Eye (2016) 30, 355–361

www.nature.com/eye

CLINICAL STUDY

A 12-year review on the aetiology and surgical outcomes of paediatric rhegmatogenous retinal detachments in Hong Kong

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Abstract

Purpose **To evaluate the aetiology, clinical features, and surgical outcomes of paediatric rhegmatogenous retinal detachments (RRD) in Hong Kong.**

Patients and methods **This is a retrospective consecutive case series of all patients aged 18 or under who underwent primary retinal detachment repair in the Hong Kong Eye Hospital from January 2000 to December 2012.**

Results **Forty-nine eyes of 47 patients were included. The mean age was 14, and the mean follow-up duration was 6.2 years. The most common aetiology for RRD was idiopathic (28.6%), followed by high myopia (24.5%), atopic dermatitis (AD) (18.4%), congenital and developmental abnormalities (16.3%), trauma (8.2%), and intraocular inflammation (4.1%). The mean preoperative visual acuity was LogMAR 1.0 ± 0.8 (Snellen equivalent 6/60). The primary anatomical success rate in this series was 65.3%, and the final anatomical success rate was 85.7%. The mean postoperative visual acuity was LogMAR 0.9 ± 1.2 (Snellen equivalent 6/48). Patients with congenital and developmental abnormalities or AD had worse anatomical and functional outcomes than patients who had no predisposing factor or high myopia.**

Conclusions **The primary and overall anatomical success rates in our series were comparable with existing literature. High myopia is the most commonly identifiable risk factor in Hong Kong and AD is associated with a higher re-detachment rates and a poor visual outcome.**

Eye (2016) **30,** 355–361; doi:10.1038/eye.2015.212; published online 13 November 2015

Introduction

Rhegmatogenous retinal detachment (RRD) is an uncommon ocular condition in the paediatric population, accounting for 3–12% of all patients suffering from RRD.[1] Unlike their adult counterparts, children with RRD often present as a challenge to the operating surgeon. They usually present late with macula-off RRD and proliferative vitreoretinopathy (PVR).[1] There are often underlying risk factors such as trauma, congenital-developmental ocular disorders, myopia, or prior surgery that affect visual prognosis.[2–6] Some patients have systemic conditions (eg, Stickler syndrome, Marfan syndrome) that would predispose both eyes to RRD.[3,7] Atopic dermatitis (AD) has been reported as another important aetiology especially from studies in Japan.[8] Despite advances in modern vitreoretinal surgery, anatomical success rates for paediatric RRD remain lower than their adult counterpart, ranging from 72 to 88%.[1,4–7,9] Visual recovery is often limited despite anatomical success.[3,9]

In this study, we report our clinical experience in the surgical management of paediatric RRD in Hong Kong.

Materials and methods

This was a retrospective, consecutive case series. We reviewed the medical and operative records of all patients aged 18 or under (at the time of surgery) who underwent surgical management of RRD at the Hong Kong Eye Hospital, which is a tertiary referral centre in Hong Kong, from January 2000 to December 2012. Patients with exudative retinal

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Received: 25 January 2015
Accepted in revised form:
8 September 2015
Published online:
13 November 2015

The content of this paper was partly presented at the 8th International Symposium of Ophthalmology—Hong Kong in the Hong Kong Convention and Exhibition Centre, Wanchai, Hong Kong.

detachment (eg, Coats disease) or tractional retinal detachment (eg, active stages of retinopathy of prematurity) were excluded. For patients who had bilateral RRD with one eye operated on in our centre and the other in another centre, only the eye that was operated on in our centre was included in this series. If both eyes were operated on in our centre then both were included in the series. Eyes that were found to be irreparable (eg, closed funnel RD) during examination under anaesthesia were classified as primary failures, their visual acuities recorded as no light perception (NLP) and their follow-up duration excluded in the subsequent analysis.

From the medical records, we collected patients' demographic data, general systemic, and ocular characteristics. Eyes were divided into six groups for analysis according to aetiology:

Group 1: Idiopathic (no specific predisposing factors found)
Group 2: High myopia (≥ -6.0D)
Group 3: AD
Group 4: Congenital or developmental ocular abnormality (Including syndromal disorders such as Down syndrome or Marfan syndrome)
Group 5: Trauma
Group 6: Uveitis

For eyes that had multiple risk factors, the eye was assigned to a group based on the main underlying aetiology.

