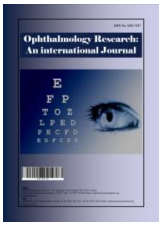

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Review on the Influence of Diabetes Mellitus in the Visual Prognosis of Cataract Surgery

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Authors' contributions

This work was carried out in collaboration among all authors. Author RK designed the study and wrote the first draft of the manuscript. Authors SDJ and MRS managed the analysis of the study. Authors PG and RJ managed the literature searches. All authors read and approved the final manuscript.

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Review Article

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ABSTRACT

India is deliberated the diabetes hub of the world, and a substantial amount of patients undergoing cataract surgery are diabetic. Developments in surgical techniques and instrumentation of cataract have large enriched the outcomes; but, surgical procedure may not be benign and real in certain entities with pre-existing retinal pathology or inadequate visual potential.. Keeping this in mind, we surveyed the different layers of the eye in managing the cataract in patients with diabetes. The changes in the cornea, intra ocular lens, choroid, and retina are the factors which influenced the visual prognosis of diabetic cataract patients. Better comprehension of different elements in charge of good result of cataract surgery in diabetic patients may direct us in better options in the management of these patients and advancing the outcomes. This review article targets to address diverse features adjoining cataracts in diabetic patients. In anelectronic MEDLINE search, appropriate studies were selected by authors using the relevant keywords.

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Keywords: Cataract; diabetes; eye; visual outcome; health; prognosis.

1. INTRODUCTION

India is an evolvingrealmof diabetic in the world. WHOexpected that, 31.7 million people were affected by diabetes mellitus (DM) in India in the year 2000 & thisnumberis predictable to upsurge to 79.4 million by 2030, this is the leading numberin any nation in the world. Tendency to progress almost 2/3 of all Type 2 andalmost all Type 1 diabetics are likely to develop diabeticretinopathy (DR) over a period of time [1-3]. As per Salil S Gadkari et al. DR prevalence in the entire is 21.7% [4]. In Prevalence of Diabetes Retinopathy in India studied by various author like, Namperumalsamy et al. (10.6%), Narendran et al. (26.2%) and Dandona et al. (22.58%), Raman et al. (18.1%), Rema et al. (17.6%), and so on [5-10]. Lian et al. (39%) in Hong Kong, Giloyan et al. (36.2%) in Armenia, Hajar et al. (27.8%) in Saudi Arabia, and Dutra Medeiros et al. (16.3%) in Portugal, Rodriguez-Poncelas et al. (12.3%) in Spain, Dawkins et al. (18.6%) in TimorLeste, Huang et al. (33.9%) in Singapore, [11-17] were some of the studies across the globe who also reported varying rates of prevalence of diabetic retinopathy.Diabetes affect almost all organ of the body like heart, kidney, liver and eye. Ophthalmic complications also occurs in various parts of the eye with staring to precorneal tear film to retina. This review article narrates how various part of the eye are influenced by the diabetes and the cause of poor visual prognosis in after cataract surgery when compared to the normal group.

Though, there is a good result through cataract surgery, but diabetes patient may have lesser visual outcome than those without diabetes and the result is worse in case of operated eyes with active proliferative retinopathy [18] or with earlier macular edema. To increase the surgical visual outcome of cataract in diabetes patient, one must undergo laser treatment for the proper control of diabetic retinopathy [19]. The greatest irresistible post-operative complication is endophthalmitis, a severe intraocular infection, with numerous studies showing that patients with high blood glucose level have a greater chance of emerging this complication [20-23], resulting in poorer outcomes [24]. In diabetic patients, management plan might need to be more hostile, with surgery performed former rather than later [24].There is a direct effect of diabetes on the eye and its affect the visual acuity. There are following reason that may affect visual outcome in various way after cataract surgery in diabetes person.

