The LASIK Flap at 120 Miles Per Hour

Flap adhesion during US Army special operations military free-fall parachute training.

BY ALICIA FAGAN, SENIOR EDITOR

Just as the number of LASIK recipients in the general population continues to grow, so does the number of military personnel who have undergone the procedure. The Army has adapted to this trend, to the point that it now performs a large volume of PRK, LASIK, and LASEK surgeries. In fact, the military maintains seven ophthalmic centers equipped with excimer lasers. Although most of its soldiers have had surface ablation, the Army does consider waivers for recruits with a history of LASIK surgery.

Historically, however, LASIK surgery has disqualified soldiers from entering the training programs of any of the Army’s Special Operations units, such as the Green Berets and the Army Rangers. Hand-to-hand combat drills, underwater combat diving, and freefall parachute jumping are regular activities of those in such units. If a soldier’s goggles become dislodged during freefall, his exposed eyes are subjected to 120-mph windblasts. The unknown effects of these windblasts on LASIK flaps was a major concern in disallowing LASIK patients’ participation in these specialized units.

This article details the research that Lieutenant Colonel (LTC) Scott Barnes, M.D., and his colleagues conducted that has influenced the special operations command’s thinking regarding allowing certain soldiers with LASIK to enter the Army’s Special Operations units.

BACKGROUND

For 2 years, LTC Barnes served as the deputy surgeon for the US Army Special Operations Command.

Figure 1. A study volunteer spends the first minute in the wind tunnel with his goggles on.

“If a soldier’s goggles become dislodged during freefall, his exposed eyes are subjected to 120-mph windblasts.”
WHY THE CONCERN OVER LASIK FLAPS?

Commanders at the advanced training schools in the special operations arena are so concerned about LASIK patients’ having flap complications because these units deploy very small numbers of soldiers who are often accompanied by a single medic who does not have the equipment or training to differentiate between a corneal abrasion and a LASIK flap complication. A complication such as a flap wrinkle could potentially necessitate evacuating the soldier, a feat associated with an assortment of logistical difficulties, such as how to scramble a medical evacuation plane into and out of a hostile or denied access area without drawing attention. The price for such a mission often runs many thousands of dollars, and medics must consider the risk of compromising a sensitive mission. LTC Barnes said, “The special operations arena is very different than the conventional Army, and with so many small groups of soldiers spread out in places like Mali, Ruwanda, or Iraq … it just doesn’t seem to make sense to ask a young medic armed with a pen light and fluorescein strips to make a strategic decision on a potential flap injury. If the soldier had surface ablation, there is no flap to worry about.”

“The situation with LASIK in the non-Special Operations soldier is quite different,” explained LTC Barnes. “The USA SO C preference for surface ablation is not necessarily applicable to the conventional Army.” He further stated, “In comparison, a deployed Army division often has 15,000 soldiers or more, accompanied by a large medical staff with dedicated evacuation channels and assets. The decision on eye injuries is shared by those with greater specific training, perhaps even division optometrists or attached ophthalmologists.” This explains the greater acceptance of LASIK patients in the general Army population. However, Army recruits still have to apply for a waiver if they have undergone refractive surgery, as do all training school applicants. The process for waivers with PRK or LASEK is relatively simple, but because LASIK surgery is currently under study protocols for many training schools, obtaining a waiver for this procedure is more involved.

LASIK FLAPS DURING FREEFALL

The study conducted by LTC Barnes and colleagues was a multiphase trial. The first phase involved LTC Barnes’ attending the military freefall school. The Lieutenant Colonel underwent 1 week of wind tunnel training followed by 3 weeks of jumping out of airplanes in order to better assess the environment of this Special Operations training school. The second phase of the study required LTC Barnes’ convincing the USA SO C generals in charge of training to allow him to recruit military subjects who had undergone LASIK surgery to voluntarily expose their eyes to the wind effects of freefall training.

