The causes and complications of enucleation and evisceration of the eye in Thammasat University Hospital

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Objective: To describe the causes and complications of enucleation and evisceration of the eye in Thammasat University Hospital

Design: Retrospective, descriptive study

Methods: The retrospective medical record review of patients who underwent enucleation or evisceration from January 2014 to December 2018 were reviewed.

Result: Forty six patients underwent evisceration (n = 35, 76%) and enucleation (n = 11, 24%). The median age was 60 ± 15.43 years (range 23 to 92) and there were 25 men and 21 women. Corneal ulcer was the most common indication for surgery (n = 29, 63%), followed by endophthalmitis (n = 9, 19.6%), ruptured globe (n = 4, 8.7%) and painful blind eye (n = 4, 8.7%). Postoperative complications were wound dehiscence (n = 8, 66.7%), conjunctival cyst (n = 3, 25%) and symblepharon (n = 1, 8.3%).

Conclusions: Corneal ulcer was the most common cause of enucleation and evisceration in Thammasat University Hospital. The most common complication was wound dehiscence, average about 1 month after surgery.

Limitations: retrospective study, in one hospital in one area; therefore, results cannot be generalized.

Keyword: enucleation, evisceration, corneal ulcer, endophthalmitis

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Introduction

Enucleation and evisceration are eye removal procedures considered as palliative treatment when all other therapeutic options are exhausted. Enucleation is the removal of the whole intact eyeball. Evisceration is the removal of the eye content through a corneal incision, leaving the scleral shell, conjunctiva, extraocular muscles, orbital fat and the optic nerve. Both procedures result in an anophthalmic socket. Indications for evisceration include endophthalmitis, non-traumatic painful blind eye and painful blind eye after open globe injuries.[1, 2] Malignant intraocular tumors such as melanomas and retinoblastomas are managed by enucleation. Other conditions managed by enucleation include severe eye injury, panophthalmitis, painful blind eye and phthisis bulbi.

Evisceration and enucleation differ in the duration of surgery and complications.[3, 4] The advantages of evisceration are shortened surgical times, good orbital tissue mobility,

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minimal injury of orbital tissue, avoid contamination and diffuse to CNS system and brain in endophthalmitis, patients are more accepting because the procedure removes only eye content. The disadvantage is a risk of symptomatic ophthalmia, effect pathology examination and risk retention of tumor and malignancy tissue.[4, 5] The advantages of enucleation are no effect on pathology, and low risk of symptomatic ophthalmia. The disadvantage of enucleation is injury of orbital tissue, prolonging surgery from complex surgery techniques. Common complications between enucleation and evisceration, include infection, hemorrhage, and implant extrusion. Long-term complications include sunken/deep superior fornix, lower eyelid laxity and ectropion, upper eyelid ptosis, socket contraction, conjunctival cyst formation, implant migration and late extrusion of the implant.[6]

The researcher wants to study the causes and complications from evisceration and enucleation in Thammasat University Hospital to analyze the factors that make the surgery successful without complications affecting the quality of life of the patients. Studied in the past 5 years of Thammasat University Hospital.

Methods

Retrospective study case evisceration and enucleation from medical records since January 2014 to December 2018. Total case is forty-six who came for postoperative follow up at least 3 months (range 3 months to 4 years).

Inclusion criteria were patients who receive evisceration and enucleation in Thammasat University Hospital who came for postoperative at least 3 months.

Exclusion criteria were patients who receive exenteration and patients who cannot continue to follow up within 3 months.

Data were collected for age, gender, causes, visual acuity at first visit, type of surgery, size of orbital implant and complications after surgery. The results were analyzed by descriptive data.

Enucleation does not increase the volume by other material, only a glass ball. The final step is closure. All techniques include the closure of multiple layers, including the sclera, tenon's membrane and conjunctiva. Most surgeons are residents, total 37 patients and have a complication 9 patients. No data of conformer size.

