Lasers in Surgery and Medicine

Plume Effect of Fractional Radiofrequency Versus Laser Resurfacing: Considerations in the COVID-19 Pandemic

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Abstract

Introduction

The COVID-19 pandemic requires us all to re-evaluate aesthetic practices to ensure optimal patient safety during elective procedures. Specifically, energy-based devices and lasers require special consideration, as they may emit plume which has been shown to contain tissue debris and aerosolized biological materials. Prior studies have shown transmission of viruses and bacteria via plume (i.e., HIV and papillomavirus). The purpose of this study was to evaluate plume characteristics of the Er:YAG resurfacing laser (Sciton; Palo Alto, CA) and compare it to the Morpheus8 fractional radiofrequency device (InMode; Lake Forest, CA).

Methods

Five patients who underwent aesthetic resurfacing and/or skin tightening of the face and neck were treated with the Er:YAG (Sciton Joule, Palo Alto, CA) and/or fractional radiofrequency (Morpheus8, Lake Forest, CA) between April 1 and May 11, 2020. Data collected included patient demographics, past medical history, treatment parameters, adverse events, particle counter data, as well as high magnification video equiptment. Patients were evaluated during treatment with a calibrated particle meter (PCE; Jupiter, FL). The particle meter was used at a consistent focal distance (612 inches) to sample the surrounding environment during treatment at 2.83 L/min to a counting efficiency of 50% at 0.3 µm and 100% at >0.45 µm. Recordings were obtained with and without a smoke evacuator.

Results

Of our cohort (*n* = 5), average age was 58 years old (STD ±7.2). Average Fitzpatrick type was between 2 and 3. Two patients received Er:YAG fractional resurfacing in addition to fractional

radiofrequency during the same treatment session. Two patients had fractional radiofrequency only, and one patient had laser treatment with the Er:YAG only. There were no adverse events recorded. The particle counter demonstrated ambient baseline particles/second (pps) at 8 (STD ±6). During fractional radiofrequency treatment at 1-mm depth, the mean recording was 8 pps (STD ±8). At the more superficial depth of 0.5 mm, recordings showed 10 pps (STD ±6). The Er:YAG laser resurfacing laser had mean readings of 44 pps (STD ±11). When the particle sizes were broken down by size, the fractional radiofrequency device had overall smaller particle sizes with a count of 251 for 0.3 μm (STD ±147) compared with Er:YAG laser with a count of 112 for 0.3 μm (STD ±84). The fractional radiofrequency did not appear to emit particles >5 μm throughout the treatment, however, the Er:YAG laser consistently recorded majority of particles in the range of 510 μm. The addition of the smoke evacuator demonstrated a 50% reduction in both particles per second recorded as well as all particle sizes.

Conclusion

Re-evaluation of the plume effect from aesthetic devices has become important during the COVID-19 pandemic. Further studies are required to characterize viability of COVID-19 viability and transmissibility in plume specimens. Based on this pilot study, we recommend that devices that generate little to no plume such as fractional radiofrequency devices be used in Phase I reopening of practice while devices that generate a visible plume such as Er:YAG laser resurfacing devices be avoided and only used with appropriate personal protective equipment in addition to a smoke evacuator in Phase IV reopening.

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