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Journal Scan

David J. Tanzer, Tyson Brunstetter, Richard Zeber, et al., Laser in situ keratomileusis in United States Naval aviators, *J Cataract Refract Surg*, 39 (2013) 1047–1058.

Laser treatment of refractive errors has become a predictable and safe therapeutic modality among the civilian population. However armed forces, the world over, have been cautious in adopting these procedures for military personnel due to the peculiar occupational environment especially in military aviation. The stability of the LASIK flap in the combat troops during contact sports and occupational trauma has always been a matter of concern.

The US armed forces permitted surface ablation (Photo-refractive keratectomy or PRK) for its personnel in 1996 followed by conventional LASIK (using metallic blade for flap creation) in 2007 and have a large follow up of such military personnel. An astounding 50,000 refractive surgical procedures are performed in the US military per year. Femtosecond laser assisted (bladeless) refractive surgery has been introduced in the recent years and has certain obvious advantages over conventional LASIK. The issue of permitting and performing refractive surgery in naval aviators, who represent one of the highest value personnel assets in the military, therefore has always been, literally, a million dollar question. This landmark paper seeks to answer this question.

This article is based on a prospective non-comparative 2-site study of 633 eyes (548 with myopia, 60 with mixed astigmatism, and 25 with hyperopia) of aviators who underwent these procedures in the US navy. All the procedures were done in service LASIK centres after the aviators met certain qualifying criteria like age more than 21 years and a stable refraction for one year. The patients underwent ophthalmological evaluation before and after the procedure including vision and higher order aberration assessment. Three groups were formed based on the type of refractive error. A questionnaire based patient satisfaction survey was also done at three months. The corneal flap was made using femtosecond laser and wave front guided ablation using excimer laser was done upto 8 mm zone. The efficacy of procedure was assessed by improvement in unaided visual acuity, aberrometry profile and patient satisfaction. The unaided vision was 6/6 or better in 98.3% of eyes with myopia and mixed astigmatism at all postoperative visits and in 95.7% of hyperopic eyes 3 months postoperatively. Of the patients, 95.9% said they believed that LASIK had helped their effectiveness as naval

aviators and 99.6% would recommend the same treatment to others. The rapid visual recovery and excellent aberrometric outcomes obtained in the study indicate that this procedure is safe and effective for naval aviators.

The strong points of this study is the prospective design and large number of cases. However there is no comparison group and therefore no randomization and a short follow up of three months which definitely reduces the strength of the evidence. The study group is not homogeneous as the group naval aviators in this study includes both pilots and non-pilot aircrew as clearly elaborated by the authors. It has not been mentioned whether all pilots were fighter pilots or mix of transport, fighters etc. The inclusion criteria seem rather liberal at -11.5 D myopia and 3.5 D of astigmatism. The visual outcomes among hyperopes are expectedly poorer compared to the myopes. The real issue in military flying is the effect on the LASIK flap stability under high G manoeuvres of fighter flying which has not been addressed by this study. Effect of high G forces and ejection simulation have been studied on animal models without adverse outcomes though there have been reports of traumatic flap dislocation in active duty military personnel. Since the main concerns of flap based refractive surgery among aviators, especially fighter aircrew are related with flap stability during high G stress and ejection, it would be worthwhile to have follow up data on these cases, in the eventuality of an ejection.

Nevertheless the safety and efficacy of LASIK in achieving early re-fighting of naval aviators both pilots and other aircrew has been highlighted.

Modern LASIK surgery has been found to be a safe and effective procedure for aviators and astronauts. Indian armed forces have permitted laser refractive surgery since 2005 in certain categories of personnel. Sufficient safeguards in terms of age, corneal thickness and refractive error have been incorporated. Availability of data from such articles and technological advances justifies the use of LASIK among our personnel and the need for extending the benefit to a wider subset of personnel. Based on the information contained in this article and taking into consideration all other factors, the Indian Air Force has recently started permitting candidates to join service in all branches including fighter flying.

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