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Effectiveness of Peroperative Subconjunctival Dexamethasone Alone versus Dexamethasone Plus Gentamicin in Uncomplicated Cataract Surgery

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Abstract

Background: Cataract remains the leading cause of curable blindness worldwide and a major public health burden in sub-Saharan Africa, including Mali. During cataract surgery, perioperative prophylaxis is commonly used to reduce postoperative inflammation and infectious complications. This study compared peroperative subconjunctival dexamethasone alone with dexamethasone combined with gentamicin in uncomplicated cataract surgery at CHU-IOTA. Methods: This prospective cohort study was conducted at the Institut d'Ophtalmologie Tropicale d'Afrique (CHU-IOTA), Bamako, Mali, from November 2024 to April 2025. One hundred patients undergoing uncomplicated cataract surgery were included, with 50 patients receiving subconjunctival dexamethasone alone and 50 receiving dexamethasone plus gentamicin. Patients were evaluated on postoperative day 1 (J1), day 4 (J4), day 15 (J15), and day 30 (J30). Main outcomes were postoperative inflammatory and infectious signs, wound healing, implant position, and visual acuity. Results: The mean age was 62.87 ± 7.37 years and women represented 58% of the sample. On J1, conjunctival hyperemia was the most frequent postoperative sign in both groups: 66% in the dexamethasone-alone group and 84% in the dexamethasone-plus-gentamicin group. Mild corneal edema was observed in 32% and 8% of patients, respectively, and moderate corneal edema occurred in 2% of the combination group. By J4, nearly all signs had resolved; from J15 to J30, no inflammatory or infectious complications were observed in either group. All implants remained centered throughout follow-up. At J30, wound

healing was complete in 100% of patients and all achieved visual acuity greater than 5/10. Conclusion: In uncomplicated cataract surgery, peroperative subconjunctival dexamethasone alone and dexamethasone plus gentamicin showed similar short-term effectiveness. Because the study was small, descriptive, and observed no infectious events, these findings should be interpreted cautiously. In this setting, dexamethasone alone may be considered a simpler and potentially less costly prophylactic option.

Keywords

Cataract Surgery, Dexamethasone, Gentamicin, Subconjunctival Injection, Postoperative Prophylaxis, Inflammation

1. Introduction

Cataract is defined as partial or total opacification of the crystalline lens, leading to progressive visual impairment [1]-[4]. It remains the leading cause of curable blindness worldwide and disproportionately affects low- and middle-income countries [2] [5] [6]. In Mali, cataract contributes substantially to avoidable blindness and remains a major public health and socioeconomic burden [2] [6].

Surgery is the only effective curative treatment for cataract [7]-[10]. Although cataract surgery has become increasingly safer with advances in microsurgical techniques, anesthesia, intraocular lenses, and perioperative pharmacologic management, postoperative inflammation and infection remain important concerns, especially in high-volume and resource-limited settings [7] [11]-[13].

Subconjunctival corticosteroid injection has long been used at the end of ophthalmic surgery to achieve high local drug concentrations and reduce tissue inflammation [7] [9]. Antibiotics such as gentamicin are sometimes added to further reduce the risk of postoperative infection. At CHU-IOTA, both dexamethasone alone and dexamethasone combined with gentamicin are used in routine practice. However, the added value of gentamicin in uncomplicated cataract surgery remains uncertain.

The present study therefore aimed to compare the effectiveness of peroperative subconjunctival dexamethasone alone versus dexamethasone plus gentamicin in uncomplicated cataract surgery at CHU-IOTA, with particular attention to postoperative inflammation, infection, wound healing, and visual recovery.