Results

Forty-six patients underwent evisceration (n = 35, 76%) and enucleation (n = 11, 24%). The median age was 60 years and there were 25 men and 21 women. There were no differences in general characteristics of patients between enucleation and evisceration (Table 1). A total of 22 patients with underlying disease, 15 patients with hypertension, 9 patients with diabetes mellitus, 8 patients with dyslipidemia and 2 patients with chronic kidney disease. Corneal ulcer was the most common cause for anophthalmic surgery in 63% (29 cases), with enucleation 3 cases and 26 cases of evisceration. The second most common indication was endophthalmitis in 19.5% (9 cases). There were 5 cases of enucleation and 4 cases of evisceration. Ruptured globe was 8.6%, 2 cases of enucleation and 2 cases of evisceration. Painful blind eye was 8.6%, divided into 1 case of enucleation and 3 cases of evisceration as shown in Table 3. The youngest age was 23 years with painful blindness and the highest age was 92 years due to a severe corneal ulcer. Classified based on the underlying indication of surgeries into traumatic (n = 27) and non-traumatic (n = 19) groups. table 2 lists indications of enucleation/evisceration stratified by traumatic and non-traumatic groups.

Table 1: General characteristics of the patients classified by type of intraocular surgery.

	Total (n = 46)		Evisceration (n = 35)		Enucleation (n = 11)		P value
	N	%	N	%	N	%	
gender							0.988
Male	25	54.3%	19	54.3%	6	54.5%	
Female	21	45.7%	16	45.7%	5	45.5%	
Age							0.730
<60	23	50.0%	18	51.4%	5	45.5%	
>60	23	50.0%	17	48.6%	6	54.5%	
Mean±SD.	59.80	±15.43	59.23	±16.19	61.64	±13.25	
Min – Max	23	- 92	23	- 92	38	- 81	
Underlying							0.229
Yes	22	47.8%	15	42.9%	7	63.6%	
No	24	52.2%	20	57.1%	4	36.4%	
DM	9	19.6%	6	17.1%	3	27.3%	0.664
Hypertension	15	32.6%	10	28.6%	5	45.5%	0.462
Dyslipidemia	8	17.4%	7	20.0%	1	9.1%	0.658
CKD	2	4.3%	1	2.9%	1	9.1%	0.425

P value from Chi-Square test, Fisher's Exact Test and Independent t-test

Table 2: Indications of enucleation and evisceration stratified by traumatic and non-traumatic groups.

Indications	**n (%)**
Traumatic	27(58.8)
Corneal ulcer	19(41.3)
Painful blind eye	1(2.7)
Endophthalmitis	3(6.2)
Ruptured globe	4(8.6)
Non-traumatic	19(41.2)
Corneal ulcer	10(21.7)
Painful blind eye	3(6.5)
Endophthalmitis	6(13)

Table 3: shows the causes, gender, number of patients, type of surgery and underlying disease.

Causes			Male (n = 25)		Female (n = 21)		evisceration (n = 35)		enucleation (n = 11)		Underlying disease (n = 22)	
	N	%	N	%	N	%	N	%	N	%	N	%
corneal ulcer	29	63.0%	15	60.0%	14	66.7%	26	74.3%	3	27.3%	15	68.2%
painful blind eye	4	8.7%	2	8.0%	2	9.5%	3	8.6%	1	9.1%	1	4.5%
Endophthalmitis	9	19.6%	4	16.0%	5	23.8%	4	11.4%	5	45.5%	5	22.7%
ruptured globe	4	8.7%	4	16.0%	0	0%	2	5.7%	2	18.2%	1	4.5%

Table 4: shows the underlying disease of the patients and the cause of the surgery.

