Safety of Femtosecond Laser-Assisted Cataract Surgery Performed by Surgeons in Training

Femtosecond laser-assisted cataract surgery has grown in popularity among ophthalmologists as a novel technique with the potential to reduce phacoemulsification energy requirements.\(^1\)\(^2\) However, early adoption of femtosecond laser-assisted cataract surgery by experienced cataract surgeons has been associated with a significant learning curve.\(^3\) Roberts et al. reported higher complication rates in the first 200 cases of femtosecond laser-assisted cataract surgery compared to 1,300 subsequent cases at a single high-volume practice.\(^3\) Given the challenges faced by experienced surgeons adopting femtosecond laser-assisted cataract surgery, it is unclear whether it can be safely performed by residents in training. We describe our experience with incorporating femtosecond laser-assisted cataract surgery in resident and fellow surgical training.

After receiving Institutional Review Board approval, we performed a retrospective case–control study of resident and fellow outcomes with femtosecond laser-assisted versus manual cataract surgery. All cataract surgeries performed at our institution from June 2012 to September 2013 by third-year residents and fellows with no prior femtosecond laser-assisted cataract surgery experience were identified. Cases performed without a femtosecond laser were included as manual cases. Cases in which wound construction, anterior capsulotomy, and lens fragmentation were performed using the LenSx femtosecond laser platform (Alcon Laboratories, Inc., Fort Worth, TX) were included as femtosecond laser-assisted cases. Cases were excluded if there was no documentation of intraoperative phacoemulsification parameters or if the case was not staffed by a corneal specialist experienced in femtosecond laser-assisted cataract surgery.

Complications and phacoemulsification parameters, including phacoemulsification times, cumulative dissipated energy, aspiration time, and irrigation fluid use were compared between femtosecond laser-assisted and manual cases using a \(t\) test.

In total, 62 femtosecond laser-assisted and 128 manual cataract surgery cases met inclusion criteria. There was no statistical difference in mean age (\(P = .12\)) or cataract grade (\(P = .31\)) between the two groups. Successful docking was achieved in 96.8% of eyes scheduled for femtosecond laser-assisted cataract surgery. Attending assistance was required in 46.8% of those eyes.

Mean irrigation fluid use and cumulative dissipated energy were 22.5% and 38.2% higher, respectively, for manual cases (\(P \leq .001\)). Total ultrasound, phacoemulsification, torsional, and aspiration times were all statistically higher in manual cases (\(P < .01\)) (Figure 1). In a sub-analysis excluding fellow cases, cumulative dissipated energy, fluid use, and phacoemulsification and torsional times remained statistically higher in manual cases despite the smaller sample size (\(P \leq .03\)). In total, four posterior capsular tears and one burn wound occurred in the manual group. No posterior capsular tears or burn wounds occurred in the femtosecond laser-assisted group.

This pilot study suggests that femtosecond laser-assisted cataract surgery can be safely incorporated in resident and fellow surgical training. Given the high success rate (96.8%), docking was not a problem for residents performing femtosecond laser-assisted cataract surgery. Overall, the complication rate for manual cases (7.0%) was consistent with published rates for residents.\(^4\)\(^-\)\(^6\) However, surprisingly, fewer complica-

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**Figure 1.** Comparison of phacoemulsification parameters between manual and femtosecond laser-assisted cataract surgery (FACS) performed by residents and fellows. Error bars show 95% confidence intervals. Asterisks indicate statistically significant differences by \(t\) test.
tions were noted in the femtosecond laser-assisted group. The presence of supervision during femtosecond laser-assisted cataract surgery may have helped to lower rates. Given the lack of complications and favorable phacoemulsification use profile with femtosecond laser-assisted cataract surgery, this study is reassuring evidence that it can be performed safely by surgeons in training. This study was limited by its retrospective nature and small sample size. Larger, randomized, controlled studies are needed to further evaluate the safety and efficacy of femtosecond laser-assisted cataract surgery performed by surgeons in training.

REFERENCES

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