Visual acuity was measured using a Snellen visual acuity chart where possible. For younger children, tests appropriate to their age group, such as Cardiff acuity cards and Kay picture tests were used. Visual acuities of count fingers, hand motions and light perception, and NLP were assigned values of 1/200, 0.5/200, 0.25/200, and 0.125/200, respectively.[10] The Snellen visual acuities were converted to LogMAR scale for statistical analysis.

Operative details were collected. Early (within the first 2 weeks) and late postoperative complications (>3 months) as well as fellow eye findings were noted.

Anatomical success was defined as total retinal reattachment up to the last follow-up. Primary success was defined as total retinal reattachment after the initial operation up to the last follow-up. However, if silicone oil was used and was intended to be removed by the surgeon, success was considered if the retina remained attached after silicone oil removal (ie, second operation). If the silicone oil removal was not intended to have long-term tamponade, or that the patient refused silicone oil removal, the operation was considered successful if the retina was flat with silicone oil *in situ*.

Statistical analysis

All statistical analysis was performed using SPSS 17.0 statistics software. For descriptive purposes, qualitative variables were stated using percentages, whereas quantitative data were described by mean and SD. For univariate analyses, student's *t*-test was used for independent data, whereas paired *t*-test was used for paired observations. For comparisons of categorical data, Fisher's exact test was used. Statistical significance was defined as $P<0.05$.

Ethics approval

This study was approved by the ethical committee of the Kowloon Central Cluster. Rec no. KC/KE-12–0149/ER-2.

Results

Patient demographics

From January 2000 to December 2012, 49 eyes of 47 patients aged 18 or under underwent RRD repair. Patient demographics and aetiology of RRD can be found in Table 1. All patients were ethnic Chinese. The mean follow-up duration was 6.2 years. Twenty-eight (59.6%) patients (28 eyes) were male. For the trauma group, 100% were male. The mean age was 14 ± 4 years old, ranging from 1 to 18 years of age. In terms of aetiology, the most common identifiable risk factors were high myopia (12 eyes, 24.5%) and AD (9 eyes, 18.4%).

The aetiology divided according to age groups and baseline clinical characteristics can be found in Table 2. The aetiology of RRD varied according to age.

Table 1 Demographics and aetiology of patients with paediatric rhegmatogenous retinal detachments

Total cases (patient, eyes)	47, 49
Male (no. of patient)	28 (59.6%)
Female (no. of patient)	19 (40.4%)
Age (mean ± SD)	13.75 ± 4.2 years
Range (age)	1–18
Age group (no. of patient)	
1–10	8 (17%)
11–15	20 (42.6%)
16–18	19 (40.4%)
Positive family history	3 (6.4%)
Bilaterality	7 (14.9%)
Aetiology (no. of eyes)	
1 Idiopathic	14 (28.6%)
2 High myopia	12 (24.5%)
3 Atopic dermatitis	9 (18.4%)
4 Congenital and developmental	8 (16.3%)
5 Trauma	4 (8.2%)
6 Intraocular inflammation	2 (4.1%)
Mean FU time (years)	6.2 ± 2.7

Table 2 Patient demographics and baseline clinical characteristics according to aetiology

