TITLE: TECNIS® or Acrysof® Soft Intraocular Lenses for Patients Undergoing Cataract Surgery: Benefits and Harms, Clinical Effectiveness, Cost-Effectiveness, and Guidelines

DATE: 21 January 2014

RESEARCH QUESTIONS

1. What are the benefits and harms associated with the use of TECNIS® or Acrysof® intraocular lenses (IOL) when compared to other hard or soft intraocular lenses for patients undergoing cataract surgery?

2. What is the clinical effectiveness of TECNIS® or Acrysof® intraocular lenses when compared to other hard or soft intraocular lenses for patients undergoing cataract surgery?

3. What is the cost-effectiveness of TECNIS® or Acrysof® intraocular lenses when compared to other hard or soft intraocular lenses for patients undergoing cataract surgery?

4. What are the guidelines associated with the use of TECNIS® or Acrysof® intraocular lenses for patients undergoing cataract surgery?

KEY MESSAGE

Twelve randomized controlled trials and two economic evaluations were identified regarding the use of TECNIS® or Acrysof® intraocular lenses when compared to other hard or soft intraocular lenses for patients undergoing cataract surgery. No evidence-based guidelines were identified.

METHODS

A limited literature search was conducted on key resources including PubMed, The Cochrane Library (2014, Issue 1), University of York Centre for Reviews and Dissemination (CRD) databases, Canadian and major international health technology agencies, as well as a focused Internet search. Methodological filters were applied to limit retrieval to health technology assessments, systematic reviews, meta-analyses, randomized controlled trials, non-randomized trials, and systematic reviews. The intent is to provide a list of sources of the best evidence on the topic that CADTH could identify using all reasonable efforts within the time allowed. Rapid responses should be considered along with other types of information and health care considerations. The information included in this response is not intended to replace professional medical advice, nor should it be construed as a recommendation for or against the use of a particular health technology. Readers are also cautioned that a lack of good quality evidence does not necessarily mean a lack of effectiveness particularly in the case of new and emerging health technologies, for which little information can be found, but which may in future prove to be effective. While CADTH has taken care in the preparation of the report to ensure that its contents are accurate, complete and up to date, CADTH does not make any guarantee to that effect. CADTH is not liable for any loss or damages resulting from use of the information in the report.

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studies, economic studies and guidelines. Where possible, retrieval was limited to the human population. The search was also limited to English language documents published between January 3, 2009 and January 3, 2014. Internet links were provided, where available.

The summary of findings was prepared from the abstracts of the relevant information. Please note that data contained in abstracts may not always be an accurate reflection of the data contained within the full article.

RESULTS

Rapid Response reports are organized so that the higher quality evidence is presented first. Therefore, health technology assessment reports, systematic reviews, and meta-analyses are presented first. These are followed by randomized controlled trials, non-randomized studies, economic evaluations, and evidence-based guidelines.

Twelve randomized controlled trials and two economic evaluations were identified regarding the use of TECNIS® or Acrysof® intraocular lenses when compared to other hard or soft intraocular lenses for patients undergoing cataract surgery. No relevant health technology assessments, systematic reviews, meta-analyses, or evidence-based guidelines were identified. Due to the large volume of relevant literature, non-randomized studies were included in the appendix.

OVERALL SUMMARY OF FINDINGS

Twelve randomized controlled trials\textsuperscript{1-12} were identified comparing different types of soft intraocular lenses (IOLs). No studies were identified comparing soft and hard IOLs. This comparison has been addressed in a previous CADTH report that included literature published from 2004 to 2009 (http://www.cadth.ca/media/pdf/htis-L1/J0328%20Intraocular%20Lenses%20final.pdf). The results and conclusions of the included randomized studies are presented in Table 1. No major safety issues were reported in any of the included studies.

Two economic studies\textsuperscript{13,14} were identified. The first study\textsuperscript{13} evaluated the rates of posterior capsule opacification (PCO) following implantation of three different IOLs (Acrysof SN60, Akreos Adapt, TACNIS Acryl IOL) and their associated costs. The costs of lenses and laser capsulotomy for PCO were compared between groups. The combined cost of surgery and laser capsulotomy for PCO was 9.81 euros higher in the Akreos Adapt group. The second study\textsuperscript{14} compared the lifetime cost of freeing astigmatic patients from spectacles with toric IOLs versus monofocal IOLs in France, Italy, Germany, and Spain. Spectacle dependence was reduced following implantation of bilateral toric IOLs. The authors determined that the economic consequences were dependent on the cost of spectacles in each country.

No relevant evidence-based guidelines were identified regarding the use of TECNIS® or Acrysof® intraocular lenses for patients undergoing cataract surgery.

