



Performance of a Vitreoretinal Surgery Instructional Videos in Training Operating Room Staff

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Abstract

Purpose: Vitreoretinal surgery comprises many discrete techniques used to treat pathology in the posterior segment of the eye. Vitreous surgery techniques may be used to treat retinal detachment, vitreous hemorrhage, vitreoretinal interface disorders, among other pathology. Approximately 300,000 retinal surgeries are performed in the United States per year. The Alcon Constellation (Fort Worth Texas, USA) is one of the most used vitrectomy machines, present in 85% of retina operating rooms in the United States.

New operating room staff may not be familiar with the Alcon Constellation machine. We developed and test a series of short videos designed to train uninitiated staff (scrub technicians and circulators) in the set up and operation of the Alcon Constellation Unit. We evaluated the ability of the course to train 30 staff members *via* surveys given pre- and post-training.

Methods: The 30 operating room staff in a hospital-based surgery center were enrolled in a training course consisting of a pre-test, a series of short instructional videos, and a post-test. A generalized McNemar's test was used to compare pre and post intervention responses.

Results: The results show improved staff confidence in using the Alcon Constellation unit.

Conclusion: These instructional videos provide a platform to effectively train operating room staff in the operation of the Alcon Constellation machine for vitreoretinal surgery.

Keywords: Vitrectomy; Vitreoretinal Surgery; Retinal Detachment; Operating Room Nursing

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Introduction

Pars Plana Vitrectomy (PPV) is the most common procedure performed by vitreoretinal surgeons worldwide to treat diseases of the posterior segment of the eye. The retina is a layer of neurosensory cells in the posterior segment of the eye that transmits a visual signal to the brain through the optic nerve. The vitreous is a gel which fills the posterior segment of the eye. The pars plana lies between the cornea and the retina and serves as the entry point to the vitreous cavity for the surgeon.

Techniques of vitreous surgery may be used to treat retinal detachment, vitreous hemorrhage, vitreoretinal interface disorders, among others. Approximately 300,000 retinal surgeries are performed in the United States per year. The Alcon Constellation (Fort Worth Texas, USA) is one of the most used vitrectomy machines, present in 85% of retina operating rooms in the United States [1,2]. The most common condition treated with vitreous surgery is retinal detachment. In a retinal detachment repair, the surgeon first inserts three ports into the eye. One of the ports is connected to an infusion cannula used to maintain constant intraocular pressure. The other two ports are used to introduce various instruments into the eye. Most commonly, the surgeon will enter with a light source through one port and a vitreous cutter in the other and remove the entirety of the vitreous gel. Retinal breaks are identified and marked with diathermy. Sub-retinal fluid is drained from underneath the retina *via* the retinal breaks or by a new hole created by the surgeon. Next, an "air-fluid exchange" is performed, wherein fluid is removed from underneath the retina as air enters the eye. Once the retina is under air, the retinal breaks are lasered. The case will conclude with the injection of intraocular gas (SF6 or C3F8) or Silicone Oil to act as a tamponade agent. The core elements of the surgery – cutting, diathermy, laser, air fluid exchange, and gas or oil injection, among other tools, require fluency with the operating machine by the nurses in the operating room.

Due to the highly specialized equipment necessary to perform a PPV, it is important to have a collaborative approach with an operating room team who is familiar with the procedure and the

equipment. The specialty nurses play a paramount role in the surgery and participate in key aspects of the surgery, such as the preparation of intraocular gas or silicone oil. For this reason, it is valuable for nurses and operating room technicians to have a standardized resource for preparing for a vitrectomy in advance of the case. Accurate training ensures the surgery is performed smoothly and improves operating room outcomes for patients [3-9].

We designed and tested an online course consisting of video training modules that can be used in real-time by operating room staff as a review course prior to a surgical case. Learners are introduced to the various steps of vitreoretinal surgery and the skills needed to use the Alcon Constellation through concise videos. Learners participate in a pre-test, video module course, and post-test. Finally, learners can observe and practice using the Alcon Constellation vitrectomy unit in the operating room.

