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Law Enforcement Management Institute of Texas**

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**Implications of the Post Laser-Assisted In Situ Keratomileusis  
(LASIK) Eye Surgery Recovery Period on Law Enforcement Training**

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**An Administrative Research Paper  
Submitted in Partial Fulfillment  
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## **ABSTRACT**

The issue of the implications of the post Laser-Assisted In Situ Keratomileusis (LASIK) refractory eye surgery recovery period on law enforcement training is relevant to law enforcement training because many recruits and officers are reducing their reliance on corrective visual devices by choosing refractory eye surgery. Although there are officer safety and convenience benefits, the vulnerability of the eyes after surgery may be a concern in light of the type of activities and environment a recruit may be exposed to during training. During training, a recruit's eyes may be exposed to mechanical, chemical, environmental, and biological hazards, such as oleoresin capsicum (OC) spray, bacteria and chlorine in water, wind, dust, and impact during combat training. This exposure during the post-surgical recovery period may compromise the integrity of the recruit's eyes, which could put him or her at risk as well as the public he or she serves. The purpose of this research is to examine if there is need for an imposed post-surgery recovery period with avoidance to these hazards.

The method of inquiry used by the researcher included the following: a review of articles, websites, research, periodicals, and journals related to LASIK, post LASIK precautions, side effects, and the effects of OC pepper spray on the eyes with particular focus on the post LASIK eyes. To get the medical practice perspective on this issue, ophthalmologists with experience performing LASIK on law enforcement recruits were interviewed. In order to gain some insight from officers who have experienced refractory eye surgery, a survey of state conservation law enforcement officers who have had LASIK was conducted. Respondents were asked to share their experience and opinions on degree of success, side effects, and recommended recovery time prior to beginning recruit

training. An additional survey was sent to 40 conservation law enforcement agencies in the U.S. regarding their policies related to vision requirements for post refractory eye surgery recovery time.

The researcher discovered that LASIK is a viable option that is increasingly utilized by law enforcement, but the training environment may put the vulnerable post surgical eye at risk during recovery. LASIK disrupts the corneal surface when a flap is created, making it vulnerable to flap dislodgement or infection. Corneal sensitivity and tear secretion decreases, which reduces the eyes natural protective mechanisms and makes it more vulnerable to corneal abrasions caused by eye rubbing or foreign objects. This has implications for the timing of high-risk training exercises, such as training in use of force, boat operations, and water rescue or training that exposes the post LASIK eyes to wind and dirt. Of particular concern is the timing of exposure to oleoresin capsicum (OC) pepper spray, which is routinely mandatory during training. Like LASIK, OC also causes a temporary decreases in corneal sensitivity, making post LASIK eyes particularly vulnerable to injury a few days following OC exposure.

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## INTRODUCTION

Refractive eye surgery is an option that allows people to enjoy the benefits of improved vision with reduced dependence on corrective lenses. In the law enforcement profession, this benefit goes beyond convenience; it could become a matter of survival. One of the most common refractory eye surgeries is Laser-Assisted In Situ Keratomileusis (LASIK), which is a surgical procedure that changes the shape of the clear covering of the eye, the cornea, and can markedly improve visual acuity the day or days immediately following surgery. Studies showed that with approximately 800,000 procedures done annually in the United States, 95% of the patients report satisfaction with their LASIK results (American Academy of Ophthalmology [AAO], 2008).

The issue to be examined in this research considers the training implications of the post-LASIK recovery period. LASIK disrupts the protective layer of the eye, which may make it more vulnerable to trauma and infection while the cornea flap heals. The issue of the length of time required for the eyes to recover prior to exposure to possible hazards in recruit training may have serious implications for those providing law enforcement training and those that choose to have refractory eye surgery prior to recruit training.

Research on this issue became of interest to the researcher after an incident where police recruits spent two cold, windy days on the firing range following exposure to Oleoresin Capsicum (OC) pepper spray. Three recruits were sent for medical follow up, and they were treated for corneal abrasions after complaining of prolonged eye pain and blurred vision. All three recruits had recently undergone LASIK surgery to meet entry vision standards.

The training implications of the recovery period after LASIK is relevant to law enforcement because of the unique stressors that may be put on the vulnerable post-surgical eyes during recruit training. During training, cadets may be exposed to natural environmental stressors, such as extended exposure to sunlight and wind. They may be exposed to biological hazards, with the potential development of infection, in chlorinated pools, lakes, rivers, or sea water. Additionally, the eyes may be vulnerable when exposed to potential mechanical trauma in combat training and chemical stressors such as chlorine and OC pepper spray exposure.

