of surgery for rhegmatogenous retinal detachment in two Buenos Aires clinics

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Declarations
Ethical approval: The study protocol followed the tenets of the Declaration of Helsinki and was approved by the ethics committee of the Argentine's National Academy of Medicine.
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Abstract

Objective: Data on treatment outcome for rhegmatogenous retinal detachment (RRD) in Latin American countries is scarce, thus we set out to determine anatomical outcome of surgery and its associated factors in two Argentine clinics.
Methods: Retrospective review of patients presenting with primary RRD from 2012 to 2016 at two eye clinics in Buenos Aires who were operated on by a single surgeon and followed for at least 90 days postoperatively.
Results: Of 144 cases (mean age 62 years, range 17-97, 42% female) with adequate followup (median 9.5 months), 102 (70.8%) underwent vitrectomy, whereas 18 (12.5%) scleral buckling, 21 (14.6%) vitrectomy+scleral buckle and three (2.1%) pneumatic retinopexy. Silicone oil tamponade was used in 23% of cases. Overall, 115 (79.9%) achieved full retinal reattachment without tamponade, 12 (8.3%) still had detached retinas and were deemed inoperable, 11 (7.6%) still had silicone oil tamponade, 3 (2.1%) were scheduled for additional surgery and 3 (2.1%) suffered severe complications. 99 (68.8%) eyes achieved reattachment with one surgery, whereas 28 (19.4%) underwent two and 17 (11.8%) three attempts. Median time to first consult was 6 days (range 0-180) and to surgery was 7 days (range 0-210). Preoperative proliferative vitreoretinopathy (PVR) grade was significantly associated to final outcome, and correlated positively with delay to surgery (r=0.318, p=0.001).
Conclusions: Anatomical success rate, choice of procedure and delays to seek and provide surgical

treatment were comparable to reports from industrialized nations. Moreover, PVR development was associated to treatment delay and to surgical failure. Thus, optimization of health care resources and effective adjunct therapy for PVR could have the greatest impact on RRD treatment outcomes.
Keywords: retinal detachment, rhegmatogenous, vitrectomy, scleral buckling, proliferative vitreoretinopathy.

Resultados anatómicos de la cirugía del desprendimiento de retina regmatógeno en dos clínicas de Buenos Aires

Resumen

Objetivo: Dado que los datos sobre resultados del tratamiento para el desprendimiento de retina regmatógeno (DRR) en países latinoamericanos son escasos, decidimos emprender el análisis de los resultados anatómicos de la cirugía y sus factores asociados en dos clínicas de la Argentina.
Métodos: Análisis retrospectivo de pacientes con DRR atendidos entre 2012 y 2016 en dos clínicas de Buenos Aires, que fueron operados por un mismo cirujano y tuvieron un seguimiento de 90 días como mínimo luego de la cirugía.
Resultados: De los 144 casos (media de edad: 62 años, rango 17-97, 42% de mujeres) en los que se realizó un seguimiento adecuado (mediana 9,5 meses), en 102 (70,8%) se realizó vitrectomía, mientras que en 18 (12,5%) se hizo cerclaje escleral, 21 (14,6%) fueron sometidos a vitrectomía + cerclaje escleral y 3 (2,1%), a retinopexia neumática. En un 23% de los casos se realizó un taponamiento con aceite de silicona. En términos generales, en 115 ojos (79,9%) se logró la reaplicación total de la retina sin taponamiento; en 12 (8,3%) el desprendimiento de retina persistió, por lo cual se los consideró inoperables; 11 (7,6%) aún tenían el taponamiento con aceite de silicona; en 3 (2,1%) se programó una nueva cirugía; y 3 (2,1%) tuvieron complicaciones graves. En 99 ojos (68,8%) se logró la reaplicación de la retina con una cirugía, en tanto que 28 (19,4%) fueron sometidos a dos cirugías y 17 (11,8%), a tres. La mediana del tiempo transcurrido hasta que se realizó la primera consulta fue de 6 días (rango 0-180) y hasta que se hizo la cirugía fue de 7 días (rango 0-210). Se observó una asociación entre el grado de vitreorretinopatía proliferativa (VRP) preoperatoria y el resultado final y una correlación positiva con la demora en realizar la cirugía (r=0,318, p=0,001).
Conclusiones: La tasa de éxito anatómico, la elección del procedimiento quirúrgico y las demoras en la búsqueda y realización del tratamiento quirúrgico fueron comparables con las informadas en países industrializados. Asimismo, se observó una asociación entre el desarrollo de VRP y la demora en el tratamiento y el fracaso de la cirugía. Por este motivo, la optimización de los recursos sanitarios y de la terapia complementaria efectiva para la VRP podría tener un gran impacto en los resultados del tratamiento para el DRR.
Palabras clave: desprendimiento de retina, regmatógeno, vitrectomía, cerclaje escleral, vitreorretinopatía proliferativa.

