CLINICAL STUDY

Complications of extracapsular cataract surgery in chronic renal failure patients

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Abstract

Purpose **In chronic renal failure (CRF) patients the risk of per- and post-operative complications in cataract surgery is high. The most frequent complications observed in these patients and the prevalence of cataract were studied.**

Methods **Eighty-two CRF patients who had undergone ophthalmic examination between December 1996 and April 1998 at Başkent University, Department of Ophthalmology, were retrospectively analysed. Of 82 patients, 18 eyes of 14 CRF patients between 37 and 79 years of age underwent cataract extraction. Planned extracapsular cataract extraction was performed in all patients and all but one had posterior chamber intraocular lens implantation. In the post-operative period, scrapings of the corneal infiltrates were cultured and smears were examined, and the conjunctiva was swabbed and cultured also.**

Results **Per-operative hypotony and scleral collapse occurred in 1 patient, and another had haemorrhage in the anterior chamber. Post-operatively, suture infiltration was observed in 10 eyes. These lesions disappeared after topical steroid and antibiotic treatment.**

Conclusions **Patients with CRF require special surgical considerations since they face both general surgical problems and others that arise due to their disease.**

Key words Chronic renal failure, Complications, Extracapsular cataract extraction, Suture infiltrates

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Haematological and metabolic disorders associated with chronic renal failure (CRF) are the most important problems that affect the eye in patients undergoing surgery.[1] Coagulation defects, malnutrition, impaired immune response and wound healing are the main problems that should be considered. These patients may have ocular involvement either due to the primary pathology and CRF or due to haemodialysis therapy.[2] Numerous reports on CRF patients have cited osmolarity changes in the lens and, consequently, lens opacities and cataract formation requiring surgery.[3,4] However, the pathogenesis of cataract formation in patients with CRF remains unclear. Predisposing factors may include changes in calcium metabolism (particularly hypocalcaemia), hyperparathyroidism, sudden osmotic and metabolic changes during haemodialysis, and inhibition of the enzyme hexokinase, which is necessary for lens metabolism.

In this study, the prevalence of cataract formation in CRF patients and the surgical and post-operative complications in patients who had undergone cataract extraction were examined.

Materials and methods

Eighty-two CRF patients who had undergone ophthalmic examination between December 1996 and April 1998 at Başkent University, Department of Ophthalmology, were retrospectively analysed and included in this study. The patients were aged between 24 to 61 years (mean 41 years). Forty-three of the patients were male and 39 were female.

Of the 82 CRF patients, 14 underwent cataract extraction. Of these patients, 10 (71%) were male and 4 (29%) were female. The mean age was 59 years (range 37–79 years). All these individuals received regular haemodialysis therapy three times weekly. In addition to CRF, 9 patients had diabetes mellitus, 3 had hypertension, 1 had congestive heart failure and 1 patient had tuberculosis (Table 1). All patients underwent haemodialysis without heparin 1 day prior to the operation. Pre-operative metabolic status was assessed 6–8 h after pre-operative dialysis. The following are the mean test values with regard to pre-operative metabolic status: blood urea nitrogen (BUN), 47.9 mg% (normal: 17–90 mg%); sodium, 138.7 mequiv/l (normal: 128–145 mequiv/l); creatinine, 6.2 mg% (normal: 3.6–10 mg%); potassium, 4.3 mequiv/l (normal: 3.0–5.9 mequiv/l).

All but 1 patient underwent planned extracapsular cataract extraction and posterior chamber intraocular lens implantation. Single

Table 1. *Clinical features of chronic renal failure patients who had undergone cataract surgery*

Patient no., eye	Age (years)	Sex	Duration of chronic renal failure (years)	Duration of haemodialysis (years)	Accompanying diseases	Pre-operative visual acuity (Snellen)	Post-operative visual acuity (Snellen)	Complication
1	51	F	20	18	DM	20/100	20/70	Suture infiltration
2	60	M	18	18	DM	CF	CF	Suture infiltration
3	79	M	4.5	4.5	TB	20/200	20/40	
4, OD	57	M	14	11	DM	CF	20/200	Suture infiltration
4, OS						20/200	20/70	Suture infiltration
5	63	F	8	8	DM	p+p+	20/32	Suture infiltration
6	46	M	4	4	HT	20/100	20/40	Suture infiltration
7	47	F	8	8		p+p+	20/70	Suture infiltration
8, OD	73	M	1.5	1.5	DM	p+p+	20/32	
8, OS						CF	CF	Suture infiltration
9	61	M	4	4	DM	p+p+	20/20	
10	64	M	4	2	DM	p+p+	20/50	Scleral collapse
11, OD	51	M	15	14	DM	20/200	20/50	
11, OS						CF	20/50	
12, OD	37	F	1.5	1.5	DM	20/200	20/32	Suture infiltration
12, OS						20/100	20/32	
13	72	M	0.5	0.5	CHF + HT	20/100	20/40	Suture infiltration
14	78	M	6	6	HT	20/200	20/20	Haemorrhage