2. Methods

This prospective cohort study was carried out at the Institut d'Ophtalmologie Tropicale d'Afrique (CHU-IOTA), Bamako, Mali, over six months, from November 2024 to April 2025. A total of 100 patients aged 40 - 70 years undergoing uncomplicated cataract surgery with posterior chamber intraocular lens implantation at CHU-IOTA during the study period were eligible for inclusion. Patients with complicated cataract, intraoperative surgical complications, active ocular in-

fection or inflammation, severe corneal disease, glaucoma, or other ocular conditions likely to interfere with postoperative evaluation or visual recovery were excluded. They were allocated into two equal groups according to the peroperative prophylactic regimen: Group 1 received subconjunctival dexamethasone alone and Group 2 received subconjunctival dexamethasone plus gentamicin.

Patients were followed on postoperative day 1 (J1), day 4 (J4), day 15 (J15), and day 30 (J30). Only patients who completed the scheduled postoperative follow-up were included in the analysis. Outcomes assessed were postoperative inflammatory signs, infectious complications, implant position, wound healing at J30, and visual acuity at J15 and J30.

Apart from the subconjunctival prophylactic regimen, both groups underwent the same standardized surgical procedure with manual nucleus extraction, posterior chamber PMMA intraocular lens implantation, and received the same basic postoperative topical treatment consisting of an antibiotic, a steroidal anti-inflammatory drug, and a non-steroidal anti-inflammatory drug. Additional anti-edematous or mydriatic treatment was prescribed according to clinical findings. The primary outcome was the occurrence and evolution of postoperative inflammatory and infectious signs during the first 30 postoperative days. Secondary outcomes were wound healing, intraocular lens position, and visual acuity. Postoperative inflammation was assessed clinically through conjunctival hyperemia and corneal edema. Infectious complications were defined as clinically diagnosed postoperative ocular infection. Wound healing was considered complete when the surgical wound showed satisfactory clinical closure without associated complication at J30. Favorable visual recovery was defined as visual acuity greater than 5/10. The study was approved by the institutional ethic committee, informed consent was obtained from all participants. Data were analyzed using SPSS version 26.0. Continuous variables were summarized using means and standard deviations, and categorical variables using frequencies and percentages.

3. Results

The study population included 100 patients, with 50 patients in each prophylactic group. The overall mean age was 62.87 ± 7.37 years. Group 1 had a mean age of 64.46 ± 6.83 years, while Group 2 had a mean age of 61.28 ± 7.60 years. Ages ranged from 40 to 70 years (Table 1). The most represented age band was 66 - 70 years, accounting for 49% of the total sample. Women represented 58% of all patients (Table 1).

On postoperative day 1, conjunctival hyperemia was the predominant postoperative sign in both groups. In Group 1, 66% of patients had conjunctival hyperemia and 32% had mild corneal edema; only 2% had no sign on day 1. In Group 2, conjunctival hyperemia occurred in 84%, mild corneal edema in 8%, moderate corneal edema in 2%, and 6% had no sign (See Table 2).

Clinical evolution was favorable in both groups. By J4, all patients in Group 1 had no postoperative sign. In Group 2, 98% had no sign and only 2% still pre-

sented mild corneal edema. From J15 to J30, the study reports no postoperative inflammatory or infectious complication in either group.

All patients received the standard postoperative base treatment. From J1 to J4, 84% received the base regimen only, 15% received the base regimen plus anti-edematous treatment, and 1% received the base regimen together with an anti-edematous agent and a mydriatic. From J15 to J30, 100% received the base regimen at tapering doses.

Implant position remained favorable throughout follow-up. At J1, J4, J15, and J30, the implant was centered in 100% of patients, with no aphakia and no decentered implant reported. At J15, 86% of patients already had visual acuity greater than 5/10. By J30, all patients had visual acuity greater than 5/10 with and without correction, and all had complete wound healing (See Figure 1).

Table 1. Baseline sociodemographic characteristics of the study population.