Resultados anatómicos da cirurgia do descolamento de retina regmatogênico em duas clínicas de Buenos Aires

Resumo

Objetivo: Dado que os dados sobre resultados do tratamento para o descolamento de retina regmatogênico (DRR) em países latino-americanos são escassos, decidimos empreender a análise dos resultados anatómicos da cirurgia e seus fatores associados em duas clínicas da Argentina.
Métodos: Análise retrospectivo de pacientes com DRR atendidos entre 2012 e 2016 em duas clínicas de Buenos Aires, que foram operados por um mesmo cirurgião e tiveram um acompanhamento de 90 dias como mínimo logo da cirurgia.
Resultados: Dos 144 casos (média de idade: 62 anos, rango 17-97, 42% de mulheres) nos que se realizou um acompanhamento adequado (média 9,5 meses), em 102 (70,8%) se realizou vitrectomia, enquanto que em 18 (12,5%) se fez cerclagem escleral, 21 (14,6%) foram submetidos a vitrectomia + cerclagem escleral e 3 (2,1%), a retinopexia pneumática. Em 23% dos casos se realizou um tamponamento com aceite de silicone. Em termos gerais, em 115 olhos (79,9%) se conseguiu a reaplicação total da retina sem tamponamento; em

12 (8,3%) o descolamento de retina persistiu, pelo qual foram considerados inoperáveis; 11 (7,6%) ainda tinham o tamponamento com aceite de silicone; em 3 (2,1%) foi programada uma nova cirurgia; e 3 (2,1%) tiveram complicações graves. Em 99 olhos (68,8%) se conseguiu a reaplicação da retina com uma cirurgia, enquanto 28 (19,4%) foram submetidos a duas cirurgias e 17 (11,8%), a três. A média do tempo transcorrido até que se realizou a primeira consulta foi de 6 dias (faixa 0-180) e até que se fez a cirurgia foi de 7 dias (faixa 0-210). Observou-se uma associação entre o grau de vitreorretinopatia proliferativa (VRP) pré-operatória e o resultado final e uma correlação positiva com a demora para realizar a cirurgia (r=0,318, p=0,001).
Conclusões: A taxa de sucesso anatómico, a eleição do procedimento cirúrgico e as demoras na busca e realização do tratamento cirúrgico foram comparáveis com as informadas em países industrializados. Também se observou uma associação entre o desenvolvimento de VRP e a demora no tratamento e o fracasso da cirurgia. Por esse motivo, a optimização dos recursos sanitários e da terapia complementar efetiva para a VRP poderia ter um grande impacto nos resultados do tratamento para o DRR.
Palavras chave: descolamento de retina, regmatogênico, vitrectomia, cerclagem escleral, vitreorretinopatia proliferativa.

Introduction

Rhegmatogenous retinal detachment (RRD) is a sight-threatening ocular disorder that occurs when the vitreous fluid dissects the neurosensory retina from the pigmentary retinal epithelium as it enters the subretinal space through one or more retinal breaks. RRD requires urgent intervention, as the detached retina quickly undergoes degeneration and proliferative vitreoretinopathy (PVR) may develop. PVR is an abnormal and highly complex vitreoretinal response to retinal breaks that is characterized by exuberant cell proliferation that furthers degenerative retinal changes[1].