The importance of vision to law enforcement is unarguable, and most agencies have corrected and uncorrected vision standards as a minimum qualification for hiring. Surveys have shown that police officers, at times, must perform critical job tasks when their glasses, 50%, or contacts, 21%, have been removed or dislodged, requiring reliance on uncorrected vision to perform job duties (Wells, Brown, Casson, Eastbrook, & Trottier, 1997; Good & Augsburger, 1987). It is common for law enforcement agencies to address this issue by requiring an uncorrected vision standard, commonly varying from 20/40 to 20/200 (Good & Augsburger, 1987; AAO, 2008).

Recruits often undergo LASIK surgery late in the selection process or even after assurance of a job, since the surgery is generally considered elective and not covered by health insurance. Commonly, agencies do not address this issue directly by policy but instead rely on the screening physician who may not have a clear understanding of the timing or relevance of specific training exercises that may put the vulnerable post surgical eye at risk.

LASIK, like any surgical procedure, is not without risks and side effects. Symptoms that could be bothersome to the majority of people could be a serious safety issue for a law enforcement professional whose safety, and the safety of the public, depends on clear vision in adverse light and environmental conditions such as darkness, heavy fog, rain, winds, dust, or smoke. Common post-surgical symptoms are sensitivity to light, blurred vision, dry eyes, fluctuations in vision, and nighttime driving difficulties due to glare and halos around lights. Many of these symptoms alleviate over time, but it is imperative that the officer avoid activities where the symptoms could affect safety, such as participating in emergency vehicle operations while still experiencing night vision problems. It is also important to avoid rushing the recovery period to protect the officers from hazards that could put the eyes at risk.

The purpose of this research is to examine these factors to determine the prudence of an imposed recovery period. The research will focus on the timing of various training exercises with a specific look at exposure to OC pepper spray, combat training, and exposure to environmental conditions such as water, wind, and dust. These research questions will be examined by a review of articles, journals, and periodicals in the medical, legal, health, and law enforcement literature. There are numerous articles on LASIK and studies on the effects of OC pepper spray. There is very little information that addresses how these issues specifically affect each other. The researcher will fill in this gap with interviews with ophthalmologists, a survey of Texas Game Wardens that have had LASIK surgery prior to recruit training, and a survey of state conservation law enforcement agencies throughout the U.S. In addition,

there will be a review of policies from the U.S. military and law enforcement agencies that have addressed this issue.

The anticipated finding of the research is that a recruit that has had LASIK should be able to participate in all typical training exercises; but, it may be necessary to allow time for the eyes to heal. It is anticipated that a clearer idea of a prudent healing time period will emerge to ensure the safety of the officer and the people that he or she serves and protects. The findings of this research will not recommend or discourage LASIK surgery; this is a medical decision between a recruit and his or her physician. Instead, it will focus on how to ensure safe training for the recruit that has chosen to have LASIK.

The field of law enforcement will benefit from the research as it applies the consolidated information, studies, opinions, and conclusions taken from the medical and law enforcement field to their own law enforcement agencies. Although the focus of the study is on conservation law enforcement officers or game wardens, there are implications that can easily be drawn for other law enforcement agencies. The findings may give some insight on how to protect the eye health of officers, reduce safety hazards for the officer and the public, and reduce liability to the agency.

## **REVIEW OF LITERATURE**

A review of literature will first examine research and information about Laser-Assisted in Situ Keratomileusis (LASIK), looking specifically at success rates, satisfaction rates, side effects, and complications, with a focus on post operative considerations related to entry or re-entry into law enforcement duties. Further review will focus on the issue of exposure to biological, mechanical, environmental, and



chemical stressors, such as the affects of OC Pepper Spray on the eye, with an emphasis on research related to the post-refractory eye surgery.

LASIK requires cutting a flap in the cornea with a blade device, microkeratome, or a laser device, laser keratome, creating a hinge that allows a flap of the cornea to be raised. A computer-controlled laser vaporizes part of the next layer, the stroma, permanently altering the shape of the cornea with the goal of improving the refractory angles to improve visual acuity. The flap is then put back in place, where it heals without the use of stitches.

Many improvements have been made since LASIK became an option for refractory eye surgery in 1990 and became a viable option to photorefractive keratectomy (PRK) or Radial Keratotomy (RK). A big step in its success came when the Food and Drug Administration (FDA) approved the excimer laser for LASIK, which allowed the creation of the corneal flap incision without the use of a blade. Following that innovation, lasers improved to wavefront optimization, which allowed computer analysis of the cornea and a customized surgical procedure (US Food & Drug, 2008). A meta-review of 19 peer-reviewed studies found that 95% of patients undergoing LASIK were satisfied with their results achieving 20/20 or 20/40 vision and were able to perform their daily activities without corrective lenses (AAO, 2008).

The military's extensive research supported the viability of LASIK for improvement of soldier readiness (Williams, 2003; Hammond, Madigan, & Bower, 2005). The Army Warfighter Refractive Eye Surgery Program (WRESP) studied 16,111 army service members receiving LASIK and reported that 86% achieved 20/20 or better

and 98% achieved 20/40 or better during their three month post surgery follow up (Hammond et al., 2005).