	Diagnosis				
	corneal ulcer (n = 29)	painful blind eye (n = 4)	Endophthalmitis (n = 9)	ruptured globe (n = 4)	Total
DM	7	0	2	0	9
	24.1%	0.0%	22.2%	0.0%	19.6%
HT	10	1	3	1	15
	34.5%	25.0%	33.3%	25.0%	32.6%
DLP	5	1	2	0	8
	17.2%	25.0%	22.2%	0.0%	17.4%
CKD	2	0	0	0	2
	6.9%	0.0%	0.0%	0.0%	4.3%

The visual acuity at first visit consisted of 11 cases no light perception, 13 cases with light perception, 5 cases with light projection, 14 cases with hand motion, 5/200 for 1 case who had uncontrolled endophthalmitis. 20/200 for 1 case who had uncontrolled severe corneal ulcer. Most patients had a hospitalization time of less than 14 days, total 25 cases, representing 54.3%, divided into 63.6% enucleation and 51.4% evisceration. The implantation material used by Thammasat Hospital were glass balls. The 36 patients were provided with 4 different sizes of glass ball implantation as follows

1. Glass ball number 14, 3 cases
2. Glass ball No. 16, 11 cases
3. Glass ball No. 18, 15 cases
4. Glass ball No. 20, 7 cases

No information 8 cases and 2 cases not implantation.

Postoperative complications were found in 12 cases, accounting for 26.1% of all patients, divided into 3 groups:

Group 1: total 8 cases, 7 cases of exposed implantation, 1 case extrusion of implantation, accounting for 66.7% of all patients with all complications. There were 2 cases of enucleation and 6 cases of evisceration. The average time at which complications occurred was 1 month. The patient whose early complication of evisceration was 7 days, who had a painful blind eye due to retinal detachment. After corrective surgery re-insert the implant, no long-term complications. Two patients had complications 3 months after surgery. The first was a severe intraocular

infection and the other one with a history of ruptured globe.

Group 2: Three cases of conjunctival cyst, who were eviscerated, accounted for 25% of all patients with complications. The average time of occurrence of postoperative complications was 1 month, with all of the underlying causes of severe corneal ulcer. The patient was treated surgically to remove the cyst.

Group 3: Symblepharon after evisceration within 1 month postoperatively, the cause of the surgery is Fungal infection of the cornea.

Table 5: Association between surgeon experience and complication.

Surgeon	Complication Number	No complication Number	
Resident	9(75%)	28(82.4%)	Peason Chi-square P = 0.713
Fellow	2(16.7%)	5(14.7%)	
Staff	1(8.3%)	1(2.9%)	
Total	12(100%)	34(100%)	

From table 5 can conclusion that surgeon factor not association with complication of enucleation and evisceration.

Table 6: shows details of patients with postoperative complications.

case	Surgery	Complication	Duration (days)	Causes
1	Evisceration	Wound dehiscence	16	Severe fungal ulcer
2	Evisceration	Wound dehiscence, short fornix, pyogenic granuloma, preseptal abscess	18	Severe corneal ulcer
3	Evisceration	Symblepharon	30	Severe fungal ulcer
4	Evisceration	Extrusion of glass ball	7	Painful blind eye
5	Evisceration	Conjunctival cyst	30	Severe bacterial ulcer
6	Enucleation	Wound dehiscence, Anophthalmic socket	14	Severe corneal ulcer
7	Enucleation	Wound dehiscence	90	Endophthalmitis
8	Evisceration	Conjunctival cyst	60	Severe corneal ulcer
9	Evisceration	Conjunctival cyst	30	Severe corneal ulcer
10	Evisceration	Wound dehiscence	30	Endophthalmitis
11	Evisceration	Wound dehiscence	90	Severe traumatic eye
12	Evisceration	Wound dehiscence	30	Severe corneal ulcer