2. CORNEAL CHANGES IN DIABETES

The cornea feels 4-fold higher glucose in diabetic tear film than in control tears. 70% of diabetics undergo corneal complications collectively called diabetic keratopathy.The diabetic cornea grieves from cellular dysfunction anddysfunctional repair mechanisms, which comprise recurrenterosions, hindered wound healing, ulcers, and edema which lead decline in corneal sensitivity and transparency [25] which may be related tocorneal epithelial defects. The person suffering with diabetes also suffer from a variety of corneal complications including superficial punctuate keratopathy, trophic ulceration, persistent epithelial defect [26,27] and dry eye which is an important contributor to these problems.There are many causes for the Dry eye syndrome and one among is the aging process [28].Few studies suggest an association among the glycated hemoglobin (HbA1C) in addition to the dry eye syndrome [29]. One study shown that patients with diabetes had less values of tear secretion and tear break up time than control group [30]. As per Jin et al patients with type 2 diabetes tend to develop tear film dysfunction. Therefore measurement of tear film break up time should be one of the routine test procedure to be followed in eye examination in diabetic patients [31]. Dry eye can lead to decrease in vision, corneal scarring, perforation and bacterial infection which may further conclude to visual disorder. Diagnosis of dry eye syndrome at initial stage will be prevented from its complications [26]. Hence early finding of dry eye disorder in diabetic patients is significant for start of treatment in beginning times.

3. CHANGES IN THE INTRAOCULAR LENS

The major reason for poor visual prognosis in people with diabetes is the Cataract. Various research has recorded a relationship among cataract and diabetes. This relationship is reinforced by a large amount of statistics from clinical epidemiological studies and basic science studies [32-47]. Based on the information from the Beaver Dam Eye Study, the Blue Mountains Eye Study, and the Visual Impairment Project, accepted relations among diabetes and both prevalent and incident posterior sub capsular cataract and, fewer, with prevalent and incident cortical cataracts but not nuclear cataract [29-43, 39-44, 48, 50].

There is supplementary sign that the possibility of cataract rises with increasing diabetes duration and severity of hyperglycemia [51]. Deposition of advanced glycation end products in the lens has been postulated as one possible pathogenic mechanism for diabetic cataract [52]. Surgery is the regular procedure meant for treating the patients with cataract and major visual impairment. In people with diabetes, cataract happens at an earlier age and advances more quickly, ensuing in greater rates of cataract surgery at a quite early age [53].

4. CHANGES IN CHOROID

Diabetic retinopathy is aprogressivelyprevailing disease and an important provider to the cause for blindness globally. In additioncollected to retinal changes, choroidal abnormalities are the most common in patients with diabetes. In diabetic patients, a few choroidal changes have been shown in various studies consistently; and the focus on choroidal thickness is essentially unique in relation to that in healthy individuals. Therefore, appreciating choroidal changes in diabetic retinopathy exists an actual task and this gap is obstructing theefforts for describing the evaluation of choroid as a projecting factor for evolution of the disease and the treatment response.

5. CHANGES IN THE RETINA

Diabetic Retinopathy is a microvasculopathy in that the microvasculature leaks serum, increased vascular permeability, and capillaries are lost early in the disease. There is collective evidence that low-grade inflammation underlies the vascular complications of DR [51-53] inflammation is a broad-spectrumreaction of the body to tissue injury in which leukocytes areemployed to the inflamed tissue. Diabetic retinopathy isconsidered best as a chronic low-level inflammation in whichthere are prominent systemic cytokines like TNF-a and IL-1b andraised numbers of circulating activated leukocytes [54-56].

6. DIABETIC RETINOPATHY

Individuals with diabetes can have an eye disorder called diabetic retinopathy. This is when high glucose levels cause harm to blood vessels in the retina. These vessels can leads to promote advancement by its swelling and breakage which rootsvisual impairment. In its most developed stage, new blood vessels rise in number on the outside of the retina, which consequences to scarring and cell loss in the retina.

Diabetic retinopathy may develop through four stages:

Nonproliferative diabetic retinopathy (NPDR) This is the early stage of diabetes with no symptoms and has mild signs of micro aneurysms (swelling of the tiny blood vessels), hard exudates (waxy yellow appearance of the protein or lipid deposits), and hemorrhage (leakage of blood vessels). Macular edema can occur in the moderate cases and retinal ischemia (blockage of blood vessels) in severe case which further leads to visual loss.

