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UNRAVELING THE MEDICAL QUALITY OF CARE FOR POSTOPERATIVE PRIMARY RETINAL DETACHMENT

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Abstract

The retina, a crucial component of the human visual system, is responsible for capturing and processing external visual information. It functions much like a camera, and its health is closely intertwined with the choroidal blood vessels that provide essential nutrients. When the nerve layer and pigment layer connected to the retina become detached, a condition known as retinal detachment, vision is profoundly affected due to the loss of nutrition. Myopia, a common vision disorder, has been linked to an increased risk of retinal detachment, particularly in cases of high myopia. Myopia rates have been soaring, especially among young people, and it is often associated with the educational environment. Studies have identified myopia-related pathological changes as a significant contributor to low vision and blindness.

This research also underlines the importance of identifying risk factors for retinal detachment, beyond myopia. Ophthalmic surgery, notably cataract procedures, and eye/head trauma have been recognized as potential risk factors. Furthermore, the study sheds light on the potential influence of occupational factors, with manual and high-risk occupations appearing to correlate with a higher incidence of retinal detachment. Educational attainment and socio-economic status have emerged as additional risk factors, possibly due to the relationship between higher education levels and myopia.

The progression of retinal detachment is marked by early symptoms such as vitreous floaters and flashes. Over time, as the retinal detachment hole enlarges and approaches the macular center,

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peripheral vision defects become apparent and eventually affect central vision. This gradual loss of vision can be debilitating and emphasizes the critical importance of early detection and intervention.

Given the substantial impact of retinal diseases on public health and epidemiology, it is imperative to address this issue. In Taiwan, retinal detachment is a major cause of blindness, with an estimated one to two thousand cases occurring each year. Left untreated, it leads to severe vision impairment and, ultimately, blindness. Awareness, prevention, and timely treatment are essential to mitigate the devastating consequences of retinal detachment.

Introduction

Usually, human beings receive 95% of external visual information. The retina is a photosensitive film attached to the inner wall of the eyeball. Its function is similar to that of a camera. The choroidal blood vessels in the wall of the eye can supply the phototrophs with the necessary nutrition. The two are closely related. Retinal detachment is a phenomenon in which the nerve layer and the pigment layer, which are originally connected to the retina, are separated. However, due to loss of nutrition, the disengaged part cannot maintain normal function and will seriously affect vision (Li, 2013). According to the Welfare and National Health Administration of the Ministry of Health investigated in 2010, the Chinese people's myopia rate below the age of 18 is as high as 85% and exceeds other countries. The reason may be related to the education environment. Holden et al.(2014)Studies have shown that myopia pathological lesions are an important cause of low vision and blindness, *The Eye Disease Case–Control Study Group*(1993) Studies have shown that less than 100 degrees of myopia retinal detachment had no effect on myopia 100-300 degrees increased the incidence of retinal detachment increased 4 times, while the incidence of retinal detachment more than 300 degrees of myopia increased 10-fold. In addition, the study also found that 55% of patients with retinal detachment are myopic (Mitry et al.,2010).The study showed that 53.2% of patients with retinal detachment were myopic, according to the study, patients with high myopia (myopia> 600 degrees) had arhegmatogenous retinal detachment of 1%(Hu, 2007; Zhang, 2011; Zhuang, 2014) ,that myopia will increase the risk of retinal detachment (Feltgen & Walter, 2014; Zhang, 2011).

Other known risk factors include ophthalmic surgery (especially cataracts) and eye / head trauma (Mitry, et al.,2011) .In addition, Curti et al.(2014) and Mattioli et al.(2008)and other scholars found that both manual workers and dangerous workers are associated with retinal detachment. Researchers from Mitry et al. (2010) and Saidkasimova et al. (2009) also found that people with higher educational level are also more prone to retinal detachment, which may also be related to the higher educational level and higher socio-economic status due to myopia. Patients in the early stages of the onset of vitreous floaters and flash, over time, when the retinal detachment hole gradually enlarged, close to the center of the macular, the patient will find peripheral vision defects and affect the central vision when the retina and the support structure be separated, that area of vision will be lost. Retinal diseases are an important topic in epidemiology and public health. Retinal detachment in Taiwan is one of the major causes of blindness among the public, and an estimated one to two thousand cases of retinal detachment are estimated annually (Guo, 2012). If left untreated, it often causes severe vision loss and blindness (Zhuang, 2014).

