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Diabetic retinal detachment surgery at a central academic hospital, Johannesburg, South Africa

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Background: Tractional retinal detachment surgery outcomes are unpredictable and need to be reviewed regularly in clinical practice settings.

Aim: To describe the visual acuity and anatomical outcomes of retinal detachment surgery for diabetic tractional retinal detachment at a central academic hospital.

Setting: Johannesburg, South Africa.

Methods: This study involves a retrospective case series of patients who had surgery for diabetic tractional retinal detachment at Charlotte Maxeke Johannesburg Academic Hospital between 01 January 2010 and 31 December 2014.

Results: A total of 65 patients with diabetic retinal detachment were included in this study. The study consisted of 63% (n = 41) male patients and 37% (n = 24) female patients. The mean age (± standard deviation) was 54 ± 12.2 years. Forty-four patients (68%) had tractional retinal detachment, and 21 (32%) patients had a combined tractional and rhegmatogenous retinal detachment. Twenty-one (32%) patients had detachments associated with vitreous haemorrhage (VH) , and 39 (60%) patients had macular-involving detachments. Forty-six (71%) patients obtained vision improvement or stabilisation and reattachment of the retina, 24 (36.9%) patients had visual acuity improvement, 22 (33.9%) patients retained the same visual acuity and 19 (29.2%) patients lost vision. Fifty-five (85%) patients had successful anatomical reattachment of the retina, and 10 (15%) patients had re-detachments after surgery.

Conclusion: The majority of patients whose files were reviewed benefited from surgical intervention for diabetic tractional retinal detachment in terms of stabilisation or improvement of vision.

Contribution: Tractional detachment surgery outcomes in our setting are comparable to those from elsewhere around the world.

Keywords: Retinal; tractional detachment; African; sub-Saharan Africa; rhegmatogenous; diabetic retinopathy.

Introduction

Tractional retinal detachment occurs when a mechanical force exerted by vitreoretinal adhesions pulls the neural retina away from the retinal pigment epithelium.[1,2,3,4] It is the second most common type of retinal detachment after rhegmatogenous retinal detachment.

Risk factors

The most common cause of tractional retinal detachment is diabetic retinopathy. Ostri et al.[5] listed the following as risk factors for diabetic retinopathy: HbA1c (glycosylated haemoglobin) greater than 7.5 mmol, blood pressure greater than 140/90 mmHg, diabetes duration, advanced age, male gender and nephropathy.[5]

Diabetic retinopathy is a disease of retinal vessels. Hyperglycaemia causes microvascular occlusion and permeability and eventually hypoxia with ischaemia.[2] Progressive retinal ischaemia leads to the secretion of vascular endothelial growth factor (VEGF). Vascular endothelial growth factor stimulates neovascularisation, and the vitreous serves as a scaffold where strong vitreoretinal adhesions and fibrovascular bands develop.[1,2,3] Contraction of the fibrovascular bands occurs as fibrosis continues. With time, the vitreous starts pulling away, and a mechanical separation of the neurosensory retina from the underlying retinal pigment epithelium occurs.[1,2,3]

Other known risk factors for tractional retinal detachment are retinal vein occlusion, sickle cell disease, retinopathy of prematurity and penetrating ocular trauma.

Indications for the management of tractional retinal detachment are tractional retinal detachment with macular involvement or threatening the macula, combined tractional and rhegmatogenous retinal detachment and tractional retinal detachment associated with chronic, nonclearing vitreous haemorrhage (VH).[3,4]

Outcomes of tractional detachments

Anatomical reattachment rate and an improvement in best-corrected visual acuity following surgery have been reported to be as high as 92.8% and 75%, respectively, in patients with tractional retinal detachment secondary to diabetic retinopathy.[2] Poor prognostic factors for surgery in this setting are poor pre-operative visual acuity, macular detachment, complex fibrovascular membranes, iris neovascularisation and macular ischaemia and oedema.[3]

The rationale for conducting this study was to review the patient profile and surgical outcome of retinal detachment surgery in the South African population.

Methods

Objectives

The objectives of this study were to describe the visual acuity and anatomical outcomes after three months following diabetic tractional retinal detachment surgery. The outcome measures were a change in Snellen visual acuity and the presence or absence of anatomical reattachment of the retina after three months following retinal detachment surgery or removal of silicone oil (where oil was inserted during the primary retinal detachment surgery).

Study design

This was a retrospective case series of patients who had pars plana vitrectomy (PPV) surgery for diabetic tractional retinal detachment at Charlotte Maxeke Johannesburg Academic Hospital between 01 January 2010 and 31 December 2014.

