Assessing the Adequacy of a Newly Developed Corneal Abrasion Prevention Guide in High-Risk Cases (Spinal Surgeries) at A Large Academic Medical Center

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INTRODUCTION

- CA is the most common ocular complication of non-ocular surgery[1]
- CAs typically heal within 72 hours, but can predispose patients to infection[1] and can cause intense pain[2]
- Neither the AANA, ASA, nor the partnering institution recommend a standardized protocol for CA prevention.
- CA prevention practices are typically left to the discretion of the provider and can be variable [3].
- CA educational initiatives have been successful in decreasing the incidence of CA leading to cost savings.
- The purpose of this quality improvement project was to assess CRNAs' preferences and practices regarding CA prevention and whether or not they perceived a newly developed CA quick reference guide as a useful tool for their practice.

METHODS

- Pre-intervention surveys were distributed via Qualtrics to participating CRNAs.
- A CA quick reference guide, which included a newly developed treatment algorithm, was provided to participating CRNAs.
- Participating CRNAs were asked to view a recorded PowerPoint presentation about CA prevention and use of the CA quick reference guide .
- CRNAs were asked to utilize the CA quick reference guide for two weeks in their practice.
- Post intervention surveys were distributed via Qualtrics to participating CRNAs after utilizing the CA quick reference guide for two weeks

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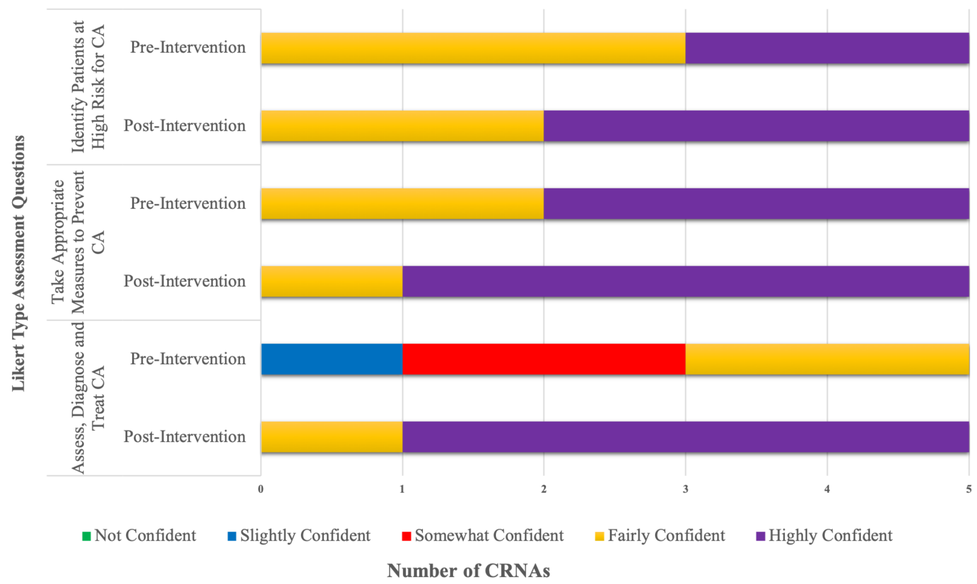
RESULTS

Figure 1

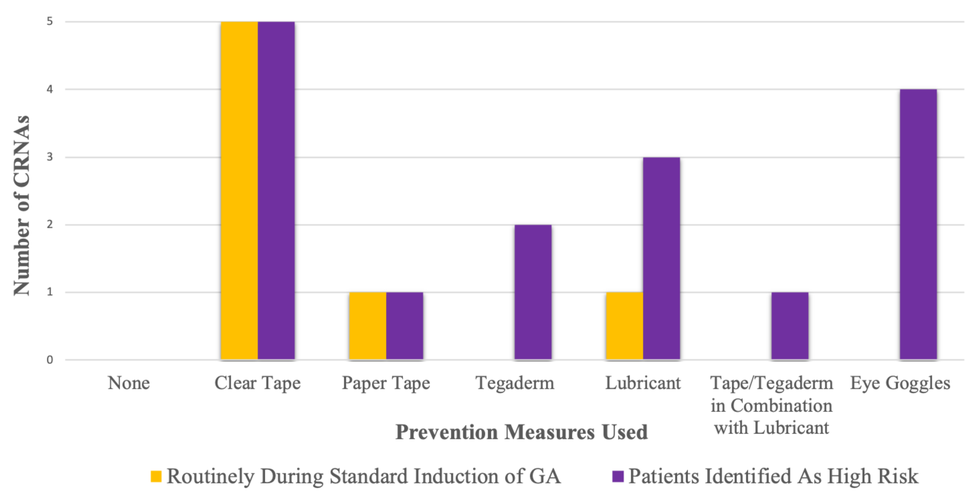
CRNA Perceived Confidence in Ability to Identify Patients at High Risk, Prevent, and Treat CAs



Note. N = 5. CA = Corneal Abrasion; CRNAs = Certified Registered Nurse Anesthetists.

