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Using a Systematic Approach to Teach Analysis of the Aging Face

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Abstract

Objective. To assess the efficacy of a novel systematic approach aimed at improving a resident physician's ability to perform analysis of the aging face.

Study Design. Prospective randomized case-control study.

Setting. Accreditation Council for Graduate Medical Education accredited Otolaryngology–Head and Neck Surgery residency program.

Methods. Twenty otolaryngology–head and neck surgery residents were randomized into 2 groups with even representation in each postgraduate year level in each cohort. One group used traditional materials (textbooks), and the other group was given exclusive access to the online learning module featuring a systematic approach to aging-face analysis. Both groups completed preactivity, postactivity, and retention assessments to gauge their ability to perform a comprehensive analysis of the aging face.

Results. When compared with a matched control cohort, the residents who used the systematic approach performed more comprehensive facial aging assessments immediately after the intervention and at a retention time point.

Conclusion. A systematic approach delivered via an 11-minute online module can significantly improve a resident physician's ability to perform analysis of the aging face. This systematic approach could be easily integrated into other online or traditional educational curriculums. Moreover, this methodology could be applied to additional areas in which residents have limited exposure but must develop expertise.

Keywords

facial aging, resident education, systematic approach

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The core curriculum for otolaryngology–head and neck surgery (OHNS) residents includes the analysis and treatment of the aging face. Patients desiring facial rejuvenation are commonly encountered in facial plastic and reconstructive surgery clinics. For these reasons, OHNS residents should develop the ability to analyze the aging face in a comprehensive and succinct manner. This educational objective must be accomplished despite having limited clinical exposure to these patients in many training programs.

In a review of commonly available resources, there was a paucity of information on translating the tenets of facial analysis to their application in the facial aging assessment. Indeed, in a 2017 survey that queried otolaryngology subspecialty program directors on their perceptions of the preparedness of incoming fellows, facial plastic surgery faculty felt only ''neutral'' about graduating residents' skills in anatomy recognition. Facial Plastic and Reconstructive Surgery was recommended as one of the subspecialties that may benefit from additional resident experience.[1]

Therefore, we developed a novel systematic approach designed for teaching a resident to more effectively perform facial aging analysis. This was delivered through an online learning module that was developed in house. Our aim was to test the efficacy of this learning module as compared with current standard text-based references.

Methods

The research protocol was submitted to the University of Kansas Institutional Review Board and was approved. Twenty OHNS residents from an Accreditation Council for Graduate Medical Education–accredited program participated in this study. There was equal representation from each postgraduate year (PGY) class. Within each of the 5 PGY classes, the residents were divided evenly into the control and intervention groups. Assignments were random in nature.

A baseline, postintervention, and retention assessment was completed by each resident. The baseline assessment of each

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resident's ability to analyze the aging face was performed before exposure to any specific educational resources. The postintervention assessment was performed after the residents used their respective resources. Finally, the retention assessment was performed at least 6 weeks after the postintervention assessment.

The control group was provided with 3 readily available text-based references. Each control resident was required to study at least 1 of the references prior to the postintervention assessment. The references provided were ''Aesthetic Facial Analysis'' in *Cummings Otolaryngology: Head and Neck Surgery*,[2] ''Aesthetic Facial Analysis'' in *Facial Plastic and Reconstructive Surgery*,[3] and ''Prerhytidectomy Facial Analysis'' on Medscape.[4] The senior authors reviewed the text-based references, deeming them as equivalents. Simultaneously, the intervention group was provided exclusive access to the online learning module (Supplemental Video 1). Using the multimedia video software, Explain Everything, Inc., we developed the 11-minute online educational learning module on the subject of the aging face. The module consisted of a video integrating a combination of images, concise text/bullet points, and voiceover narrative.

Before the postintervention assessment, each resident confirmed completion of either studying a provided text-based reference or viewing the online learning module, as was predetermined. During each assessment, the residents examined a series of 3 standardized patient photos consisting of the frontal, three-quarter, and profile views. Each resident had up to 5 minutes to provide a verbal analysis of the aging face. Their responses were recorded and subsequently graded based off of a binary rubric developed in collaboration with the senior authors (**Table 1**). Residents received a point for each element of the aging face that they discussed, and this score was recorded.