	Idiopathic (Gp 1)	*High myopia (Gp2)*	*AD (Gp3)*	*Cong (Gp4)*	*Trauma (Gp5)*	*Inflam (Gp6)*	*Total*
Total patient ($n=47$)	14	12	7	8	4	2	47
Male	6 (42.9%)	8 (66.7%)	2 (28.6%)	7 (87.5%)	4 (100%)	1 (50%)	28 (59.6%)
Age (mean ± SD)	14.13 ± 3.02	15.25 ± 2.73	14.67 ± 3.04	9.99 ± 6.69	11.17 ± 4.91	17.00 ± 1.41	13.75 ± 4.2
Range							
1–10	2 (14.3%)	0 (0%)	2 (28.6%)	3 (37.5%)	1 (25%)	0 (0%)	8 (17%)
11–15	8 (57.1%)	5 (41.7%)	1 (14.3%)	4 (50%)	2(50%)	0 (0%)	20 (42.6%)
16–18	4 (28.6%)	7 (58.3%)	4 (57.1%)	1 (12.5%)	1 (25%)	2 (100%)	19 (40.4%)
Positive family history of RD	1 (7.1%)	0 (0%)	1 (14.3%)	0 (0%)	1 (25%)	0 (0%)	3 (6.4%)
Bilaterality	0 (0.0%)	2 (16.7%)	2 (28.6%)	2 (25%)	1 (25.0%)	0 (0.0%)	7 (14.9%)
Total eyes ($n=49$)	14	12	9	8	4	2	49
Pre-op BCVA	0.50 ± 0.54	0.9 ± 1.0	0.90 ± 0.8	1.1 ± 0.5	0.30 ± 0.35	1.4 ± 1.3	0.97 ± 0.78
Snellen equiv	0.32 (6/19)	0.12 (6/48)	0.12 (6/48)	0.08 (6/75)	0.5 (6/12)	0.04 (6/150)	0.10 (6/60)
Mean pre-op refraction	− 2.68 ± 1.82	− 11.67 ± 4.59	− 4.08 ± 4.07	− 0.38 ± 7.78	− 5.05 ± 5.49	NA (1 missing)	− 5.34 ± 5.72
Mean FU time (years)	8.1 ± 2.9	7.2 ± 2.3	6.0 ± 3.2	7.7 ± 2.3	6.6 ± 1.8	5.1 ± 4.0	6.2 ± 2.7

Abbreviations: AD, atopic dermatitis; Cong, congenital and developmental disorders; Inflam, intraocular inflammation; Pre-op, preoperative; RD, retinal detachment.
Percentages are column percentages calculated with total patient or eyes of each aetiological group as the denominator.

For patients presenting at age 10 or younger, the most common aetiology was congenital and developmental abnormalities (37.5%). For patients aged 11 and above, high myopia (30.8%) was most common.

Congenital and developmental etiologies identified in Group 4 (some eyes have more than one predisposing factors) were: X-linked juvenile retinoschisis (one eye), Marfan syndrome (one eye), Down syndrome (one eye), optic disc or choroidal coloboma (two eyes), iris dysgenesis (one eye), congenital cataract (two eyes), congenital glaucoma (one eye), cicatricial ROP (one eye).

RRD was present bilaterally in seven (14.9%) patients. All had underlying risk factors, including AD, myopia, congenital and developmental abnormalities (Table 2).

The clinical characteristics of RRD according to aetiological groups and their fellow eye findings are shown in Table 3. The mean duration from onset of symptoms to operative repair was 4.5 months. In total, 28 eyes (57.1%) presented with macula-off status, and 18 eyes (36.7%) presented with PVR grade C or worse. The most common cause for RRD was lattice with holes (36.7%), followed by flap tear or hole (34.7%). Lattice was the most common fellow eye finding noted in 20 eyes (41%).

The operative details of the eyes grouped into etiologies are shown in Table 4. A total of 12 surgeons performed the surgeries. The surgical technique was determined by the surgeon. Two eyes (4%) were classified as primary failures as surgical repair for retinal detachment was considered not possible after examination under anaesthesia. One was a patient with Down Syndrome who was found to have closed funnel RD on table, the other was a case of cicatricial ROP presenting with combined tractional and rhegmatogenous RD. Within aetiological subgroups, scleral buckling (SB) alone was most often performed for patients without major predisposing factor (50%), myopia (66.7%), and trauma (100%). Combined pars plana vitrectomy (PPV) and SB was the procedure of choice for patients with AD (55.6%) and congenital and developmental abnormalities (62.5%). Concomitant lens surgery (cataract extraction or lensectomy with or without intraocular lens implantation) was performed in 10 eyes (20.4%). This was due to cataracts (found in 6 of the 10 eyes) or severe anterior PVR. For cases with anterior PVR the lens was removed to assist in vitreous base shaving and anterior membrane peeling.

