Falls before and after cataract surgery: a prospective cohort study

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Vision impairment and falls

- Vision impairment has long been recognised as a risk factor for falls

- People with cataract are 2–3 times more likely to experience a fall (Blue Mountains Eye Study, Melbourne VIP)
Cataract in the older population

• ~ 33% of adults aged ≥65 years have clinically significant cataract

• Cataract impairs vision by:
  - reducing the sharpness of the images we see
  - impacting our ability to identify colours
  - causing glare sensitivity on sunny days and at night
  - impairing our ability to discriminate between an object and its background (contrast sensitivity)
Cataract – changes to vision

Glare from oncoming headlights

Street scene
Cataract – changes to vision

Viewing stairs through cataract
Cataract surgery & falls: Evidence to-date

- Expedited first eye cataract surgery reduces rate of falls (UK, Harwood 2005)
  - Randomised controlled trial: 306 women aged > 70 years
  - 154 participants expedited surgery (within 1 month of referral); 152 routine 12 month wait (controls)
  - 12 month follow up (prospective falls reporting)
  - 40% reduction in risk of recurrent falls in operated group during 1 year of follow up
  - 34% reduction in overall falls rate in operated group (compared to controls)
Cataract surgery & falls: Conflicting evidence

- First eye cataract surgery **increases** rate of hospitalised falls (Meuleners 2013):
  - >28,000 bilateral cataract surgeries in WA
  - patients >2 times more likely to be hospitalised from fall injury between 1st and 2nd eye surgery, than prior to surgery
- Cataract surgery produces **no difference** in the likelihood of falls (McGwin 2006):
  - 214 older patients with cataract (US): 122 underwent surgery; 92 did not
  - Risk ratio 0.96, 95% CI 0.64–1.42
- Cataract surgery **reduces the rate of hip fracture** (used as a proxy for falls):
  - Analysis of >1 million cataract surgeries (Medicare, US)
  - Risk ratio 0.84 (95% CI 0.81 – 0.87) (Tseng et al JAMA 2012)
The FOCUS Study: Longitudinal cohort study of fall risk and secondary health outcomes in older adults with cataract

- 329 participants aged ≥65 years (October 2013–Aug 2015)
- Bilateral cataract; recommended for 1st eye surgery
- 8 public hospitals: Sydney, Melbourne, Perth
Assessments at each time point include:

- Measures of vision
- Refractive error and spectacles
- Visual disability (Catquest 9-SF)
- Quality of life (EQ-5D-5L)
- Physical function (SFPB)
- Incidental & Planned Exercise (IPEQ)

Falls self-reported prospectively (monthly) by falls calendar with phone follow-up:

- 24 months or 6 months after second eye surgery
## Study participants

### Inclusion criteria
- Aged 65 years and over
- Recommended by optometrist, GP or ophthalmologist for first eye cataract surgery

### Exclusion criteria
- Cognitive impairment (Short Portable Mental Status Questionnaire > 2 errors)
- Diagnosis of dementia, Parkinson’s disease or stroke
- Unable to complete study assessments in English language
- Significant ocular co-morbidities, e.g. glaucoma, diabetic retinopathy, age-related macular degeneration
- Planned combined ocular surgery, e.g. glaucoma and cataract
- Residing outside metropolitan area (preventing completion of study visits)
- Living in a residential/long-term care facility
- Unable to walk (either aided or unaided)
### FOCUS Study: Baseline cohort (n=329)

<table>
<thead>
<tr>
<th>Category</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age (years)</strong></td>
<td>75.7 ± 5.3</td>
</tr>
<tr>
<td><strong>Female, n (%)</strong></td>
<td>182 (55.3)</td>
</tr>
<tr>
<td><strong>Vision status</strong></td>
<td></td>
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<tr>
<td>Bilateral habitual visual acuity (Snellen)</td>
<td>6/12+2 ± 2 lines</td>
</tr>
<tr>
<td>Bilateral contrast sensitivity (log units)</td>
<td>1.48 ± 0.21</td>
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<tr>
<td>Patient reported visual disability (0 least–100 most)</td>
<td>38.6 ± 14.5</td>
</tr>
<tr>
<td>Vision impaired (&lt;6/18), n (%)</td>
<td>32 (9.7)</td>
</tr>
<tr>
<td><strong>Health status</strong></td>
<td></td>
</tr>
<tr>
<td>Comorbidities</td>
<td>4 ± 2</td>
</tr>
<tr>
<td>Medications</td>
<td>5 ± 4</td>
</tr>
<tr>
<td>Antidepressant use, n (%)</td>
<td>39 (11.9)</td>
</tr>
<tr>
<td>Health Related QoL (VAS: 0 worse–100 best)</td>
<td>76 ± 18</td>
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<tr>
<td><strong>Physical activity</strong></td>
<td></td>
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<tr>
<td>Weekly physical activity (hours)</td>
<td>42.8 ± 24.2</td>
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<tr>
<td>Planned activity</td>
<td>3.3 ± 4.3</td>
</tr>
<tr>
<td>Walking activity</td>
<td>3.5 ± 4.9</td>
</tr>
<tr>
<td>Fallen in past 12 months, n (%)</td>
<td>129 (40.2)</td>
</tr>
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Norm >70 years: 1.76 ± 0.15