Data analysis was performed using SPSS version 25.0 software (IBM Corporation, Armonk, New York, USA). A rank-based nonparametric Kruskal-Wallis test was performed to determine if there was a statistically significant difference in assessment performance between the control and intervention groups.

Table 1. Binary Grading Rubric.

Component	0/1
Skin complexion	
Photoaging	
Rhytids	
Hairline/horizontal thirds	
Brow position	
Brow symmetry	
Upper lid	
Lower lid	
Platysma	
Melolabial folds	
Malar contour	
Jowls	
Gland ptosis	
Chin position	
Cervicomental angle	
Hyoid position	
Soft tissue (fat or skin?)	

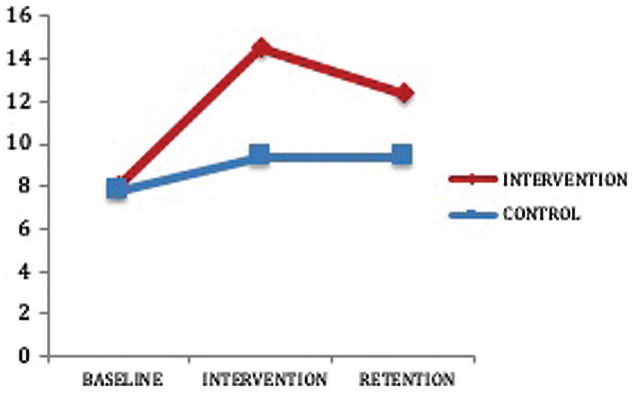

Figure 1. Assessment scores at each time point for the control and intervention groups.

Results

In **Figure 1**, collective baseline (T1), intervention (T2), and retention (T3) assessment scores are depicted for the intervention and control groups. **Figures 2A-E** depict the same assessment data stratifying the resident participants by PGY. As a whole, the resident participants demonstrated improvement from T1 to T2, and this improvement was maintained at T3 in the retention assessment. A Wilcoxon signed-ranks test confirmed that these were statistically significant changes in both groups from T1 to T2, (P = .001). Between the intervention and retention assessments, there was no statistically significant change among all participants (P = .106).

A Kruskal-Wallis test was used to compare the performance between the 2 groups. There was no difference between the two groups at T1 (P = .82), indicating matched baseline skill level in both cohorts. This test also demonstrated significantly better performance in the intervention group at both T2 (P = .001) and T3 (P = .009) when compared with the control group. **Figures 3A-C** show box plots at each time point for the control and intervention groups. The intervention group median scores at T2 and T3 were higher than the corresponding scores in the control group. The intervention group also demonstrated tighter score distribution, as evidenced by the interquartile ranges of 2 and 3 at T2 and T3, respectively.

Discussion

Facial aging analysis is a vital skill for OHNS resident physicians. The thoughtfulness of a surgical plan is intimately related to the thoroughness of the facial analysis. The systematic approach presented in the online learning module