Anatomical outcomes

The primary success rate was 65.3%, whereas the final success rate was 85.7% (Table 4). Patients with congenital and developmental abnormalities had the lowest primary (50%) and final (50%) anatomical success rates, followed by patients with AD (primary success rate 55.6%; final success rate 77.8%). Patients with high myopia and trauma had the highest primary and final success rate (75 and 100%, respectively for both groups).

Functional outcomes

Overall the mean postoperative best corrected visual acuity (BCVA) (LogMAR 0.91 ± 1.18; Snellen approx. 6/48) was not significantly different from preoperative BCVA (LogMAR 0.97 ± 0.78; Snellen approx. 6/60, $P=0.25$) (Table 4).

When comparing macula-on and macula-off status, patients presenting with macula-on status had a significantly better BCVA both pre and post-operatively compared with patients with macula-off status. Preoperatively, the mean BCVA for eyes with macula on status was logMAR 0.40 ± 0.54, whereas the mean BCVA

Table 3 Clinical characteristics of retinal detachment and fellow eye findings

	Idiopathic (Gp 1)	*High myopia (Gp2)*	*AD (Gp3)*	*Cong (Gp4)*	*Trauma (Gp5)*	*Inflam (Gp6)*	*Total*
Total eyes $n=49$	14	12	9	8	4	2	49
Mean duration from onset to OT	4.8 months	7.7 months	2.3 months	2.1 months	0.9 month	13 months	4.5 months
Clinical Characteristics of RRD[a]							
Mac off	8 (57.1%)	6 (50.0%)	5 (55.6%)	7 (87.5%)	2 (50.0%)	0 (0%)	28 (57.1%)
PVR ⩾ Grade C	7 (50%)	2 (16.7%)	3 (33.3%)	4 (50%)	0 (0%)	2 (100.0%)	18 (36.7%)
Lattice with holes	5 (35.7%)	7 (58.3%)	4 (44.4%)	1 (12.5%)	1 (25%)	0 (0.0%)	18 (36.7%)
Flap tear/hole	4 (28.6%)	3 (25.0%)	3 (33.3%)	3 (37.5%)	2 (50%)	2 (100.0%)	17 (34.7%)
Oral dialysis	3 (21.4%)	1 (8.3%)	1 (11.1%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	6 (12.3%)
Giant tear	1 (7.1%)	1 (8.3%)	0 (0.0%)	0 (0.0%)	1 (25%)	0 (0.0%)	3 (6.1%)
Retinoschisis	1 (7.1%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (2.0%)
Peripheral neovascularization	1 (7.1%)	0 (0.0%)	0 (0.0%)	1 (12.5%)	0 (0.0%)	1 (50.0%)	3 (6.1%)
Not stated in chart	0 (0%)	1 (8.3%)	1 (11.1%)	3 (37.5%)	0 (0%)	0 (0.0%)	5 (10.2%)
Fellow eye findings[a]							
Lattice	5 (35.7%)	9 (75.0%)	3 (33.3%)	2 (25.0%)	0 (0.0%)	1 (50.0%)	20 (40.8%)
Breaks	0 (0.0%)	6 (50.0%)	5 (55.6%)	1 (12.5%)	0 (0.0%)	0 (0.0%)	12 (24.5%)
RD	0 (0.0%)	3 (25.0%)	5 (55.6%)	2 (25.0%)	1 (25.0%)	0 (0.0%)	11 (22.4%)
WsP	3 (21.4%)	3 (25.0%)	1 (11.1%)	0 (0.0%)	1 (25.0%)	1 (50.0%)	9 (18.4%)
Cataract	1 (7.1%)	0 (0.0%)	3 (33.3%)	3 (37.5%)	0 (0.0%)	0 (0.0%)	7 (14.3%)

Abbreviations: AD, atopic dermatitis; Cong, congenital and developmental disorders; Inflam, intraocular inflammation; RRD, rhegmatogenous retinal detachment; WsP, white without pressure. [a]Each eye may have more than one clinical characteristic.