However, like any surgery, the outcome is not perfect. There are risks of complications and side effects that deter from perfect vision. The American Academy of Ophthalmology (AAO) reported that 90% of patients achieved 20/20 (AAO, 2008), but this does not necessarily mean perfect vision. Normal visual acuity of 20/20, with a decrease in contrast sensitivity, sharpness, and crispness, has been described in several studies and is often referred to as "LASIK 20/20" (AAO, 2008, Federal Trade Commission, 2008; Knorz, Hugar, Jendritzka, & Liermann, 1999; Eye Surgery Education Council, n.d.; Fan-Paul, Li, Miller, & Florakis, 2002; Mutyala, McDonald, Scheinblum, Ostrick, Brint, & Thompson, 2000). These other qualities of vision may be particularly critical to an officer's job duties and survival, particularly when working at night or low light environments.

A look at reported side effects of LASIK, the usual timeline for their resolution, and an identification of chronic side effects is helpful in making training decisions. The USFDA (2008) stated that most patients experience mild pain and discomfort, burning, scratchiness, tearing, and watery eyes for the first three days. In the first week, they may experience sensitivity to light, and hazy or blurred vision. Up to one month post surgery, the patient may expect hazy or blurred vision, dry eyes, glare, halos, and some difficulty driving at night. These symptoms generally reduce and disappear after six months (Eye Surgery Education Council, n.d.; AAO, 2008; Mutyala et al., 2000).

The Comprehensive Refractive Study (CRS)-USA LASIK Study found that 5.8% of patients experienced complications at the three month follow up period but many of

these problems were resolved within six months of surgery (Eye Surgery Council Education, n.d.). Reports of side effects of halos, starbursts, and reduced night vision vary from 9% to 29%, and the majority of the symptoms decrease over time, with 97-98% of LASIK patients claiming overall satisfaction (Stulting, Carr, Thompson, Waring, Wiley, & Walker, 1999; Wang & Maloney, 2000). Out of 7.6 million people undergoing LASIK, the FDA received only 140 negative reports related to LASIK, over a nine-year period, which most commonly included double vision, dry eyes, and halos (Gardner, 2008). Stories of individuals that have chronic complications from LASIK have been expressed on the internet, describing life altering complaints (Ellin, 2008), but the risks are relatively low. The prevalence of serious complications persisting past six months is less than 1% (Naoko, Ikuko, Yoshiko, & Kaquo, 2000; Casebeer & Kezirian, 1999; Knorz, et al., 1999).

If these symptoms are resolved within six months or at least lessened to the level of annoyance that does not interfere with the recruit's ability to safely carry out job duties, it may be prudent to focus on the vulnerabilities of the post surgical eye. A close look at any training activities that could expose the eyes to hazards during this vulnerable recovery period would be helpful to ensure there is no interference with the healing process. A particular concern is the cornea's reduced sensitivity to chemical and mechanical stimuli post LASIK. Studies showed that corneal sensitivity is reduced dramatically and remains significantly below normal for times that vary amongst studies from three weeks to two years (Gallar, Acosta, Jukka, Moilanen, Holopainen, Belmonte, Timo, & Tervo, 2004), with the majority reporting three to six months (Benitez-del-Castillo, del Rio, Iradier, Hernandez, Castillo & Garcia-Sanchez, 2001; Stapleton,

Hayward, Bachand, Trong, Teh, Deng, Yang, Kelly, Lette, & Robinson, 2006; Linna, Vesaluoma, Perez-Santonja, Petroll, Alio, & Tervo, 2000). In addition to decreased corneal sensitivity, tear secretion is significantly reduced, with dry eyes reported by approximately 50% of LASIK patients, for 3 months and returns to normal in 9 months it can be longer if there was extended use of contacts prior to surgery (Benitez-del-Castillo et al., 2001; Eye Surgery Education Council, n.d.).

The decreased corneal sensitivity and tear production is related because of a feedback loop that is created when the corneal flap is cut either by blade or laser. When the eye is dry, a message is sent to the brain that stimulates the eyes' lacrimal glands to produce tears. However, when the corneal flap is created the nerves of the cornea are severed and the feedback is disrupted, causing decreased tearing or dry eyes (Eye Surgery Education Council, n.d.). Decreased corneal sensitivity and dry eyes reduces natural protective mechanisms of blinking and tearing, which may make the eye vulnerable to dust, chemicals, pollution, and wind.

To reduce risk of complications, the USFDA and the AAO recommended restriction from non-contact sports for one to three days, avoidance of strenuous contact sports for one month, and refrain from swimming for one to eight weeks. An additional consideration for the timing of training activities is that visual fluctuations may occur the first few months up to six months (USFDA, 2008; AAO, 2008; Federal Trade Commission [FTC], 2008). These suggested restrictions may have some strong implications for the timing of recruit training exercises.

