

Cochrane Corner: immediate sequential bilateral surgery versus delayed sequential bilateral surgery for cataracts

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The recently published Cochrane Review by Dickman et al. evaluated safety, clinical outcomes, cost-effectiveness and patient-reported outcomes of immediate sequential bilateral cataract surgery (ISBCS) compared to delayed sequential bilateral cataract surgery (DSBCS)¹. The primary and secondary outcomes assessed are summarised in Table 1.

Table 1: Primary and secondary outcomes of ISBCS compared to DSBCS evaluated by Dickman et al.¹

Outcomes	Definition	ISBCS vs. DSBCS	Certainty of Evidence
Primary			
Endophthalmitis (follow-up: 6 weeks)	Definition as per the Endophthalmitis Vitrectomy Study ²	Little to no difference	Low
Refraction (follow-up: 1-3 months)	Spherical equivalent refraction achieved NOT within 1.0 dioptre of target refraction		Low to moderate
Complications (follow-up: 3 months)	Intraoperative (e.g. posterior capsule rupture) and postoperative (e.g. cystoid macular oedema, retinal detachment)		Very low
Cost-effectiveness	Total cost per participant, cost per QALY or both (reported as USD 2017 equivalent)	Lower costs for ISBCS	Very low
Secondary			
Visual acuity (follow-up: 1-3 months)	Baseline to postoperative change in BCDVA [difference of <5 letters (e.g. 0.1 logMAR) was considered clinically insignificant]	Little to no difference	Very low
PROMS (follow-up: 1-3 months)	Participant satisfaction, vision-specific QoL and health-related QoL at baseline and final postoperative assessment		Moderate

Abbreviations: ISBCS, immediate sequential bilateral cataract surgery; DSBCS, delayed sequential bilateral cataract surgery; QALY; quality-adjusted life year; USD; United States dollar; BCDVA, best corrected distance visual acuity; PROMS, patient-reported outcome measures; QoL, quality of life

A total of 14 studies were included involving 276,260 patients (7384 for ISBCS and 268,876 for DSBCS); comprising two randomised controlled trials (RCTs), seven non-randomised studies (NRSs) and six economic evaluations (one study being both a NRS and an economic evaluation). The review authors concluded that there were likely no clinically important differences in outcomes between ISBCS and DSBCS, although the limited quantity and quality of evidence provided only low- to very low-certainty regarding this lack of difference for most outcomes of interest (Table 1).

Primary Outcomes

The absolute risk of unilateral endophthalmitis with ISBCS was estimated at 0.019% (95% CI 0.003 to 0.12%); approximately 1/5000 cases. There were no reported cases of bilateral endophthalmitis, although the included studies were not sufficiently powered to detect this. The review presented no evidence of difference between ISBCS and DSBCS for the incidence of endophthalmitis.

For refractive outcomes, no difference in refractive outliers was found, although there was very limited data. This was similar for intra- and postoperative complications, however there was marked heterogeneity, thought in part due to a difference in the definition of complications between studies, and most studies excluded at-risk patients. Regarding cost-effectiveness analysis, only one study reported cost-effectiveness ratios and this was deemed to be at critical risk of bias and a gross overestimation of the costs of DSBCS. Of the five partial economic evaluations included, these could not be pooled due to methodological differences, however all reported lower mean total costs for ISBCS.

Secondary Outcomes

For postoperative best corrected distance visual acuity (BCDVA) and patient-reported outcome measures (PROMs), only data from RCTs (n=2) were included. Regarding BCDVA, there was no evidence of a difference between ISBCS and DSBCS, although results could not be pooled due to high heterogeneity. A similar conclusion was also drawn for PROMs, although results could only be pooled for change in visual function from baseline (as reported by the Visual Function Index).

Gaps for Future Research

Given the limited evidence from RCTs and high inter-study heterogeneity regarding some of the intended outcomes, the authors of the Cochrane Review highlighted the need for additional RCTs with more inclusive data. The refined populations included in RCTs are unlikely to reflect the population that would be offered ISBCS in a real-world cataract service. The lack of information regarding outcomes of higher-risk patient groups (e.g. ocular/medical comorbidities) limits the value of the research base for refining existing patient selection criteria, something particularly pertinent for ISBCS.

A potential drawback of ISBCS, in which there is lack of refractive outcomes of the first eye to guide lens choice for the second eye, requires further study using patient-centred outcomes. In terms of complication analysis, the inclusion of endophthalmitis as a primary outcome in

this review is questionable given its rare incidence and is arguably of limited or no clinical value. A more relevant complication which could inhibit surgeons from offering ISBCS would be the risk of bilateral cystoid macular oedema (CMO). Based on the largest UK dataset to date involving 35,563 low risk eyes, the rate of unilateral CMO in patients without risk factors was 1.17%³. Given that first eye CMO can be assumed to be predictive of second eye involvement due to clustering of patient-related risk factors⁴, the incidence of bilateral CMO in ISBCS is a notable absentee from the current evidence base. Nonetheless, it is encouraging to note that a recent large population-based analysis reported similar CMO rates for ISBCS (1.79%) and DSBCS (1.96%)⁵.