Table 4 Operative details, anatomical and functional outcomes according to aetiological subgroups

	Idiopathic (Gp 1)	*High myopia (Gp2)*	*AD (Gp3)*	*Cong (Gp4)*	*Trauma (Gp5)*	*Inflam (Gp6)*	*Total*
Total eyes $n=49$	14	12	9	8	4	2	49
Operative details[a]							
SB only	7 (50.0%)	8 (66.7%)	3 (33.3%)	0 (0.0%)	4 (100%)	0 (0.0%)	22 (44.9%)
PPV only	1 (7.1%)	1 (8.3%)	1 (11.1%)	2 (25.0%)	0 (0.0%)	1 (50.0%)	6 (12.2%)
SB+PPV	5 (35.7%)	3 (25.0%)	5 (55.6%)	5 (62.5%)	0 (0.0%)	1 (50.0%)	19 (38.8%)
EUA only (inoperable)	1 (7.1%)			1 (12.5%)			2 (4.1%)
Lens surgery (CE ± IOL or lensectomy)	1 (7.1%)	2 (16.7%)	2 (22.2%)	3 (37.5%)	1 (25.0%)	1 (50.0%)	10 (20.4%)
Tamponade $n=27$	7	4	6	7	1	2	27
Gas (SF6 or C3F8)	3 (42.9%)	1 (25.0%)	4 (66.6%)	1 (14.3%)	1 (100%)	0 (0.0%)	10 (37.0%)
Silicone Oil	4 (57.1%)	3 (75.0%)	2 (33.3%)	6 (85.7%)	0	2 (100%)	17 (63.0%)
Anatomical outcome n = *49*							
Primary success	10 (71.4%)	9 (75.0%)	5 (55.6%)	4 (50%)	3 (75.0%)	1 (50%)	32 (65.3%)
Final success	13 (92.9%)	12 (100%)	7 (77.8%)	4 (50%)	4 (100%)	2 (100%)	42 (85.7%)
Silicone oil *in situ*	3 (21.4%)	3 (25.0%)	2 (22.2%)	3 (37.5%)	1 (25.0%)	2 (100%)	14 (28.6%)
Mean no. of operation	1.43 ± 0.9	1.42 ± 0.9	1.56 ± 0.7	1.71 ± 1.1	1.33 ± 0.5	1.5 ± 0.7	1.48 ± 0.8
Functional outcome by aetiology							
Pre-op BCVA (LogMAR)	0.50 ± 0.54	0.9 ± 1.0	0.90 ± 0.8	1.1 ± 0.5	0.30 ± 0.35	1.4 ± 1.3	0.97 ± 0.78
Post-op BCVA (LogMAR)	0.41 ± 0.43	0.54 ± 0.82	0.91 ± 1.18	1.49 ± 1.35	0.07 ± 0.15	1.55 ± 1.48	0.91 ± 1.18
Snellen equiv (pre-op)	0.32 (6/19)	0.12 (6/48)	0.12 (6/48)	0.08 (6/75)	0.5 (6/12)	0.04 (6/150)	0.10 (6/60)
Snellen equiv (post-op)	0.40 (6/15)	0.32 (6/19)	0.12 (6/48)	0.03 (6/190)	0.8 (6/7.5)	0.03 (6/190)	0.12 (6/48)
Mean pre-op refraction	− 2.68 ± 1.82	− 11.67 ± 4.59	− 4.08 ± 4.07	− 0.38 ± 7.78	− 5.05 ± 5.49	NA (1 missing)	− 5.34 ± 5.72
Mean post-op refraction	− 2.86 ± 4.46	− 8.34 ± 6.49	− 6.50 ± 3.33	− 6.75 ± 3.45	− 5.40 ± 1.70	NA	− 5.43 ± 5.06

Abbreviations: AD, atopic dermatitis; BCVA, best corrected visual acuity; CE, cataract extraction; Cong, congenital and developmental disorders; EUA, examination under anaesthesia; Inflam, intraocular inflammation; IOL, intraocular lens; PPV, pars plana vitrectomy; SB, scleral buckling. [a]Total number of surgeons = 12.

for eyes with macula-off status was logMAR 1.25 ± 0.84. The difference was 8.6 Snellen lines ($P = 0.01$). Postoperatively, the mean BCVA for eyes with macula on status was logMAR 0.31 ± 0.60, whereas the BCVA for eyes with macula-off status was logMAR1.16 ± 1.12. The difference was also 8.6 Snellen lines ($P = 0.04$).

