



Optimal Illumination: The BFF Light

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Introduction

In the operating room, all surgeons, particularly ophthalmic surgeons, require an easily adjustable, highly directed source of illumination. Current overhead spotlights commonly found in the operating room are bright and directable but, for the seated ophthalmic surgeon, require an interruption in surgery for repositioning. Interruptions for adjustment of the light increases operating time and creates unnecessary surgeon movement. A previous study found that up to 64% of light adjustments interrupt surgical tasks and that 56% of adjustments did not occur by the optimal route, suggesting that improved lighting should also decrease the need for its repositioning.¹

Case Report

We identified several design principles of a novel lighting device to address the specific needs of procedures with small, focused surgical fields- such as in ophthalmology. Such a device would possess: 1) a bright, directed light beam, 2) flexible placement near the surgeon's head level for convenient adjustment without standing, and minimization of light beam occlusion by the surgeon, 3) compatibility with sterile protocol, and 4) no additional floor space requirements. A prototype device consisting of an ultrabright LED light with a flexible neck and mount was designed and tested (Figure 1).

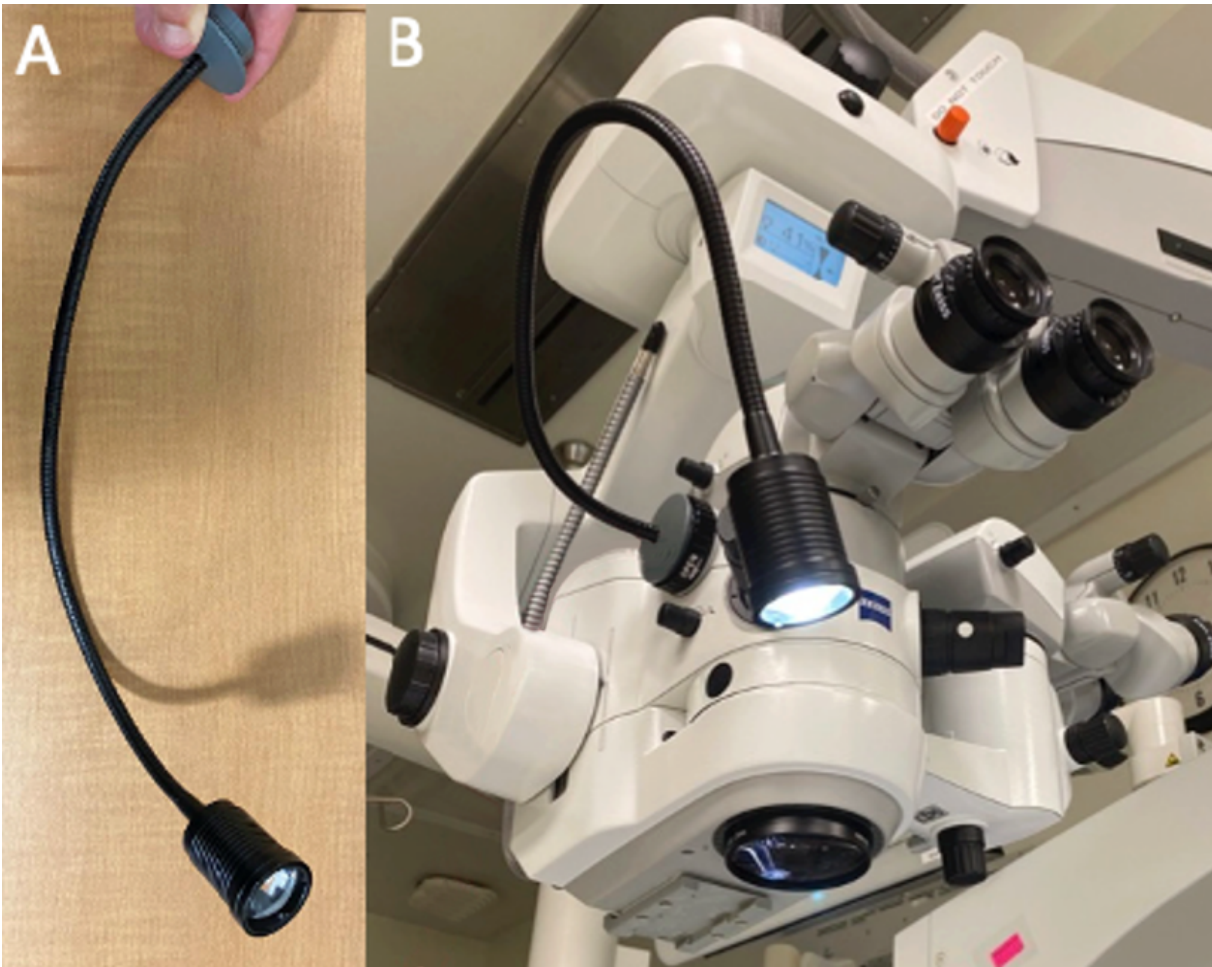


Figure 1. The Brodie-Fekrat Flex (BFF) Light provides robust illumination (500 lumens) and is easily positioned within the surgeon's physical sphere of reach such that the procedure is not interrupted by the surgeon standing from field to adjust lighting (Figure 2).

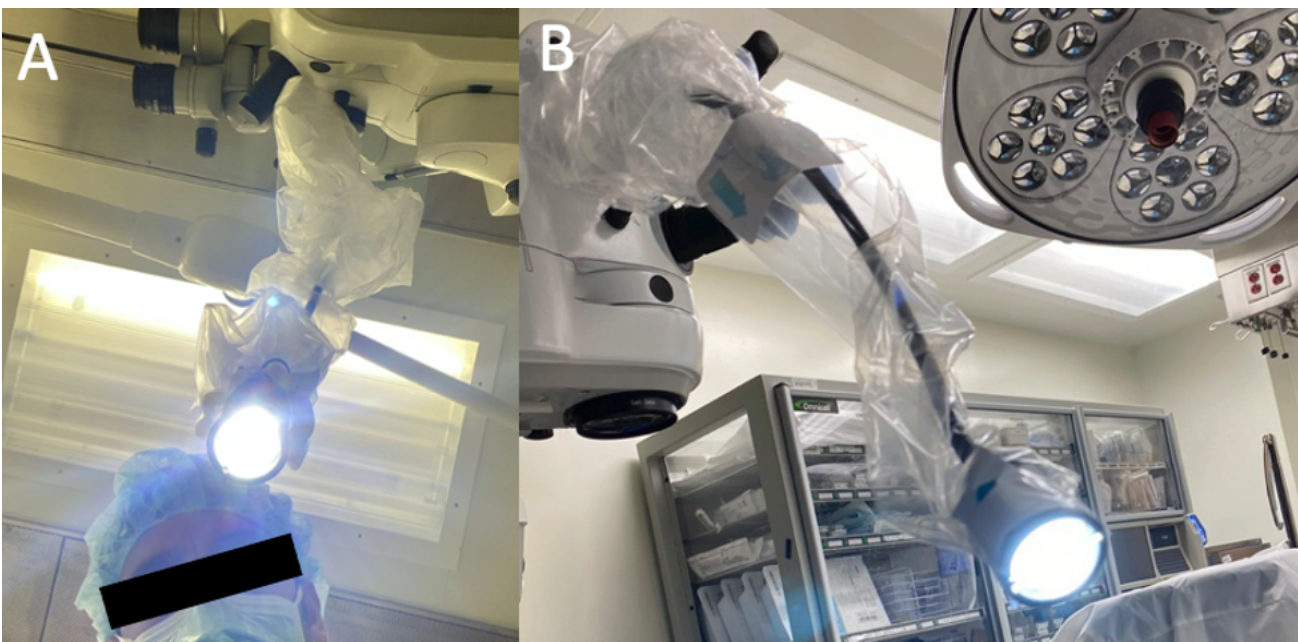


Figure 2. In comparison to overhead lighting where movement of the surgeon's or assistant's head often blocks illumination of the surgical field, this device can be mounted over the patient's body so as to not interfere with the surgery or become obstructed by movement. The mount allows attachment to an operating microscope

either on the housing or on an empty eyepiece hub (shown), or clip-attachment to an exam chair headrest arm or overhead light handle in other embodiments - without additional floor space required for such equipment (Figure 3).