There are several treatment modalities for RRD: pneumatic retinopexy (PR), scleral buckling (SB), pars plana vitrectomy (PPV) and the combination of the last two (PPV+SB). The choice of the procedure depends highly on the surgeon's preference, as well as the extent of the RRD, age of the patient, lens status and grade of PVR, among other factors. There is no global consensus for treating RRD, although there is an increasing trend towards PPV as first choice[2]. Anatomical success rates differ considerably between reports[3-6], a situation that probably reflects variations in RRD complexity as well as treatment patterns.

Contrasting with the data from North American and European countries, there are very few reports on RRD treatment patterns and outcomes from Latin America, a vast region with unique sociodemographic characteristics[6-9]. Considerable delay in treatment was reported in Brazil[8] and Venezuela[9], which may negatively impact on the anatomical outcome because of the associated increased prevalence of PVR at the time of surgery. There is, however, a paucity of information from Argentina on surgery for RRD. Therefore we set out to report on the demographic and clinical characteristics of all RRD cases operated on by one surgeon in two clinics in Buenos Aires, focusing on anatomical outcome and its associated factors.

Methods

The study was a retrospective, two-center study that focused on the anatomical outcome of surgery for RRD. The study protocol followed the tenets of the Declaration of Helsinki and was approved by the ethics committee of the National Academy of Medicine. A chart review was undertaken of all patients with primary RRD operated on by one surgeon (JGG) from September 2012 to October 2016 at two clinics serving non-overlapping regions of the greater Buenos Aires metropolitan area. Clinic #1 received mostly patients from the national public health insurance agency (PAMI), which serves retirees, disabled pensioners, indigents and war veterans; whereas clinic #2 tended only to patients with private health insurance or from trade union-sponsored health providers. All patients were referred to the vitreoretinal surgeon, who confirmed the diagnosis of

primary RRD. Exclusion criteria were as follows: history of penetrating trauma or other severe eye disease in the affected eye, prior ocular surgery in the affected eye other than cataract surgery, and less than 90 days of follow-up after surgery.

The choice of surgical procedure was determined by the vitreoretinal surgeon on a case-by-case basis. All patients were operated on under local anesthesia (peribulbar or sub Tenon's blockade with 1:1 lidocaine/bupivacaine), and either PR, encircling SB, PPV or combined encircling SB+PPV was performed. At clinic #1, all PPV procedures were standard three-port 20-gauge, whereas at clinic #2, all were 23-gauge. Tamponade choice was also at the surgeon's discretion, as well as positioning instructions. All patients were examined on the day after the surgery, at weeks 2 and 4, and then monthly or bimonthly depending on the case.

The onset of RRD was defined by medical history as the appearance of retinal detachment-associated symptoms in the affected eye: sudden onset or worsening of floaters, flashes, curtain-like shadow and/or decreased vision. The first consult was defined as the first examination by an ophthalmologist at the clinic, which may not have been the operating surgeon. PVR was graded by the surgeon immediately before the surgery as outlined by the Retina Society Terminology Committee[10]. Anatomical outcome was assessed by detailed ophthalmoscopic evaluation at least 30 days after surgery only when no trace of gas (if used as tamponade agent) was present and on every subsequent visit. Data from the last available visit was used to assess outcome at the end of the study period. Success was defined as complete retinal reattachment without tamponade, that is, when there was no gas left in the eye and at least 90 days had passed after the surgery, or 30 days after silicone oil removal. Surgery for silicone oil removal per se was not considered an additional surgical procedure to reattach the retina, unless other maneuvers such as PVR membrane peeling, additional laser endophotocoagulation or perfluorocarbon-assisted endodrainage of residual retinal detachment were performed during the same intervention; in that case, silicone oil removal was considered part of an additional PPV for retinal attachment. Failure grading was adapted from the European VitreoRetinal Society (EVRS) study[11]: type 1 was defined as when the retina was not fully attached after at least one intervention and the eye was considered inoperable by the surgeon or the patient refused further surgery, irrespective of the presence of a tamponade agent; as type 2 when the retina was fully attached with silicone oil tamponade still present in the eye; as type 3 when the retina was not fully attached, regardless of the presence of a tamponade agent, and further surgery was planned; and as type 4 when the retina was fully attached without tamponade but a severe extraretinal complication developed in the operated eye, such as corneal decompensation or phthisis bulbi.

