What Laser Vision Correction Means to the Military...

Soldiers, Sailors, Airmen, Marines

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The presenter has no financial or proprietary interest in any material or method mentioned.

The views expressed in this presentation are those of the presenter and do not necessarily reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government.
Military’s Demanding Visual Requirements

- Aviation
  - High performance flight
  - Aircraft carrier landing
  - Unique optical devices
- Special Operations
  - Diving
  - Parachuting
- Night vision devices
- Weapons scopes
- Chemical / biological personal protective gear
Utility / Impact of Laser Vision Correction

- Improved functional vision
- Contact lens wear actually prohibited while deployed to Iraq, Afghanistan and Korea
- Lower risk for casualties
Lower risk of casualty with LASIK vs contact lens wear

From Oliver Schein, MD, MPH of Johns Hopkins University's School of Medicine


- Cumulative annual risk of infection with contact lens wear is 18/10,000 (0.18%).
- Cumulative annual risk of infection following LASIK is 1/2,000 (0.05%).
- Therefore, the risk of infection is 180 X greater with contact lenses than with LASIK over the course of a lifetime.

From the ASCRS Cornea Clinical Committee:

- In 2007, there were 2 cornea transplants for infection following LASIK vs 55 transplants for infections related to contact lens wear.
Yearly Spectacle Requirement

Prescription (diopters spherical equiv)

Potentially treatable

>100,000/yr
Laser Vision Correction Research / Clinical Trials Conducted in the Military

- 45 studies performed to date
  - 15 under Investigational Device Exemption (IDE)

- Goal is independent evaluation of LVC
  - Specific issues addressed by military research:
    - Quality of vision
    - Visual recovery
    - Environmental issues related to LVC
      - Aviation
      - Diving
      - Special Operations
    - Expanded parameters of LVC
    - Latest technology
Results of Studies

- **PRK in Naval Aviator Study**
  - \( n = 785 \) aviators

- **Laser Comparative LASIK Study**
  - \( n = 480 \) patients

- **Satisfaction analysis**
  - \( n = 1,200 \) patients

- **Night Driving Study**
  - \( n = 21 \) patients

- **LASIK Flap Stability Study**

- **LASIK in Naval Aviator Study**
  - \( n = 30 \) aviators
PRK in Naval Aviation
Uncorrected Visual Acuity - 6 months
(n = 785 aviators)
PRK in Naval Aviation
Change in Best-Corrected Visual Acuity - 6 months
(n = 785 aviators)
PRK in Naval Aviators
Summary of Complications

- **Corneal erosion – single case**
  - Incidence 0.1%

- **Late Haze**
  - Visually significant
    - 7 eyes of 4 aviators
      - Temporarily not correctable to 20/20
      - Quality of vision complaints
  - Incidence 0.5%

- **Scar – single case**
  - Corneal infection following PRK
  - Loss of best-corrected vision to 20/32
  - Returned to full flight status
  - Incidence 0.1%
PRK in Naval Aviator
Cumulative Flight Experience

- **>48,000 flight hours** accumulated within 6 months following PRK

- **>19,500** landings since PRK
  - • 2,622 carrier arrested landings

- 100% of aviators treated to date have successfully returned to full flight status
Laser Comparative Study
Uncorrected Visual Acuity - 1 Month
(n = 960 eyes)

No significant differences
Laser Comparative Study
Change in Best-Corrected Visual Acuity - 6 Months
(n = 960 eyes)

No significant differences
Keratome Comparison Study
a prospective, comparative interventional clinical trial
(n = 600 eyes)

- 2 Surgeons
- 1 Excimer laser
  - Wavefront-guided (Custom)
- 3 flap techniques
  - 2 Mechanical
  - 1 Femtosecond
Keratome Comparison

Uncorrected Visual Acuity – 1 Month

(n = 600 eyes)

All keratomes safe and effective
Keratome Comparison

Change in Best-Corrected Visual Acuity – 3 Months

(n = 600 eyes)

All keratomes safe and effective
Overall Satisfaction Following LASIK

(n = 1,200 patients)

98.1% Satisfied
1.9% Dissatisfied
Change in Night Driving Performance

with Glare After LASIK

Preop to postop change in feet

-30
-20
-10
0
10
20
30
40

Detection

Identification

Improved after surgery
Significant Change of Night Driving Performance

Preop-postop Δ greater / less than - 44 feet
Significant Change of Night Driving

Det ID Det w/glare ID w/glare

Loss No Change Gain

Preop-postop $\Delta$ greater / less than - 44 feet
Is the flap stable?
Flap Stability Study

LASIK in Naval Aviators
Uncorrected Visual Acuity – 2 weeks
(n = 30 aviators)
LASIK in Naval Aviators
Change in Best-Corrected Visual Acuity (1 month)
(n = 30 aviators)

No eye is worse than 20/20 UNCORRECTED
LASIK in Naval Aviators
1 month questionnaire

Do you feel LASIK has helped or hindered your effectiveness as a Naval Aviator...

Would you recommend LASIK treatment to Naval Aviation...
DoD Refractive Surgery Centers

Warfighter Refractive Surgery Program

20 total centers: 8 Army, 7 Navy, 5 Air Force

Map of the United States showing the locations of the 20 total centers: 8 Army, 7 Navy, 5 Air Force.
DoD Laser Vision Correction
Cumulative Total

In Thousands

Air Force
Navy
Army

FY00 FY01 FY02 FY03 FY04 FY05 FY06 FY07
Demographics of Laser Vision Correction Patients in the Military

- **Age**
  - Average age of military LVC patient: 34
  - Average age of civilian LVC patient: 37
  - Age range: 18 - 60

- **Gender**
  - 82% male, 18% female
  - 50:50 gender ratio in civilian LVC

- **Refractive Error**
  - Range: +6 to -13 diopters
Laser Vision Correction in the Military

Number of treatment
- >224,000 procedures performed in the military to date
  - Air Force: >51,000 procedures
  - Army: >100,000 procedures
  - Navy: >73,000 procedures

Impact
- Laser Vision Correction is approved for ALL aspects of military service, including aviation, special operations and support personnel
- LVC is approved for NASA astronauts
- Surgery is not without risk
Relative Risk of Laser Vision Correction in the Military

- Only 1 DoD medical disability retirement related to LVC to date
  - Medical board due to quality of vision complaints despite 20/20 uncorrected vision
  - Rate of 1:112,500, or 0.009%
Summary of US Military Warfighter Laser Vision Correction Program

- LVC has been overwhelmingly successful in the military, in ALL job types
- LVC has shown tremendous operational benefits
  - Approved for military aviators, divers, special operations personnel and NASA astronauts
- LVC has been proven to have extremely low risk
  - Likelihood of disability is 0.009%
- Satisfaction is incredibly high in service members receiving LVC
  - Enhances job performance
    - 95% improvement in effectiveness as Naval aviator
    - 100% of treated Naval aviators would recommend procedure to fellow aviators
Summary Perspective

- I have had the privilege of treating and then flying with the first F/A-18 Hornet pilot to have refractive surgery and who then landed on an aircraft carrier. As we flew toward the ship that night, he relayed to me that he had never seen the carrier and the landing lights better. I took great pride in that fact, not only because I was in the jet at the time, but because I had provided a service that permanently improved his ability to perform this visually demanding task.

- Since this inaugural case, we have treated more than 1,000 aviators, several of whom I have flown with. If I did not personally believe that LVC was in their best interest, I would not be treating anyone on active duty with LVC or advocating that it be done in the civilian community.