Range 6/4–6/48
Falls during the wait for first eye cataract surgery

- 138 (52%) falls were injurious
- Prospective falls data:
  - 267 falls involving 101 (31%) participants
  - Median duration of observation 176 days (range 30–730 days)
  - Fall incidence 1.2 per year (95% CI 1.0–1.3)
Predictors of falls during the surgical wait

• 329 participants (305 complete cases for analysis)

<table>
<thead>
<tr>
<th>Predictor</th>
<th>Incidence rate ratio</th>
<th>95% CI</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Walking activity (hours/week)</td>
<td>1.06</td>
<td>1.01-1.10</td>
<td>0.02</td>
</tr>
<tr>
<td>Body mass index</td>
<td>0.96</td>
<td>0.92-1.00</td>
<td>0.06</td>
</tr>
<tr>
<td>Quality of life (EQ-5D-5L VAS: 0–100, per 5 unit ↓)</td>
<td>1.12</td>
<td>1.05-1.20</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fallen in 12 months prior to Baseline</td>
<td>2.48</td>
<td>1.57-3.93</td>
<td>&lt;0.001</td>
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</table>

• No visual factors associated with fall risk during the wait for first eye cataract surgery
# Participant characteristics: first eye cataract surgery

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>No cataract surgery in study period n=133</th>
<th>First eye cataract surgery n=196</th>
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</thead>
<tbody>
<tr>
<td><strong>Socio-demographic</strong></td>
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<tr>
<td>Age (years)</td>
<td>75.5 ± 4.7</td>
<td>75.9 ± 5.7</td>
</tr>
<tr>
<td>Female, n (%)</td>
<td>76 ± 57.1</td>
<td>106 (54.1)</td>
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<tr>
<td><strong>Health status</strong></td>
<td></td>
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<tr>
<td>Comorbidities (FCI)</td>
<td>4.3 ± 2.3</td>
<td>4.2 ± 2.1</td>
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<tr>
<td>Medications (total)</td>
<td>4.9 ± 3.4</td>
<td>4.4 ± 3.8</td>
</tr>
<tr>
<td>≥ 5 medications, n (%)</td>
<td>60 (45.1)</td>
<td>80 (40.8)</td>
</tr>
<tr>
<td>Antidepressant use, n (%)</td>
<td>18 (13.5)</td>
<td>21 (10.7)</td>
</tr>
<tr>
<td><strong>Physical activity</strong></td>
<td></td>
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<tr>
<td>Total weekly activity, hours</td>
<td>0.24 ± 0.21</td>
<td>43.2 ± 24.6</td>
</tr>
<tr>
<td><strong>Physical function (SPPB score: 0 worst–12 best)</strong></td>
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<tr>
<td>Gait speed, m/sec</td>
<td>1.47 ± 0.22</td>
<td>0.9 ± 0.3</td>
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<tr>
<td>Standing balance, sec, 0-60</td>
<td>64 (48.1)</td>
<td>50.0 ± 13.6</td>
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<td>Sit to stand 5x, stands/sec</td>
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Summary

- Those with a history of falls in the prior year and who walk more during their surgical wait are at greatest risk
  - One in three patients waiting for cataract surgery will experience a fall
  - More than one half of all falls were injurious
- First eye cataract surgery was associated with a 33% reduction in incident falls and significant improvement to vision in the operated eye
- Major change (>0.75D) in the spherical equivalent dioptic power of the spectacle lens of their operated eye following surgery had a 2x increase in fall risk during the post-surgery time period
Best practice management of cataract

- Efficient processing of referrals
- Expedited first eye cataract surgery
- Optimal refractive management
Acknowledgements

- Save Sight Institute
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- Bankstown-Lidcombe Hospital, NSW
- Centre for Eye Research Australia
- Royal Victorian Eye & Ear Hospital
- Royal Perth Hospital, WA
- Fremantle Hospital, WA
- Sir Charles Gairdner Hospital, WA

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