All patients were included who had PPV surgery for diabetic tractional retinal detachment. All patients whose medical records were incomplete were excluded from the study. Patients were also excluded if they had retinal surgery for other indications such as rhegmatogenous retinal detachment, VH, macular disorders (macular holes and epiretinal membranes), endophthalmitis, cataract surgery complications other than retinal detachment and intraocular foreign body without retinal detachment.

Surgical procedure

The routine surgical procedure for diabetic tractional detachment was a 23-gauge PPV, fibrovascular membrane peel and silicone oil tamponade. Phacoemulsification cataract surgery was performed in patients who had a cataract. In patients who subsequently developed a cataract with silicone oil *in situ*, the phacoemulsification cataract surgery was performed at the time of silicone oil removal.

Sample size and statistical analysis

Descriptive statistics were used to analyse the demographics, including age, race and gender, as well as the clinical characteristics.

Surgical success was defined as anatomical reattachment plus improvement in vision or anatomical reattachment plus stabilisation of vision. Surgical failure was defined as a detachment of the retina at three months following surgery or removal of silicone oil.

The identification of risk factors for surgical failure was performed in a univariate manner with the Student's *t*-test (two-sided) for continuous data and Fisher's exact test (two-sided) for categorical data. A p-value of < 0.05 was considered statistically significant.

Ethical considerations

Ethical approval and permission to conduct the study were obtained from the Human Research Ethics Committee (Medical) at the University of the Witwatersrand (ref. no. M141195).

Results

Total study population

A review of the theatre lists for the specified period identified a possible 853 records for review. Figure 1 indicates a flow chart of records excluded from the study. The final number

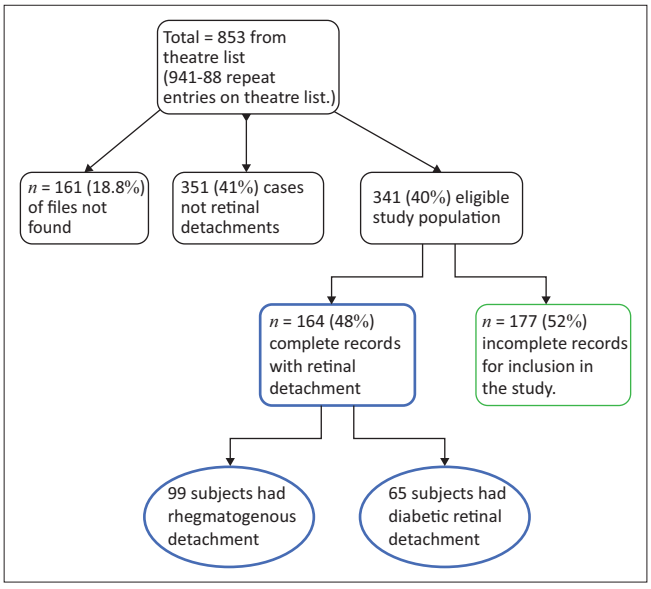

FIGURE 1: Flow diagram of the study population.

of the tractional retinal detachment cases identified for analysis was 65.

In this study, 65 patients had PPV surgery for diabetic tractional retinal detachment. These patients either had a tractional or a combined tractional and rhegmatogenous retinal detachment. The group consisted of 63% (n = 41) male patients and 37% (n = 24) female patients. The mean age (± standard deviation [s.d.]) of the group was 54 years (±12.20 years), and the median was 57 years with a range of 22–69 years. All of the patients were diabetic, 47 (72%) patients also had hypertension and 6 (9.2%) patients had associated renal failure. Forty-four (68%) patients had tractional retinal detachment and 21 (32%) patients had a combined tractional and rhegmatogenous retinal detachment.

Forty-six (71%) patients obtained a successful surgical outcome with either improvement or stabilisation in vision and attachment of the retina, 24 (36.9%) patients had vision improvement, 22 (33.9%) patients retained the same vision and 19 (29.2%) patients had deterioration in vision. Fifty-five (84.6%) patients obtained anatomical attachment of the retina, and 10 (15.4%) patients remained detached after repeat surgery.

Table 1 shows factors associated with surgical outcomes. Vitreous haemorrhage (VH) complicated the detachments in 21 (32.3%) patients; however, the outcome was not significant when compared to detachments without associated VH.

The majority of patients, that is, 39 (60%) patients, had tractional retinal detachment involving the macula; however, the outcome measure of macular-involving detachments compared to macular-sparing diabetic detachments was not significant.