OD, right eye; OS, left eye; DM, diabetes mellitus; HT, hypertension; CHF, congestive heart failutre; TB, tuberculosis; p+p+, light perception; CF, counting fingers.

piece all-PMMA design intraocular lenses were implanted in these patients. One diabetic individual underwent extracapsular cataract extraction but did not have an intraocular lens implanted. An 8–10 mm clear corneal incision was made in all patients. The corneal wound was sutured with five to seven interrupted 10/0 monofilament nylon sutures. Subconjunctival antibiotics and steroids were administered routinely at the end of surgery. Post-operatively, patients received topical tobramycin 5 times daily and topical dexamethasone phosphate 5 times daily for 1 week, 4 times daily for 2 weeks and 3 times daily for 3 weeks. This therapy was continued for 6 weeks. Corneal and conjunctival calcium deposits due to CRF were present in all but 2 patients. Tear secretion was assessed with the Schirmer-I test and recorded at each visit. All our patients had Schirmer values of less than 10 mm. Those with Schirmer values below 5 mm were started on artificial tear therapy after initial evaluation. In all patients with suture infiltrates, the conjunctiva was sampled for culture using a sterile cotton-tip applicator, and corneal scrapings were obtained under topical anaesthesia using a Kimura spatula. Topical antibiotics were suspended at least for 12 h prior to obtaining corneal samples for culture.[5] Slides were smeared and stained with Gram and Giemsa stains, and blood, chocolate, and Sabouraud's dextrose agar plates were inoculated.

Best corrected visual acuity levels were measured using Snellen visual acuity charts at the first admission and at every follow-up visit.

Results

Lens opacities associated with CRF were observed in 50% (41/82) of the patients, and cataract formation requiring surgical intervention was observed in 17% (14/82) of these. Of the 41 patients, 11 (27%) had slight lens opacities, 10 (24%) had early posterior subcapsular cataract and 6 (15%) had nuclear sclerosis that did not require cataract surgery. In the remaining 14 (34%) patients who required cataract extraction the types of lens opacities were as follows: nucleocortical cataract in 10 patients, mature cataract in 2 patients and posterior subcapsular cataract in 2 patients.

Eighteen eyes of these 14 patients were operated on and the following data related to the visual acuities and surgical complications reflect the results derived from these 18 eyes. Pre-operatively, in 14 (78%) of the eyes, visual acuity was worse than or equal to 20/200. At the 6 months post-operative visit, 12 (67%) of the eyes had a visual acuity better than or equal to 20/50. In the per-operative period, the most serious complications observed were hypotony and scleral collapse in 1 patient, and haemorrhage into the anterior chamber in another. The haemorrhage was controlled by anterior chamber irrigation and viscoelastic injection. The hypotony and scleral collapse was managed by fast wound closure,

Fig. 1. *Digital anterior segment photograph, showing the multiple suture infiltrates observed following extracapsular cataract extraction in a chronic renal failure patient 10 days after surgery.*

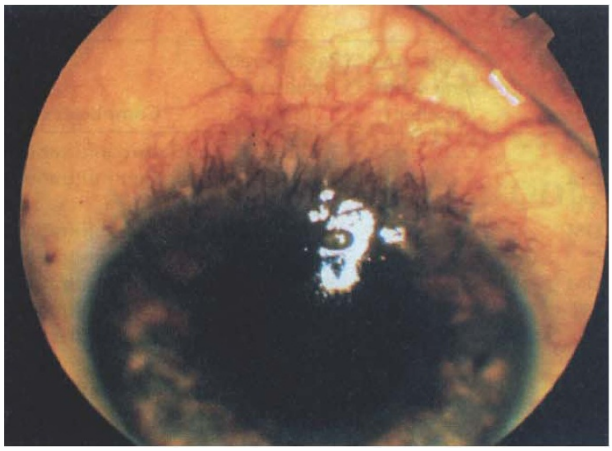

Fig. 2. *Creamy-white coloured, epithelialised infiltrates that are surrounded by vascularisation in a chronic renal failure patient 18 days after surgery.*

