Eye protection in the operating theatre: Why prescription glasses don't cut it

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Introduction

Needle-stick injury represents a serious occupational hazard for medical professionals, and much time is spent on educating students and practitioners on its prevention. Acquiring a blood-borne viral infection such as Human Immunodeficiency Virus (HIV), Hepatitis B or C from a patient is a rare yet devastating event. While most often associated with 'sharps' injuries, viral transmission is possible across any mucocutaneous membrane – including the eye. Infection via the transconjunctival route is a particularly relevant occupational hazard for operating room personnel, where bodily fluids are commonly encountered. Published cases of HIV seroconversion after ocular blood splash reinforce the importance of eye protection. [1]

Surgical operations carry an inherent risk of blood splash injury - masks with visors are provided in operating theatres for this reason. However, many surgeons and operating personnel rely solely upon prescription glasses for eye protection, despite spectacles being shown to offer an ineffective safeguard against blood splash injury. [2]

Incidence of blood splash injury

The incidence of blood splash is understandably more prevalent in some surgical specialties, such as orthopaedics, where power tools and other instruments increase the likelihood of blood spray. [3] Within these specialties, the risk is acknowledged and the use of more comprehensive eye protection is usually routine.

Laparoscopic and endoscopic procedures may particularly be viewed as low-risk, despite the rates of positive blood splash evident on post-operative examination of eye protection in one prospective study approaching 50%. [4] These results imply that even minimally invasive procedures need to be treated with a high level of vigilance.

The prevalence of blood splash during general surgical operations is highlighted by a study that followed one surgeon over a 12 month period and recorded all bodily fluids evident on protective eyewear following each procedure. [5] Overall, 45% of surgeries performed resulted in blood splash and an even higher incidence (79%) was found in vascular procedures. In addition, half of the laparoscopic cases were associated with blood recorded on the protective eyewear postoperatively.

A similar prospective trial undertaken in Australia found that protective eye shields tested positive for blood in 44% of operations, yet the surgeon was only aware of the incident in 18% of these cases. [6] Much blood spray during surgery does not occur at a visually perceivable level, with this study demonstrating that the incidence of blood splash during a procedure may be considerably higher than is realised.

Despite the predominance of blood splash occurring within the operating theatre, the risks of these injuries are not limited to surgeons and theatre staff - even minor surgery carries a considerable risk of blood splash. A review of 500 simple skin lesion excisions in a procedural dermatology unit revealed positive blood splash on facemask or visor in 66% of cases, which highlights the need for protective eyewear in all surgical settings. [7]

Risk of blood splash injury

Although a rare occurrence, even a basic procedure such as venepuncture can result in ocular blood splash injury. Several cases

of confirmed HCV transmission via the conjunctival route have been reported. [8-10]

Although the rates of blood-borne infectious disease are reasonably low within Australia, and likewise the rates of conversion from a blood splash injury are low at around 2%, [9] the consequences of contracting HIV, HBV or HCV from a seropositive patient are potentially serious and require strict adherence to post exposure prophylaxis protocols. [11] Exposure to bodily fluids, particularly blood, is an unavoidable occupational risk for most health care professionals, but personal risk can be minimised by using appropriate universal precautions.

For those operating theatre personnel who wear prescription glasses, there exists a common belief that no additional eye protection is necessary. The 2007 Waikato Eye Protection Study [2] surveyed 71 practicing surgeons, of which 45.1% required prescription glasses while operating. Of the respondents, 84.5% had experienced prior periorbital blood splash during their operating careers, and 2.8% had gone on to contract an illness from such an event. While nearly 80% of the participants routinely used eye protection, amongst those who wore prescription glasses, 68% used them as sole eye protection.

A 2009 *in vitro* study examining the effectiveness of various forms of eye protection in orthopaedic surgery [12] employed a simulation model, with a mannequin head placed in a typical position in the operating field, with femoral osteotomy performed on a cadaveric thigh. The resulting blood splash on six different types of protective eyewear was measured, and found that prescription glasses offered no benefit over control (no protection). While none of the eye protection methods tested offered complete protection, significantly lower rates of conjunctival contamination were recorded for recommended eyewear, including facemask and eyeshield, hard plastic glasses and disposable plastic glasses.

Prevention and management of blood splash injury

Given that blood splash is an occupational hazard, the onus is on the hospital and clinical administration to ensure that there are adequate supplies of protective eye equipment available. Disposable surgical masks with full-face visors have been shown to offer the highest level of protection from blood splash injury [12] and ought to be readily accessible for all staff involved in procedures or settings where contact with bodily fluids is possible. The use of masks and visors should be standard practice for all theatre staff, including assistants, scrub nurses

and observers, regardless of the use of prescription spectacles.

Should an incident occur, a procedure similar to that used for needle-stick injury may be followed to minimise the risk of infection. The eye should first be rinsed thoroughly to remove as much of the fluid as possible and serology should be ordered promptly to obtain a baseline for future comparisons. An HIV screen and acute hepatitis panel (HAV IgM, HB core IgM, HBsAg, HCV and HB surface antibody for immunised individuals) are indicated. Post-exposure prophylaxis (PEP) should be initiated as soon as practicable unless the patient is known to be HIV, HBV and HCV negative. [13]

Conclusion

Universal precautions are recommended in all instances where there is the potential for exposure to patient bodily fluids, with an emphasis on appropriate eye protection. Prescription glasses are unsuitable for use as the sole source of eye protection from blood splash injury. In light of the fact that a blood splash injury can occur without knowledge of the event, regular blood tests for health care workers involved in regular procedural activity may allow for early detection and intervention of workplace acquired infection.

Conflict of interest

None declared.

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