There is also a need for well-designed cost-effectiveness studies as none of the included studies were able to provide the required data for this form of economic evaluation [expressed as total costs per quality-adjusted life year (QALY)]. Comparison of costings will be highly contextual, as staff and procurement costs vary between settings, but the QALY gains ISBCS may provide, will also vary greatly depending on the typical inter-eye delay incurred with DSBCS. It can be expected that patients with the same quality of life (QoL) prior to cataract surgery will end up with similar QoL whether they have both eyes operated on the same day, or on separate days. However the benefits of second eye surgery for QoL are well-established⁶; ISBCS potentially provides the opportunity to realise those benefits sooner, hence the QALY gains will be a function of the inter-eye delay (Figure 1). Future studies need to demonstrate the value of ISBCS versus DSBCS in a way that permits meaningful comparison and translation of benefits between different contexts in terms of cost-effectiveness.

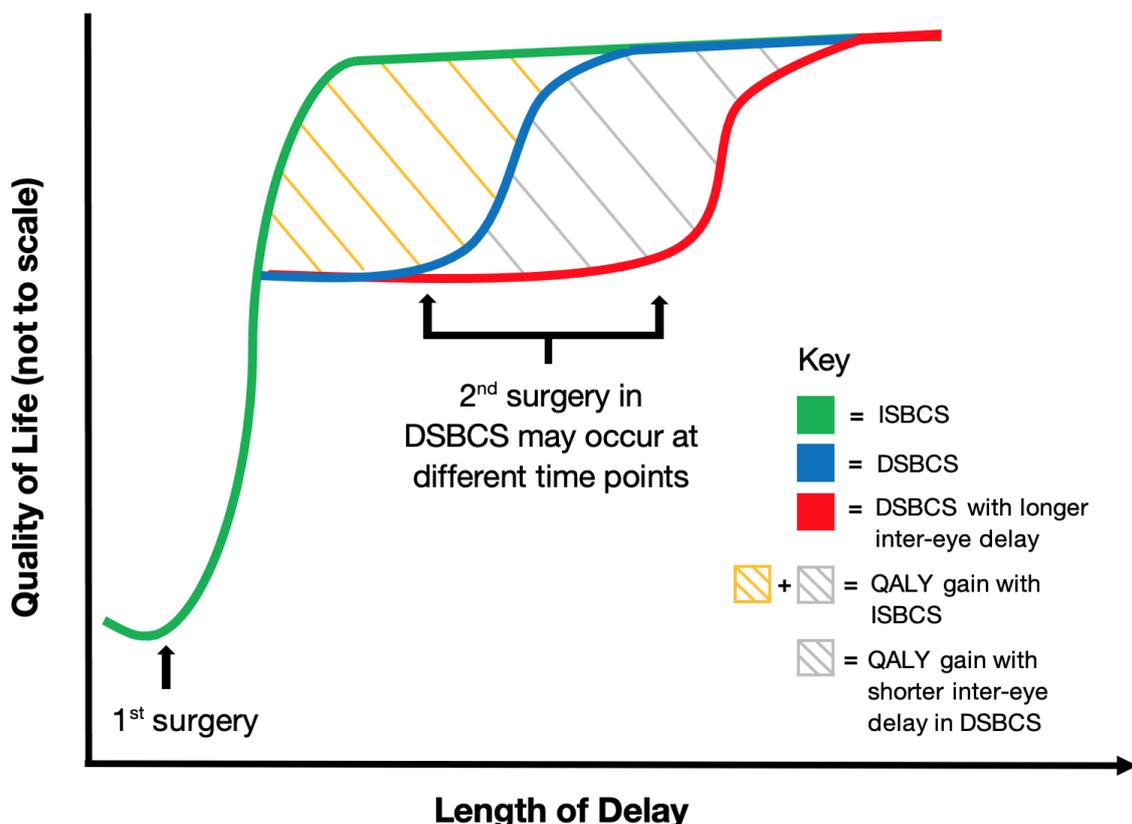


Figure 1: QALY gain from ISBCS versus DSBCS (NB. estimates of the relative QoL benefits from 1st and 2nd eye vary). QALY, quality-adjusted life year; ISBCS, immediate sequential bilateral cataract

surgery; *DSBCS*, delayed sequential bilateral cataract surgery; *QoL*, quality of life

Lastly, it is worth noting on a global scale that there is a paucity of research on the outcomes and cost-effectiveness of ISBCS in low- and middle-income countries where the risks and benefits of ISBCS may be very different.

Conclusion

As one of the most common surgical procedures performed worldwide, coupled with its ever-increasing demand with an ageing population⁷, cataract surgery warrants constant innovative approaches to enhance its throughput in the most cost-effective and sustainable way while maintaining patient safety. So is there a role for ISBCS in meeting this demand? Qualitative evidence suggests that there may be more willingness to opt for ISBCS than has been seen in UK practice^{8,9}. Time and motion study modelling also gives optimism that ISBCS can yield efficiency gains, improving productivity in UK NHS operating theatres¹⁰. The Cochrane Review by Dickman et al. shows ISBCS to be a promising solution if we accept the low-certainty evidence that ISBCS offers similar clinical outcomes at lower cost. Future research should address the aforementioned gaps to reaffirm the utility of ISBCS and support its implementation in routine clinical practice, and several clinical trials (including an RCT by the authors of this Cochrane Review¹¹) are eagerly anticipated.

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