Kinematic analysis of surgical dexterity in intraocular surgery.

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Abstract

OBJECTIVE: To evaluate the potential of motion analysis as a discriminator of surgical skill during intraocular surgery.

METHODS: Twenty-four subjects were divided into 3 groups (n = 8 each) based on the number of completed phacoemulsification procedures: novice (n < 10), intermediate (n = 10-150), and expert (n > 150). The Qualisys motion-capture system obtained data from the surgeons performing (1) corneal wound construction (incision), (2) continuous curvilinear capsulorrhexis (CCC), and (3) phacoemulsification lens extraction on artificial eyes. The main outcome measures were time, overall path length, and total number of movements. Statistical significance was set at P < .05.

RESULTS: For the incision task, significant differences between the levels of experience were found for time (P = .001), number of movements (P = .001), and path length (P = .05). For the CCC task, significant differences were found between groups for time (P = .03) and number of movements (P = .03), but not for path length (P = .08). For the phacoemulsification task, significant differences were found between the 3 groups for time (P = .04), path length (P = .02), and number of movements (P = .04).

CONCLUSIONS: Motion analysis differentiated between surgeons with varying levels of experience performing phacoemulsification tasks, thus demonstrating construct validity. This technique may be useful in the objective quantitative measurement of microsurgical skill with potential applications for training and research.

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