Forty-four (68%) patients with diabetic detachments had extensive fibrovascular involvement (180° or more). There was no significance in outcomes between the group that had less than 180° of fibrovascular involvement and those who had more than 180° of fibrosis (Table 1).

TABLE 1: Factors associated with surgical outcomes.

Variable	Successful outcome cases	Unsuccessful (failure) outcome cases	Total	p
VH presence				
VH present	17	4	21	-
VH absent	29	15	44	-
Total	46	19	65	0.26
Macular status				
Macular off	28	11	39	-
Macular on	18	8	26	-
Total	46	19	65	1.0
Fibrovascular involvement				
≥ 180° fibrosis	30	14	44	-
⍰ 180° fibrosis	16	5	21	-
Total	46	19	65	0.57

VH, vitreous haemorrhage.

Discussion

All the patients in this group had either Type 1 or Type 2 diabetes with associated advanced proliferative diabetic retinopathy and presented with either tractional detachments or combined tractional and rhegmatogenous detachments.

The mean age at the time of presentation amongst the patients with diabetic detachment was 54 years, and the median age was 57 years. In their study on outcomes of tractional detachments in diabetic retinopathy, Qamar et al. found their patients presented in the fifth decade, with a mean age of 52 years (range: 40–60 years).[2] Gupta et al. also had diabetic retinopathy patients with a mean age of 54.08 years (s.d. ± 14.15).[4]

Various factors are known to cause poor surgical outcomes in late complications of proliferative diabetic retinopathy such as poor pre-operative visual acuity, macular detachment, complex fibrovascular membranes and iris neovascularisation.[3] Patients with diabetes may also have associated diabetic maculopathy with or without ischaemia, which is a poor prognostic finding. Seventy-one percent of the present study's patients with diabetes had stabilised or improved vision following the surgery, and 85% of the operated cases remained attached three months postoperatively.

The functional and anatomical outcomes in this study are promising and suggest that the results in this centre may be comparable with those found in other centres. Gupta et al., in their study in the United Kingdom, found a 93.2% stabilisation in vision and an 84.3% anatomical success.[4] Qamar et al. (Bahawal Victoria Hospital, Pakistan) had a 75% improvement in vision and a 92.8% reattachment rate (including patients who required a second retinal procedure).[2] However, the sample size in the diabetic group in this study is too small to compare these results adequately against other studies.

Only 31% of the study population had prior laser treatment, and this resulted in the majority of patients presenting with a fibrovascular complex of more than 180°. More extensive fibrovascular membranes correlate with poorer surgical outcomes. In this study, extensive fibrovascular membrane of more than 180° was suggestive to be associated with poorer outcomes; however, these findings were not statistically significant.

Macular ischaemia is another known major risk factor for poor outcomes.[6,7,8,9] In this study, the anatomical attachment is higher than the visual success, and this is most likely because of macular ischaemia.

Altan et al. reported various complications of PPV in their study of diabetic tractional detachment, including retinal tear formation in 28.5%, re-detachment in 14.2% and hypotony in 21.4%.[6] In this study, 15.4% of patients re-detached; however, other complications were not noted in this study sample. A larger sample size would have likely identified more complications.

Barzideh et al. described the role of optical coherence tomography (OCT) in measuring subfoveal fluid postsurgery, and they found that persistent subfoveal fluid is the cause of poor or delayed visual recovery.[10] Unfortunately, OCT was not routinely performed for the current study's patients postoperatively, and therefore, these results cannot be compared with those found by Barzideh et al. In the future, this is a measurement that should be included in postoperative visits because of the implications it has on visual recovery.

The outcomes of surgery for retinal detachment at Charlotte Maxeke Johannesburg Academic Hospital are comparable to those found in other studies, within the limitations of the study.

Limitations of the study

The study was conducted retrospectively, looking at the clinical records of patients who had retinal surgery from 2010 to 2014. The retrospective nature of the study is the major limiting factor, as a very large proportion of the potential study population was excluded purely based on missing and/or incomplete records. This impacted the sample size, which in turn may have influenced the outcome, as well as the relative significance of variables that may or may not have influenced the outcome in these patients.

Conclusion

The results of this sample of patients are comparable with those found in other African countries and other developed countries.

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Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

Authors' contributions

M.M. contributed to the conceptualisation and design of the study, data collection and analysis, and write-up of the manuscript. M.A.M. contributed to the conceptualisation and design of the study, data analysis, review of the manuscript, supervision of the project and funding acquisition.

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Data availability

Raw data of this research are available on request from the corresponding author, M.A.M.

Disclaimer

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