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Research Article

### EFFECT OF HEPARIN ON POST OPERATIVE INFLAMMATION AFTER CATARACT SURGERY IN DIABETICS

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**Abstract:**

**Introduction:** Cataract surgery may result in preoperative and postoperative complications. Cataract surgery and other intraocular procedures have a higher incidence and more pronounced postoperative inflammatory reactions in diabetic patients. These reactions are associated with age and may be affected by surgical technique, intraoperative injury to adjacent structures such as iris, presence of antecedent ocular infection, and remnants of retained cortical material.

**Methodology: Study Design:** Descriptive case series.

**Setting:** Department of Ophthalmology, DHQ Hospital, Kasur.

**Duration:** The study was conducted from June 2019 to December 2019.

**Sample Size:** Sample size of 34 cases was included in the study.

**Sampling Technique:** Non probability, consecutive sampling.

Fifteen eyes from 15 cataract cases aged  $30 \pm 15$  years (group 1: range 15–50 years) received anterior chamber irrigation with heparin sodium (5 IU/cc) during operation and received 1 ml of heparin sodium (concentration 10 IU/ml) added to the irrigating solution of BSS (BSS Plus) whilst in 19 eyes from 19 cataract cases aged  $39 \pm 10$  (group 2: range 29–49 years), BSS without heparin sodium was used.

**Results:** The two groups were comparable in age and distribution of sex (Student *t*-test  $p > 0.05$ ). There were no statistically significant differences between the two groups. Mild anterior chamber reaction was observed in only four patients in group 1, while nine cases of group 2 experienced marked anterior chamber reaction.

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## INTRODUCTION:

Cataract surgery may result in preoperative and postoperative complications. [1] Cataract surgery and other intraocular procedures have a higher incidence and more pronounced postoperative inflammatory reactions in diabetic patients. These reactions are associated with age and may be affected by surgical technique, intraoperative injury to adjacent structures such as iris, presence of antecedent ocular infection, and remnants of retained cortical material. Heparin has anti-inflammatory and antiproliferative effects in addition to its anticoagulant function, [2] inhibits fibrin formation after intraocular surgery, and has also been shown to inhibit fibroblast activity. [3]

In this prospective study, we evaluated the influence of anterior chamber irrigation with heparin sodium on early postoperative inflammation and cellular reaction after cataract surgery.

## METHODOLOGY:

**Study Design:** Descriptive case series.

**Setting:** Department of Ophthalmology, DHQ Hospital, Kasur.

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mm. After the nucleus was hydrodissected, lens material was aspirated using the automated irrigation/aspiration mode of the phacoemulsifier after the hydrodissection. All cases received posterior capsulorrhexis with a diameter of 3.5 mm and 4.0 mm. One eye received anterior vitrectomy in group 1 and two eyes received anterior vitrectomy in group 2. One eye received anterior vitrectomy in group 1 and two eyes received anterior vitrectomy in group 2. All eyes having intraocular lens (IOL) implantation received monoblock, hydrophobic foldable acrylic IOL. Cases with perioperative complications were not included in the study. No oral or subconjunctival steroids were used. Standardized postoperative treatment comprised prednisolone acetate 1% eight times a day for one week followed by six times a day for the second week and tapered over six weeks, and ciprofloxacin 0.3% and ketorolac 0.5% three times a day for one month. All patients were followed daily for the first three days, once a week for the first month, and at the 3rd and 6th months. At all visits, postoperative intraocular complications, including fibrin formation, anterior and posterior synechia, cyclitic and pupillary membrane formation, and posterior capsular opacification (PCO) were recorded and compared. The followup period after surgery was between three and 24 months (average 9.4 months =  $\pm 7.15$ ). The Fisher's exact test was used for statistical analysis.

