conferenceseries.com SciTechnol
15th International Congress on
VISION SCIENCE AND EYE
August 10-11, 2017 | London, UK

Prasanth Gireesh et al., Int J Ophthalmic Pathol 2017, 6:4
DOI: 10.4172/2324-8599-C1-002

Learning Curve of Femtosecond laser assisted cataract surgery

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Purpose: To assess the learning curve in the initial 100 cases of cataract surgery performed using the femtosecond-laser-assisted-cataract-surgery (FLACS) by experienced cataract surgeons without prior experience with the femtosecond laser platform.

Setting: Tertiary care eye hospital in South India.

Methods: First 100 consecutive eyes undergoing FLACS were prospectively studied to understand the docking time, number of docking attempts, problems encountered during docking and complications attributable to docking. Phacoemulsification performed after the femtosecond laser was also studied for complications, need for additional instrumentation and total time required for surgery. Comparison between two operating surgeons was also made.

Results: One hundred eyes of 91 participants were included in the analysis. The mean age of participants was 57.8+8.2 years and 68% were men. Surgery was performed by the SMO in 56 eyes and by the JMO in 44 eyes. Successful docking of the femtosecond laser was recorded in 70% eyes at the first attempt. Most of the remaining eyes underwent successful docking at the second attempt. The commonest causes for failure of docking were inadequate suction, air bubble at the docking interface, failed patient registration and eye movement post docking. Seven patients had pre-dock miscellaneous errors such as undetected patient interface, insufficient rise of the table height and pre-treatment error, which occurred due to inadequate tightness of the patient interface attachment. Only one patient experienced loss of suction during the laser delivery because of sudden movement in the middle of the procedure. The mean time taken for successful docking was 9.3+6.4 minutes. Total time for phacoemulsification surgery across the study period was 12.9+6.2 minutes. Keratome was required to open the corneal incision in 18% eyes. Similarly, 6% eyes showed anterior capsular tags, when the capsulorhexis was uncovered and only one of these evolved into a radial capsular tear. Two eyes with mature cataract had significant miosis after laser, which dilated well with intracameral adrenaline. Only one eye experienced zonular dialysis. There were no other complications during surgery including posterior capsular rupture and vitreous loss. Six eyes had persistent subconjunctival hemorrhage in the first post-operative day and 25 eyes had corneal edema in the first post-operative day, all of which resolved within 1 week of surgery. Eight patients had IOP spike (>21 mmHg) in the first postoperative day, out of which 7 resolved spontaneously and one patient required topical timolol for one-month duration. At 6 weeks follow up, 79% eyes attained UCDVA of 20/20, 19% had UCDVA of 20/30 and only 2 eyes had 20/40. All eyes had BCDVA of 20/20. When surgeries were divided into quartiles (Table 1), a significant reduction was seen in docking time between the first 25 eyes and the remaining 75 eyes. Similarly, successful 1st docking attempts significantly improved from 36% in the first quartile to 80% in the 4th quartile. Three attempts were required in 2 eyes (one in 1st and 3rd quartile) and 4 attempts were required in 1 eye in the first quartile. Additionally, the need to use a keratome to open the corneal incision showed time trends across quartiles. When surgeries were divided into deciles (i.e. groups of 10 each), docking time reduced significantly after the first 30 cases. Similarly, the proportion of successful docking at 1st attempt shows a trend to improve from 1st to 10th decile. The average number of docking attempts per case was 1.44, which improved with learning from 1.6 in the first decile to 1.3 in the last decile. No other significant differences were observed between the deciles. Comparison between the two operating surgeon showed that the senior surgeon performed phacoemulsification surgery significantly faster than the junior, however, he required using the keratome in significantly more number of eyes.

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