Figure 2

Method used to Secure the Eyes During Routine Induction of GA and in Patients at High Risk of CA



Note. N = 5. Multiple responses allowed. CA = Corneal Abrasion; CRNAs = Certified Registered Nurse Anesthetists; GA = General Anesthesia.

DISCUSSION

- The CA quick reference guide improved CRNA perceived confidence in ability to identify patients at high risk and ability to take appropriate measures to prevent CAs.
- Variability was seen in anesthesia provider selection of prevention method when patients were identified as high risk for CA emphasizing the need for standardized prevention protocols
- CRNAs reported increased confidence ability to assess, diagnose, and treat perioperative CAs.
- CRNAs reported increased awareness of the potential for CAs and that the guide was helpful to identify high risk cases and select appropriate prevention measures.
- Participating CRNAs made no changes to their current practice and most reported they were unlikely to utilize the CA quick reference guide in the future.
- All CRNAs reported an eye care documentation shortcut would be useful for their practice.

CONCLUSIONS

- Increased CRNA confidence in ability to identify high-risk cases and implement appropriate prevention measures may lead to reduced incidence of perioperative CAs and improved variability in prevention method used.
- The newly developed treatment algorithm could be used at the institution in order to implement anesthesiology-led treatment of simple CAs, which has been demonstrated to decrease mean time to treatment when compared to ophthalmology consult[4] with potential cost savings due to PACU and OR delays[5].
- In the future, development of a simple algorithm guiding CRNAs in the appropriate selection of evidenced based prevention methods for specific surgeries and patient populations may be a logical next step in continuation of this QI project and towards the development of standardized practice.
- This QI project led to the development of improved "hot key" eye care documentation shortcuts at the partnering institution which may lead to improved electronic documentation of CA prevention methods.

Intraoperative Corneal Abrasion Prevention

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Risk Factors:

- Advanced Age[1,2,3,6]
- SRNA as provider[1,5]
- Head and neck surgery[2,5]
- Graves' disease/exophthalmos[2,5]
- Lateral/prone/trendelenburg position[1,2]
- Prolonged surgery duration > 3.5 hours[6]
- Robotic surgery cases[6]
- Diabetes[1]
- Low ASA status[1]

Incidence/Litigation

- One of the most common malpractice cases (4%)
- 2% of all malpractice claims
- Incidence of CAs 0.64% overall[6]
- CAs account for 35% of all ocular injury claims and awards for ocular injuries are 4% higher than any other claim[6]

Sources of CAs:

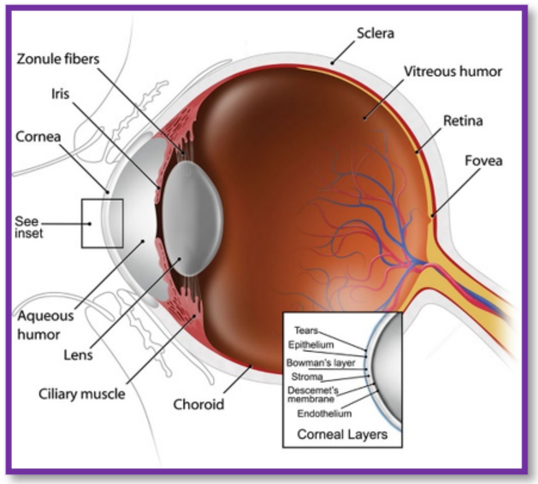
- Identification badges[1,4]
- Stethoscopes[1]
- Laryngoscopes[1,4]
- Oxygen facemasks[1,2,4]
- Pulse oximeter probe on dominant hand[1,2,4]
- Watch band[2,4]
- Surgical drapes[2,4]
- Bair hugger[2]

Pathophysiology

- Corneal abrasions are superficial injuries to the epithelial layer of the cornea that cause pain, photophobia, excessive tearing, headache, and blurry vision.
- They normally heal within 72 hours but cause patients extensive, unanticipated discomfort in addition to their post-operative pain[2,4]
- One fifth of these injuries occur from mechanical trauma such as scratching the eyes post-surgery or from objects such as oxygen masks, badges, and surgical drapes as well as chemical injuries from substances such as antiseptics[2]. Other factors that add to the risk of corneal abrasions are foreign bodies, contact lens, and dry eyes[2].
- During general anesthesia, contraction of the orbicularis oculi muscle is inhibited therefore putting patients at increased risk for corneal abrasions due to insufficient closing of the eyelid and subsequent drying of the cornea[2].
- General anesthesia also inhibits blink reflexes, tear production, and what is known as Bell's phenomenon.
    - Bell's phenomenon is the upward and outward movement of the globe when the eyes close. The cornea stays more exposed during a threat without this reflex intact, contributing to injury.

