



International Journal of Surgery Science

E-ISSN: 2616-3470
P-ISSN: 2616-3462
© Surgery Science
www.surgeryscience.com
2019; 3(4): 503-506
Received: 04-08-2019
Accepted: 06-09-2019

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Role of the risk cataract forming factors on the postoperative outcome

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DOI: <https://doi.org/10.33545/surgery.2019.v3.i4i.291>

Abstract

Cataract is the most common cause of blindness, and the age related cataract is the commonest one, other factors is considered an additive factor, surgical extraction of the cloudy lens and intra-ocular lens implantation is the final solution of this problems, now the efforts are heading to wards of uses anti-oxidant agents in order to slow the cloudiness of the lens. The Objective of this study, is to find if there is correlation between the causative risk factors and the post – operative outcome.

Keywords: Cataract, blindness, antioxidant

Introduction

Cataract is considered the most common leading cause of blindness worldwide, caused by opacity of the ideal clear lens, this will lead to a significant vision impairment, it is responsible for blindness of 32.4 million people and 191 million vision morbidity around the world. Lens is the crystalline clear part of the eye that permit the passage of the light to the retina which works by converting the light that comes through the lens into signals. Lens is consist from natural crystalline (specialized proteins) which combined with specific amount of proteins and water, when biochemical and physiochemical changes develops this will disrupt the architecture or result in the formation of molecules larger than 1,000 nm, the affected area loses its transparency and opacity (dens cloudy) results, loss of transparency called cataract irrespective of the affected vision ^[1-4].

Cataract could be classified according to:

- 1) The anatomical location: nuclear, cortical, sub capsular (anterior or posterior), capsular (anterior or posterior capsular), mixed, and others.
- 2) by etiology: age related, congenital and juvenile, traumatic, associated with primary ocular disease, associated with systemic disease (including metabolic disorders, renal diseases, cutaneous disease, connective tissue/skeletal disorders, central nervous system and Down's syndrome), environmental factors (including radiation, pharmaceutical, infectious, postsurgical) and others like ectopic lentis.
- 3) According to maturity: immature, mature, hyper mature, morgagnian.

Pathophysiology of the formation of cataract seems to be multifactorial, and each factor responsible on special type of cataract. Age related cataract is the most common type in many studies and considered an essential factor, other secondary risk factors (as mentioned above) e.g. diabetes and other metabolic syndrome, sun light exposure, trauma, smoking, body mass index, long term steroid therapy, estrogen replacement therapy, socioeconomic and educational state. Oxidative damage and ultraviolet are considered the predominant contributors of cataract formation. Oxidative stress induced cataract formation by aggregation of crystalline proteins developing clumps and results in loss transparency with increasing age, in addition to the protein clumping, oxidative stress can leads to calcium homeostasis imbalance, DNA damage, and membrane lipid peroxidation. many studies had been done to improve that an additional changes and variations can occur at the site of the lens capsule, lens matrix and many biochemical pathway alteration can occur according to the factors mentioned above which can aggravate lens cloudiness and opacity ^[2-12].

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Management

Started with clinical examination: vision assessment, measure intraocular pressure, for diabetic patients, optic nerve and retina should be examined.

Medical: although surgery (removal of the cloudy lens) is the ideal treatment, efforts now is to prevent or at least stop progression of the cataract by using antioxidant vitamins, other studies offers to use vitamins with minerals.

Indication of surgery: when cataract prevent daily activities such as reading or driving, and when cataract interfering with interfering with other eye problems (still there is a controversy about the timing of surgery).

Surgery: called cataract extraction there are two main generic terms, i) intra capsular: removal of the lens with its intact capsule. ii) Extra capsular: removal the nucleus and keeping the capsule intact and followed by Intra ocular lens implantation, more than one approach for this process ;manual extraction, phacoemulsification, small incision cataract surgery, femtosecond laser, each one of them with special advantage over the other followed by intra ocular lens implantation [4, 12-17].