## RESULTS:

The two groups were comparable in age and distribution of sex (Student t-test  $p > 0.05$ ). There were no statistically significant differences between the two groups. Table 1 shows preoperative and postoperative patient data in groups 1 and 2. Mild anterior chamber reaction was observed in only four patients in group 1, while nine cases of group 2 experienced marked anterior chamber reaction. In five of nine patients from group 2, anterior chamber reaction was severe which resulted in pupillary membrane and synechia. In the long-term follow up in two cases from group 2, pupillary irregularity was reported. Hyphema or intraocular hemorrhage due to heparin were not reported in any cases in both groups. Differences found between the group 1 and the group 2 could have occurred by chance or because of the small size of the studied population.

Table 1- Postoperative complications after cataract surgery

Characteristics	Group 1 (15 eyes)	Group 2 (19 eyes)	Statistical difference
Gender	7:8	9:10	P = 1.0000
Cells in anterior chamber > 10	4	9	P = 0.1604
Fibrin in anterior chamber	0	5	P = 0.1192
Pupillary membrane and anterior synechiae	0	5	P = 0.1192

## DISCUSSION:

The pathogenesis of postoperative fibrinoid inflammation is unknown. Any defect in the blood–aqueous barrier (BAB), possibly due to intraocular inflammation, preoperative high intraocular pressure (IOP), or excessive eye manipulation during surgery may lead to a disturbance in the coagulation and fibrinolytic pathway.<sup>4</sup> A tendency towards increased postoperative inflammation is well recognized.<sup>5</sup> Intraocular inflammation manifests itself as increased cells and flare, inflammatory precipitates on the IOL and the endothelium, formation of synechia, and inflammatory cyclitic membranes.<sup>1</sup> The fibrinoid reaction after cataract surgery is caused by the breakdown of the immature BAB and insufficient trabecular meshwork fibrinolytic activity.<sup>6</sup> Secondary complications of severe fibrinoid reaction include papillary membrane and opacification of the anterior hyaloid face.<sup>6</sup> Therefore, measures that may prevent or decrease inflammation in these eyes deserve consideration.<sup>7</sup> In addition to its well-known anticoagulant activity, heparin has anti-inflammatory and antiproliferative properties.<sup>6</sup> Heparin inhibits fibrin formation after intraocular surgery and has also been shown to inhibit fibroblast activity.<sup>3</sup> Due to its antithrombin effect, heparin inhibits fibrin formation by accelerating the control mechanisms for thrombin and activated X-factor.<sup>8</sup> Previous studies elucidate several mechanisms through which heparin may inhibit inflammation including induction of apoptosis in human peripheral blood neutrophils, inhibition of the complement activation and lymphocyte migration, l- and p-selectin, adhesion-molecule support of the initial attachment of leukocytes to the vessel wall at the inflammation site, neutrophil chemotaxis, and generation of refractive oxygen species by mononuclear and polymorphonuclear leukocytes.<sup>1,4,6</sup> Another useful adjunct for the prevention of membrane formation over the IOL optic is the use of a heparin-coated IOL. In our study of cataract surgery, addition of heparin to the irrigating BSS prevented postoperative inflammatory complications. In this study it was shown that in heparin sodium-added group 1 patients, early postoperative inflammatory reactions were rare. Bayramlar and colleagues<sup>6</sup> concluded that the addition of heparin to the irrigating solution during surgery decreases postoperative

fibrinoid reaction and late inflammatory complications.

The incidence of PCO after cataract surgery has been reported as high as 95.8%.<sup>9</sup> Several studies demonstrated

the antiproliferative effect of heparin on lens epithelial cells and its additive effect to prevent PCO. In our study, in the 6th month, PCO was reported in only one case from group 1 and in four cases from group 4. Hyphema, which can be seen during surgery due to heparin irrigation, was not seen in our study. However, this risk can also be diminished by using low molecular weight heparin.<sup>8</sup> Iverson and colleagues suggest that fragmin, at a concentration of 5 IU/mL, lowers the risk of hemorrhage during vitreoretinal and lensectomy surgeries.<sup>10</sup> Our results suggest that adding heparin sodium to the irrigating solution seems to be a safe, effective, and promising method to prevent early postoperative inflammatory reactions and PCO formation in the long term after cataract surgery.

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