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<tr>
<th>Author, Year</th>
<th>Intervention and Comparator(s)</th>
<th>Results</th>
<th>Conclusions</th>
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<tbody>
<tr>
<td>Ang et al. (2013)\textsuperscript{1}</td>
<td>Crystalens® Advanced Optics accommodating</td>
<td>Crystalens groups had significantly better monocular,</td>
<td>All types of lenses demonstrated good safety and</td>
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<td>Acrysof® IQ</td>
<td>ReSTOR® +3.0 multifocal</td>
<td>binocular, high contrast and low contrast uncorrected intermediate visual acuity than the other two groups.</td>
<td>uncorrected visual acuity at all distances. Crystalens resulted in statistically significantly improved intermediate vision.</td>
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<td>Cillino et al. (2013)&lt;sup&gt;2&lt;/sup&gt;</td>
<td>ReSTOR SN6AD3</td>
<td>Mean photopic UNVA, DCNVA, and CNVA did not differ between groups. Photopic DCIVA was best in the ReSTOR SN6AD1 group and better in TECNIS ZMA00 than in the ReSTOR SN6AD3 group.</td>
<td>The authors concluded that these newer-generation multifocal lenses were suited to working-age patients.</td>
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<td>Constantinou et al. (2013)&lt;sup&gt;3&lt;/sup&gt;</td>
<td>Acrysof SA60AT Tecsoft Flex</td>
<td>There was no significant difference found between groups in UDVA and BDVA and both groups showed equal improvement. Both groups demonstrated similar rates of PCO after surgery.</td>
<td>The authors concluded that the lower cost Tecsoft was a viable alternative to the Acrysof lens.</td>
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<td>Wilkins et al. (2013)&lt;sup&gt;4&lt;/sup&gt;</td>
<td>TECNIS ZM900 multifocal Akresos AL monofocal</td>
<td>Binocular uncorrected acuities did not differ significantly for distance but intermediate acuity was significantly worse in the multifocal arm and near acuity in the monofocal arm.</td>
<td>The authors concluded that patients in the TECNIS group were more likely to go without glasses than those in the Akresos group.</td>
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<td>Ferreira et al. (2012)&lt;sup&gt;5&lt;/sup&gt;</td>
<td>TECNIS toric IOL Acrysof IQ toric IOL</td>
<td>At 2 month follow up, UDVA, CDVA, spherical equivalent refraction, and residual astigmatism were not statistically significantly different between groups.</td>
<td>The authors concluded that both lenses studies promoted good postoperative outcomes.</td>
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<tr>
<td>Rasp et al. (2012)&lt;sup&gt;6&lt;/sup&gt;</td>
<td>Acri.Smart monofocal</td>
<td>At 1, 6, and 12</td>
<td>The authors</td>
</tr>
<tr>
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<td>Acrysof ReSTOR SN6AD3 multifocal AT LISA 366D diffractive multifocal</td>
<td>months postoperatively, the diffractive multifocal groups had significantly better uncorrected reading acuity and uncorrected smallest print size. Patients with diffractive lenses could read much smaller print sizes.</td>
<td>concluded that multifocal IOLs with a diffractive component resulted in good reading performance that was significantly better than that demonstrated by refractive multifocal or monofocal IOLs.</td>
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<td>Lee et al. (2011)⁷</td>
<td>TECNIS Z9003 Acrysof IQ SN60WF Akreos ADAPT-AO</td>
<td>Mean best spectacle-corrected visual acuity, refractive error, and higher-order aberrations were not significantly different between groups. Patient satisfaction was similar between groups.</td>
<td>The authors concluded that the final visual quality was not different between the three treatment groups.</td>
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<td>Salvatore et al. (2011)⁸</td>
<td>TECNIS ZCB00 Acrysof SN60WF</td>
<td>At 2 months after surgery, high-order aberration, visual evoked potentials, retinal sensitivity, and fixation stability were not significantly different between groups. Contrast sensitivity values were significantly better in the TECNIS group.</td>
<td>The authors concluded the surface design of the TECNIS IOL resulted in a better quality of vision following cataract surgery.</td>
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<td>Bhusal et al. (2010)⁹</td>
<td>Acrysof SA60AT TECNIS Z9000</td>
<td>At 1 year, BCVA was similar in both groups. Two eyes in each group had significant anterior chamber reaction with fibrin membrane formation. At 1 year, PCO was more common in the Acrysof group.</td>
<td>The authors concluded that both types of IOL were compatible and safe for use in pediatric cataract surgery.</td>
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<td>Jafarinasab et al. (2010)(^{10})</td>
<td>Sensar Akreos AO TECNIS Acrysof IQ</td>
<td>At 3 months, spherical aberration was significantly in favor of TECNIS over Acrysof and was significantly higher in Sensar and Akreos over the other two lenses over a 4mm pupil. Sensar was found to be inferior to the other three lenses.</td>
<td>The authors determined TECNIS and Acrysof IQ resulted in significantly better visual function, especially at a small pupil size. The differences decreased as pupil size increased.</td>
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<td>Caporossi et al. (2009)(^{11})</td>
<td>Acrysof SN60AT spherical Sensar AR40e spherical Acrysof SN60WF aspherical TECNIS Z9000 aspherical</td>
<td>There were no significant differences between groups reported in postoperative best spectacle-corrected visual acuity, spherical aberration, or PCO.</td>
<td>The authors concluded that the results confirmed the use of modified aspheric IOL improved visual performance at 2 years after surgery.</td>
</tr>
<tr>
<td>Su et al. (2009)(^{12})</td>
<td>TECNIS Z9000 Acrysof SA60AT</td>
<td>Postoperative corneal higher order aberrations and contrast acuity were not significantly different between groups.</td>
<td>The authors concluded the aspheric TECNIS lens resulted in significant changes to ocular and spherical aberration but did not result in better functional outcomes.</td>
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BCVA = best-corrected visual acuity; BDVA = best-corrected distance visual acuity; CDVA = corrected distance visual acuity; CNVA = corrected near visual acuity; DCIVA = distance-corrected intermediate visual acuity; DCNVA = distance-corrected near visual acuity; IOL = intraocular lenses; PCO = posterior capsule opacification; UDVA = uncorrected distance visual acuity; UNVA = uncorrected near visual acuity
REFERENCES SUMMARIZED

Health Technology Assessments
No literature identified.

Systematic Reviews and Meta-analyses
No literature identified.

Randomized Controlled Trials

   PubMed: PM24092961

   PubMed: PM23953097

   PubMed: PM23207175

   PubMed: PM24070808

   PubMed: PM22785061

   PubMed: PM23079311

   PubMed: PM20636488

   PubMed: PM22102213


Economic Evaluations


Guidelines and Recommendations
No literature identified.

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APPENDIX – FURTHER INFORMATION:

Non-Randomized Studies