An additional concern for conservation law enforcement officers is the timing of exposure to sea, chlorinated water, and river or lake water, which are necessary as the

recruit trains in drown proofing, swiftwater rescue, boat operation, and personal watercraft operation. The concern of early exposure to sea or fresh water is the possibility of the development of an infection before the corneal flap has a chance to heal. Swiftwater and boat operations add the extra risk of water under pressure contacting a flap that has not yet healed. A general recommendation is to wait one to two months post surgery before exposure to this environment (Usaeyes, 2009; USFDA, 2008).

The issue of the possibility of visual harm from OC pepper spray is a concern to law enforcement training independent of the added concerns of LASIK surgery. OC is an oily extract of pepper plants of the genus *Capsicum* which has been adapted from its original use as a spice and a topical anesthetic to an effective law enforcement tool in confronting uncooperative or combative subjects (National Institute of Justice [NIJ], 1994; Smith & Stopford, 1999). The concern related to post refractory eye surgery is the common practice for officers to be exposed to OC pepper spray during training. This experience gives them familiarity with the effects of the OC spray and instills confidence in their survival skills while under the influence of pepper spray. It also instills compassion and reinforces the need to adequately decontaminate subjects. This practice has been challenged, most notably by the Occupational Safety and Health Administration (OSHA), who concluded that exposure to OC spray during training constitutes an unacceptable risk (Smith & Stopford, 1999); however, this practice was recently supported by a federal judge of the U.S. District Court for the District of Columbia (Weissmann, 2009).

Considering the wide use of OC spray as a law enforcement tool, the common practice of spraying officers during training, and the common choice of refractory eye surgery to meet entry vision standards, it would be prudent to examine the effects of OC on the eyes with a focus on the vulnerability of the post LASIK eye due to the surgical flap, reduced tear production, and reduced corneal sensitivity. The effects of different OC pepper spray products are similar, but the intensity may vary. Eye symptoms commonly reported are tingling, intense burning pain, swelling, redness, tearing, temporary blurred vision, and intense involuntary closing of the eyes, which generally disappears within about 45-60 minutes (NIJ, 1994; Lee, Yolton, Schnider, & Janin, 1996).

Of particular concern in law enforcement training is that the OC spray has been shown to cause some temporary cellular damage to the corneal tissue, which may decrease corneal sensitivity and cause a reduced blink reflex. This could lead to corneal abrasions from contact lenses or foreign bodies during this vulnerable post exposure period (Smith & Stopford, 1999). Studies revealed a low incident of lasting ocular effects with incidents of corneal abrasions ranging from .8% to 8% (Brown, Darren, & Challoner, 2000; Watson, Stremel, & Westdorp, 1996). Reduction in corneal sensitivity has been shown to last from 24 hours up to seven to nine days (Zollman, Bragg, & Harrison, 2000; Vesaluoma, Muller, Gollar, Lambiase, Moilanen, Hack, Belmonte, & Tervo, 2000; Lee et al., 1996; Granfield, Onnen, & Petty, 1994). Experts in the ophthalmology field suggest that those in the law enforcement and military profession may need to wait six to nine months after surgery to ensure adequate time for healing (Lewy & Stockman, 2007). They specifically warn of the dangers of eye

trauma causing flap dislodgement or pepper spray causing Diffuse Lamellar Keratitis, which can make the cornea hazy.

An incident of interest involved seven cadets who experienced extreme symptoms of skin irritation and blistering of the eyelids, which required first aid and medical follow up after participating in OC spray training at a criminal justice training center (Jackson, 2008). The program coordinator issued a training incident written report and indicated during personal communication that there are several precautions that could be drawn from the incident. He suggested the use of water-based stream with 0.22% or less capsaicinoids concentration, the use of safety glasses to allow gravity flow of exposure rather than the possibility of a forceful application to the eyes, and the avoidance of the use of eye drops with OC exposure. He suggested that the carriers and propellants used with the OC spray, the rubbing following exposure, and the vigorous irrigation during decontamination may cause adverse affects rather than the OC itself. This opinion is supported by other studies (Lee et al., 2006; Vesaluoma et al., 2000; Dupuy, Thompson, & Beuerman, 1998). The training facility requires recruits to have a one year recovery period after refractory eye surgery before application. None of the seven affected recruits had a history of refractive eye surgery.

Since the focus of this research is not on the decision of whether to expose recruits to OC or the type of spray to use but on the training implications of exposing post LASIK surgery eyes to OC spray, a search for studies with subjects who had LASIK and were sprayed with OC uncovered only one study with a very small sample size. Five Pennsylvania State Police Academy cadets (10 eyes) who had LASIK were exposed to OC and examined 24 hours afterwards. It should be noted that all the

subjects were 13 to 25 months post LASIK surgery, with an average of 18 months. Fifty percent had corneal inflammation but no abrasions and no significant changes in visual acuity, 40% had minimal symptoms, and 10% had mild symptoms. Although all subjects had normal corneal sensitivity 24 hours after exposure, the researchers pointed out that other studies showed a decrease in corneal sensitivity. They concluded that due to the decrease in corneal sensitivity after LASIK lasting up to three months and the fact that OC spray exposure may also cause a temporary decrease in corneal sensitivity, they advised waiting at least three months after LASIK before exposure to OC (Hand & Chotiner, 2002).

