

## Ten best papers

1. Mandal AK. Illuminated microcatheter-assisted passage assisted circumferential trabeculotomy and trabeculectomy (IMPACTT): An improved surgical procedure for primary congenital glaucoma. *Seminars in Ophthalmology* 2022; 37:786-789.

**Important discoveries/contributions:** In search for the best surgical treatment for primary congenital glaucoma (PCG), 360-degree trabeculotomy combined with trabeculectomy has been conceptualized as the new treatment modality. Illuminated microcatheter passage assisted circumferential trabeculotomy and trabeculectomy (IMPACTT) is safe and effective and may represent an improved surgical procedure for the management of advanced PCG.

2. Mandal AK, Gothwal VK, Mohamed A. Long-term outcomes in patients operated for primary congenital glaucoma between 1991 and 2000: A single centre database study. *Ophthalmology* 2023; 130: 1162-1173.

**Important discoveries/contributions:** The primary aim of the present study was to evaluate long-term surgical outcomes and visual acuity in patients operated for different sub-types of PCG between 1991 and 2000 by a single surgeon. The secondary aim was to investigate the factors that influence surgical outcomes and reoperation rates over the course of follow-up. In this large cohort of patients, combined trabeculotomy-trabeculectomy is a useful procedure in this large cohort of patients with PCG. It provides good IOP control and moderate visual recovery that remained over a 20-year follow-up after surgery. In the Cox multivariate model, predictors of poor visual outcome were male gender, bilateral affliction, presence of corneal edema at presentation, level of preoperative IOP, and any additional intraocular surgery.

3. Mandal AK, Gothwal VK, Khanna R. Combined Trabeculotomy-Trabeculectomy for Primary Congenital Glaucoma: Long-term Experience from a Tertiary Referral Centre in a Developing Nation. *Acta Ophthalmologica* 2022;100: e439-e447.

**Important discoveries/contributions:** The purpose of this study was to evaluate the long-term visual and surgical outcomes, and associated risk factors for poor outcomes in patients with primary congenital glaucoma (PCG). The cohort included 653 consecutive PCG patients (1128 eyes; mean age, 26 months), of whom 475 (73%) underwent simultaneous bilateral CTT. Kaplan-Meier survival analysis revealed 1-, 5-, 10-, 15-, and 19-year complete success rates of 92.6% (n = 372), 75.5% (n = 173), 55.9% (n = 72), 44.7% (n = 19), and 21.6% (n = 3), respectively. Primary CTT may be safely employed to control IOP and may provide long-term benefits in PCG patients. This is the largest cohort of patients with primary congenital glaucoma operated and followed-up by a single surgeon over a period of 21 years.

4. Mandal AK, Sulthana, SS Gothwal, VK. Primary Congenital Glaucoma: Trends in Presentation Over Three Decades at a Tertiary Eye Care Center in India. *Journal of Glaucoma* 2020; 29: 1095-1100.

**Important discoveries/contributions:** The purpose of this study was to compare the trends in presentation of patients with PCG over 3 different time periods at 10-year intervals (1998, 2008, and 2018) managed by a single surgeon at one of the largest tertiary eye care centers in South India. In this study, huge time delay was observed between first primary congenital glaucoma (PCG) symptom recognition by parents to ophthalmological diagnosis and this delay was unchanged over time. Bilateral affliction and mean presenting intraocular pressure remained unaltered.

We provide unique single center-based information of trends in the presentation of patients with PCG over 3 decades. Diagnostic delay was common, and a large number of characteristics of patients with PCG in South India have remained unchanged, particularly, age at onset and at diagnosis and laterality.

5. Mandal AK, Gothwal VK, Chaurasia S. Corneal endothelial features in patients operated for primary congenital glaucoma. *Ophthalmology Glaucoma* 2023; 6: 380-386.

**Important discoveries/contributions:** The purpose of the present study was two-fold: (1) to evaluate the corneal endothelial cell morphology using specular microscopy imaging in an Indian cohort of operated primary congenital glaucoma (PCG); and (2) to compare the endothelial cell parameters among different sub-types of PCG. Patients with PCG have significantly lower endothelial cell density (ECD) compared to controls. Patients with neonatal-onset PCG have highest ECD among the 3 sub-groups. These changes in the corneal endothelium in patients with PCG should be borne in mind while planning further corneal or glaucoma procedures.

6. Gothwal VK, Seelam B, **Mandal AK**. Quality of life following surgery for congenital glaucoma: findings of the LVPEI congenital glaucoma registry. *Eye (Lond)*. 2019; 33: 659-667.

**Important discoveries/contributions:** In this study, we evaluated the health-related quality of life (HRQoL) of children operated for primary congenital glaucoma (PCG) using the Kidscreen-27 questionnaire. A total of 121 children (mean age 11.8 years; SD, 2.8 years; 51% male) with unilateral or bilateral PCG who underwent glaucoma surgery in infancy (mean duration since surgery, 10.2 years; SD 4.2 years) by a single surgeon at a tertiary eye care centre where administered the Kidscreen-27 questionnaire (self or interviewer administered in a face to face interview) during their routine follow-up visit. The majority of the children (83%) had bilateral PCG and congenital type of the disease (79%). Despite undergoing successful glaucoma surgery, children with PCG reported reduced HRQoL. Younger children with PCG are more likely to experience this lowered HRQoL and ophthalmologists will need to be alert to this. Efforts must be made to improve the HRQoL of children with PCG.

7. Gothwal VK, Sharma S, **Mandal AK**. Beyond Intraocular Pressure: Visual Functioning and Quality of Life in Primary Congenital Glaucoma and Secondary Childhood Glaucoma. *Am J Ophthalmol*. 2020; 209:62-70.