Proliferative diabetic retinopathy (PDR): This is the most advanced stage of diabetic eye disease. In this neovascularization (new blood vessels) occurs which further bleed in to the vitreous causing floaters which will hinder the vision. These new blood vessels can form scar tissue. Accompanying scar tissue can contract and cause retinal detachment—the pulling away of the retina from underlying tissue, this is a serious condition which can affect both the central and peripheral vision.

7. ANTERIOR ISCHEMIC OPTICNEURO-PATHY

It is a serious vascular disorder of the optic nerve. Studies recommend that up to 25% of AION patients have a history of diabetes [57]. In diabetic patients, the microvascular disease affecting the frontal part of the optic nerve is thought to root the ischemia [58,59]. The optic disc in the contra- lateral eye of patients with AION is typically small in width with a trivial or absent cup, referred to as a “disc at risk.” Patients with AION frequently present with moderate loss of vision upon wakening, presumablyrelated to night-time systemic hypotension [60]. Visualacuity is better than20/200 in 60% of cases at presentation [61]. Untreated, AION generally remains stable, and recurrence in the same eye is unusual [62]. Good recovery of vision was witnessed in 43% of patients in the Ischemic Optic Neuropathy Decompression Trial [63]. There are no confirmed treatments for AION, and the Ischemic Optic Neuropathy Decompression Trial revealed no benefit of optic nerve decompression surgery [64].

8. DIABETIC PAPILLOPATHY

It is a rare condition of the optic nerve described by acute disc edema and mild visual loss [65]. Diabetic papillopathy is a threat factor for the development of diabetic retinopathy [66]; and, in rare occurrences, papillopathy can precede the development of AION [67]. Early researchers hypothesized a toxic impact of abnormal glucose digestion on the optic nerve in people with diabetes; following studies have recommended that diabetic papillopathy might be an insignificant and reversible type of AION [68]. The importance of this condition is dual. Initially, this condition might be misdiagnosed as papilledema [69]. Second, telangiectasia at the optic disc indiabetic papillopathy might be mixed up as neovascularization in the optic disc as a feature of proliferative diabetic retinopathy, prompting needless laser photocoagulation. Diabetic papillopathy unexpectedly recovers within a year, with good visual prognosis in many patients, vision returns to a level 20/ 30 [70]. Proper control of diabetes, hypertension and renal disorder might help to resolve this illness. Here is a narrative proof that intraocular steroid infusion might profit patients with visual impairment [71].

9. OCULAR MOVEMENT DISORDERS

Ocular movement disorders extraocular motility disorders might result in patients with diabetes, secondary to diabetic neuropathy, including the third, fourth, or sixth cranial nerves. Hardly, simultaneous palsies of various extraocular nerves can occur [72,73]. The primary reason in 25–30% of patients aged above 45 who develop acute extraocular muscle palsy is diabetes [74]. In a study, 1% of patients with diabetes existed to have cranial nerve palsies, matched with only 0.13% of control subjects. Among them, 41% had a third nerve palsy. In another population-based study, patients with sixth cranial nerve palsy remained six times more likely to have diabetes [75]. Another vital indicative feature in diabetes-related third cranial nerve palsy is Pupil sparing differentiating it from surgical causes, such as intracranial aneurysm or tumor. In diabetic cranial nerve palsies, recovery of extraocular muscle function generally arises within 3 months [76,77,78].

10. CONCLUSION

The quantity of individuals with diabetes mellitus is expanding exponentially. Individuals with diabetes have not constantly shared the good results after cataract surgery as compared to the non-diabetic population. Visual prognosis of the cataract surgery may vary dependent on the severity of the diabetic retinopathy. Therefore, we conclude from this review that one should consider evaluating the various layers of the eye thoroughly compared with the preoperative, inoperative and post-operative factorsto get a better visual prognosis in diabetes patients post cataract surgery.

CONSENT

It is not applicable.

ETHICAL APPROVAL

It is not applicable.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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