Variable	Group 1 Dexamethasone alone	Group 2 Dexamethasone + gentamicin	Total
Mean age, years	64.46 ± 6.83	61.28 ± 7.60	62.87 ± 7.37
Age range, years	40 - 70	40 - 70	40 - 70
40 - 45 years	0 (0%)	2 (4%)	2 (2%)
46 - 50 years	2 (4%)	3 (6%)	5 (5%)
51 - 55 years	3 (6%)	9 (18%)	12 (12%)
56 - 60 years	6 (12%)	7 (14%)	13 (13%)
61 - 65 years	8 (16%)	11 (22%)	19 (19%)
66 - 70 years	31 (62%)	18 (36%)	49 (49%)
Female sex	28 (56%)	30 (60%)	58 (58%)
Male sex	22 (44%)	20 (40%)	42 (42%)

Table 2. Evolution of postoperative findings over time.

Follow-up time	Group 1: dexamethasone alone	Group 2: dexamethasone + gentamicin
J1	Hyperemia 66%; mild corneal edema 32%; no sign 2%	Hyperemia 84%; mild corneal edema 8%; moderate corneal edema 2%; no sign 6%
J4	No postoperative sign in 100%	No postoperative sign in 98%; mild corneal edema in 2%
J15	No postoperative sign in 100%	No postoperative sign in 100%
J30	No postoperative sign in 100%	No postoperative sign in 100%

4. Discussion

This study compared two perioperative prophylactic approaches in uncompli-

cated cataract surgery: subconjunctival dexamethasone alone versus dexamethasone combined with gentamicin. The main finding is that both regimens yielded similarly favorable short-term outcomes, with no infectious complication, no persistent inflammatory complication, complete wound healing, centered implants, and satisfactory visual recovery in all patients by J30.

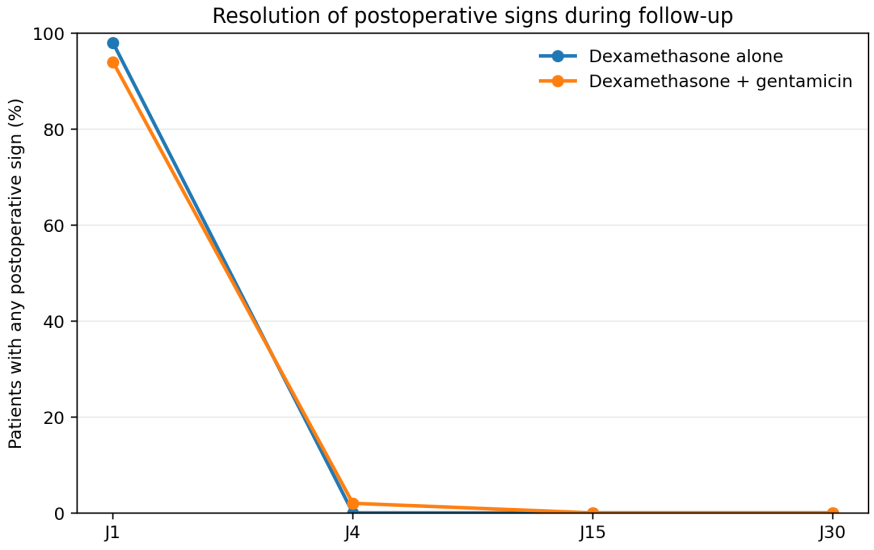


Figure 1. Resolution of postoperative signs during follow-up.

The age structure of the study population is consistent with the epidemiology of age-related cataract. The overall mean age of 62.87 years is close to values reported in other West African studies cited in the study, including Djiguimde *et al.* in Burkina Faso and Cissouma *et al.* in Mali. This pattern supports the expected concentration of cataract surgery in older adults and fits the established literature indicating that cataract incidence rises with advancing age [4] [6].

The female predominance observed in this cohort was modest but clear. The study notes that similar female predominance has been reported by Balo *et al.* in Togo and Olokoba *et al.* in Nigeria, whereas other series have shown male predominance. In the present context, this finding may reflect local demographic structure, longevity differences, and health-seeking patterns rather than a biologically meaningful difference in cataract occurrence.