Data was collected with the aid of Microsoft Excel 2010 and analyzed with IBM SPSS version 21. Normality was assessed by the Kolmogorov-Smirnov test, and then parametric or non-parametric tests were used accordingly. For normal data, mean ± SD is shown, whereas for non-normal, median (range) is presented. Spearman's correlation analysis and forward conditional logistic regression were used to study the relationship between variables. Statistical significance was set at $p < 0.05$.

Results

Demographics and retinal detachment characteristics

For this study, 144 cases were collected in total, 78 (54.2%) from clinic #1 and 66 (45.8%) from clinic #2. Overall median follow-up was 9.5 months (range 3-50 months), with no significant difference between clinics (9.5 vs 9.5 months, p=0.99). Demographics are summarized in table 1 and the characteristics of the retinal detachment at the time of surgery are shown in table 2.

Choice of surgical procedure and outcome of initial surgery

Regarding the type of surgery, 102 (70.8%) patients underwent PPV, whereas 18 (12.5%) underwent SB, 21 (14.6%) underwent PPV+SB

Table 1. Demographics.

	Overall (n=144)	Clinic #1 (n=78)	Clinic #2 (n=66)	Statistical comparison between clinics (p)
Age (yrs)	61.6±15.4 (17-97)	66.5±12.7 (30-97)	55.8±16.4 (17-83)	<0.001
Gender (female)	61 (42.4%)	36 (46.2%)	25 (37.9%)	0.39
Laterality (right)	69 (47.9%)	38 (48.7%)	31 (47.0%)	0.87
Lens status (phakic eyes)	86 (59.7%)	42 (53.5%)	44 (66.7%)	0.13
Time from symptoms to surgery (days)	13 (1-195)	15 (1-149)	12 (2-195)	0.19
Time from symptoms to consult (days)	6 (0-180)	4 (0-120)	7 (0-180)	0.44
Time from consult to surgery (days)	7 (0-210)	10 (0-210)	6 (0-40)	0.01

Table 2. Characteristics of retinal detachment cases.

		Overall (n=144)	Clinic #1 (n=78)	Clinic #2 (n=66)	Statistical comparison between clinics (p)
	Macula on	39 (27.1%)	18 (23.1%)	21 (31.8%)	0.26
Number of detached retinal quadrants	1	23 (16.0%)	5 (6.4%)	18 (27.3%)	0.005
	2	58 (40.3%)	38 (48.7%)	20 (30.3%)	
	3	24 (16.7%)	14 (17.9%)	10 (15.2%)	
	4	39 (27.1%)	21 (26.9%)	18 (27.3%)	
Localization of retinal detachment	Detached temporal superior quadrant	105 (72.9%)	56 (71.8%)	49 (74.2%)	0.85
	Detached nasal superior quadrant	78 (54.2%)	44 (56.4%)	34 (51.5%)	0.62
	Detached temporal inferior quadrant	103 (71.5%)	57 (73.1%)	46 (69.7%)	0.71
	Detached nasal inferior quadrant	81 (56.3%)	50 (64.1%)	31 (47.0%)	0.04
PVR grade	0	72 (50.0%)	39 (50.0%)	33 (50.0%)	0.20
	A	30 (20.8%)	18 (23.1%)	12 (18.2%)	
	B	21 (14.6%)	15 (19.2%)	6 (9.1%)	
	C	14 (9.7%)	5 (6.4%)	9 (13.6%)	
	D	0 (0%)	0 (0%)	0 (0%)	

PVR = proliferative vitreoretinopathy

Table 3. Choice of tamponade agent for first surgery.