Within aetiological groups, there was a small VA gain in all groups except Group 3 (AD) and Group 4 (congenital and developmental abnormalities). Patients in Group 2 (high myopia) and Group 5 (trauma) had the greatest improvement in vision. For the high myopia group, there was a vision gain of 3.6 Snellen lines, $P = 0.18$ and for the trauma group there was vision gain of 2.3 Snellen lines, $P = 0.32$. None of the VA changes (both overall mean VA change or VA change within aetiological groups) was statistically significant.

Complications

Common short-term complications included increased intraocular pressure, severe uveitis, or new thinning or breaks requiring supplementary laser (Table 5). Cataract, band keratopathy, and glaucoma were the most common long-term complications. Of the 12 eyes that developed cataract, 9 subsequently underwent cataract extraction surgery.

Discussion

The common aetiologies for paediatric retinal detachment are different in different countries. Prior intraocular surgery and congenital and developmental abnormalities like cicatricial ROP rank high on the list in the United States and United Kingdom,[7,9,11] trauma is the most common aetiology in Iran,[6] whereas Stickler's syndrome is common in Middle Eastern countries such as Egypt and Saudi Arabia.[1,12] In East Asia, trauma and high myopia were reported as leading causes of paediatric retinal detachment in Taiwan,[2,4] and AD is an important risk factor in addition to trauma and myopia in Japan.[8] For Hong Kong, in our series of 49 eyes in 47 children we have identified high myopia and AD as two of the most important identifiable causes of paediatric retinal detachment in this region.

Myopia is highly prevalent in Hong Kong, as is with the rest of East Asia. About 70% of the population would be myopic by 17 years of age.[13] Previous cross sectional studies have indicated a prevalence of myopia to be 85–88% for Chinese local school students.[14] Similar prevalence is found in Taiwan, where 81% of children of 15 years are myopic.[4] High myopia is an important aetiological factor in paediatric retinal detachments across East Asia, present in 23–38% of RRD patients according to studies conducted in Japan and Taiwan.[2,4,5] In our study, the prevalence of high myopia (−6 D as the cutoff) in RRD patients is 23.1%. However, the definition of myopia in children varies between −3D to −6D, as −4D already represents abnormal elongation of eyeball in children.[4] If we used −3D as a cutoff in this study, nearly half (22 eyes, 45%) will be in the myopia group. The refraction for the myopic group in this study also tends to be more extreme with a mean of −11.67 ± 4.59 D. Four eyes had a refractive error of > −10 D (extreme myope), whereas the rest had myopia > −6D (high myope).

A recent study by Wong *et al*[15] has reported a difference in pathology and surgical outcome between high myopic (> −6D) and extreme myopic eyes (> −10D). Extreme myopic eyes tend to have retinal tears compared with high myopic eyes where atrophic holes are more common. Also, extreme myopic eyes have poorer surgical outcome. Our study seems to support their finding in that one of the eyes with extreme myopia suffered from a giant retinal tear rather than lattice with holes, and the primary success rates for extreme myopic eyes were lower than high myopic eyes at 50 and 88%, respectively. Although the difference did not reach statistical significance ($P = 0.24$), it is probably due to the small number of eyes in this study. Future studies with larger sample number may establish this difference.

AD is found to be another important aetiological factor in our study, being present in 18% of the eyes. Patients in our series often had severe disease and were on systemic medications (56% on oral steroids). We found a high incidence of bilateral RRD (28.6%) in such patients. AD associated with retinal detachment was reported as early as 1996 from Japan, where the disease entity is common. Takahashi *et al*[16] found that atrophic holes were

Table 5 Early and late postoperative complications

Short-term	
Increased IOP >21 mm Hg	12 (24.5%)
Severe uveitis with PS and seclusio papillae	3 (6.1%)
New thinning or breaks requiring supple laser	3 (6.1%)
Long-term	
Glaucoma	4 (8.2%)
Cataract[a]	12/39 (30.8%)
Corneal	7 (14.3%)
Band K	5 (10.2%)
Corneal scar	1 (2%)
Corneal blood staining	1 (2%)
Squint	1 (2%)
Exposed buckle	1 (2%)
Subconj abscess with subsequent granuloma	1 (2%)
Macular hole	1 (2%)
Persistent subretinal band	1 (2%)
Pthisis	3 (6.1%)

