"I Can See the Light": Cataract Surgery Decreases Risk of Orthopaedic Trauma

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INTRODUCTION:

Fractures causing life-altering orthopedic trauma represent a significant burden within the geriatric population, impacting global health systems and profoundly affecting patients and their families. With the incidence of fragility fractures increasing annually due to an aging population, it's imperative to implement enhanced preventative and treatment strategies to mitigate risk. The estimated 1-year mortality for geriatric patients who sustain a hip fracture has been documented to range from 16-36%, with studies showing mortality rates being 3-4 times higher when compared to the general population. Although breakthrough advances have been made in successfully treating orthopedic trauma, few strategies exist to prevent such events.

Visual impairment due to age-related cataracts is recognized as a modifiable risk factor for orthopedic trauma, offering potential for preventive intervention. Among all causes of vision loss, cataract-related visual disturbances have the second highest fall rate. This condition brings further issues related to stereoacuity and postural instability that only accentuate the need for early intervention. Furthermore, cataract progression increases the risk of comorbid physical and mental conditions that exacerbate the risk for falls. With outcomes of surgical correction being highly efficacious, cataract surgery significantly improves visual acuity, enhancing mobility and safety in the geriatric population.

This international population-based cohort study investigates the role of cataract surgery in reducing the incidence of commonly occurring orthopedic trauma that may occur as a result of visual impairment.

METHODS: Using the TriNetX database (Cambridge, MA, USA), patients who underwent cataract surgery were identified (CPT codes 66982, 66984), along with a control group with age-related cataracts (ICD-10 H25) treated without surgery. Exclusion criteria included other potential visually significant ophthalmic comorbidities (e.g. glaucoma) or a pre-existing orthopaedic condition increasing fracture risk (e.g. primary bone tumor/bone metastases). Cohorts were balanced through 1:1 propensity score matching (PSM) based on demographics and relevant risk factors. Post-PSM, one-year and lifetime risk, excluding the first 90 days post-operatively, of hip, vertebral body, distal radius, bimalleolar/trimalleolar ankle fractures and proximal humerus fractures. All analyses were completed using the statistical applications available on TriNetX.

RESULTS:

Before propensity score matching, our study comprised a cohort of 236,652 patients who underwent cataract surgery and a control group of 818,425 cataract patients without surgery. Baseline characteristics revealed that the cataract surgery group was slightly older, with an average age of 68 ± 12.5 years compared to 66.1 ± 10.7 years in the control group. The gender distribution also demonstrated a slight male predominance in the cataract surgery group (43.27%) compared to the control group (41.84%). Racial demographics varied, with White patients comprising 71.33% of the surgery cohort compared to 52.99% of the control cohort. In contrast, patients identified as Hispanic or Latino comprised 8.95% of the surgery group compared to 4.48% of the control group. Regarding health conditions, age-related osteoporosis without pathological fracture was slightly higher in the surgery group (4.75% vs 3.71%). In addition, a history of nicotine dependence (8.08% vs 6.56%) and benzodiazepine use (2.62% vs 2.62%) were comparable between the two cohorts.

Following PSM, the final analysis included 233,335 patients from the surgery and cataract control cohorts. Overall, subjects who underwent cataract surgery demonstrated significantly fewer fractures in most locations. The largest effect size was observed for trimalleolar ankle fractures (RR: 0.83, 95% CI: 0.71-0.96). However, the risk of bimalleolar fracture was not significantly different, with an RR: 0.88, 95% CI: 0.77-1.01. Fractures of the distal radius showed a notable reduction in risk, with an RR: 0.87, 95% CI: 0.81-0.93, while fracture rates of the proximal humerus were also significantly reduced, with an RR: 0.92, 95% CI: 0.85-0.99. The risk ratios were lower but still significant for hip fractures, with an RR: 0.90, 95% CI: 0.85-0.96, and for vertebral fractures, with an RR: 0.93, 95% CI: 0.88-0.97.

DISCUSSION AND CONCLUSION:

These findings underscore the impact of cataract surgery in reducing the incidence of orthopaedic trauma among patients with age-related cataracts. While evaluating fracture risks post-cataract surgery, pronounced risk reductions were seen in the distal regions of both upper and lower extremities. Notably, trimalleolar ankle fractures saw the highest decline in risk by 17%. In contrast, the incidence of bimalleolar fractures remained largely unchanged. Trimalleolar fractures, a more severe fracture pattern when compared to bimalleolar fractures, increase the need for surgical intervention and overall failure of closed reduction. Current literature highlights the elevated complication rates, up to 40%, in geriatric patients over 65 undergoing open surgical correction. Additionally, fractures of the upper limb, specifically the distal radius and

proximal humerus, demonstrated reductions of 14% and 8%, respectively. The protective effect of cataract surgery in these fracture patterns has yet to be described.

Our study suggests that undergoing cataract surgery is associated with a reduced risk of fractures, including hip, vertebral, proximal humerus, ankle, and distal radius fractures. This protective effect highlights the importance of considering cataract surgery not only for vision improvement but also as a preventative measure against fractures in vulnerable populations, especially the elderly. Further research is necessary to understand the mechanisms behind this association and to explore how vision screening and cataract surgery can be integrated into broader strategies for enhancing patient outcomes and reducing fracture risks.