The purpose of medical care is to meet people's health needs, provide a safe medical environment and good medical quality. Good medical quality must be able to diagnose the disease early and provide appropriate treatment, and in the course of treatment to avoid medical errors and complications, in order to reduce the incidence of injuryand disability(Zhao, 2013).Retinal detachment postoperative visual acuity mainly depends on the time of retinal detachment, the size and coverage of the macular or not, if the stripping range, the longer the time, including macular degeneration, nerve and photoreceptor cells more serious damage, even after the operation of the retina back to the wall of the eyeball, but the central vision is only about 0.2 (Soni , Hainsworth & Almony ,2013).Therefore, patients with high-risk health education can find symptoms of retinal detachment as soon as possible to seek medical attention, an important key to save vision is the treatment of early retinal detachment(Soni, Hainsworth & Almony ,2013; Zhuang, 2014).Soni, Hainsworth, & Almony (2013) studied the effects of vitrectomy and scleral buckling on patients in 2013, and included retinal reattachment, postoperative visual acuity changes and postoperative complications in the postoperative medical quality index.

Therefore, the purpose of this study was to study the hospitalization data of patients with retinal detachment surgery in a medical center and to follow up for one year after the operation to discuss the demographic variables of the patients who underwent retinal detachment surgery and the influence of surgical modality on their medical quality.

Methods Design of the study

In this study, retrospective study design was used to collect data by chart review; collect and sort out the secondary data such as the existing medical records and electronic databases, and log the medical records of each patient one year after surgery. This study divided the data into three parts: demographic variables (gender, age, occupation, education, hypertension, myopia), surgical methods (scleral buckling, vitrectomy and vitrectomy combined with scleral buckling) and medical quality (visual recovery, postoperative complications, re-hospitalization).

Sample and data collection

The data of this study was chosen from a medical center in southern Taiwan. The study case was the first patient undergoing retinal detachment surgery from September 1, 2012 to August 31, 2014.Exclusion criteria include (1) Medical records are incomplete. (2) Diagnosis as diabetic retinopathy. (3) Eyes due to external factors caused by retinal detachment injury. (4) Under 18 years old and over 85 years old. (5) Surgery combined with other types of surgery at the same time. A total of 233 study cases were included.

Research ethics and statistical analysis

We obtained approval from the Institutional Review Board (IRB) of Kaohsiung Chang Gung Memorial Hospital (104-8531B) prior to proceeding the study. This study was retrospective method and did not come into contact with the patients. Patient-related therapies were completed when patient information was collected. The patient information is linked to the data analysis taking into account the privacy of the patient and the principle of least harm. The information obtained is for the purpose of this study only. The remaining provisions are handled in accordance with the Human Ethics Committee's research ethics approach. In this study, the PASW Statistics v18 Traditional Chinese version of the research hypothesis made by the statistical analysis of data, and $p < .05$ represents statistically significant difference.

Results

A total of 233 participants were enrolled, 134 (57.5%) men and 99 (42.5%) women, with an average age of 51.52 ± 13.612 years (Table 1).

Table 1 demographic variables statistics(n=233)

Variable		Number	Percentage	Mean±SD
gender	male female	134	57.5	
		99	42.5	
age	overall average under 40			51.52±13.612
	years old	47	20.1 56.7	
	41-60 years old	132	23.2	
	61 years old and above	54		
education level	under junior highschool	90	38.6 40.4	
	college institutes	94	21.0	
	university and above	49		
Occupation	no workers	98	42.1 18.4	
	free service industries	43	20.6	
	other	48	18.9	
		44		
hypertension	no yes	185	79.4	
		48	20.6	
myopia	myopia 100 degrees below myopia of more than 101 degrees	105	45.1	
		128	54.9	

In the procedural section, up to 151 scleral buckles (64.8%) were performed. In terms of medical quality, visual acuity recovered in the range of 0.02-0.4 postoperative visual acuity was 140 (60.1%); postoperative complications were 59 (25.3%) and 44 were re-hospitalizations (18.9%)