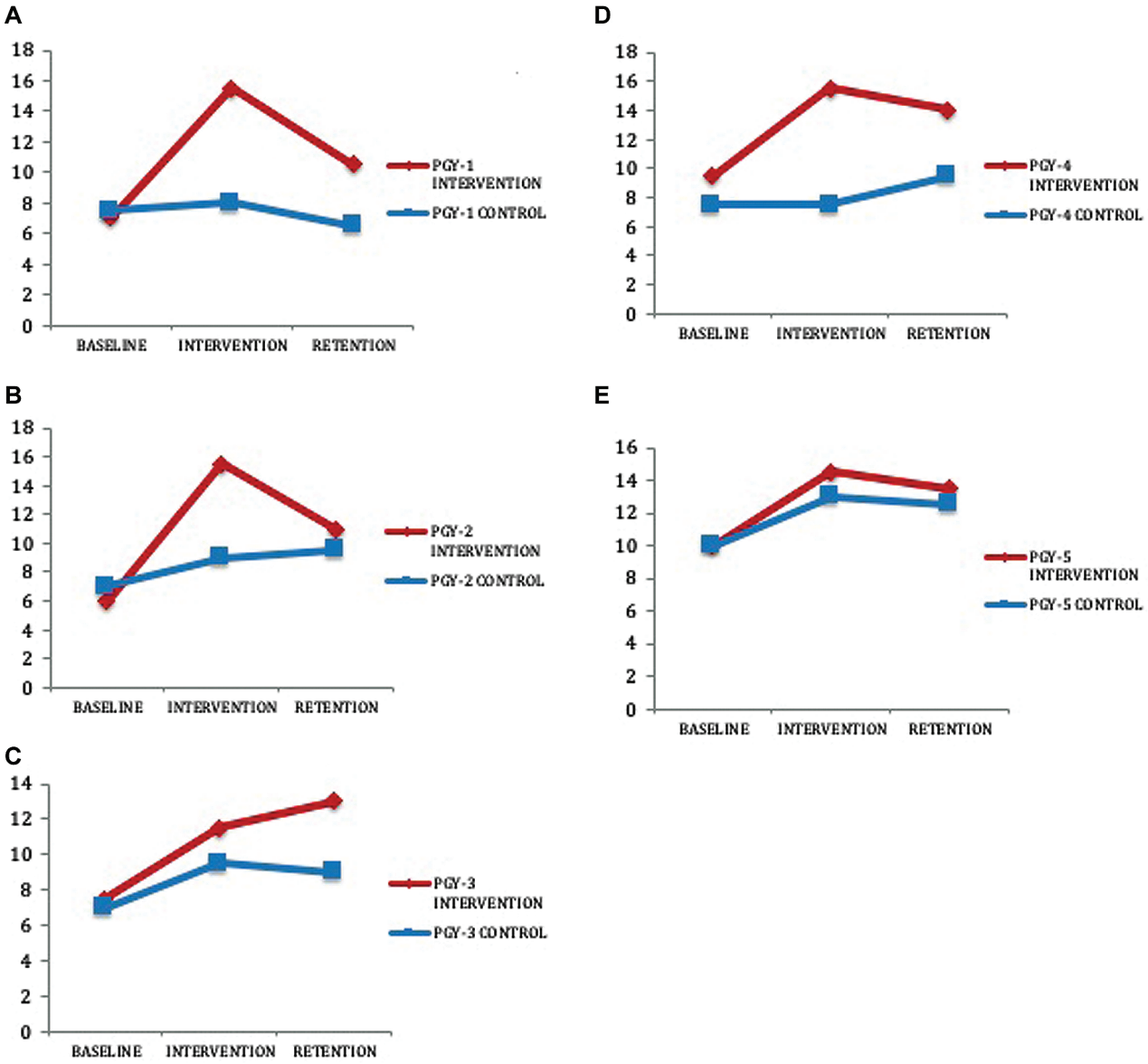

Figure 2. Assessment scores at each time point for control and intervention groups stratified by postgraduate year, sequentially with A corresponding to postgraduate year 1.

allows for a comprehensive analysis that lends itself to the next step in training, which is the synthesis of an appropriate surgical plan. This must include the ability to identify red flags such as a high hairline or upper eyelid ptosis that would significantly impact the planned interventions. In this way, the analysis becomes a powerful tool to plan the surgery and identify potential pitfalls.

Despite its importance, mastery of analyzing the aging face is occasionally difficult for residents to obtain because of the relatively limited clinical exposure to esthetic surgery patients. For this reason, the educational resources residents use to attain this skill are integral to their success. There are many constraints on resident time, including patient care obligations and the need to master a wide variety of topics. Resident education initiatives must be time efficient and high yield.

When it comes to facial plastic surgery topics such as nasal analysis, the efficacy of a systematic approach has been established in recent publications. Shockley et al.[5] reported a prospective cohort study showing the efficacy a 10-slide PowerPoint (Microsoft Corp, Redmond, Washington, USA) in improving a resident's ability to perform nasal analysis. A similar study by Hilger et al.[6] demonstrated that residents scored significantly higher when compared with their co-residents on an assessment of photographic nasal analysis conducted 10 weeks following a one-time lesson. The intervention itself was a 10-minute slideshow presentation on a focused and methodical approach to nasal analysis.[6] The data presented here showcase a system that is beneficial to resident understanding of the aging face, which has not yet been addressed as thoroughly as nasal analysis.

