

Outcomes Of Cataract Surgery Without Prophylactic Sclerotomy in Patients With Nanophthalmos

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Abstract:

Introduction:

Nanophthalmos is a rare clinical spectrum of disorders with a phenotypically small but morphologically normal eyes. A sudden decompression of the globe during any intraocular surgery, may lead to choroidal effusion and suprachoroidal hemorrhage. To prevent this, some surgeons prefer sclerotomies before opening the eye.

Methods:

The data regarding the clinical profile, intraoperative and post operative complications and cataract surgery outcomes were taken and analyzed. The patients were taken up for cataract surgery only after controlling the intra ocular pressure (IOP) to less than 20mm Hg by doing prophylactic laser peripheral iridotomy (LPI) and/or by giving adequate IOP lowering agents. All surgeries were performed without doing any prophylactic sclerotomies by experienced surgeons.

Results:

18 patients (27 eyes) with nanophthalmos were included in the study. Age ranged from 26-80yrs with a mean of 54.44 ± 14.16 yrs. Axial length ranged from 15.06-19.6mm with a mean of 18.36 ± 1.2 mm. Out of 18 patients, 5 patients (9 eyes) underwent LPI. Two patients had associated retinitis pigmentosa. None of the patients landed in choroidal effusion during the surgery or postoperatively.

Conclusion:

By controlling IOP prior to the surgery, complications like choroidal effusion and suprachoroidal hemorrhage can be avoided without doing sclerotomy prior to opening the eye.

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I. Introduction:

Nanophthalmos is a rare genetic disease with a small eye secondary to compromised growth and is characterized by ⁽¹⁾ Shortened axial length (generally 20mm or less; at least two standard deviations below age-matched controls), increased lens/eye volume ratio with narrow anterior chamber angle, High hypermetropia (ranging from +8.00 to +25.00 DS) and Scleral thickening. A sudden decompression of the globe during any intraocular surgery, may lead to choroidal effusion and suprachoroidal hemorrhage. In order to prevent these complications some surgeons perform two to four sclerotomies before opening the eye. ⁽²⁾

II. Aim:

To study the clinical profile, operative management (cataract surgery), intraoperative and postoperative complications of patients with nanophthalmos in a tertiary eye care hospital retrospectively.

III. Methods:

It is a retrospective study with patients aged more than 20years with axial length of <20mm who underwent cataract surgery were included and the patients aged less than 20yrs and with axial length of >20mm were excluded.

18 consecutive patients (27 eyes) with nanophthalmos who underwent cataract surgery with implantation of IOL over a period of 8.5yrs (January 2014 to July 2022) were included.

The data regarding demography, visual acuity, IOP (pre LPI and post LPI), gonioscopy, fundus findings, axial length, IOL power, surgical data including intraoperative and postoperative complications, postoperative visual acuity and postop fundus status were noted. All patients were taken up for cataract surgery only after controlling the IOP (less than 20mm Hg) by doing prophylactic LPI and/or by giving adequate IOP lowering agents. all surgeries were performed by experienced surgeons without doing any prophylactic sclerotomies.

IV. Results:

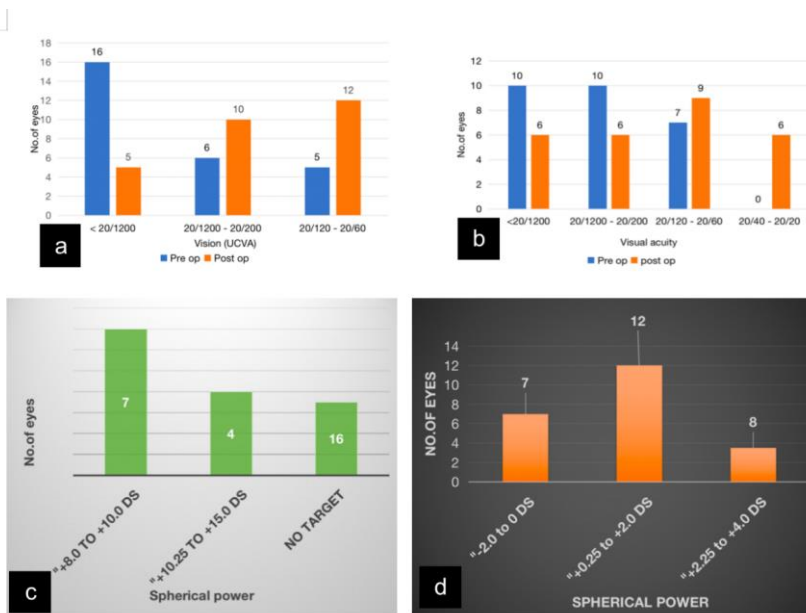
27 eyes of 18 patients having nanophthalmos were included in the study. 9 patients underwent cataract surgery in one eye and 9 patients in both the eyes. Age ranged from 26-80yrs with a mean of 54.44 ± 14.16 yrs. Out of these 3 patients were aged less than 50 years and remaining 15 were aged more than 50 years. 3 were males and 15 were females. Axial length ranged from 15.06-19.6mm with a mean of 18.36 ± 1.2 mm. IOL power was calculated in IOL master using Hoffer Q or SRK-T formulas and was ranged from 30D to 54.50 D with a mean of 40.50D.