The military has a vertical wind tunnel at Fort Bragg, North Carolina—a $6 million, multistory building with propellers that can generate winds of between 120 and 160 mph. Soldiers who attend this Special Operations school spend the first week of the 4-week training program “flying” in the wind tunnel in order to learn the effects of body positioning and movement in a more controlled environment. In this controlled setting, if something had happened to these volunteers’ LASIK flaps, the wind tunnel could have been quickly shut down.

Although LTC Barnes and the other investigators were surprised when 55 to 60 military personnel volunteered for this study, they did not have time to test them all. The study involved 12 soldiers who had undergone bilateral LASIK and 12 soldiers who had no history of refractive surgery to serve as controls. The 12 LASIK volunteers’ surgeries occurred between 7 and 60 months prior to the wind tunnel flights (mean 25.6 months).

Each subject spent approximately 2 minutes in the wind tunnel (1 minute with his goggles on [Figure 1] and 1 minute with his goggles off, gazing down into the windblast [ Figure 2]). “In reality, paratroopers would not stare down into the wind if their goggles became dislodged; they would likely look away from the wind.
blow and squint or close their eyes,” said LTC Barnes. “For the purposes of this study, however, we wanted to create the worst possible scenario. The freefall instructors were in the wind column with these soldiers making sure that they kept their head down and eyes open after their goggles were removed.”

**POST-WIND TUNNEL RESULTS**

The investigators performed extensive statistical analysis on the study subjects. Before the soldiers’ wind tunnel flights, LTC Barnes performed a manifest refraction, slit-lamp exam, IOP measurement, and corneal topography on each volunteer, and he conducted similar examinations/measurements after the “flights.” LTC Barnes stated, “We did not find any dislocations or other trauma to the LASIK flaps. The LASIK group did not differ from the nonsurgical group of participants in any of the categories, which was a fairly significant finding. No significant change occurred in the participants’ visual acuities from pre- to postflight, either among individuals or between the groups, and we found the same results with their IOPs, spherical equivalents, astigmatic cylinder and axis, corneal powers, and asphericities.”

Each soldier completed a questionnaire after the wind tunnel flight regarding dryness, irritation, blurring, and other significant factors. Another question asked the participants whether they would have felt able to complete the mission if they had been participating in an actual parachute jump. All the participants in both groups indicated that they experienced blurring and dryness in their eyes during and immediately after the flight, but none felt that the conditions compromised their ability to perform their mission. Importantly, the flights did not affect these patients’ visual acuities, prescriptions, slit-lamp examinations, or flaps.

During the third phase of the study, the volunteers will complete the 3 weeks of freefall parachuting from Army planes. LTC Barnes indicated that, to date, “only one participant has completed the study. He had no problems with his LASIK flaps after parachuting, and we do not anticipate that any of the other participants will, either. I believe that the wind tunnel is the most traumatic part of the study, and if the volunteers experienced no complications at that time, then they likely will complete the parachuting without incident. Of course, we exit the plane in groups and it is not unusual to be kicked, elbowed, or kneed, and it is not hard to imagine that such events could have an adverse effect on a LASIK flap.”

**CONCLUSION**

Based on these initial results, the Army Special Operations Command has considered accepting selected soldiers into the special operations training schools after LASIK surgery. USA SOC commanders still prefer surface ablation in their soldiers and will continue to favor it if a soldier has an option between the two procedures.

“Because the military now offers refractive surgery to its soldiers, USA SOC policy is that its ‘action guys’ have PRK/LASEK unless the soldier has a clinical/medical reason to have a LASIK procedure,” said LTC Barnes. Nonetheless, the initial results of this small study seem to suggest that soldiers selected for the special operations arena who have previously undergone LASIK may be able to withstand the rigors of military freefall training.

Captain Schallhorn continues to research LASIK patients’ performance with underwater operations/SCUBA. He and LTC Barnes are exploring a combined study approach involving the Green Berets and the Navy Seal training programs.

LTC Scott D. Barnes, MD, is the Chief Fellow with the Cornea and Refractive Surgery Service at the Massachusetts Eye and Ear Infirmary in Boston. He may be paged at (617) 523-7900; or e-mailed at scott_barnes@meei.harvard.edu.