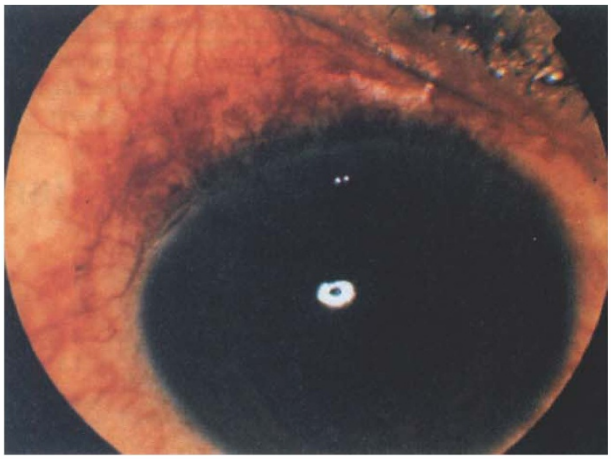

Fig. 3. *Digital anterior segment photograph showing the disappearance of infiltrates after treatment.*

anterior chamber reformation with viscoelastic and injection of Balanced Salt Solution. In both patients, surgery was completed without further problems. There were no surgical complications in any of the other patients. One individual with proliferative diabetic retinopathy did not undergo lens implantation.

Post-operatively, suture infiltration was observed in 10 (56%) eyes between 2 and 4 weeks. Characteristically, the lesions were round, white, often multiple, and ranged from 0.2 to 0.4 mm in diameter. The surrounding area was typically vascularised and the surface of the lesion was epithelialised. The infiltration did not extend to the cornea (Figs. 1, 2). Cultures of the conjunctiva and cultures and smears from corneal scrapings showed no microorganisms. In these patients, dexamethasone phosphate dosage was increased to every 2 h for 1 week, every 3 h for 2 weeks and then tapered according to clinical response. Topical tobramycin dosage remained 5 times daily during this period. Perfect healing with no scar formation was achieved in all cases (Fig. 3).

Among the 18 operated eyes, pre-operative Schirmer values were between 5 and 10 mm in 14 eyes and less than 5 mm in the remaining 4. Suture infiltrations were present in 3 of the 4 eyes with Schirmer values less than 5 mm. As these patients were already receiving artificial tears, no additional treatment for dry eyes was started.

No per- or post-operative complication was observed in 6 eyes (Fig. 4). The patients were followed for 6 months post-operatively.

Discussion

The ocular complications of CRF include anterior and posterior segment pathologies and neuro-ophthalmological problems.[2] The most frequently encountered anterior segment pathologies are corneal and conjunctival calcification, decreased tear production and cataract formation. In CRF, osmolarity changes in the lens and, consequently, lens opacities and cataract formation requiring surgery, have been reported by Berlyne *et al.*[4]

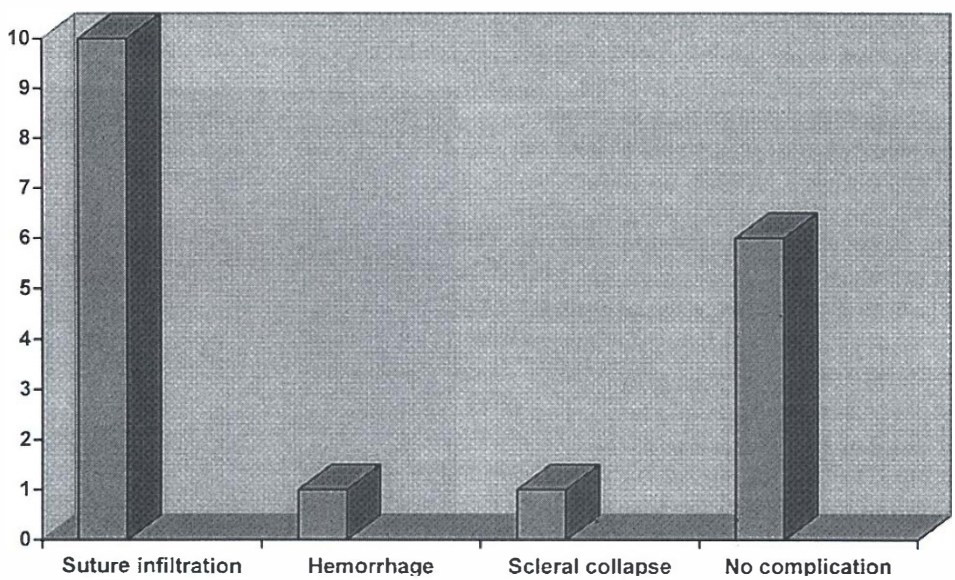

Fig. 4. *Complications of extracapsular cataract surgery in chronic renal failure patients.*