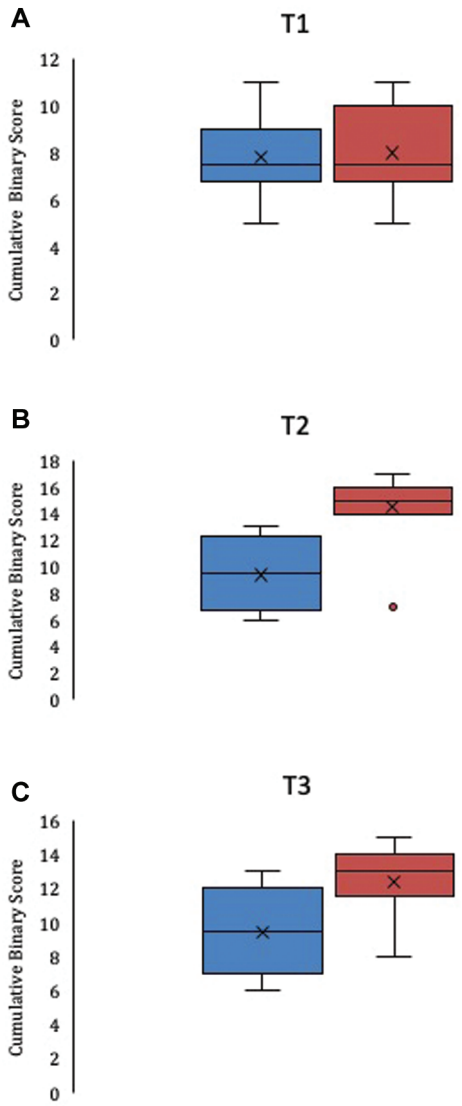

Figure 3. Boxplots of assessment scores for control (blue) and intervention (red). A, B, and C sequentially depict time points T1, T2, and T3, respectively. Standard error lines displayed. "x" marks the median value.

In the current study, the efficacy of a systematic approach to analysis of the aging face was proven, as the intervention group of residents performed a more comprehensive analysis relative to a matched control group. This difference in performance was sustained in the retention assessment following the intervention. Moreover, the intervention group was able to attain this skill by viewing a short, 11-minute, online learning module. This then represents an expeditious way to substantially and reliably improve a resident's ability to perform analysis of the aging face.

The merit of the supplemental online curriculums in particular have been established in the literature, including one study involving 3 OHNS residency programs that saw a 10% increase in scores in the facial plastic surgery section of the Otolaryngology Training Exam with use of online modules.[7] A growing body of education literature supports the use of blended learning in which traditional instruction is supplemented with online self-guided lessons, to allow learners to be in control of their education.[8] The role for animated lessons has been shown in other medical education applications to be efficacious as well.[9] Traditional didactic and textbook learning still has a role in the education of surgical residents. However, online learning modules may represent an opportunity to use technology to improve the efficiency of this process. Our systematic approach to aging face analysis lends itself well to both online and animated formats. The importance of these types of digital learning experiences may specifically benefit scenarios that are uncommonly encountered by the resident but remain an important skill.

Conclusion

A novel systematic approach was shown to improve a resident's proficiency in performing a comprehensive analysis of the aging face relative to their peers using traditional textbook references. This likely reflects the ease of comprehension and implementation of systematic approaches. The educational content was delivered through an online platform that was convenient and efficient, requiring only 11 minutes for viewing. This methodology could be applied to additional areas in which residents have limited exposure but must develop expertise.

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Author Contributions

Sunthosh Sivam, study design, data collection, data interpretation, manuscript preparation, and critical review and revision of manuscript; **Patrick Kim**, data collection, data interpretation, and manuscript preparation; **Clinton Humphrey**, study design, data interpretation, manuscript preparation, and critical review and revision of manuscript; **J. David Kriet**, study design, data interpretation, manuscript preparation, and critical review and revision of manuscript.

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Supplemental Material

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