Abbreviation: PS, posterior synechiae. [a]Excluding cases where combined cataract surgery was performed in the primary operation.

predominantly responsible for RRD in eyes with clear lens, whereas retinal dialysis was mainly responsible for eyes with cataract, aphakia, or pseudophakia. The authors suggested that constant rubbing or hitting of the eye by patients with AD may cause anterior vitreous traction and lead to RRD, and that oral dialysis were commonly reported in these eyes.[8,16] In our experience, however, most breaks were peripheral lattice with holes (33%), and oral dialysis was only found in only one (11%) of the eyes, compared with 50% found in other studies.[8] The majority of the eyes in the AD group had clear lens (5/9 eyes, 55.6%), two eyes had cataract and were extracted during the primary retinal detachment repair, whereas two eyes were pseudophakic. The eye that had an oral dialysis had a clear lens.

RRD due to congenital and developmental abnormality in our sample was less common and included cicatricial ROP, optic disc coloboma, Down syndrome, X-linked juvenile retinoschisis, and Marfan Syndrome. There were no cases of FEVR as commonly reported in Japan[8] or Stickler's syndrome as commonly reported in the Middle East.[1,12] Interestingly, the trauma cases in our study had relatively good anatomical and functional outcome (75% primary success, 100% final success, mean final VA 6/7.5). One reason may be that they had better baseline vision (mean VA 6/12) and that they presented earlier with a shorter period from onset of symptoms to operation (mean 0.9 month), and none had PVR.

Our anatomical surgical outcomes showed a final reattachment rate of 85.7%, which was comparable with that in the literature (72–88%).[1,4–8,16] SB was the most common procedure performed in this series (42.9%) closely followed by combined sclera buckling with vitrectomy (40.8%). Eyes in the idiopathic or high myopic groups had better anatomic and visual outcomes compared with other aetiological groups, whereas patients with congenital and developmental disorders had the worst anatomical outcome, echoing other reports with success rates ranging from 64.6 to 80%).[6,8] Patients with AD also had poor anatomical outcome with high re-detachment rates (final anatomical success rate of 78%) and poor visual outcome (same preoperative and postoperative Snellen equivalent VA of 6/48). This could be due to persistent chronic uveitis due to atopic reactions leading to PVR, or inflammation of the ciliary body causing traction to the pars plana and peripheral retina causing new breaks.[16] Ongoing trauma by eye rubbing or slapping may also have a role in the poor reattachment rates. Combined SB and PPV were often needed in such cases for successful retinal reattachment (used in 56% of eyes in our series).

Functionally, BCVA improved or remained the same in all aetiological groups except congenital abnormalities and uveitis. Despite anatomical success in a large proportion of patients, visual recovery was limited with mean Snellen BCVA change from 6/60 to 6/48. This observation has been well described in the literature. Factors attributing the poor visual outcome include late detection of RRD with macula-off status,[6] concomitant ocular abnormalities (especially patients with congenital and developmental disorders), difficult and repeated surgeries with tightly adherent vitreous and aggressive PVR.[17]

Limitations to our study included a single centre, retrospective case series study design, and the sample size was relatively small in some aetiological subgroups, for example, 5 and 6. However, to the best of our knowledge this is the first study of its kind in Hong Kong providing information on the most common risk factors of paediatric RRDs in this locality, which differs from what was reported previously in Western, Middle Eastern, or even East Asian countries. Identifying such factors may have prognostic implications.

In conclusion, paediatric RRD is a rare entity in Hong Kong. High myopia and AD are the most commonly identifiable risk factor in this series. AD is associated with higher re-detachment rates and poor visual outcome.

Summary

What was known before

- Paediatric RRD remains a challenge to the treating ophthalmologist despite advances in modern vitreoretinal surgery, with lower anatomical and functional success rates compared with adult RRDs.
- Paediatric RRD often have underlying risk factors that affect prognosis, for example, trauma, congenital-developmental ocular disorders, myopia, prior surgery, and underlying systemic conditions. The prevalence of such risk factors varies across different regions of the world.