A review of the literature showed that LASIK is an increasingly utilized viable option to reduce a law enforcement officer's reliance on glasses or contacts. There are side effects to LASIK that may interfere with the safe performance of law enforcement duties, such as altered night vision, and place the officers' eyes at risk to chemical, environmental, biological, and mechanical stressors due to reduced corneal sensitivity, decreased tear production, and the vulnerability of the healing corneal flap. Although the period of time for side effects to subside and the time of vulnerability varies, there are some guidelines that can be garnered and adapted to law enforcement training. The review of the literature also showed that OC pepper spray has intense, short-term effects on the eye, but it is usually temporary. A reduction in corneal sensitivity does occur, which may increase vulnerability to dust, light, chlorine, and wind for a few days post exposure. Research appeared to be particularly lacking in the area of the affects of OC on the post LASIK eye to use as a guide for law enforcement training decisions.



## METHODOLOGY

The research question to be examined considers the implications of post refractive eye surgery recovery in game warden recruit training. Insurance rarely covers LASIK or other refractive surgery, which drives applicants to wait until they are selected for class before they have the procedure. Vision is usually corrected immediately or within a few days, allowing them to meet entry vision standards. The recruits then participate in tactical and patrol training that may expose them to mechanical, environmental, chemical, or biological hazards as they train in water rescue, use of force, OC pepper spray, and tactics in the outdoors, with prolonged exposure to wind, dust, and sunlight. The research question is whether there should be a required post LASIK recovery time prior to these exposures.

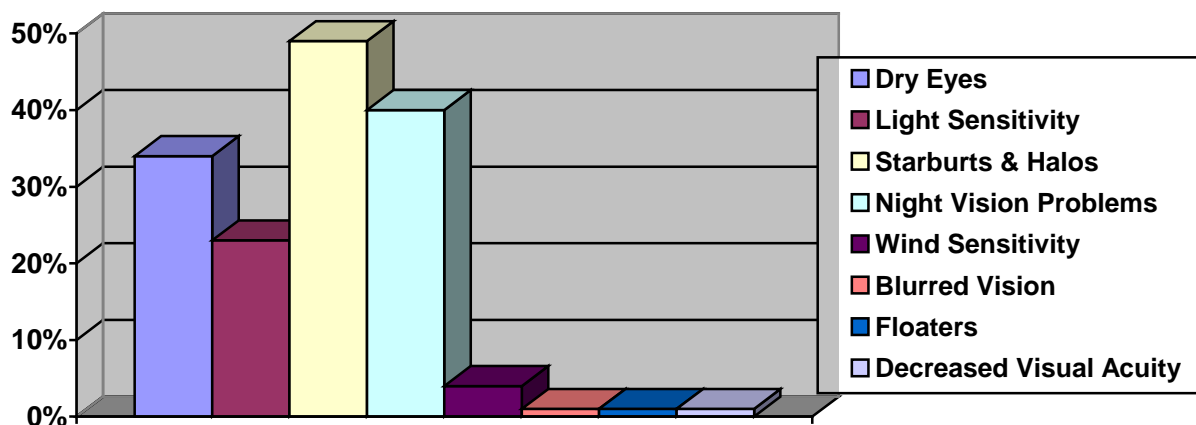
The researcher hypothesizes that LASIK is a viable option to reduce a law enforcement officer's reliance on visual corrective devices, such as contacts or glasses, but an imposed post LASIK surgery recovery period prior to certain training activities and environments may be prudent to ensure safety for the officer and the public he or she serves. The method of inquiry will be to survey game wardens and conservation law enforcement agencies in other states regarding their experiences and policies related to training and LASIK surgery. Interviews shall be conducted with physicians that have experience providing LASIK surgery for law enforcement officers. An examination of military, federal, state, and city law enforcement policies will be conducted. These inquiries will serve to supplement the literature review of articles, internet sites, periodicals, and journals that examined the impact of LASIK on the eyes in relation to hazards he or she may be exposed to during training.

The instrument that will be used to measure the researcher's findings regarding the subject of training implications of post LASIK eye surgery will include two surveys. One survey will be sent to approximately 500 Texas Game Wardens asking those who have had refractory eye surgery to respond to six questions related to their experience, side effects, satisfaction rating, and their opinion on the length of time that should be required for recovery prior to recruit training (Appendix 1). An additional survey questionnaire will be sent to conservation law enforcement agencies in 40 states, asking them to respond to policy questions regarding vision requirements, eye refractory surgery to meet visual requirements, recovery time before certain training exercises, if officers carry OC pepper spray, and any experiences related to these issues (Appendix 2).