The results showed that education level ($\chi2 = 10.901$, $p < .05$), myopia ($\chi2 = 14.866$, $p < .05$) and operation mode ($\chi2 = 28.151$, $p < .05$) showed statistically significant differences with eyesight recovery. Age ($\chi2 = 8.929$, $p < .05$), education level ($\chi2 = 7.522$, $p < .05$) and operation mode ($\chi2 = 34.523$, $p < .05$) showed statistically significant differences with postoperative complications. The surgical method ($\chi2 = 17.757$, $p < .05$) showed statistical differences with re-hospitalization. Multiple logistic regression analysis of all the study variables on visual acuity recovery showed that the overall mode test result chi-square = 79.559, degree of freedom (df) = 24, $p < .001$ up to significant level result, The overall model predicted the correct ratio was 64.8% (> 60.1%).In terms of age, when the patient's age was 41-60 years old, the odds of recovering from visual acuity of 0.5 or more were 4.967 ($p < .05$, OR = 4.967, 95% CI = 1.369-18.022) compared to those under 40 years of age.On the occupational side, the occupational patients was 5.352 times more potent than 0.02 for non-occupational patients ($p < .05$, OR = 5.352, 95% CI = 1.45019.760) for the recovery of other eyesight. When the patient had a myopia of more than 101 degrees visual acuity recovery situation 0.02-0.4 odds ratio of myopia 100 degrees below the patient's .161 times ($p < .05$, OR = 0.161, 95% CI = .061-.424).In surgical procedures, when the patient underwent vitrectomy, the odds of recovery from visual acuity were .43 times greater ($p < .05$, OR = 0.043, 95% CI =) than those with scleral buckling at visual acuity of 0.020.4. 013-.144), and were 170 times more likely to be scleral buckling than those with a 0.5 or greater recovery ($p < .05$, OR = 0.170, 5% CI = .048-.601). When the patient's surgical procedure was vitrectomy combined with scleral buckling, the odds of recovery from visual acuity were 206 ($p < .05$, OR =

0.206, 95% CI = .079-. 535) were 0.85 times more likely to have scleral buckling than those with 0.5 (p <.05, OR = 0.085, 95% CI = .019-.371) at visual acuity recovery (Table 2).

Table 2 Logistic regression analysis of visual recovery(n=233)

	0.01 or less vs.	*B*	S.E,	OR	*p*	95%CI
gender (male reference group)	0.02-0.4	.481	.408	1.617	.239	.727-3.600
	0.5 or more	.607	.491	1.835	.216	.701-4.800
under 40 (reference group)						
41-60 years old						
61 years old and above(reference	0.02-0.4	.600	.537	1.823	.264	.636-5.221
group)	0.5or more	1.603	.658	4.967	.015*	1.369-
	0.02-0.4	.399	.759	1.404	.655	18.022
	0.5or more	.774	.948	2.169	.414	.317-6.209
						.338-13.915
Under junior(reference group)						
high school college institutes						
university and above	0.02-0.4	.613	.492	1.845	.213	.703-4.843
	0.5or more	.419	.606	1.521	.489	.464-4.985
	0.02-0.4	-.009	.609	.991	.988	.301-3.267
	0.5or mor	1.172	.709	3.230	.098	.805-12.956
no(reference group) workers						
free service industries	0.02-0.4	.201	.604	1.223	.739	.374-3.997
	0.5or more	.571	.680	1.771	.401	.467-6.714
other	0.02-0.4	-.549	.517	.578	.289	.210-1.592
	0.5or more	-.848	.631	.428	.179	.124-1.476
	0.02-0.4	1.677	.666	5.352	.012*	1.450-
	0.5or more	.828	.775	2.288	.286	19.760
						.501-10.458
hypertension(no reference group)	0.02-0.4	-.894	.512	.409	.081	.150-1.115
	0.5or more	-1.112	.650	.329	.087	.092-1.176
myopia (myopia 100 degrees below the reference group)	0.02-0.4 0.5or more	-1.829 - .499	.495 .593	.161 .607	<.001*** .400	.061-.424 .190- 1.940

scleral buckling (reference group)						
vitrectomy	0.02-0.4					
	0.5or	more	-3.141	.616	.043	<.001***	.013-.144
vitrectomy combined with scleral buckling	0.02-0.4	0.5or	-1.771	.644	.170	.006**	.048-.601
	more		-1.580	.487	.206	.001**	.079-.535
			-2.465	.752	.085	.001**	.019-.371