What this study adds

- High myopia and AD are the two most important identifiable risk factors in Hong Kong. RDs associated with AD is related to poor surgical and functional outcomes.

Conflict of interest

The authors declare no conflict of interest.

Acknowledgements

We would like to thank Kelvin Ye from the Department of Ophthalmology and Visual Sciences, The Chinese University of Hong Kong, for providing statistics support.

References

1 Soliman MM, Macky TA. Pediatric rhegmatogenous retinal detachment. *Int Ophthalmol Clin* 2011; **51**(1): 147–171.

2 Wang NK, Tsai CH, Chen YP, Yeung L, Wu WC, Chen TL *et al.* Pediatric rhegmatogenous retinal detachment in East Asians. *Ophthalmology* 2005; **112**(11): 1890–1895.
3 Weinberg DV, Lyon AT, Greenwald MJ, Mets MB. Rhegmatogenous retinal detachments in children: risk factors and surgical outcomes. *Ophthalmology* 2003; **110**(9): 1708–1713.
4 Chang PY, Yang CM, Yang CH, Huang JS, Ho TC, Lin CP *et al.* Clinical characteristics and surgical outcomes of pediatric rhegmatogenous retinal detachment in Taiwan. *Am J Ophthalmol* 2005; **139**(6): 1067–1072.
5 Chen SN, Jiunn-Feng H, Te-Cheng Y. Pediatric rhegmatogenous retinal detachment in taiwan. *Retina* 2006; **26**(4): 410–414.
6 Soheilian M, Ramezani A, Malihi M, Yaseri M, Ahmadieh H, Dehghan MH *et al.* Clinical features and surgical outcomes of pediatric rhegmatogenous retinal detachment. *Retina* 2009; **29**(4): 545–551.
7 Fivgas GD, Capone A Jr. Pediatric rhegmatogenous retinal detachment. *Retina* 2001; **21**(2): 101–106.
8 Oono Y, Uehara K, Haruta M, Yamakawa R. Characteristics and surgical outcomes of pediatric rhegmatogenous retinal detachment. *Clin Ophthalmol* 2012; **6**: 939–943.
9 Gonzales CR, Singh S, Yu F, Kreiger AE, Gupta A, Schwartz SD. Pediatric rhegmatogenous retinal detachment: clinical features and surgical outcomes. *Retina* 2008; **28**(6): 847–852.
10 Scott IU, Schein OD, West S, Bandeen-Roche K, Enger C, Folstein MF. Functional status and quality of life measurement among ophthalmic patients. *Arch Ophthalmol* 1994; **112**(3): 329–335.
11 Lee RW, Mayer EJ, Markham RH. The aetiology of paediatric rhegmatogenous retinal detachment: 15 years experience. *Eye* 2008; **22**(5): 636–640.
12 Wenick AS, Baranano DE. Evaluation and management of pediatric rhegmatogenous retinal detachment. *Saudi J Ophthalmol* 2012; **26**(3): 255–263.
13 Edwards MH, Lam CS. The epidemiology of myopia in Hong Kong. *Ann Acad Med Singapore* 2004; **33**(1): 34–38.
14 Lam CS, Goldschmidt E, Edwards MH. Prevalence of myopia in local and international schools in Hong Kong. *Optom Vis Sci* 2004; **81**(5): 317–322.
15 Wang NK, Chen YP, Lai CC, Chen TL, Yang KJ, Kuo YH *et al.* Paediatric retinal detachment: comparison of high myopia and extreme myopia. *Br J Ophthalmol* 2009; **93**(5): 650–655.
16 Takahashi M, Suzuma K, Inaba I, Ogura Y, Yoneda K, Okamoto H. Retinal detachment associated with atopic dermatitis. *Br J Ophthalmol* 1996; **80**(1): 54–57.
17 Bremen SB. *Pediatric Rhegmatogenous Retinal Detachment and PVR*. European Society of Ophthalmology: Copenhagen, Denmark, 2013.