Out of 18 patients, two patients had both eyes (BE) nanophthalmos with associated retinitis pigmentosa.

Out of 18 patients, 5 patients (9 eyes) underwent YAG PI, of which 3 patients had glaucoma One patient had neovascular glaucoma (NVG) in one eye with IOP of 64mm Hg rest all had IOP of less than 26 mm of Hg. IOP of all patients brought down to less than 20mm Hg before doing surgery either by doing LPI or by giving oral acetazolamide or syrup glycerol and / or IV mannitol.

Only phacoemulsification with implantation of foldable intraocular lens was done in these patients. All surgeries were done by experienced surgeons without performing prophylactic sclerotomies. Surgery was uneventful in all the cases without any intraoperative or major postoperative complications. Minor complications like postoperative microcystic corneal edema was noted in 6 eyes which was treated with Cap.acetazolamide SR 250mg once a day for 3 days. All patients were given topical prednisolone eye drops 6times/day for 1week, then in tapering doses and one Cap.Acetazolamide 250mg SR prophylactically. Postoperative day 1 and one week, all patients fundus was examined by the retina surgeon to rule out choroidal detachment. None of the patients developed choroidal detachment. Postoperative refractive status was assessed 5 weeks after the surgery.

Uncorrected visual acuity (UCVA) (Graph 1(a)) was improved in all cases postoperatively. Out of 27 eyes postoperative best corrected visual acuity (BCVA) was improved in 59.2% (n=16) eyes but remained same as preoperative BCVA in 40.7% (n=11) eyes (Graph 1(b)).



Graph 1: (a) Preoperative and Post operative UCVA, (b) Preoperative and Postoperative BCVA, (c) Preoperative spherical refractive power, (d) Postoperative spherical refractive power

Though best corrected visual acuity (BCVA) has not improved in some cases because of amblyopia, uncorrected visual acuity (UCVA) has improved in all the cases.

The preoperative spherical refractive power of most of the eyes (n= 7) was between +8.0 to +10.0 DS and couldn't be assessed in most of the eyes (16) due to the presence of dense cataract (Graph 1(c)). Postoperative spherical refractive power of most of the eyes (n= 12) was between +0.25 to +2.0 DS. It was between 0 DS to -2.0 DS in case of 7 eyes remaining 8 eyes had between +2.25DS to +4.0DS (Graph 1(d)).

Out of 27 eyes, Hoffer Q formula was used to calculate the IOL power of 12 eyes and the SRK-T formula in remaining 15 eyes. All the eyes with Hoffer Q formula got the acceptable post operative spherical refractive power between -1.0 DS to +1.0 DS and eyes with SRK-T formula had a residual spherical refractive power of more than -1.0 DS and +1.0 DS.

V. Discussion:

Nanophthalmos is a rare clinical spectrum of disorders with a phenotypically small but morphologically normal eyes.⁽³⁾ Cataract surgery in nanophthalmic eyes is often challenging with poor visual outcome and potential complications such as uveal effusion, supra choroidal haemorrhage, retinal detachment, and corneal decompensation. Nanophthalmic eyes are prone to develop uveal effusion either from the thickening of sclera or from the dense collagen around the vortex veins and the resulting compression of venous drainage channels^(4,5).

In the present study, we had done phacoemulsification with intraocular lens implantation in 18 patients of which 9 patients underwent cataract surgery in both eyes and 9 in one eye. The surgery was done after controlling the IOP adequately (less than 20mm Hg) and we had done cataract surgery without doing sclerotomy. None of the patients had any uveal effusion intra operatively or post operatively similar to the study done by Faucher A et al.,⁽⁶⁾ where although sclerotomy was not performed prior to phacoemulsification, none of the patients landed in uveal effusion.