* p<.05, ** p< .01 , *** p< .001

Binary logistic regression analysis was performed on all postoperative complications for all study variables. The overall pattern test results were chi square = 49.547, df = 12, p <.001 for a significant level, in the fittest test Hosmer and Lemes how test, p = .051, showed no statistically significant difference, indicating that this model is well fitted, dependent variables can be effectively predicted by independent variables, the overall prediction accuracy rate of 78.1% (> 74.7%). In terms of age, the odds of having postoperative complications when the patients were 41-60 were 3.530 times better than those under 40 (p <.05, OR = .530, 95% CI = 1.046-11.912). In surgical procedures, the odds ratio for vitrectomy versus postoperative complication was 4.199 times (p <.05, OR = 4.199, 95% CI = 1.65910.628) for patients undergoing scleral buckling surgery. When the surgical approach was vitrectomy combined with scleral buckling, the odds ratio for postoperative complications was 6.347 folds (p <.05, OR = 6.347, 95% CI = 2.884-13.971) for patients undergoing scleral buckling (Table 3).

Table 3 Postoperative complications by Logistic regression analysis (n=233)

	B	S.E,	*OR*	*p*	95%CI
gender (male reference group	-.699	.381	.497	.066	.236-1.048
under 40 (reference group)				.120	
41-60 years old	1.261	.621	3.530	.042*	1.046-11.912
61 years old and above(reference group)	1.070	.772	2.915	.166	.642-13.239
under junior(reference group) high school				.257	
college institutes university and above	-.587	.420	.556	.162	.244-1.226
	-.787	.583	.455	.177	.145-1.429
no workers				.209	
free service industries	-.670	.522	.512	.200	.184-1.425
other	.179	.489	1.196	.714	.458-3.121
	-.845	.536	.430	.115	.150-1.228
hypertension(no reference group)	-.430	.463	.650	.353	.262-1.613
myopia (myopia 100 degrees below the reference group)	.504	.398	1.655	.205	.759-3.610
scleral buckling (reference group)				.001	
vitrectomy	1.435	.474	4.199	.002**	1.659-10.628
vitrectomy combined with scleral buckling	1.848	.403	6.347	<.001***	2.884-13.971

* p< .05, ** p< .01 , *** p< .001

All the research variables were re-hospitalized by a binary logistic regression analysis, the overall pattern test results chi square= 27.956, degree of freedom (df) = 12, p = .006, and Hosmer and Lemeshow for fitness test, p=

.869, which showed that there was no statistically significant difference, indicating that the mode fitness good, dependent variables can be effectively predicted by the independent variables, the overall prediction accuracy rate of 82.4% (> 81.1%). In terms of age, the odds of re-hospitalization when the patient was older than 61 years were 4.464 times greater than those under 40 years (p <.05, OR = 4.464, 95% CI = 1.024-19.463).In terms of the surgical modality, when the surgical procedure was performed, the vitrectomy was 7.723 times more favorable than the scleral buckling surgery (p <.05, OR = 7.723, 95% CI = 2.931-20.350) For vitrectomy combined with scleral buckling, the odds ratio for re-hospitalization was 2.602 (p <.05, OR = 2.602, 95% CI = 1.068-6.339) as compared to patients receiving scleral buckling (Table 4).