Methods

The target audience for the module includes scrub technicians and circulators who are in a hospital system or outpatient ambulatory surgical setting where they will work with vitreoretinal surgeons. These learning materials are also useful for residents, fellows, and vitreoretinal surgeons in learning how to set up and use the Constellation machine. The curriculum is held over a 45-min period, which includes both the pre- and post-test, module, and skills-based practice session. The course is recommended to be held biannually at the beginning and middle of the calendar year. This course is available online for reviewing the steps of the surgery.

Module directors are encouraged to review the module videos (Appendix A) and pre- and post-test questions and answers (Appendix B) prior to the session to ensure adequate understanding of and familiarity with the material. A sequence of steps to accompany the online module (Appendix C) is provided within the instructor guide. Virtual modules will be available online through the Google Forms link: (<https://forms.gle/UW6x6FLDFgF9A6G1A>). This link contains 5 trial videos, and 11 total videos were produced (Appendix D) (Videos 11).

The sequence used in our training is as follows:

1. Ask participants to enter their current level of experience using the Alcon Constellation (5 min).
2. Ask participants to answer a series of 5 specific questions for our pre-test regarding the steps of using the Alcon Constellation (5 min).
3. Show the five short module videos regarding the steps of surgery (10 min).
4. Ask participants to answer a series of 5 specific questions for our post-test regarding the steps of using the Alcon Constellation (5 min).
5. Ask participants to answer a series of subjective questions for our post-test and the opportunity to give feedback (5 min).
6. Make the Alcon Constellation machine available for practice.
7. The scrub technicians and circulators will practice with the machine (approximately 20 min, variable).

After taking the module test, scrub technicians and circulators can observe the techniques of setup in the operating room. Then,

the participant can practice using the Constellation under direct supervision and assistance of the module director. The training was given to 30 surgical technicians who work in the operating room of Harborview Medical Center in Seattle, Washington.

Results

Our sample size included 30 surgical technicians who participated in the surgery. A generalized McNemar's test was used to compare the pre-test and post-test results. Our module interface was accessed online using the Google Forms link. Technicians were surveyed before and after the course to rate their experience on a scale of 1 to 10 with the Alcon Constellation (1 = not at all confident, 10 = very confident) with the following questions:

Q1: How confident do you feel using the Alcon Constellation machine?

Q2: I am more confident in my abilities to scrub for this procedure.

Q3: I have a strong feeling of understanding regarding this procedure.

Q4: I am more confident in my abilities to scrub for this procedure.

Q5: I will use this video again to prepare for an upcoming retina procedure.

Q1: What is the appropriate nitrogen gas pressure for the constellation to function?

Q2: How much BSS do you have in the bottle when you start changing the BSS bottle?

Q3: When tuning the Fragmatome during an ongoing case, the following needs to occur after connecting the Fragmatome to the constellation and before pressing the button to initiate tuning.

Q4: During the automatic gas dispensing process, how many cycles of gas filling should occur?

Q5: Which type of commonly used silicone oil comes in a preloaded glass syringe?

Our results showed that out of the 30 scrub technicians employed at our hospital system, only 7 have had experience with the Constellation machine. Of those 7, only 4 had worked with the Constellation more than 5 times. Our survey questions showed that our course was helpful for showing basic steps of vitrectomy for beginners, and helpful for those who used the machine in the past to improve their basic knowledge. Our data showed that the module led to an increased confidence level of the scrub technicians when working with the Alcon Constellation from 2.3 to 3.8 with a p-value of less than 0.001. Figures 1 and 2 show the results of the module.

Qualitative feedback on the course included the following comments:

- "I like the way the instruction was broken down into small learning modules."
- "I love how the videos are short and concise."
- "Thanks for the education. I am more prepared."

Discussion

There are approximately 2,000 retina specialists in the United States, most of whom are vitreoretinal surgeons [1-4]. With the development of 25 and 27G vitrectomy in the mid-2000s, new tools



Images 1-11:

have been created to support smaller gauge surgery, including Alcon's Constellation [1,2]. Due to simpler instrumentation and greater efficiency, it is becoming more common for vitreoretinal surgeons to practice in ambulatory surgical centers and hospitals [1-4].

In the hospital setting, the scrub technicians and circulators practice in the ophthalmic operating room, the general surgery, trauma surgery, and gynecologic surgery setting. As a result, operating room surgical staff may not have as much experience with ophthalmic machinery as those in an ambulatory surgical center. Therefore, many surgical team members who work in the vitreoretinal operating room may have limited experience using the equipment. Additionally, the increased presence of traveling surgical staff may contribute to the varied experience levels with ophthalmic machinery.

