




Dedicated Chalazion Clinic as a Tool for Early Surgical Education in Ophthalmology Residency

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Abstract

Objective Ophthalmology residency programs aim to improve resident surgical teaching through increased surgical exposure over a 4-year period. Resident-centric surgical clinics across various surgical specialties have been established to help develop surgical autonomy and experience. We present the first demonstration of a resident-centric chalazion incision and drainage clinic (chalazion clinic) in an ophthalmology residency with the goal of increasing early surgical exposure to residents.

Design The chalazion clinic was founded in July 2019. It is a once weekly procedure clinic conducted by an ophthalmology resident and supervised by an ophthalmology attending. Patients with chalazia were referred directly to this clinic for evaluation and management, rather than the oculoplastics clinic as they were in the past. Retrospective review of Accreditation Council for Graduate Medical Education (ACGME) case logs of all residents per academic year before and after establishment of the chalazion clinic was performed in order to assess the impact on residents' chalazion procedure numbers per academic year.

Setting The study involved a single academic ophthalmology department.

Participants Ophthalmology residents of all years were present.

Results A resident of any year performed an average of 3.0 chalazion procedures per year in the 2018 to 2019 academic year, 3.8 in 2019 to 2020, and 8.4 in the 2020 to 2021, which represents a 180% increase in procedure numbers per resident. Among post-graduate-year 2s (PGY)2s, the average number of chalazion procedures increased from 2.1 procedure per year to 22.3 per year (961.9% increase).

Conclusion To the best of our knowledge, this is the first description of a dedicated resident-centric chalazion clinic in an ophthalmology residency program. PGY2s demonstrated the largest increase in procedural numbers. While chalazion incision and drainage is a minor procedure, increased exposure to surgical procedures early in training could help improve residents' skills and confidence. This clinic provides a proof of concept of a dedicated minor procedure clinic for ophthalmology residents to increase early procedural volume.

Keywords

- ▶ ophthalmology
- ▶ chalazion
- ▶ surgical education
- ▶ residency

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During ophthalmology residency, the Accreditation Council for Graduate Medical Education (ACGME) requires each resident to be evaluated on six core competencies throughout residency training.¹ In 2002, the American Board of Ophthalmology recommended adding surgical skills as a seventh core competency.^{1,2} The ACGME now provides a framework for assessing achievement of surgical milestones to ensure that ophthalmology residents develop surgical skills related to periorbital, intraorbital, and intraocular surgery within a span of 4 years of post-graduate training.^{2,3} Ophthalmology residency programs provide resident surgical education through surgical exposure and primary surgical cases, and there are a wide variety of ophthalmology microsurgical assessment strategies that have been developed to evaluate resident surgical skills.⁴⁻⁸

There have been efforts across surgical specialties to develop earlier surgical experience in training in order to better prepare residents for more complex surgical operations.⁹ For example, the American Board of Surgery mandates that general surgery residents log 250 cases by the end of their second post-graduate year (PGY2).¹⁰ Resident centered surgical clinics are one initiative that have been implemented across various surgical specialties with the goal of increasing surgical autonomy and promote earlier resident surgical experiences.¹¹⁻¹³ These clinics have been shown to be an effective and safe addition to residency training.¹¹⁻¹³

Chalazia are benign blockages of meibomian glands that can result in erythematous and sometimes painful eyelid nodules. Chalazia can be managed through conservative measures such as warm compresses and massage, or in cases of refractory chalazia, through surgical incision and drainage. Chalazion incision and drainage is a relatively simple surgical procedure performed by ophthalmologists, and in a cooperative patient, this procedure can be performed safely under local anesthetic in a procedure room or clinic. The ACGME requires residents to perform a minimum of three procedures during their training.

This study presents the first reported resident-centric chalazion incision and drainage clinic (chalazion clinic) in an ophthalmology residency program, which may serve as a tool to increase procedural volume in ophthalmology training.

Methods

This study was a Massachusetts Eye and Ear Infirmary Quality Improvement initiative and therefore was deemed exempt from review by the Massachusetts General Brigham Institutional Review Board. All procedures followed were in accordance with the ethical standards within the Declaration of Helsinki.