The results of the study concluded that the main cause of intraocular removal and removal of tissues in the eye consisted of 63% corneal infection, followed by endophthalmitis 19.6%, exposure to ruptured globe 8.7% and painful blind eye in 8.7%. The male-female ratio was similar. Except for the ruptured globe, which was found to be all male. The most common procedure is evisceration, with a total of 35 cases and enucleation 11 cases. Underlying diseases were found in 22 cases, divided into 15 cases of hypertension, 9 cases of diabetes mellitus, 8 cases of dyslipidemia, 2 cases of chronic kidney failure. Corneal ulcers were found to be the underlying disease in 15 cases (68.2%), followed by endophthalmitis in 5 cases (22.7%). Initial

visual acuity of the patients affected severity and prognosis, most of the patients had initial visual acuity of hand motion (HM), 14 cases, followed by 13 cases with poor light projection, 11 cases of no light perception, good light projection in 5 cases and 1 case each of 5/200 and 20/200. The number of hospital stays was less than 14 days. Seven cases stayed more than 43 days, all of which were corneal ulcers.

Complications after enucleation and evisceration were found in 12 cases. Most commonly wound dehiscence, in 8 cases with an average occurrence of about 1 month after surgery, 4 cases from severe corneal ulcers, 2 cases from endophthalmitis and one case each of painful blind eye, and ruptured globe. Three cases of conjunctival cyst 1 case of symblepharon from corneal ulcer. Late complication, only 2 cases, was an exposed glass ball and a contracted socket. No data of care socket of patients.

Discussion

According to a comprehensive review of literature, the majority of causes of evisceration and enucleation differ from country to country, even in different hospitals within the same country. Whether it is caused by ruptured globe, painful blind eye, corneal ulcer, endophthalmitis, retinal cancer. Some causes can be prevented and corrected such as ruptured globe, corneal ulcer and endophthalmitis. In a study in Thailand at Siriraj Hospital[8] From 1982 to 1986, which consisted of 410 cases of evisceration and enucleation, 29% were found to be caused by endophthalmitis, 15.37% from ruptured globe. Metta Pracharak hospital[9] found that the cause of the evisceration and enucleation from panophthalmitis and endophthalmitis were mostly due to severe corneal ulcer and ruptured globe.

From the study in Thammasat University Hospital, it was found that causes of evisceration and enucleation were most commonly caused by corneal ulcers. Followed by endophthalmitis, painful blind eyes and ruptured globe. Most of the corneal ulcers are caused by bacteria and fungus. Some patients had a history of soil or grass inoculated into their eyes before developing a corneal ulcer. The accident is a condition that can be prevented such as an accident from work, or iron debris splashed into the eyes.

Regarding postoperative complications of this study, we found that patients with wound dehiscence were caused by severe corneal ulcers and endophthalmitis. The only implanting material used in Thammasat Hospital is only the glass ball. Therefore, it was not impossible to compare whether any implantation material had any effect on complications in this locality. In the study byCuster and Trinkhaus[10], it was found that 6.6% of 3012 cases who had porous substrates developed wound dehiscence compared to 2.9% of 615 non-porous implants. Wladis et al.[11] found that the rate of wound dehiscence appeared to be compared between porous and non-porous implants. There was no statistically significant difference. In addition, in some patients many complications can be found. For example, two patients with corneal ulcers had complications with wound dehiscence followed by a shallow fornix and symblepharon.

Therefore, it is important to prevent and correct complications after surgery. Achieving hemostasis during surgery reduces bleeding complications, selection of appropriate implant size, postoperative conformer and advising patients to close eyes tightly after the surgery for 3 days will help reduce complications. In addition, patients should be appointed to monitor symptoms periodically. This makes it possible to assess any impending complications and may lead to treatment and prevent aforementioned complications, in addition to eye protection by educating patients about the risks of certain work

tasks. It can help reduce corneal ulcer and work accidents and can reduce the surgery to remove the eyeball. In addition, caution about surgical techniques in patients with severe corneal ulcer or endophthalmitis will be able to reduce complications from the surgery. And lastly, preventing the wound dehiscence by suturing the tenon capsule well together to increase the strength of the tenon capsule.

Conclusion

Corneal ulcer and endophthalmitis are the leading causes of enucleation-evisceration. The most common procedure is evisceration. The most common complication found was wound dehiscence, often occurring about 1 month after surgery.

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