Table 4 Logistic regression analysis of re-hospitalization (n=233)

	B	S.E,	*OR*	*p*	95%CI
gender	-.308	.397	.735	.439	.337-1.602
under 40 (reference group)				.122	
41-60 years old	.693	.596	2.000	.245	.622-6.431
61 years old and above(reference group)	1.496	.751	4.464	.046*	1.024-19.463
Under junior(reference group) high school				.168	
college institutes university and above	-.526	.479	.591	.272	.231-1.510
	.477	.551	1.611	.387	.547-4.741
no workers				.296	
free service industries	.121	.605	1.128	.842	.345-3.692
other	.891	.512	2.438	.082	.894-6.649
	-.014	.539	.986	.979	.343-2.833
hypertension(no reference group)	.183	.457	1.201	.689	.490-2.943
myopia (myopia 100 degrees below the reference group)	.409	.431	1.505	.343	.646-3.504
scleral buckling (reference group) vitrectomy				.001	
vitrectomy combined with scleral buckling	2.044	.494	7.723	<.001***	2.931-20.350
	.956	.454	2.602	.035*	1.068-6.339

Discussion Descriptive statistics

According to literature review, 134 males (57.5%), 99 females (42.5%), and average age 51.52 ± 13.612 years of age were distributed in this study compared with the data of Chou et al. in 2007. The statistics are similar (Soni , Hainsworth & Almony ,2013). Foreign scholars pointed out that 53.2% of patients with retinal detachment are myopic (Hu, 2007), with the proportion of more than 101 degrees in this study 54.9% of the results were similar. The surgical methods used by Jackson et al.(2014) to study retinal detachment in 2014 were vitrectomy (79.1%), scleral buckling (12.1%), and vitrectomy with scleral buckling (8.8%), In the study, retinal detachment was performed by vitrectomy (12.9%), scleral buckling (64.8%), and vitrectomy combined with scleral buckling (22.3%). Cause cataracts, and different medical systems at home and abroad, so the way doctors take surgery will be different.

Inferential Statistics

There was a statistically significant difference between eyesight recovery and education level and myopia respectively. Domestic scholars pointed out that pathological myopia adverse effect on vision is an important cause of low vision and blindness. The study with the above scholars has similar results (Jackson, Donachie ,

Sallam , Sparrow & Johnston,2014).Uhr, Mishra, Wei, & Wu et al.(2016) found that there was a significant difference in educational programs in visual acuity recovery similar to the results of this study. In terms of surgical methods, visual acuity recovery and surgical methods were statistically different, and scholars suggest that different surgical methods for the recovery of visual acuity were significantly different result consistent (Hatef , Sena , Fallano , Crews & Do ,2015; Jackson , Donachie , Sallam , Sparrow & Johnston,2014).

Postoperative complications, age and education showed statistical differences in Taiwan study pointed out that the incidence of endophthalmitis after cataract surgery and the patient's age and educational level are different (Fang, Chien, Ng, et al.,2006). The study of retinal detachment postoperative complications and patient age, education, the difference between the situation, although the different types of diseases but the results are similar. In the way of operation, postoperative complications and surgical methods showed statistical differences. Azad et al.(2007) found that patients who underwent vitrectomy were prone to cataract, with a 17% incidence six months later. Jackson et al.(2014)then tracked the incidence of cataract after one year as 54.1%. The different surgical modalities included the potential for complications (Hatef et al.,2015). The results of this study are similar to those of the above scholars. There was a statistically significant difference in re-hospitalization and surgical resection, which was similar to Ho et al.(2009) found that the major surgical modalities were different from re-hospitalization.

All variables were used for visual acuity recovery using multiple logistic regression analysis. When patient's age ranged from 41 to 60 years, the odds ratio for those with visual acuity of 0.5 or above were lower than those of 40 or younger, which were similar to the results of Cheng et al.(2008) in treating patients with high myopia with riparian retinal detachment patients with better postoperative visual acuity with different results may be different sources of study. In addition, Curti et al.(2014) showed similar outcomes for manual workers when the occupational status was higher for those with other occupations at 0.02-0.4 in the case of visual acuity recovery; when the patient's myopia more than 101 degrees in the case of visual acuity 0.02-0.4 more than myopia in patients with a low odds ratio of 100 in the joint study of Spain and Portugal pointed out that no myopia in patients with vitreous resection combined with scleral buckling surgery after visual acuity recovery. A good vitrectomy ($p = 0.017$)(Sanabria , Fernandez , SalaPuigdollers , et al.,2011) was similar to the effect of myopia on visual acuity recovery in this study. When the patient's surgical approach to vitrectomy in the case of visual acuity 0.02-0.4 or more than scleral buckling surgery patients than the odds ratio; when the patient underwent vitrectomy combined with scleral buckling, the odds ratio for patients with scleral buckling at visual acuity recovery of 0.02-0.4 or above was lower, which is consistent with the study by Jackson et al. (2014). In the categories of surgery for visual acuity , of which 69.7% had vitrectomy visual recovery, 71.6% visual acuity scleral buckling, and 65.6% visual recovery with vitrectomy and scleral buckling. The results show that vitrectomy visual recovery is poor, the study and the above scholars' findings are consistent, due to the need for intravitreal vitrectomy fluid damage to the eye higher, scleral buckling surgery for extraocular surgery so postoperative visual acuity better.