Clinic Design

The chalazion clinic was first implemented in the 2019 to 2020 academic year. It took place weekly for a half-day and was conducted by an ophthalmology resident and supervised by an ophthalmology attending (Chief Resident/Director of Eye Trauma Service in 2019–2020 and an oculoplastics-

trained attending in 2020–2021). All ophthalmology residents (PGY2-PGY4) rotated through the clinic in 2019 to 2020, and exclusively PGY2s rotated in the clinic in 2020 to 2021. Patients were referred to the chalazion clinic for consideration of incision and drainage from numerous sources: outpatient ophthalmology or optometry clinics both at the institution and in the community, the Ophthalmic Emergency Department at Massachusetts Eye and Ear, and local urgent care centers and Emergency Departments.

Residents performed all aspects of patient care including obtaining the history and physical examination, clinical decision making, obtaining informed consent, clinical documentation, surgical incision and drainage, providing postoperative instructions and prescribing medications. The residents also performed all aspects of the surgical set up, including preparing the procedure room.

On the first day of the rotation, the resident observed the oculoplastics attending for the first few procedures. For consistency, the surgical technique for incision and drainage was standardized for all patients, and the attending verbalized the procedure in a stepwise fashion. After observing the first few procedures, the resident was granted the ability to perform certain steps of the procedure as the attending saw fit. After the first procedure day, the resident served as the primary surgeon with autonomy granted as appropriate by the supervising attending ophthalmologist. The attending surgeon was present and assisted the resident throughout the entirety of each procedure. At the end of each clinic day, the attending surgeon provided verbal feedback on their surgical performance and areas for improvement. Subjective feedback from the residents was solicited informally throughout the academic year.

Surgical Technique

The surgical technique used for chalazion incision and drainage is as follows: after identifying the patient and surgical site, the patient was marked and a time out for safety was performed. A mark was then placed on the chalazion, both at the eyelid margin and on the anterior lamellar skin, to help identify the exact location of the chalazion. Anesthetic was provided with proparacaine drops on the ocular surface and local infiltration of lidocaine 2% with 1:100,000 epinephrine direct on the eyelid. A chalazion clamp was then placed and the eyelid everted. A Number 11 blade was used to make a partial thickness linear incision (2–3 mm) into the tarsal plate. A chalazion curette was used to express the contents of the meibomian gland. Topical antibiotic ointment was applied, followed by an eye patch. The patient was then discharged home.

Surgical Numbers

The ACGME annual resident case logs were retrospectively reviewed for the academic years of 2018 to 2019, 2019 to 2020, and 2020 to 2021, and the total annual number of chalazion incision and drainage procedures performed by residents of each academic year was collected. Any chalazion incision and drainage procedure performed by a resident, regardless of the locale in which it was performed (i.e.,

operating room versus clinical procedure room) was included in order to evaluate the resident's overall surgical experience.

Statistical Analysis

The mean, standard deviation, median, and range were determined for number of chalazion incision and drainages performed per resident. Considering the relatively larger variances in the data, quasi-Poisson regression was used to analyze the yearly trend over the 3 year period in both PGY2 procedure numbers as well as all residents', with the year being the predictive variable. Considering the skewed distribution of counts, Kruskal-Wallis rank sum test was used to compare the number of procedures in the 3 years followed by a pairwise comparison, and a Benjamini-Hochberg method was used for *p*-value correction. All statistical analyses were performed using R-project Statistical Software version 4.1.2 (Vienna, Austria, 2021).

Results

A total of 72 chalazions were drained by residents in the academic year 2018 to 2019; 91 in 2019 to 2020; and 202 in 2020 to 2021 (→Table 1). A resident from any class year performed a mean of 3.0 incision and drainages in 2018 to 2019 prior to the founding of the clinic, 3.8 in 2019 to 2020, and 8.4 in 2020 to 2021, with medians of procedures per resident of 2.0, 3.0, and 2.0 for respective academic year. When evaluating PGY2s only, the average number of chalazion incision and drainages increased from 2.1 per year in 2018 to 2019 to 22.3 per year in 2020 to 2021, a near 10-fold increase, with a median of procedure per resident of 2.0, 4.5, and 24.0 for respective academic year. A majority of PGY2s (75% or 6 of the 8 total residents in the PGY2 class) performed this procedure prior to the implementation of the chalazion clinic (i.e., two residents did not log any chalazion procedures that academic year), and all (100% or 8 of 8) PGY2 residents performed this procedure in 2020 to 2021, when the chalazion clinic became a standardized part of the PGY2 residency curriculum.