Assessment and Diagnosis

- Initial assessment and treatments can be completed by an anesthesiologist
- Abrupt onset of eye pain, blurry vision, photophobia, excessive tearing, foreign body sensation within 2 hours of procedure[2,4]
- R/o foreign body: evert eyelids to assess for any foreign body. If foreign body present irrigate with topical anesthetic[2,4]
- Assess visual acuity, EOMs, pupil reactivity[4]
- Definitive diagnosis: fluorescein staining reveals yellow green staining of basement membrane in presence of corneal abrasion[2,4]



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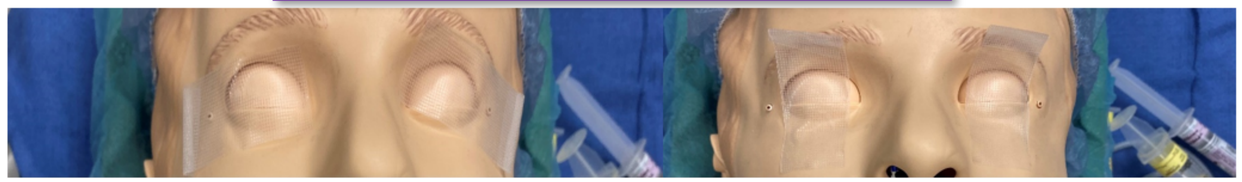
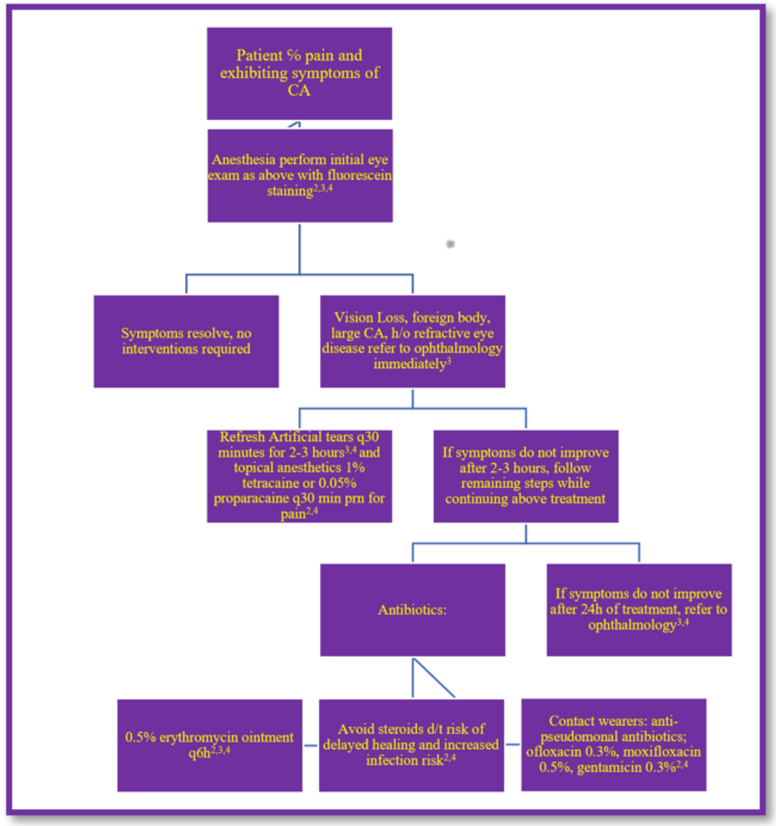
How do you tape your patients' eyes shut? Horizontal vs Vertical?



Interventions

- Secure eyelids with tape immediately after loss of lid reflex on induction and prior to securing the airway (Sundar)
    - The tape should be placed horizontally across the entire lid line. (Sundar, Grixti)
    - Use of Tegaderm to secure eyes in high risk cases[1,4] Tegaderm is water-tight and can prevent chemical injury with surgical prep solutions on the face[2]
- Use preservative-free 4% methylcellulose-based ointment to lubricate the eyes when taping is undesirable[1,4]
- Paraffin based lubricant can absorb highly soluble anesthetics like Halothane and cause irritation[1]
- Petroleum ointments are flammable - avoid with high FiO2 and electrocautery near the face[2]
- Remove tape from upper to lower lid to reduce risk of mechanical trauma[2]

Stepwise Treatment Protocol



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