All variables were analyzed by binary logistic regression analysis of postoperative complications. When patient's age is between 41 and 60 years of age, the postoperative complication rate is higher than the odds of under 40. The present study and Fang et al.(2006) found that the incidence of endophthalmitis complicated with cataract surgery has an impact on the age of patients.

Although the types of diseases discussed in this study are different, the results show both postoperative complications and patients age is related to the situation. When patients underwent vitrectomy or vitrectomy combined with scleral buckling, the complication rate after scleral buckling was significantly higher than that of scleral buckling, and Jackson et al.(2014) reported that the incidence of intraoperative complications was 6.1%,

the incidence of complications were 6.1% for vitrectomy, 3.6% for scleral buckling and 8.8% for vitrectomy and scleral buckling, respectively. The results of this study are similar to those of the above scholars.

All variables were re-hospitalized by a binary logistic regression analysis, results in terms of age, when the patient's age is over 61, the odds of re-hospitalization are higher than those under 40 years of age. Cheng et al.(2008) found that younger patients often have higher success rates. The above scholars' studies are similar to the results of this study. In terms of surgical modality, when the patient's surgical approach to vitrectomy or vitrectomy with scleral buckling the odds of re-hospitalization are higher than those with scleral buckling. This result is consist with Ho et al.(2009) found that scleral buckling surgery is the lowest re-hospitalization rate.

Conclusion and Suggestion

The results of this study showed that the patient's age, myopia and surgical methods have an impact on the quality of medical treatment after retinal detachment. Scleral compression surgery for visual recovery, postoperative complications and re-hospitalization have higher odds ratio than vitrectomyand vitrectomy combined with scleral compression surgery. The findings of the study can be used as a reference for hospital administrator and medical personnel to improve postoperative medical quality. Clinically strengthen the education of patients need to cooperate with medical staff, such as postoperative health education. For example, take 6-8 hours / day lying (or prone) guidance can help retinal re-attachment. In addition, care and patient care for the elderly, myopia patients to strengthen postoperative care and precautions, and emphasized the importance of regular follow-up with physicians follow-up examination, further extended to the clinic to teach myopia public eyes regular follow-up to avoid myopia caused by retinal detachment in the hope of reducing the patient's postoperative complications and re-hospitalization rate, and can enhance the importance of eye health in general.

Retinal detachment is a very important public health problem, probably because of Taiwan's population of myopia, so the age of onset of retinal detachment younger than abroad. Myopia and many eye diseases are related, such as glaucoma, cataract retinal detachment and macular degeneration. The results of this study also showed that myopia has an impact on the quality of medical treatment after retinal detachment. It is expected that the competent health authorities can intensify the promotion of prevention and treatment of myopia, enhance their understanding of the harm caused by high myopia, and develop regular eye examinations. These may reduce myopia damage to the eyes.

Future research direction and research limitations

In this study, the chart review method was used. Some of the variables (such as occupational and myopia degree) were limited by the research data. And since many people with retinal detachment had hydrographic evidence of macular degeneration at emergency admission but did not record the medical record. This may not present the patient's real situation. The sample of this study is limited to a southern medical center, the results of the study cannot be extrapolated to other areas of retinal detachment surgery patients; Future studies may allow for comparative analysis of samples collected from trans-disciplinary groups or hospitals in the same ethnic group, such as northern and central medical centers, and may increase the study of the correlation between medical costs and retinal detachment in order to understand the issues related to the utilization of medical services in patients with retinal detachment .

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