For PGY2s, there was also a significant difference in the number of procedures performed among the 3 years (adjusted *p*-value <0.01 between 2018 to 2019 and 2020 to 2021; as

well as 2019 to 2020 and 2020 to 2021). There was no significant change between 2018 to 2019 and 2019 to 2020 (adjusted *p*-value of 0.08). For all residents, there was no significant change in number of procedures across the 3 years (*p* = 0.56). Quasi-Poisson regression analysis for yearly trend found that there was a statistically significant yearly increase in the number of procedures performed per resident over the 3-year period of study. The incidence rate ratios were 3.89 (CI 2.85–5.52, *p* <0.001, yearly increase rate of 289%) for the PGY2s and 1.75 (CI 1.24–2.54 *p* <0.002, yearly increase rate of 75%) for all residents.

Discussion

The implementation of the chalazion clinic is a tool for earlier and consistent surgical exposure for ophthalmology residents. The chalazion clinic resulted in increased performance of chalazion incision and drainage among residents during the 2020 to 2021 academic year. To the best of our knowledge, this is the first report of a resident-centric chalazion incision and drainage clinic in the United States.

Several factors contributed to the establishment of the chalazion clinic. Prior to the implementation of the chalazion clinic, the chalazions were referred to the oculoplastics service for evaluation and management. The volume of chalazion referrals became so high that the service was not always able to accommodate urgent consultations. Furthermore, oculoplastics faculty often performed these procedures as primary surgeons, as residents were not always immediately available, and residents would have inconsistent exposure and difficulty finding opportunities to participate in the procedure. Hence, a plan was proposed to establish the chalazion clinic to address the high volume of referrals, help patients be seen in a timely fashion, and allow for more consistent resident participation while maintaining faculty supervision.

With the concept in place, the chalazion clinic was established quickly. There was an adequate volume of patients as Massachusetts Eye and Ear is a large referral center. The clinic accepted direct referrals for evaluation and possible drainage from within the hospital system as well as from local urgent care centers, primary care clinics, and emergency departments. There was also an available minor surgical suite

Table 1 Results

	2018 to 2019		2019 to 2020		2020 to 2021	
	PGY2s only	All residents	PGY2s only	All residents	PGY2s only	All residents
Mean (SD) of procedures per resident	2.1 (0.7)	3.0 (0.7)	4.1 (0.8)	3.8 (0.7)	22.3 (2.1)	8.4 (2.2)
Median of procedures per resident	2.0	2.0	4.5	3.0	24.0	2.0
Range of procedures for residents	0 to 6	0 to 11	0 to 7	0 to 10	9 to 28	0 to 28
Sum of cases performed per academic year	17	72	33	91	178	202
Proportion of residents with at least one logged case	6 of 8	15 of 24	7 of 8	19 of 24	8 of 8	14 of 24

equipped with operative equipment and appropriate set up and an ophthalmology attending [Chief Resident/Direct of Eye Trauma Service] in 2019–2020 and an oculoplastics-trained attending in 2020–2021) available to supervise the clinic weekly to ensure proper resident teaching and supervision. Consistent supervision for each academic year and a centralized location for this procedure allowed surgical experiences to be more uniform across all residents.

Resident surgical clinics have been implemented in other specialties, such as plastic surgery and general surgery, and have been shown to be safe and effective additions to increase surgical autonomy.^{11–13} For example, a 4-year review of a single institution resident-centric clinic in a general surgery department demonstrated the safety and efficacy of their clinic and found no significant difference in their 30-day complication rate between patients operated on by residents versus attendings. They also surveyed both patients and residents and noted positive patient satisfaction scores and positive resident feedback.¹³

The establishment of a resident-centric chalazion clinic increased primary surgical numbers, particularly for PGY2 residents, thus supporting the idea that a chalazion clinic could be a useful tool to expanding early surgical experiences. Establishing this clinic allowed for a trend of increasing chalazion-related procedure numbers in the PGY2 class, with a yearly increase rate of 289 and 75% on average for the PGY2s and all residents, respectively over the 3-year period. The changes were not effective instantly, but the intervention became statistically significant after one academic year. There was a possible increasing trend on the number of the procedures done among all residents classes over 3 years, but the increase was not significant.