Having a well-prepared technician team is imperative for patient care. Apart from patient factors that cannot be controlled for, such as higher patient age, complex comorbidities, or poor baseline vision, surgeon and assistant experience is a key factor in determining efficiency and high-quality patient care [7-11].

We provide materials for training the scrub technician in a concise module available for continuous review. Residents in training as well as attending surgeons can also benefit from watching these module videos to gain familiarity with the surgical machinery. This is the first module course designed for teaching the various steps of the Alcon Constellation. These videos can be watched prior to a training session and can be referred to afterwards for review.

A few limitations of our study included our small sample size of

30 participants. We tested immediate recall by giving participants a post-test in the same setting after watching the module videos. One potential confounder of our pre- and post-test results include the dissimilar experience levels of those taking the tests with the Alcon Constellation.

To conclude, we develop a stepwise approach to help teach the basic steps of vitreoretinal surgery using the Alcon Constellation for scrub technicians and operating room circulators. We provide a resource available for their continuous and future training. Given the unanimous feedback from our learners, we believe that this module is effective in improving the knowledge and confidence of a surgical team in using the Alcon Constellation.

Videos Links:

<https://youtu.be/69E7zHaB27A>

https://youtu.be/sIYF_AWcuns

<https://youtu.be/H2jseHojEms>

<https://youtu.be/WtxINTL2ALE>

<https://youtu.be/4fcAA74gEM4>

<https://youtu.be/13ODMhcbnsQ>

<https://youtu.be/JbbmqM01ieM>

<https://youtu.be/Nhv8GeSBzps>

<https://youtu.be/vfR8Zl9NRws>

<https://youtu.be/-IHD-FAE-ff>

<https://youtu.be/RjR5WuGlpU>

References

1. Alcon Inc. My Alcon: US. MyAlcon for Consumers. Retrieved March 21, 2022.
2. Houston SKS. Get behind the wheel of the constellation. *Retina Today*. 2015;10(6):77-80.
3. Scott MN, Weng CY. The evolution of pars plana vitrectomy to 27-G microincision vitrectomy surgery. *Int Ophthalmol Clin*. 2016;56(4):97-111.
4. Nguyen KH, Patel BC, Tadi P. *Anatomy, head and neck: Eye retina*. StatPearls Publishing. 2023.
5. Steel D. Retinal detachment. *BMJ Clin Evid*. 2014;3:2014:0710.
6. Kadrmas, EF. About time? Vitreoretinal surgery in the ASC: How progressive doctors and facilities are making it work. *Ophthalm Management*. 2001.
7. Mazinani BAE, Rajendram A, Walter P, Roessler GF. Does surgical experience have an effect on the success of retinal detachment surgery? *Retina*. 2012;32(1):32-7.
8. Xu R, Carty MJ, Orgill DP, Lipsitz SR, Duclos A. The teaming curve: A longitudinal study of the influence of surgical team familiarity on operative time. *Ann Surg*. 2013;258(6):953-7.
9. Mansour AM, Hamam R. Operating room central serous chorioretinopathy. *SAGE Open Med Case Rep*. 2017;5:2050313X17740052.
10. Mansour A, Stewart MW, Charbaji AR, Jawhari KME, Zein LE, Mansour MA, et al. Perceived surgeon stress during no-sedation topical phacoemulsification. *Clin Ophthalmol*. 2020;14:2373-81.
11. Kaushik J, Pannu A, Chaitanya YVK, Kumar A, Parihar JKS, Jain VK, et al. Effect of complicated ocular surgery in stress-related parameters: A novel outlook into surgeon's health. *Indian J Ophthalmol*. 2021;69(9):2282-6.
12. Yamamoto A, Hara T, Kikuchi K, Fujiwara T. Intraoperative stress experienced by surgeons and assistants. *Ophthalmic Surg Lasers*. 1999;30(1):27-30.
13. Jones KI, Amawi F, Bhalla A, Peacock O, Williams JP, Lund JN. Assessing surgeon stress when operating using heart rate variability and the State Trait Anxiety Inventory: Will surgery be the death of us? *Colorectal Dis*. 2015;17(4):335-41.