		Tamponade					Total
		Gas SF_6	Gas C_3F_8	Silicone oil	Silicone oil+PFCL	None	
Procedure	Scleral buckle	12	0	0	0	6	18 (12.5%)
	Vitrectomy	72	2	25	3	0	102 (70.8%)
	Vitrectomy+scleral buckle	17	0	3	1	0	21 (14.6%)
	Pneumatic retinopexy	3	0	0	0	0	3 (2.1%)
	Total	104 (72.2%)	2 (1.4%)	28 (19.4%)	4 (2.8%)	6 (4.2%)	144

PFCL = perfluorocarbon liquid.

and only three (2.1%) were treated with PR. Choice of tamponade agent by type of procedure is shown in table 3. Comparing clinics #1 and #2, there were significant differences in the proportion of patients undergoing PPV (83.3% vs 56.1%, p<0.001) and SB (6.4% vs 19.7%, p=0.02), but neither PPV+SB (9.0% vs 21.2%, p=0.06) nor PR (1.3% vs 3.0%, p=0.59).

Concerning outcome, 95 (66.09%) patients achieved full retinal reattachment with the first intervention, with no significant difference between clinics #1 and #2 (59.0% vs 74.2%, p=0.08). Anatomical success rate after one surgery by type of procedure was: 57.8% for PPV, 77.8% for SB, 90.5% for PPV+SB and 100% (100% vs 100%) for PR. Of note, 7 (7.4%) of these 95 patients still had silicon oil tamponade at the end of the study period (type 2 failure).

Number of surgical attempts per eye, additional surgery and subsequent outcome

Regarding the number of surgical procedures intended to reattach the retina, 99 (68.8%) patients underwent one, 28 (19.4%) patients underwent two and 17 (11.8%) patients underwent three attempts. No eyes were operated on more than three times to reattach the retina. Of the 49 (34.0%) cases that did not achieve full retinal reattachment with the first intervention, four (2.8%) were deemed inoperable or the patient refused further surgery (type 1 failure) and two (1.4%) had another surgery planned (type 3 failure) at the end of the study period. Of the remaining 45 cases, 20 (44.4%) achieved full retinal reattachment with the second surgery, and the type of procedure was: SB 3 (6.7%, and only one [33.3%] was successful), PR 3 (6.7%, of which all [100%] were successful), PPV 31 (68.9%, of which 9 [29.0%] were successful) and PPV+SB 8 (17.7%, of which 7 [87.5%] were successful). There was a significant difference in the rate of retinal reattachment rate between patients that underwent PPV and PPV+SB as second procedure (29.0% vs 87.5%, p<0.01). Considering the final outcome at the end of the study, one of the patients that had a PPV as second procedure developed phthisis bulbi after severe hypotony, despite achieving a fully reattached retina (type 4 failure), and another patient who received a PPV+SB as second procedure still had silicone oil tamponade (type 2 failure).

Of the cases that underwent a second procedure to reattach the retina, 25 (55.6%) were unsuccessful. Six (24.0%) were deemed inoperable or refused further surgery (type 1 failure) and two (8.0%) were scheduled for additional surgery at the end of the study (type 3 failure). The remaining 17 (68.0%) underwent a third surgical attempt to reattach the retina, of which 14 (82.4%) were successful: SB 1 (5.9%, successful [100%]), PPV 14 (82.3%, of which 11 [78.6%] were successful) and PPV+SB 2 (11.8%, both successful [100%]). Considering the final outcome at the end of the study, three [17.6%] cases still had silicone oil tamponade (type 2 failure) and

two (11.8%) had developed corneal decompensation (type 4 failure) due to endothelial contact with silicone oil.