**Important discoveries/contributions:** In this study, we compared visual functioning (VF) and vision related QoL (VRQoL) of children 8-18 years of old treated for primary congenital glaucoma and secondary childhood glaucoma. In a cross sectional study, a total of 309 children 8-18 years old treated for PCG and secondary childhood glaucoma between 2000 and 2010 by a single pediatric glaucoma specialist where prospectively enrolled at LV Prasad Eye Institute, Hyderabad, India. Children completed 2 questionnaires, the LV Prasad Functional Vision Questionnaire-II (LVP-FVQ-II), and the impact of Vision Impairment-Children (IVI-C) questionnaire. Rasch-calibrated scores from both these questionnaires were used to compare the VF and VFQoL between the 2 groups. Results showed that children with treated PCG experienced significantly better VF and VRQoL than those with secondary childhood glaucoma, despite comparable VA and IOP. Clinicians can use this information that goes beyond conventional clinical measures in the decision-making process when planning for any interventions for these patients

8. Gothwal VK, **Mandal AK**. Quality of life and life satisfaction in young adults with primary congenital glaucoma. *Ophthalmology Glaucoma* 2021;4 (3): 312-321.

**Important discoveries/contributions:** In this study, we examined the quality of life (QoL) and life satisfaction (LS) outcomes in 82 patients with PCG operated during early childhood and are transitioning into adulthood. Their mean age was 22.5 years (standard deviation, 4.6), 52% were male and 94% had bilateral affliction. Participants were asked to complete the 26-item World Health Organization Quality of Life-BREF (WHOQOL-BREF) questionnaire (items related to satisfaction with general health, physical, psychological, social relations, and environmental aspects) and the 5-item Satisfaction with Life Scale (SWLS) in the clinic visit. Clinical data including visual acuity (VA) and visual fields (VFs) were collated from medical records. Rasch analysis was used to optimize the psychometric properties, with higher scores indicating a higher degree of QoL and LS, for both the questionnaires.

Linear regression models were used to examine associations between overall QoL and LS (in separate models), and sociodemographic and clinical variables. The QoL and LS were measured using Rasch-transformed scores from the WHOQOL-BREF questionnaire and SWLS, respectively. Response rate was 93%. The overall mean (SD) Rasch-scaled scores for QoL were 0.93 (1.11) and 0.87 (1.32) for environment domain and 0.41 (1.56) logits for LS. Better QoL was significantly related to rural residence and higher education in both univariable and multivariable analyses and explained 13% variance. Higher LS was significantly related to marital status, unilateral affliction, and higher education in univariable analyses. However, multivariable regression analysis showed that only marital status was independently associated with higher LS and explained 8.8% of variance. Clinical and treatment variables (VF, surgical interventions, medications) were not independent predictors of QoL/LS. Our results suggest that QoL and LS

of treated patients with PCG during adult life are generally good and appear to be driven by factors other than clinical indices. Educational achievement appears to be linked to better QoL and LS, and clinicians should emphasize the importance and need for education in the continued care of these patients.

Of the 39 participants pursuing education at various levels in the emerging adults group, a little over one-half (n=21, 54%) were in secondary education, and the remaining (n=18, 46%) were pursuing tertiary education (under- and post-graduation) including professional courses in medicine, engineering and technology, computer science, pharmacy and chartered accountancy.

Of the 11 participants working in the young adults group, the most common type of occupations pursued by them belonged to group 1, managers (54%), which included business services, administration managers, and sales managers. The remaining participants (46%) belonged to group 2, professional, and this group consisted of teaching and information and communications technology professionals (e.g., software and application developers and analysts).

Of the 11 participants working in the emerging adults group, the most commonly engaged occupations belonged to group 2, professional (55%), such as teaching and business and administration professionals (e.g., finance). This was followed by group 1, managers (27%), and included business services, administration managers, and sales managers. The remaining 2 participants (18%) belonged to group 7, which comprised craft and related trade workers (car mechanics).

Overall, 13 participants (16%) are married; seven (54%) have children and while four of these have one child each, three participants have two children each. None of the children are afflicted with glaucoma.

9. Kabra M, Zhang W, Rath S, **Mandal AK**, Senthil S, Pyatla G, Ramappa M, Banerjee S, Shekhar K, Marmamula S, Mettla AL, Kaur I, Khanna RC, Khanna H, Chakrabarti S. Angiopoietin receptor TEK interacts with CYP1B1 in primary congenital glaucoma. *Hum Genet.* 2017;136: 941-949.
10. Labelle-Dumais C, Pyatla G, Paylakhi S, Tolman NG, Hameed S, Seymens Y, Dang E, **Mandal AK**, Senthil S, Khanna RC, Kabra M, Kaur I, John SWM, Chakrabarti S, Nair KS. Loss of PRSS56 function leads to ocular angle defects and increased susceptibility to high intraocular pressure. *Dis Model Mech.* **2020** May 1; 13(5). dmm042853.

**Important discoveries/contributions (for # 9 and 10):** Along with his geneticist colleagues at the L V Prasad Eye Institute, Dr. Mandal has been instrumental in spearheading and facilitating genetics research in primary congenital glaucoma (PCG) over last 25 years with an overarching goal of translation. The large clinical and genetic data in PCG have helped identify novel genes, assess mutation spectrum, and have provided evolutionary insights for migrations of mutations across populations. This also led to the international collaborations with Brazil, Tunisia, Portugal, Australia and USA to understand the nature-nurture dialectics in

PCG (PLoS One 2015). The dissections of the genetic and physical interactions of genes along with comprehensive genotype-phenotype correlations have helped identify novel functional targets in PCG through various *in vitro* (Hum Genet 2017) and *in vivo* (Dis Model Mech 2020) approaches with an outcome aimed at devising novel molecular diagnostics for predictive testing and guiding therapeutics.