The response rate to the survey of 500 Texas Game Wardens resulted in 50 responses from those that had received refractory eye surgery. This indicates that approximately 10% of the force has had refractive eye surgery, but the actual response rate is unknown because there are no records of the numbers of game wardens who have had this surgery. The response rate from surveys sent to conservation law enforcement agencies in 40 states questioning related policies and experiences resulted in responses from 22 different states, a 44% response rate. The information obtained from the respective surveys will be analyzed by consolidating the responses to the questions regarding the officer's personal experience with LASIK and the agencies' experience and response to the issue.

## FINDINGS

The response to the survey sent to approximately 500 Texas Game Wardens stated that 10% (50) have had refractory eye surgery, and 80% of these had LASIK; the remaining had PRK and RK. Most of the officers had at least a two-month gap between the time of eye surgery and recruit training, and ten had less than a one-month recovery. The following chart shows the most common reported side effects post refractory eye surgery:

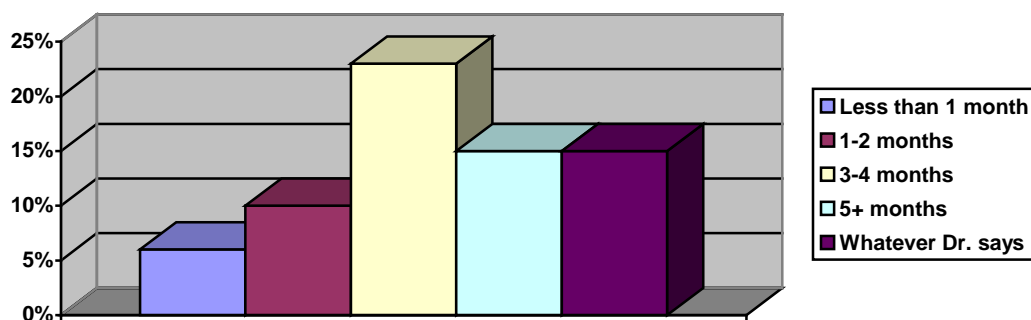


**Figure 1.** Percentage of Post LASIK reporting side effects.

The most commonly reported symptoms are starbursts and halos around lights at night, night vision problems, such as distance perception, and dry eyes. Most reported declining symptoms with a return to normal within two to six months. Several respondents had a great deal of difficulty with night vision the first month. Three respondents claim that night vision issues, starbursts, and halos still persisted after six months but none reported interference with their ability to safely do their job. One of the respondents continues to utilize glasses, especially at night, due to the reduction in visual clarity although visual acuity is normal.

Despite reported side effects, the satisfaction rates were high. Respondents were asked to rate their satisfaction with the results of eye surgery from one (Dissatisfied) to ten (Satisfied, would do it all over again). Ninety-eight percent reported a satisfaction rate of eight or higher and 75% rated a ten. The only rating below an eight was a three, which was a RK surgery. Three respondents reported incidents that supported their satisfaction with LASIK. The incidents occurred prior to refractory eye surgery, where their glasses fogged up, which seriously interfered with officer safety as an incident was escalating. The majority of comments were positive regarding their experiences with refractory eye surgery.

Respondents were asked their opinion, personally or based on their physician's recommendation, about the length of recovery period he or she would recommend prior to recruit training.



**Figure 2.** Recommended recovery time post LASIK.

The most commonly reported opinion was to allow three to four months prior to training that required exposure to water and OC pepper spray. The opinions varied from whatever time period the eye surgeon recommended to six months. One

respondent indicated that her eye surgeon stated he would never sign a release that allows intentional exposure to OC spray.

The respondents reported side effects and the length of time for them to subside very similarly to respondents in surveys found in the literature. The satisfaction rate of the respondents, 98% reported satisfaction, was also similar to that found in other studies.

The compiled results from 22 state conservation law enforcement agencies responding to the survey showed that 18 of the agencies have corrected and uncorrected vision standards. The remaining five agencies utilize the standards required to get a state drivers license. Of those that had vision standards, the corrected standard was 20/20 or 20/30, and uncorrected vision standards ranged from 20/40 to 20/200, with the majority 20/100 or 20/200. Eye refractory surgery such as LASIK was not a disqualifier with any surveyed agencies. The majority of respondents relied on the physician's medical advice regarding the recovery time after eye surgery. Two agencies require one year and one agency requires one month recovery before recruit training. Sixteen agencies responded they carry OC pepper spray, and one agency allows voluntary carry of OC. Twelve of the 16 agencies that carry OC require mandatory spraying of officers during training. The agency that allows voluntary carry of OC requires mandatory spraying if OC is carried. One agency requires a night blindness test if the applicant has had refractory eye surgery. Comments showed a great deal of interest in the subject and a desire to receive survey results.