Final outcome and associated factors

Of the 144 cases, 115 (79.9%) had achieved full retinal reattachment without tamponade (anatomical success), 12 (8.3%) still had detached retinas and were deemed inoperable or refused further surgery (type 1 failure), 11 (7.6%) still had silicone oil tamponade (type 2 failure), 3 (2.1%) still had detached retina and were scheduled for additional surgery and 3 (2.1%) had achieved retinal reattachment with severe complications (type 4 failure). Outcome by clinic is also shown in table 4. Restricting the analysis to definitive outcomes, i.e., success and failure types 1 and 4, the true success rate was 88.5%, with a non-significant difference between clinics #1 and #2 (85.3% vs 91.9%, p=0.28). A logistic regression model was fitted to predict the definitive outcome in this restricted subset (130 cases), which included age, gender, lens and macular status, number of detached retinal quadrants and PVR grade. In this model, only PVR grade was significantly associated with the outcome in this model, but it identified correctly 97.2% of successful cases and 21.4% of failed cases. Outcome by PVR grade at the time of surgery is shown in figure 1. There was a significant correlation between the time from RRD onset to surgery and the grade of PVR observed (Spearman's r=0.318, p=0.001), as shown in figure 2.

Based on the observed sizable effect of PVR on final outcome, the dataset was reanalyzed (post hoc) by classifying cases as simple (PVR grades 0 o A) or complex (B or worse) according to this variable at the time of first surgery. Results are summarized in table 5. Of the 137 (95.1%) cases with adequate PVR grading, 102 (74.5%) were simple and 35 (25.5%) were complex. There was a non-significant tendency towards a greater number of interventions in the complex group (proportion of cases operated on more than once (26.5% vs 42.9%, p=0.09), and there was a significant difference in the proportion of cases that were operated on twice (14.7% vs 31.4%, p=0.04). Regarding the type of procedure, there was a significant difference in the number of cases that were initially subjected to PPV, either alone or PPV+SB (82.4% vs 97.1%, p=0.04). There was also a significant difference in the success and type 1 failure rates between simple and complex cases.

Discussion

In the present study, we show that anatomical outcome after surgery for RRD in two different Argentine clinics is comparable to that of other countries, but several distinctions need to be made because different criteria are used in most published reports. Because of the rather inclusive nature of the Argentine health system, with both a government-funded health provider that covers most of the retired population and private health providers that cover most of the working population, we chose to compare our findings to those from nationwide studies from countries with inclusive health systems[2-3, 12].

Regarding demographics, male predominance and age distribution are similar to those reported in nationwide studies from England and Denmark[3, 12], despite the different ethnic composition. Remarkably, there is also coincidence with a Dutch study[13] on the time elapsed between the onset of RRD-related symptoms and the first consult, with median of 6 days in our study and 4 days in the Netherlands, and the time until first surgery, with a median of 13 days in our study and 14 days in the Netherlands[13]. The retrospective nature of our study and the fact that the extensive retinal exam was performed by the surgeon on the day of the surgery preclude the assessment of macular status influence on the delay to seek medical attention. At any rate, the similarity suggests that the insidious nature of symptoms and probably a reduced alarm threshold in the elderly both represent a universal hurdle for providing prompt treatment, regardless of the contrasting socioeconomic conditions in both countries.

On the clinical aspect of the RRD cases, there was also a predominance of phakic eyes and macular involvement, as reported in other nations.

Table 4. Outcome at the end of the study period.

		Total (n=144)	Clinic #1 (n=78)	Clinic #2 (n=66)	Statistical comparison between clinics (p)
Success		115 (79.9%)	58 (74.4%)	57 (86.4%)	0.10
Failure	Type 1	12 (8.3%)	8 (10.3%)	4 (6.1%)	0.55
	Type 2	11 (7.6%)	7 (9.0%)	4 (6.1%)	0.55
	Type 3	3 (2.1%)	3 (3.8%)	0 (0.0%)	0.25
	Type 4	3 (2.1%)	2 (2.6%)	1 (1.5%)	1.00

