Is the use of a powered dermatome an aerosol-generating procedure (AGP)? Implications for personal protection against COVID-19 virus

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Introduction

Many healthcare workers have contracted SARS-CoV-2 during the pandemic, many cases of which have resulted in severe illness and death. No studies have assessed the potential for powered dermatomes to generate aerosol, an essential technique in burns and plastic surgery. The primary aim of the present study was to capture video footage to illustrate the potential for a powered dermatome to generate significant spray and hence aerosol.

Method

We utilised a simulated skin graft harvest experimental method. Fluorescein-stained saline was used with ultraviolet (UV) backlighting to demonstrate fluorescent spray from a popular brand of air-powered dermatome. Ultra-slow-motion (960 frames/s) video was used to demonstrate the oscillation of the dermatome blade and the origin within the machine of any spray generated, and the extent of spray generated

Results

Ultra-slow-motion video at 960 FPS was captured during usage of a powered dermatome. Droplets of various sizes spraying out from the leading edge at the sides where the blade oscillates are clearly visible. The spray emerges from the leading edge of the dermatome back- wards at an approximate angle of 45°.

Our study demonstrates that powered dermatome usage is likely to generate aerosol from blood or blood-contaminated fluid, but does not demonstrate or quantify to what extent this may be clinically relevant in terms of viral transmission potential. We suggest ways to reduce the risk of spray from dermatomes including limiting donor-site bleeding and avoiding a wet donor area.

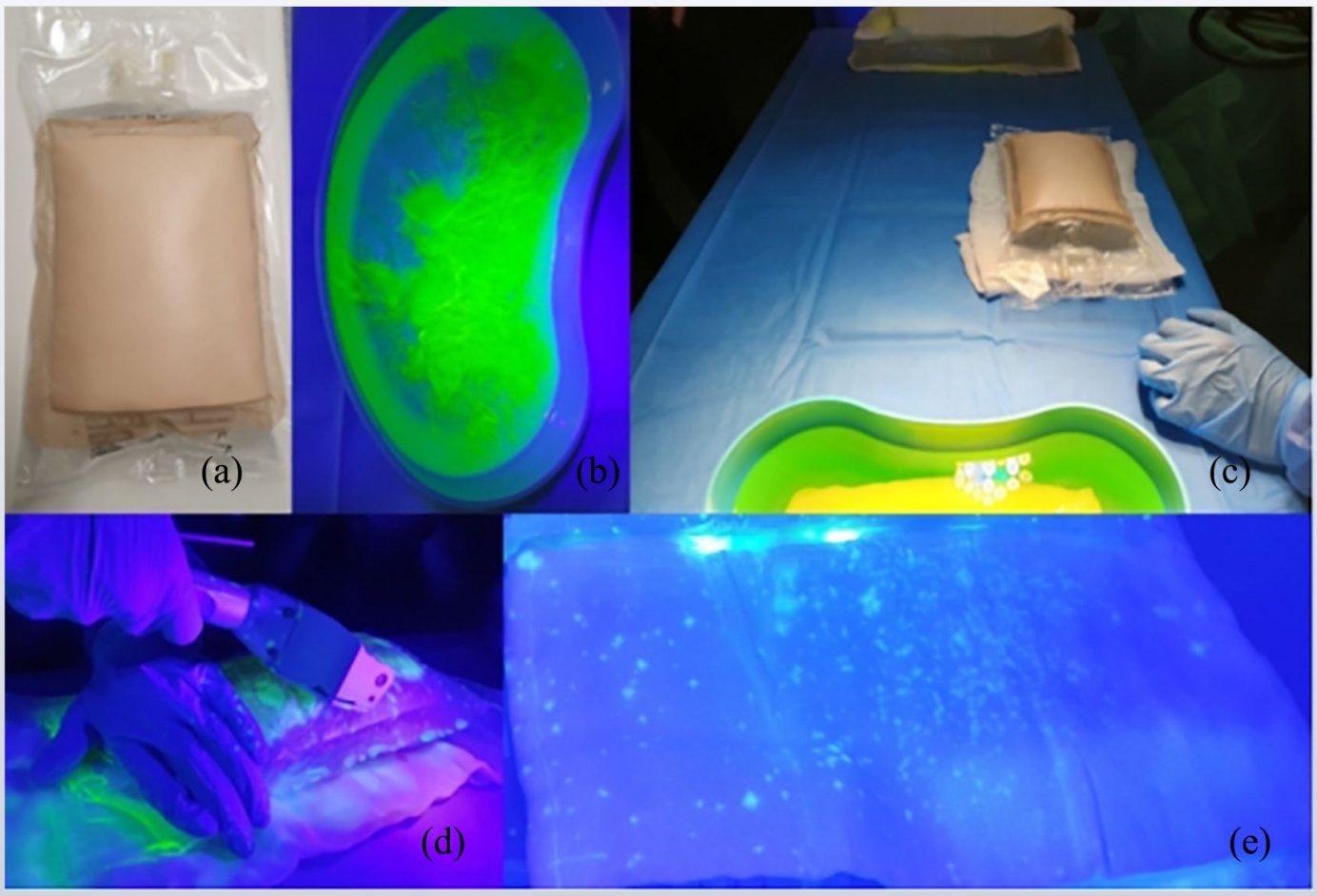

Figure 1. Experimental setup. From left to right and clockwise: (a) An unopened bag of saline with adhesive dressing to simulate donor site; (b) fluorescein-stained saline with ultraviolet light backlight to simulate a donor site wet with blood or fluid; (c) simulated operating environment; (d) powered dermatome in use; (e) fluorescein-tinted spray from dermatome captured on dry gauze. Readers are referred to the videos which are the focus of this study.

Discussion

Based on real-time and ultra-slow-motion video footage of a powered dermatome in use during simulated SSG harvest, we believe powered dermatomes are likely to generate aerosol from any fluid, including blood present at the blade interface. Hence, dermatome use should be categorised as an AGP. It should be noted that our study provides no information on the risk of transmission of COVID-19 through this practice, and it is uncertain how dermatome use may translate into clinical risk when compared with other procedures currently defined as AGPs that originate from airways and mucosal surfaces. Decisions relating to PPE for procedures requiring dermatome usage should take into account our findings.

It is likely that the creation of spray from dermatomes can be reduced with less water, fluid or blood in the operative field, and the surgical team do have the potential to modulate this harvesting environment by use of paraffin to lubricate the area of harvest (instead of water or saline), and infiltration of the donor site with local anaesthetic with adrenaline to limit bleeding – the simple assertion being ‘less wet, less blood, less spray’.

There is a need for further studies to ascertain the aerosol-generating nature, and hence risk of COVID-19 transmission, of a range of interventions relevant to burns and plastic surgery, including those listed in the BAPRAS guidance. The methodology we employed in this study may be helpful in this regard, at least for preliminary experimental studies on other devices. It can also be envisaged that a modification of this strategy could easily be adapted for use in vivo.

Reference: Shokrollahi K. Et al. Is the use of a powered dermatome an aerosol-generating procedure (AGP)? Implications for personal protection against COVID-19 virus. Scars, Burns & Healing. January 2020. doi:10.1177/2059513120951920