Personal interviews with two eye surgeons who have performed numerous LASIK on game warden recruits suggested that recruits can resume most normal

activities within 48 hours of surgery. They should avoid dirty or windy environments for one week. They expressed a greater concern with exposure to fresh water, sea water, and swift water environments than they did with OC spray exposure. They suggested avoiding swimming for one month to avoid infection. Regarding the issue of OC spray, they suggested that the risk of exposure is not greater than for the normal eye. There was more of a concern over the direct spray of water to the eyes during decontamination after OC spray than exposure to the OC itself because of possible disruption of the corneal flap. They cautioned that the eye, with or without LASIK, should be protected during defensive tactics. A post LASIK eye should be meticulously protected for three weeks.

A review of policies related to LASIK surgery to meet minimum vision requirements was conducted using an internet search and follow up phone interviews were conducted if clarification was needed. A review of several federal agencies showed some variances of post refractory eye surgery recovery period prior to application. The U.S. Fish and Wildlife Services (U.S. Department of Interior Law Enforcement, 1998) requires a one year recovery before application for a special agent. OC carry is optional, but if chosen, mandatory spraying during training is required. The U.S. Border Patrol (U.S. Department of Homeland Security, 2009) allows LASIK if an acceptable recovery time has occurred. An additional ophthalmologic exam is required to test for glare and contrast sensitivity. A medical clearance is required for rigorous law enforcement training including exposure to OC pepper spray. The U.S. Coast Guard requires six months recovery (USCG, 2008).

The military generally allows active duty soldiers, airmen, sailors and Marines to have laser eye surgery to meet vision standards (Powers, R., 2009). An interview with a program administrator at the U.S. Air Force Refractory Surgery Center (2009) added some additional insight. Soldiers must have stable eye sight that, meets the vision requirements, and be currently free from steroid use. The usual recovery time for LASIK is between two weeks to a month, for PRK it may be three to six months. Special Forces must wait one year after refractory surgery. Basic training has minimum exposure to water and chemicals, with drown proofing and chemical training occurring later in the soldier's career. It was suggested that the eye is not fully healed until six months to one year, and it was recommended there be a three to six month wait period before water training and a one year period before chemical training. He pointed out that the U.S. Air Force, as of May 2007, changed refractory eye surgery as a disqualifier to a mandatory one year recovery for aviators.

A look at how various other law enforcement agencies in Texas address this issue may serve as a comparison. For two major city police departments, one dropped their mandatory wait period after refractory eye surgery, and the other requires a three month recovery period. A large county law enforcement agency requires a one year recovery before recruit training. Two large state law enforcement agencies do not have a mandatory waiting period, instead approaching the issue like many other law enforcement agencies by relying on a physician's release to begin training.

## **DISCUSSIONS / CONCLUSIONS**

The issue examined by the researcher considered the training implications of the post LASIK recovery period. The purpose of the research is to ensure a recruit who

has had refractory eye surgery can safely participate in law enforcement training without undo risk to the recruit, coworkers, and the public. The research question that was examined was the length of recovery time needed before exposure to stressors associated with training exercises. The researcher hypothesized that to ensure long term safety for the recruit's eyes and the safety of the recruit, co-workers, and the public, it would be prudent to impose a post LASIK recovery time prior to swimming, swiftwater training, night time emergency vehicle operations, boat operations, combat training, and OC pepper spray exposure.

The researcher concluded from the survey findings, interviews with professionals, experience from military and law enforcement agencies, and the literature review that LASIK is an increasingly utilized option for improving law enforcement officers' readiness and safety by improving vision and reducing the reliance on corrective devices; however, there are training implications for the recovery time that follows surgery. The satisfaction rates are high, 98%, but there are side effects that diminish over time during the one to six month healing period.

The integrity of the cornea's surface and nerves are compromised during surgery, leaving the eye vulnerable for a period of time until the flap heals and corneal sensitivity normalizes. Law enforcement training is intense and may expose the vulnerable eye to stressors that civilians may not be exposed to. The researcher found there are considerations in the timing of training activities in relation to this recovery period prior to exposure to certain training exercises and environments.

The findings showed that LASIK causes a reduction in corneal sensitivity and tear production for three to six months up to two years. This has the affect of



decreasing the eye's normal protective mechanisms of tearing and blinking, which could put an already vulnerable cornea at additional risk. An increase in vulnerability may occur with exposure to OC pepper spray, which also causes a transient reduction in corneal sensitivity with studies varying from 24 hours to 9 days. During this time, the eyes may be particularly vulnerable to irritants such as dust, foreign objects, and wind. These findings suggest that the timing of OC pepper spray exposure after LASIK should be considered as well as the training activities scheduled for the days immediately following pepper spray exposure. It may be prudent to avoid bright sunlight, wind, water, pollution, and dust for several days after OC exposure. A common practice during OC decontamination is to allow the recruit to use a garden hose, or other water stream, to forcefully flush water to the eyes. A less traumatic decontamination procedure that would allow water to flow instead of forcefully flushing the eye with water may be preferred to reduce the risk of flap dislodgement. Another common practice during the decontamination period is to allow recruits to face into a strong fan; this could be a concern for the post LASIK eye that is vulnerable to dry eyes and foreign objects.