By contrast, the extension of detached retina at the time of surgery was greater than in the Scottish report[12], as determined by the number of cases with only one affected retinal quadrant (18% vs 59%), and the PVR grade distribution at the time of surgery differed significantly with the multicentric EVRS study[11], with less severity in our series. Regarding the type of procedure, PPV alone as initial treatment was performed less frequently in our series (70% vs 64-95%)[2-3, 12], and conversely, there were more combined procedures (16% vs 1-8%)[2-3, 12]. In other words, the choice of PPV alone or PPV+SB in our series (86%) is within the range of the other studies (70-95%)[2-3, 12]. Consistently, the choice of SB alone as a first procedure (13%) is comparable to the English and Scottish reports (12-29%)[3, 12], although the Danish seem to have abandoned it almost completely (<5%)[2]. Regarding the choice of tamponade agent in PPV alone or PPV+SB, silicone oil was used as frequently as in other series (25% vs 18-31%)[2-3].

The methodological differences between studies and the lack of standardized criteria for reporting results preclude precise comparisons of outcomes after the first surgery for RRD, mainly because other studies report on simple and complex cases separately. The primary success rate, defined as full retinal reattachment without tamponade at the end of the study, was comparable to other series (75% vs 79-80%)[3, 12]. The number of patients with silicone oil at the end of the study (type 2 failure) after the first surgery was the same as for the English series (8%)[3], but there

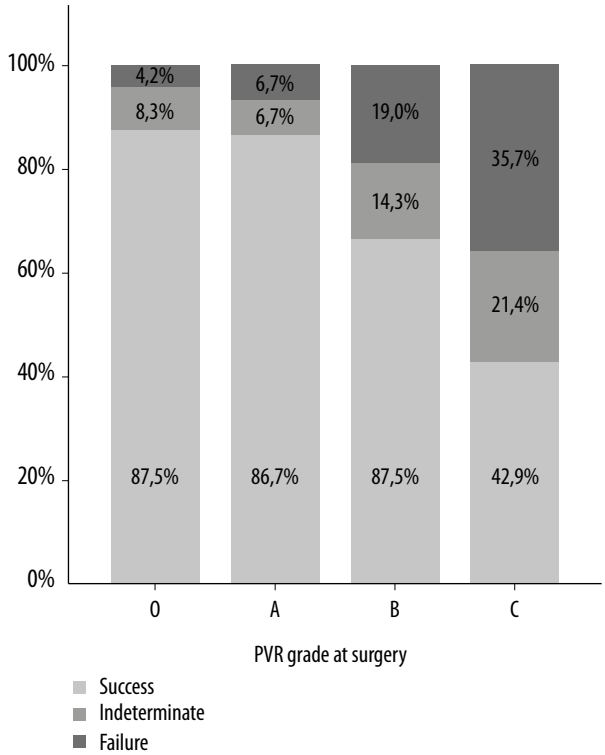

Figure 1. Outcome by proliferative vitreoretinopathy grade at the time of surgery. Success was defined as complete reattachment of the retina without tamponade, indeterminate as presence of tamponade or further surgery planned to reattach the retina at the end of the study period, and failure as retinal detachment deemed inoperable or retinal reattachment with severe extraretinal complications. PVR = proliferative vitreoretinopathy.

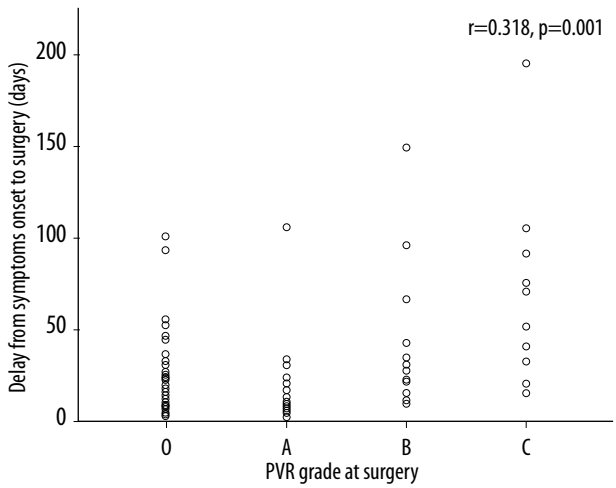

Figure 2. Correlation between proliferative vitreoretinopathy grade and time to surgery. A significant positive correlation (Spearman´s r=0.318, p=0.001) was found between the time elapsed from onset of symptoms and first surgery and the grade of proliferative vitreoretinopathy.