Materials and Methods

A retrospective study analyzed the probable risk factors of cataract formation, outcome and complication after cataract surgery and its relation to the potential factor. This study target 235 patients attended a private clinic, operations done at Al-Rabie hospital, age between 3 -90 years (114 males, 121 females) was complaining from poor vision. After listening to the complain of the patients (gradual deterioration of the vision). All patients examined according to these steps: first step assess visual acuity, ophthalmoscope examination to assess red reflex to prove presence of opacity in the visual axis, slit lamp examination to assess type of the cataract. after proving that visual impairment is caused by cataract, studying the risk factors. The indication for the decision of cataract surgery is taken according to these points: i) severe visual impairment, and when cataract affect quality of life and prevent daily activities such as reading or driving. ii) Medical when cataract interfere with diagnosis and treatment of other eye problems of posterior segment of the eye such as diabetic retinopathy, optic neuropathy iii) cosmetic such as white pupil.

Results

From total 235 patients presented with deterioration of vision, in general there is no significant variation between the incidence of males 114(48.5%), and females 121(51.5), In order to study the effect of most important risk factors (aging process), patients divided into six groups and also the variation between male and female, this study revealed that the peak incidence is at two age groups, first between (60-69) years old, 74(31.5%) patient, females slightly affected (55.4%) more than males at this age group, the second high incidence group is between age of (70-79) years, 82(35%) patients, in this age group, also females (65%) affected more than males. The overall incidence is decreased when we go to the younger age groups with male predominant, for those between (50-59) years, 43(18.3%) patients, and 58% of them are males, those between (40-49) years old 15(6.4%) patients only, (87%) of this group are males and lastly for those less than 40 years only 8(3.4%) patient all of them are males (table-1).

Table 1: Age and sex of the patients

Aga (years)	Male	Female	Total
80-90	6	7	13
70-79	29	53	82
60-69	33	41	74
50-59	25	18	43
40-49	13	2	15
<40	8		8
Total	114	121	235

Second target in this study is to assess the second common risk factor which is diabetes mellitus, in this study 25 patient (10.6%), 17(about 2/3d) males, 8 females, in females similar to the above distribution i.e. more in age (70-79) years, (7.5%) of female patients, for (60-69), (7.3%) of (70-79) years female patients, no female patient bellow 50 years had diabetes mellitus. Double number of females, 17 male patients had diabetes mellitus (15% of male patients), maximum at age group between (60-69) years, 8 male patients (32%), and also high in age group (50-59) years, 6 male patients affected (31.%) at this age group. And the incidence is less at age group of (70-79), (40-49) years, the incidence is (7.5%, 8.3%) respectively (table-2).

Table 2: Diabetic patients

Age (years)	Male	Female	Diabetic M	Diabetic F	Total
80-90	6	7			13
70-79	27	49	2	4	82
60-69	25	38	8	3	74
50-59	19	17	6	1	43
40-49	12	2	1		14
<40	8				8
Total	97	113	17	8	235

Among 114 male patients 20(17.5%) male patients is heavy chronic smoker.

Among all age groups 10(2.9%) patients presented with another eye problem in addition to the cataract. At age group of (80-90) years, one male patient presented with corneal opacity. At age group of (70-79) years two, one male and one female have history of optic atrophy and one female has corneal opacity. At age group of (60-69) years one male patient has sign of uveitis, and one female patient has central retinal vein occlusion. Among age group of (40-49) one male patient has uveitis, another male patient has central serous chorioretinopathy. Patient 34 years has sign of uveitis, and one male patient has macular disorder.

Other risk factors which emerged sporadically in this study. One patients 47 years old has history of neurological illness. Among group less than 40 years seven out of eight patients (87.5%) associated with isolated risk factor, one patient short stature and abnormal body mass in addition to hypocalcaemia, four patients has history of trauma. In addition to the two patients mentioned above (eye problems). Surgery, the goal is to extract the cloudy lens by phacoemulsification. 16 of total 235 patients, cloudy lens was removed by extra capsular cataract extraction. 13 females and 3 males, 11 of cases the decision of extra capsular extraction is taken from the start, 5 is due to intraoperative complication posterior capsular tear (four patient), 3(2 females, one male) patients, one female one male are diabetic, belong to the age group of (70-79) years. 2(one male, one female) belong to the group of (60-69) years. 3 of 5 patient of posterior capsule tear associated with vitreous loss. Visual Outcome; For analytical

studied patient divided into two groups i) good vision quality 6/12 or better, ii) moderate to low visual quality less than 6/12. 211(90%) patients of 235 has good visual outcome. 24 (10%), has moderate vision quality, 3(two of them are diabetic) patients due to posterior capsule tear associated with vitreous loss and only one patients 90 years old develop endophthalmitis one year

postoperative i.e. only 4(1.7) patients due surgical operation. In (table-3), illustrate the problems which is emerged post-operatively, refractory error, simple and solved by eye-glasses which is not more than one diopter. Age related macular degeneration which is also, one of the aging process not related to the type of surgical technique.

