Simulated cataract surgery training of the non-dominant hand to improve bimanual performance

Jennifer Hind, Carl Mulholland, Alan Cox, David Lockington

Tennent Institute of Ophthalmology; Glasgow, Scotland.

jennifer.hind@ggc.scot.nhs.uk. No relevant disclosures exist

INTRODUCTION

- Intraocular surgery requires manual dexterity.
- Surgical simulation resources like the EYESI cataract simulator develop relevant dominant hand skills and bimanual surgical techniques.
- There is no formal assessment documenting how the non-dominant hand develops during this training.

AIMS

- We set out to evaluate if the EYESI cataract modules could be shown to be effective at training the non-dominant hand and see if improving trainees' surgical competence resulted in improvements in confidence.

METHODS

- Ophthalmic trainees in Glasgow, UK, performed bespoke bimanual cataract surgery tasks before and after targeted non-dominant hand training on the EYESI simulator.
- A validated self-confidence survey regarding use of non-dominant hand in surgery was completed at the start and end of the study.
- Hand dominance was calculated using the shortened Edinburgh Handedness Inventory (EHI).

REFERENCES

1. Oldfield RC. The assessment and analysis of handedness: The Edinburgh inventory. Neuropsychologia. 1971;9(1):97-113.
2. Veale JF. Edinburgh Handedness Inventory - Short Form: a revised version based on confirmatory factor analysis. Laterality. 2014;19(2):164-77.
3. Stoet G. The Edinburgh Handedness Inventory (short form) [Internet]: Psytoolkit; 2020 [cited 2020 Jul 03]. Available from: https://www.psytoolkit.org/survey-library/handedness-ehi.html#_introduction
4. Geoffrion R, Lee T, Singer J. Validating a self-confidence scale for surgical trainees. J Obstet Gynaecol Can. 2013;35(4):355-61.

RESULTS

- 16 trainees participated (8 male, 8 female; median age 29 years (26-35))
- 7 were year ST1-3 (junior), 9 were ST4-7 (senior).
- Median completed cataract operations were 155 cases (1-730).
- 15 (93.8%) stated right-hand dominance, with median EHI score of 87.5).
- Median self-confidence scores increased significantly following training (12.5/30 vs 16/30; t=5.1194, p<0.05).
- Improvement in score parameters was demonstrated after targeted training (see table)

Task: Bimanual training, level 4	Pre-training test score (median)	Post-training test score (median)	Wilcoxon signed rank
Time (s)	51.8	44.1	p<0.05
Odometer (mms^{-1})	103.68	92.6	p<0.05
Unintended movement off sphere Instances (range)	10.5 (3-30)	10.5 (3-18)	p<0.05
Total score	76.5	77.8	p<0.05

DISCUSSION

- We have demonstrated that the EYESI simulator can train the non-dominant hand in intra-ocular surgery, resulting in significant improvements in competence performing bimanual tasks.
- Such improvements correlated with increased self-confidence amongst trainees.
- Targeted non-dominant hand training should be included in future cataract simulation modules (as is already the case with vitreo-retinal modules).
- Engagement with bimanual surgical simulation training could also help trainers when supervising alternate-handed trainees.
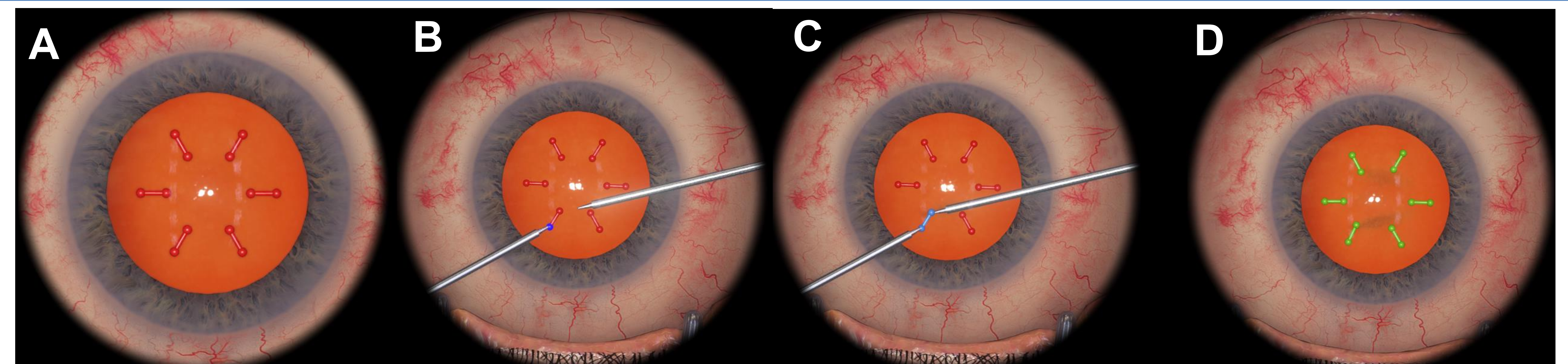

Figure 1: Trainees were assessed performing bimanual tasks (see image), before and after a 20 minute training course targeting the non-dominant hand