In a study done by Sharmila Rajendrababu et.al⁽⁷⁾ they had done cataract surgery with sclerotomy in 42.55% patients and without sclerotomy in 57.45% patients out of which 3.33% patients had uveal effusion as a complication in cases with sclerotomy and 12.76% patients had uveal effusion in cases without sclerotomy. In another study done by sharmila rajendrababu et al.⁽⁸⁾ 12.9% patients who underwent cataract surgery without sclerotomy had uveal effusion as a complication but none of patients in sclerotomy group had uveal effusion.

The IOL power calculation also plays an important role in these short eyes to achieve acceptable postoperative refraction. In our study, the postoperative refraction was acceptable with the usage of IOL power calculation formula Hoffer Q but not with SRK-T. The study done by Gavin and Hammond concluded that the Hoffer Q formula was more accurate than the SRK/T in case of axial length less than 22mm.⁽⁹⁾ Another study done by MacLaren *et al.*, reviewed 72 eyes with mean AL of 20.79 mm, and concluded that the Haigis formula was the most accurate followed by the Hoffer Q, while Holladay 1 and SRK/T were the least accurate in predicting post operative refractive accuracy in case of short eye balls.⁽¹⁰⁾ Moschos MM et al. had concluded that Haigis formula provides more accurate results and Hoffer Q can be considered as an alternative in eyes with axial length of less than 22mm.⁽¹¹⁾

VI. Conclusion:

None of our patients had any intraoperative or postoperative uveal effusion. By controlling IOP prior to the surgery by giving either oral glycerol or iv mannitol and by doing YAG peripheral iridotomy when required, complications like choroidal effusion and suprachoroidal hemorrhage can be avoided without doing sclerotomy prior to opening the eye.

Though BCVA is not improved in all cases due to amblyopia, but UCVA has improved in all cases.

Hoffer Q gives acceptable postoperative refractive outcome than SRK-T in case of nanophthalmos.

References:

- [1]. Sundin OH, Dharmaraj S, Bhutto IA, Et Al. Developmental Basis Of Nanophthalmos: MFRP Is Required For Both Postnatal Ocular Growth And Postnatal Emmetropization. *Ophthalmic Genet.* 2008; 19(1):1-9.
- [2]. Singh OS, Simmons RJ, Brockhurst RJ, Trempe CL. Nanophthalmos: A Perspective On Identification And Therapy. *Ophthalmology.* 1982; 89(9):1006-12.
- [3]. Singh OS, Simmons RJ, Brockhurst RJ, Trempe CL. Nanophthalmos: A Perspective On Identification And Therapy. *Ophthalmology.* 1982;89:1006–12.
- [4]. Yamani A, Wood I, Sugino I, Wanner M, Zarbin MA. Abnormal Collagen Fibrils In Nanophthalmos: A Clinical And Histologic Study. *Am J Ophthalmol.* 1999;127:106–8.
- [5]. Shiono T, Shoji A, Mutoh T, Tamai M. Abnormal Sclerocytes In Nanophthalmos. *Graefes Arch Clin Exp Ophthalmol.* 1992;230:348–51.
- [6]. Faucher A, Hasanee K, Rootman DS. Phacoemulsification And Intraocular Lens Implantation In Nanophthalmic Eyes: Report Of A Medium-Size Series. *J Cataract Refract Surg.* 2002;28:837–42.
- [7]. Sharmila Rajendrababu, Sujani Shroff Et Al. Clinical Spectrum And Treatment Outcomes Of Patients With Nanophthalmos. *Eye (Lond).* 2021 Mar; 35(3): 825–830.
- [8]. Rajendrababu S, Babu N, Sinha S, Balakrishnan V, Vardhan A, Puthuran GV, Et Al. A Randomized Controlled Trial Comparing Outcomes Of Cataract Surgery In Nanophthalmos With And Without Prophylactic Sclerostomy. *Am J Ophthalmol.* 2017;183:125–33.
- [9]. Gavin EA, Hammond CJ. Intraocular Lens Power Calculation In Short Eyes. *Eye* 2008;22:935-8.
- [10]. MacLaren RE, Natkunarajah M, Riaz Y, Bourne RR, Restori M, Allan BD. Biometry And Formula Accuracy With Intraocular Lenses Used For Cataract Surgery In Extreme Hyperopia. *Am J Ophthalmol* 2007;143:920-31.
- [11]. Moschos MM, Chatziralli IP, Koutsandrea C. Intraocular Lens Power Calculation In Eyes With Short Axial Length. *Indian J Ophthalmol* 2014;62:692-4.