A central observation was that conjunctival hyperemia was the dominant postoperative sign on J1 in both groups. This is important because it suggests that the early postoperative response was primarily a transient inflammatory tissue reaction rather than an infectious process [13]-[15]. Mild corneal edema, especially when rapidly regressive, is also compatible with expected endothelial and surface stress after cataract surgery [16] [17]. The near-complete disappearance of these signs by J4 strongly supports the interpretation that they resulted from surgical manipulation rather than failure of prophylaxis.

Although the proportion of hyperemia was numerically higher in the dexame-

thasone-plus-gentamicin group on J1, while mild corneal edema was more frequent in the dexamethasone-alone group, these differences should be interpreted cautiously. The sample size was limited, and the study did not present a powered comparative inferential analysis aimed at proving superiority of one regimen over the other. The clinically relevant point is that both groups converged rapidly toward complete resolution and remained free of complications through J30.

The complete absence of documented infectious complications in both groups deserves careful interpretation. It supports the overall effectiveness of the perioperative and postoperative management strategy used at CHU-IOTA. At the same time, it means that the study cannot demonstrate a specific incremental anti-infective benefit of gentamicin in this setting because infection was absent regardless of group allocation. In uncomplicated cataract surgery, modern aseptic technique, standardized operative steps, and consistent postoperative care may already reduce the infectious risk to a very low level [7] [16] [17].

The wound-healing and visual results were particularly reassuring. By J30, all patients had complete wound healing and visual acuity greater than 5/10. Implant position remained centered in all cases across all follow-up points. These findings indicate that both prophylactic regimens were compatible with excellent short-term anatomic and functional recovery.

Another important point is that all patients received postoperative treatment including antibiotic, steroidal anti-inflammatory, and non-steroidal anti-inflammatory drops, with additional medications in selected cases. This standardized postoperative regimen almost certainly contributed to the very low complication rate and excellent healing profile. Therefore, the study should not be interpreted as proving that the intraoperative injection alone determined the outcomes. Rather, it shows that within a broader standardized care package, dexamethasone alone performed as well as dexamethasone plus gentamicin in uncomplicated cases.

From a practical and economic perspective, the findings support a simplified regimen. If dexamethasone alone offers the same short-term outcomes as the combined regimen, omitting gentamicin may reduce medication costs, simplify perioperative preparation, and limit unnecessary antibiotic exposure. In resource-limited environments, even small savings per case may have meaningful consequences for service efficiency and patient access.

The study has limitations. It was conducted at a single tertiary center, included only 100 patients, and had follow-up limited to 30 days. Rare events such as endophthalmitis would require a much larger sample to compare with adequate statistical power. In addition, surgeries and follow-up were performed by the same surgeon, which improves consistency but may reduce generalizability. These limitations should be acknowledged when interpreting the results.

5. Conclusion

In this prospective cohort of patients undergoing uncomplicated cataract surgery

at CHU-IOTA, peroperative subconjunctival dexamethasone alone and dexamethasone plus gentamicin produced similarly favorable short-term outcomes. Within the care package used in this setting, dexamethasone alone appears to be a reasonable, simpler, and potentially less costly prophylactic alternative for uncomplicated cataract surgery. Because the study was small, descriptive, and observed no infectious events, these findings should be interpreted cautiously. Larger multicenter studies with longer follow-up would help confirm these findings.

Author Contributions

Conceptualization, NG and MLK; methodology, NG and MLK; software, SMD; validation, NG, MLK, and MS; formal analysis, NG; investigation, MLK; resources, NG, JT; data curation, RS; writing—original draft preparation, NG; writing—review and editing, FS and MS; visualization, SMD and RS; supervision, FS; project administration, JT; funding acquisition, NG. All authors have read and agreed to the published version of the manuscript.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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