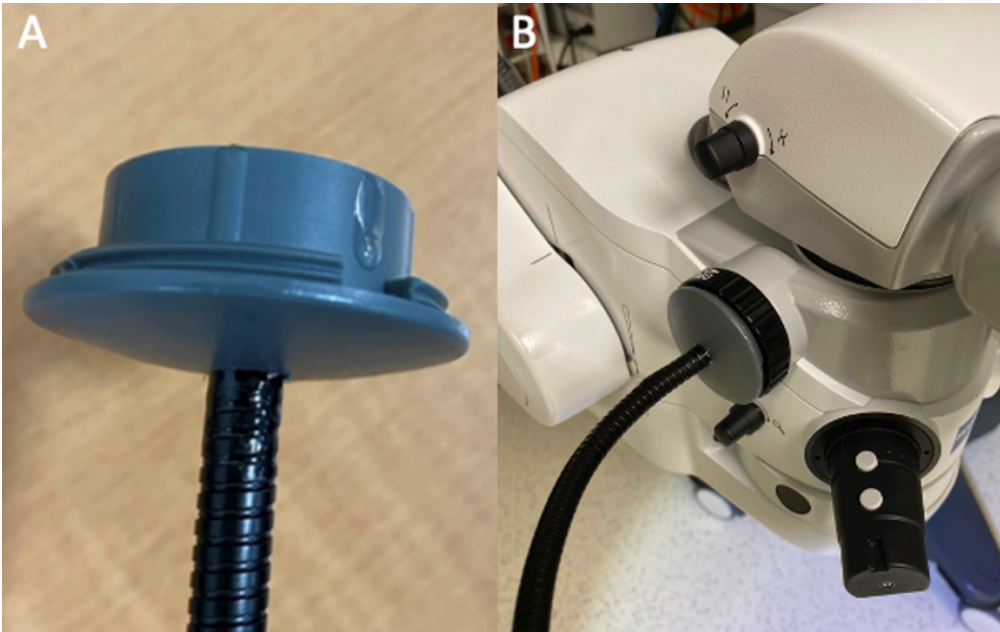


Figure 3. The light can be easily powered via a battery (lithium ion battery 18650 (3000mAh); 5.5 hours of illumination) or wired power source (1.5A/7.5W). Unless single-use, the design allows for draping with a sterile endoscope drape (Figure 4).²



Figure 4. In a survey of 3 scleral buckle procedures performed by a surgeon and assistant at a tertiary eye care center, the use of two ceiling-mounted overhead spotlights required 5 procedure-interrupting light adjustments on average. Similar procedures utilizing the BFF Light as the exclusive illumination source did not require any

such adjustments.

Discussion

While many ophthalmic procedures are performed using the operating microscope and its integrated light source, others including scleral buckling, strabismus surgery, and eyelid surgery rely on alternative illumination, often the ceiling-mounted spotlights, which is often suboptimal. We highlight its use during scleral buckle placement. To our knowledge, there is no low-cost light source that offers the benefits of the BFF Light described herein. Such illumination solves existing lighting challenges and has applicability not only in the clinic and operating room setting in ophthalmology but also in other specialties such as dermatology, plastic surgery, dental, and podiatry, among others.

References

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Statement of Ethics

This case report adheres to patient confidentiality and ethical principles in accordance with the guidelines of the Declaration of Helsinki and relevant local regulations. No patient consent was necessary for this report.

Conflict of Interest Statement

Drs. Fekrat and Brodie are co-inventors of the device discussed herein.

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Authorship

We attest that all authors contributed significantly to the creation of this manuscript, each having fulfilled the criteria as established by the ICMJE.