Table 3: Patients operation

Age	D.retinopath.		Intra operat.		Prev. eye prob.		AMD		Wrong IOL D		Late comp.	
	Male	Female	Male	Female	Male	female	male	Female	Male	female	Male	Female
80-90					1			1			1	
70-79	1		1	1	1	2	1		1			
60-69	1		1		1	1		1				
50-59	1	1										
40-49					2				1			
<40					2				1			
Total	3	1	2	1	7	3	1	2	3		1	

Discussion

This study demonstrate that the most important risk factor for lens opacity is aging process, this is clear by comparing the incidence of cataract between the age groups as we see it increased by age, males affected earlier, the incidence is higher till age of 60 years, after this age, the incidence steadily increased specially in females the incidence is doubling according to males incidence and according to age groups bellow 60 years. This is consistent with other studies, this is explained by (Manuel *et al.*) who confirm that there is an adverse relation between deficiency of alpha-crystalline protein and lens opacity, even prove that there is an adverse relation between this protein and presbyopia, this protein is decreases over time with aging. (The function of this protein is anti-cataract), other studies also confirm that incidence female age related cataract is higher than male in most age groups [18-21]. The other risk factors (diabetic, smoking, uveitis, trauma), in this study males is affected by another risk factors more than females and mostly affect patients below 60 years. Regarding males 44(38.6) patients has another risk factor, these include 20 males of all age group smoker, 17 diabetic, 4 trauma, 2 uveitis and corticosteroid therapy, one case short stature and abnormal body mass, this explain why incidence of cataract in male patients is higher, while in females no clear additional risk factor apart from 8 (6.6%) patients only, all females patient deny the history of hormonal therapy. So the role of other risk factor is not clear in females, while other study confirm that there is relationship with hormonal study [22] The second aim of the study is to evaluate the association between the forming risk factor of cataract and post-operative complications. This study reveal that about 90% of patient has good vision quality after cataract extraction, from 24 patients, only 3 patients (17%), this result is consistent with other results by expert hands [23-25], 2 of them are diabetic due to intra-operative complication, posterior capsule tear with vitreous loss, instead of this complication, the non-diabetic patient had better post-operative vision, and as noted this complication is occur in older age group. In addition to posterior capsule tear, 4 diabetic patients also had moderate visual acuity due to diabetic retinopathy, so the total number of diabetic patients who had moderate vision quality is (6) patients (25%) of those with moderate response, and (24%) of diabetic patients, so the risk of visual deterioration in diabetes mellitus is not caused by risk of operation, other researcher also advise to avoid visual complication by control of the original disease [26]. Another cause of unavoidable visual deterioration in elderly is macular degenerative changes 3 patient of postoperative poor

vision are due to AMD, and most probably surgical technique has no role on the course of AMD, this is also mentioned by other researchers [27]. So, although the age related cataract is the commonest cause of cataract, but has a very good outcome postoperatively, only one case with late complication cataract surgery 90 years old develop endophthalmitis and loss of vision. Post-operative moderate quality of vision is acceptable sometimes if compared to total blindness. those who was still had bad vision postoperatively, 20 of 24 patient, the cause is not related to the surgical procedure, the relation between the preoperative visual acuity and post-operative visual outcome is done by others but still controversial [28].

Conclusion

With the advanced surgical management of cataract extraction and presence of highly specialized centers for ophthalmology worldwide, the role of cataract formation risk factor becomes minimum. Although the cataract is multifactorial, the age related cataract is the most common cause, females affected more than males. In the absence of other eye problem, the lens extraction and Intra Ocular lens implantation, the post-operative outcome is very good till age near eighties where the operative complication is expected and the associated of other aging problems is emerged like AMD. Diabetes mellitus is Known factor for cataract formation, but the outcome depended mainly on the control of the disease and the incidence of postoperative outcome is similar to that of non-diabetic, and the incidence post-operative poor vision is lower than the incidence of poor vision due to other eye problems. With the advanced surgical management of cataract extraction and presence of highly specialized centers for ophthalmology worldwide, the role of cataract formation risk factor is become highly minimized.

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