Importantly, all PGY2 residents logged a range of 9 to 28 cases. This is compared to six of the eight total PGY2 residents logging a range of one to six cases prior to initiation of this clinic, with two of eight logging zero cases in the academic year. This could suggest either more consistent logging and an increased capture rate, or a more consistent resident exposure to this procedure across the class. This clinic decreased the likelihood that residents would not achieve the surgical minima set forth by the ACGME, as all residents met the requirements once the clinic once established.

There has been a considerable effort across ophthalmology residency programs worldwide to improve resident surgical skills.⁴ While chalazion incision and drainage is not a technically challenging procedure, this clinic allowed the less experienced residents to have earlier exposure operating in the periorbital area. They also learn basic surgical principles such as preoperative preparation and set-up, patient positioning, surgical field preparation, exposure, lighting, instrument handling, local anesthesia, and postoperative care.

Subjective feedback regarding the clinic was solicited informally throughout each academic year, and it was consistently positive across residents. Residents enjoyed having a centralized place to experience some surgical autonomy and comfort with a procedure early on in their residency. Anecdotally, ophthalmologists across the hospital system

have noted the benefit of the centralization of a chalazion clinic due to ease and timeliness of referrals.

It can be difficult to increase surgical case volume during residency training, as there may be a limited number of surgical teachers or cases that are appropriate for trainees. The chalazion clinic was an easily implemented program that increased surgical exposure to a specific surgical procedure, particularly impacting the PGY2 residents. The current literature on surgical outcomes in various surgical fields suggests that increased surgical volume is associated with improved surgical outcomes.^{14,15} This has also been shown within ophthalmology, where experienced cataract surgeons with increased annual caseloads demonstrated lower complication rates.¹⁶ While chalazion incision and drainages procedures historically have low complication rates, these types of minor procedures introduced earlier in surgical curricula may benefit the less experienced surgical trainees. By increasing their procedural volume earlier in their training, they have the potential to improve their fine motor skills and their surgical confidence.

There are limitations to this study. The data was gathered from ACGME surgical case logs, which is based on residents' self-reported data. As only three chalazion procedures are required to graduate, some residents may not fully log all cases performed once they have met the minimum criteria. However, residents may be more likely to log multiple procedures done in one day in a dedicated clinic, rather than a procedure performed sporadically throughout their training. Additionally, the change in procedure numbers per resident in the 2019 to 2020 was less so than in the 2020 to 2021 academic year. This may have been due to several factors. First, the referral base for the clinic after its establishment was smaller, and so the number of procedures performed each day in the 2019 to 2020 academic years was fewer overall. As word of mouth and more established referral patterns spread across the hospital system, the number of procedures booked per day increased in the 2020 to 2021 academic year. The clinic was also supervised by an oculoplastics trained attending in 2020 to 2021, as opposed to the chief resident, which may have influenced referral patterns. Also, the numbers may be aberrantly low due to the COVID-19 pandemic affecting several months of the 2019 to 2020 and 2020 to 2021 academic years, with complete shutdown of clinic for several months in the 2019 to 2020 academic year, and resumption of clinic in July 2020. Lastly, given the small sample size, the statistical analysis may be skewed and the power of the Poisson distribution is possibly low.

The implementation of a resident-based chalazion clinic provides proof of concept of a dedicated minor procedure clinic centered around ophthalmology resident education. To the best of our knowledge, this is the first description of a dedicated chalazion clinic in ophthalmology training. Our model allowed ophthalmology PGY2 residents in particular to experience a large increase in early surgical volume with the establishment of this clinic, which may allow less experienced trainees to begin developing surgical skills and confidence. As the residency program integrated with

PGY1s in the 2021 to 2022 academic year, PGY1s have now been able to participate as well. This is an exciting area of expansion as it allows even more trainees to begin developing earlier procedural skills.

Disclosures

G.W.A.: Ocular Technologies (cofounder, consultant), Kriya Therapeutics (consultant), Xenon-VR (consultant), McKinsey & Company (external advisor).

S.K.F.: Horizon Therapeutics (consultant), Viridian Therapeutics (consultant), Poriferous (consultant), WL Gore and Associates (consultant).

Conflict of Interest

None declared.

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