The findings of the research supported that a recovery period is needed to allow the eyes to heal and reduce vulnerability to injury, but there were conflicting opinions on the timing of exposure to environmental chemical, mechanical, and biological hazards related to post LASIK surgery and law enforcement training. Many agencies addressed the issue by relying on physician clearance instead of mandating an imposed recovery period by policy. If this strategy is utilized, it is imperative that the physician understand the implications and timing of higher risk training exercises in the law enforcement

training so that general guidelines for civilians are not automatically applied to the law enforcement officer.

Some general conclusions can be drawn from this research, but it must be recognized that different people heal at different rates and medical oversight is warranted. Based on studies, surveys, and the opinions of experts in the field, it is the conclusion of the researcher that a minimum of one month should pass between the time of LASIK surgery and exposure to combat training, night time emergency vehicle operation training, wind, and dust. Safety precautions that should be taken to protect any eye, particularly a post surgical eye, should be followed, such as the use of protective eye gear during combat training or potential exposure to chemical or foreign bodies. A minimum of two months is recommended before prolonged exposure to water such as a swimming and swiftwater rescue training. A minimum of three to six months should pass between the time of eye surgery and OC pepper spray. The researcher suggests minimizing training activities that require exposure to water, bright sunlight, dust, pollution, and wind the week following OC spray exposure due to the reduction in corneal sensitivity caused by both LASIK and OC exposure. These are general conclusions drawn from interviews, studies, surveys of officers who have had LASIK, and a review of related literature; it is the opinion of the researcher that medical oversight is needed to temper any of these findings.

Limitations that might have hindered this study are that the focus has been on LASIK surgery, but there are other eye refractory surgery options such as PRK. It is assumed that similar precautions are in order although recovery from PRK is generally slower. The scarcity of research specific to LASIK and OC pepper spray exposure to

the eyes causes a reliance on subjective opinions from surveys of officers who have had both experiences. More study in this area is needed to guide law enforcement agencies in making training decisions to protect their officers.

This study has been focused on conservation law enforcement officers; however, conclusions can be drawn for all law enforcement officers. The issue of law enforcement training issues for post LASIK eye surgery is relevant to contemporary law enforcement because many applicants are choosing this surgery to meet entry visual requirements and to reduce the annoyance and safety issues of reliance on visual corrective devices. Many recruits and officers are choosing eye refractory surgery, and the timing of entrance or re-entrance into the law enforcement job duties must ensure safety to the officer, co-workers, and the public he or she serves.

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## APPENDIX 1

### LASIK Surgery Survey for Texas Game Wardens

I am doing a research project that looks at the recovery time that may be needed from the time a person gets LASIK eye surgery until they are exposed to OC Pepper spray, water, dust, combative impact...activities experienced in cadet training. This is a purely VOLUNTARY survey. Your information will be confidential, obviously if you email me the survey I will have your name but it will not be utilized any further.

If you have had refractory eye surgery, please continue with the survey but indicate the type of surgery you had.

Year of surgery:

Type of eye surgery (i.e. LASIK, PRK):

Time gap between eye surgery and cadet training if applicable:

Any side effects experienced and duration (has it improved or still exists?)

Ex: night vision changes, halos around lights, star bursts anything that interferes or challenges your work?

From 1 (Dissatisfied) to 10 (would do it all over again) what is your satisfaction with the eye surgery?:

Based on your experience, what length of time, if any, do you think should be required between time of LASIK and cadet training activities i.e. swimming, OC, firing range etc:

Any other thoughts...

Lt. Cinda Brooks  
Cinda.brooks@tpwd.state.tx.us

## APPENDIX 2

Survey for Conservation Law Enforcement Officers emailed to 40 states July 2009

Vision Requirements and Recovery after Refractory Eye Surgery (LASIK, PRK...)

I am a Texas Game Warden and nurse doing research on the implications of the recovery period after refractory eye surgery (LASIK, PRK...) on law enforcement training. I would like to find out how your agency is addressing this issue as well as find out your minimum vision requirements. I will compile the information and send it back to those who respond. Please answer the following questions:

1. Name
2. Agency
3. Minimum vision requirement: Corrected:                      Uncorrected
4. Is LASIK or PRK allowed to reach these vision standards?
5. Do you have a required recovery time after eye surgery prior to entry or re-entry into the job?
6. Do you carry OC Pepper Spray  
If yes..
  - a. Do you require mandatory exposure to your officers?
  - b. Are there any restrictions for those with previous eye surgery?
7. Any other related comments or information?

Thank you in advance for your time and input.

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