Table 5. Outcome by retinal detachment complexity at first surgery.

	Simple RRD (n=102)	Complex RRD (n=35)	Statistical comparison (p)
Number of operations	1: 75 (73.5%)	1: 20 (57.1%)	0.09
	2: 15 (14.7%)	2: 11 (31.4%)	0.04
	3: 12 (11.8%)	3: 4 (11.4%)	1.00
First procedure	PR: 2 (2.0%)	PR: 0 (0%)	1.00
	SB: 16 (15.7%)	SB: 1 (2.9%)	0.07
	PPV: 71 (69.6%)	PPV: 26 (74.3%)	0.67
	PPV+SB: 13 (12.7%)	PPV+SB: 8 (22.9%)	0.18
Final outcome	Success: 89 (87.3%)	Success: 20 (57.1%)	0.0004
	Failure 1: 3 (2.9%)	Failure 1: 8 (22.9%)	0.0008
	Failure 2: 7 (6.9%)	Failure 2: 4 (11.4%)	0.47
	Failure 3: 1 (1.0%)	Failure 3: 2 (5.7%)	0.16
	Failure 4: 2 (2.0%)	Failure 4: 1 (2.9%)	1.00

RRD = rhegmatogenous retinal detachment; PR = pneumatic retinopexy; SB = scleral buckling; PPV = pars plana vitrectomy.

was a higher rate of patients undergoing two (18% vs 13%) and three procedures (11% vs 3%) in our report. In this regard, the reoperation rate in the Danish study was also 16%[2], markedly lower than ours (29%). Considering that the primary success rate in the English study was similar to ours, it is not clear whether the higher reoperation rate in our series was due to less reluctance on the patients or operating surgeon to respectively accept or offer a second attempt or to some other methodological difference.

Complexity-based staging of RRD cases is a useful approach that allows for better comparisons and was adapted from the EVRS series[11]. However, it should be noted that the EVRS study was based on individual reports from surgeons instead of series of consecutive patients, and therefore it is likely that a selection bias might have taken place. Anatomical success after one surgery in simple cases was 74% in our series and 85% in average in the EVRS study, as the latter informed separately based on lens status and type of procedure. By contrast, complex cases should be further classified by PVR grade. In this way, there were no important differences in the results for grade B cases, but our success rate was markedly lower for grade C cases than in the EVRS study. However, the latter only included grade C-1 cases, that is, with only one full thickness retinal fold, whereas our report included many cases with more advanced PVR. At any rate, it is clear that a larger series of cases and, more importantly, standardized criteria are required for rigorous comparisons.

In summary, here we show that the anatomical outcome of surgery for RRD in two eye clinics in Buenos Aires is within the internationally reported figures, although there were remarkable differences between the two centers. The fact that the same surgeon operated on all cases in both centers rules out the surgeon factor, so other causes must be sought out. The longer delay in surgical treatment in clinic #1 (10 vs 6 days from first consult to surgery) was likely due to the red tape and intricacies of the Argentine government-funded health provider for retirees and pensioners. This might explain the greater extension of retinal detachment and the observed trend of worse PVR at the time of surgery in clinic #1 (table 2). At the same time, the available surgical instrumentation was not the same in both centers, which may have favored the observed

discrepancies in anatomical success. Regardless of these peculiarities, this work confirms the significant weight of PVR on surgical outcome and the late presentation and delayed treatment of many affected patients at eye clinics. These conclusions highlight, on the one hand, the need of increasing population-wide awareness of RRD-associated symptoms so that this delay is reduced, and on the other hand, the necessity of optimizing health care resources so that prompter surgery can be performed. This problem, it seems, is not exclusive to Argentina[13]. Moreover, there is the unmet need of an effective adjuvant pharmacological treatment for PVR before, during or after surgery for RRD.

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