The factors known to predispose a patient to cataract formation are changes in calcium metabolism (particularly hypocalcaemia), hyperparathyroidism, and sudden osmotic and metabolic changes during haemodialysis. It is also assumed that the imbalance of urea during haemodialysis accelerates cataract development. The same authors reported punctate focal cataract formation in the transparent lens, similar to those seen in other hypercalcaemic states, in approximately 50% of their CRF patients. This finding has been suggested to be early evidence of a metabolic cataract. Of the 23 CRF patients in the Berlyne *et al.*[4] series, 2 underwent cataract surgery for mature cataract. Osman *et al.*[6] reported that 4 of their 280 CRF patients developed bilateral cataracts and underwent cataract extraction. In our series, lens opacities associated with CRF were observed in 50% (41/82) of patients, and cataract formation requiring surgical intervention was observed in 17% of these (14/82).

We believe that the haemorrhage into the anterior chamber that occurred in one of our patients was related to a coagulation defect. Such defects are frequently seen in CRF cases,[1] where platelet adhesion and aggregation are impaired due to uraemia and bleeding time is thus prolonged. When these patients undergo surgery, special efforts should be made to minimise trauma, and viscoelastics should be used to decrease the risk of haemorrhage. It has been suggested that the elevation in intraocular pressure might be due to the occurrence of decreased blood osmolality during haemodialysis, and the resultant passage of fluids into the orbital tissues that have higher osmotic pressure.[7] In the meantime, blood osmolality may show imbalance in the days following haemodialysis due to the increasing concentration of urea, and this can lead to extraocular fluid transfer with vitreous volume changes. As our patients had haemodialysis 1 day before surgery, we may speculate that the per-operative scleral collapse observed in our patient developed due to these haemodialysis-related osmotic changes.

Suture infiltration was the most common complication in the post-operative period. Negative cultures, the absence of microorganisms in smears and the good response to topical steroid therapy all led us to conclude that these infiltrations were sterile.

Conjunctival and corneal calcium deposits are frequently seen in CRF patients,[8] and symptoms such as irritation, hyperaemia and pain related to these deposits may be observed. All but 2 of our patients had corneo-conjunctival deposits; thus we believe that calcium deposits do not play a significant role in the development of suture infiltration.

As a result of the dehydration that occurs, tear secretion is decreased after haemodialysis. Lactoferrin, which is present at high concentrations in human tears, is known to combat many bacteria.[9] Patients with dry eye, and thus decreased levels of lactoferrin, lysozyme and IgA in tears, are predisposed to ocular surface infection and inflammation.[10] In CRF patients, the total tear secretion is decreased and, as a result, relatively low levels of immunoglobulin and lysozyme are present. Therefore, a tendency for ocular surface inflammation might be expected. Anterior segment pathologies are frequently encountered in CRF patients. Acidosis, hyperglycaemia, protein-calorie malnutrition, and the serum and tissue hyperosmolality which accompany uraemia impair leucocyte function and may cause a tendency towards infection and inflammation.[11] Reduced tear production and the relative decrease in tear defence factors may be local predisposing elements of ocular surface inflammation. We suggest that this could explain the high frequency of post-operative suture infiltration seen in patients with severe CRF. We believe that these infiltrations were sterile since microbiological testing revealed no infectious aetiology and there was an excellent response to local steroid therapy.

Potentially vision-threatening post-operative complications such as corneal ulceration and melting are more common in patients with dry eyes.[12] Adequate treatment of tear deficiency can prevent serious post-operative complications after cataract surgery in patients with dry eyes and this could be the reason for the absence of above-mentioned corneal complications in our series.

In CRF patients the risk of per- and post-operative complications is high, because many systems are affected by the disease. Post-operative suture infiltration was the most frequent complication observed in our series.

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