

# Advantages of Eye-Tracking Technology upon Surgeries and Vulnerability of Surgical Training

**Type:** Editorial

**Received:** February 08, 2023

**Published:** February 12, 2023

**Citation:**

Rima Benatoui., et al. "Advantages of Eye-Tracking Technology upon Surgeries and Vulnerability of Surgical Training". PriMera Scientific Surgical Research and Practice 1.3 (2023): 01-03.

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Eye innervation analysis, has showed the multiplicity of nerves and the diversity of their particularities. The optic nerve "second cranial nerve" innervated retina, the sensory cells. The third cranial nerve; the oculomotor nerve play a major role in extrinsic motility of eyeball, while the pathetic nerve responsible for the extrinsic motility of the eye. Lacrimal nerve innervated cornea, it emerged from Willis ophthalmic nerve that constitutes a branch of trigeminal nerve. Retina and cornea deemed fundamental when studying eye surgery and the complexity of their innervations with multiple nerves from different sources makes the eye surgery more complex. It is evident that, eye diseases in case of neurodegenerative diseases exhibited a large spectrum of symptoms, as Apraxia of eyelid opening, increased blink rate, decreased spontaneous blink, decrease in corneal sensitivity and deposition of phosphorylated a-synuclein in retinal ganglion cells.

It has revealed that autonomic innervation represents 85-90% of innervation faced to sympathetic one. The mastery of the unmyelinated C fibers than faster conductors A $\delta$  fibers, gives the eye more sensitivity as only hyperosmolarity or heat. In dry eye disease, even the inability of tear production, the stimulation of receptor neuro-activator as nicotinic acetylcholine receptor, or treatment via nasal route, alleviated this infirmity. In other hand, tear film homeostasis could be repaired via stimulation of parasympathetic fibers of trigeminal nerve.

The surface of eye and lacrimal glands are exposed to air infection, and viruses of hand contact, which increase the risk of infection that land first the tear film. The resilience of tear film protect corneal and conjunctival epithelium, but its lipophilicity increases possibility of viruses to access the ocular surface. The prevalence of vision impairment has taken various origins like exaggeration of electronic surfaces use, some kinds to environment toxicity, chronic diseases and after surgical neuropathies as it could take birth even earlier as preterm birth. As high levels of glucose induced neurotoxicity, glia cells intervenes via glutamate, chemokines and pro-inflammatory cytokines, the retina of diabetic retinopathy is a thickening in retina, and cornea is useful for identifying neuropathy, as shown a deficiency in number of nerve's fibers. About 57% of people with Down syndrome have visual problems, and analyzing visual acuity considered as the basis of an eye exam. Age-related macular degeneration, glaucoma, uncorrected refractive error, cataract, and diabetic retinopathy are the most abundant eye diseases.

Many studies interested in developing eye drops holding drugs with high solubility in water and high retention on ocular surface, to repair the defects of corneal epithelium; and to prevent surgery laser usually used in high intraocular pressure and ocular pain. In other hand, while treating glaucoma, the drug subsistence remain a discomfort matter for the patients, as it guarantee only a short term eye protection; eye lenses have been proposed due their longer protection referring to higher rates of drug absorption they offered and their substitution into a drug source for the eye's anterior chamber and the corneal layer.

Between embarrassing health's conditions of both males and females, males are prone to retinal detachment, and females are subject to inflammation. Dry eye disease is marked with high levels of inflammatory mediators IL-1 $\beta$ , IL-6, IL-10, IFN- $\gamma$ , TNF- $\alpha$  and 'matrix metalloproteinase' MMP-9 mRNA expression in tears. During pregnancy, it has noticed that disorders of ocular as inflammatory demyelination and autoimmune disease provoking disorders of intraocular pressure, and falling blood pressure in cornea. While, thyroid eye disease begins with an inflammation until the fibrotic phase, this autoimmune perturbation when involved the extraocular muscles induce strabismus, the steady progress of the surgery of the horizontal strabismus, estimated with the motor and sensory success accomplished with adjustable suture. The surgery of strabismus with thyroid eye disease expected as successful with eye movements and senses.

Patients practically undergo magnetic resonance imaging (MRI) and computed tomography (CT), to disclose neuro-ophthalmological and orbital conditions of the eye, via assessing orbital mass/malformation, abscess or thyroid eye disease, or identify white matter lesions inducing neuromyelitis optica spectrum disorder. Thyroid hormones as exerted a crucial role on neuro-sensorial development of the eye, the volume of the eye measured via a morphometric and stereological studies of the retina myelination and glial development of the optic nerve, remain crucial in eye diseases diagnosis. Strabismus identified using multiple technics as synaptophore, alternate cover-uncover test with or without prism, and the Krinsky test. Keratoconus, diagnosed by corneal tomography, this disease could aggravated with collagen or genetic alterations.

Recently, doctors' decision between pharmacological treatments and surgeries became obvious, and its success or failure are prejudged. Strabismus required a surgical intervention, but amblyopia could be corrected pharmacologically. In appropriate cases to surgery, the blind painful and neoplasms, the eye removal is lifesaving, but in other cases as glaucoma, trauma and inflammation surgery remain just a failure of treatment [1]. In some cases, like the pathology of acute angle-closure glaucoma, the doctors should immediately intervene to prevent vision loss and ophthalmology consultations to avoid post-operative complications. During surgery, the vital signs are mainly important to ensure the smooth completion of the operation like blood pressure, pulse rate and respiratory rate. For completing their job, the doctors would better prescribe a convenient treatment after surgery, as wound healing became a main step in surgical; a pH value close to 7, and Polyethylene glyco-lysozyme considered as a tissue adhesive after corneal surgeries with assured biosafety proven by absence of cytotoxic effects on epithelial cells, neither conjunctival epithelial cells.

Interested in the movement of the eye from a departure point to another one, and as the arrangement of the eye identified with three fixations, spatial location, assessment of the saccade, and its landing point. One arrangement succeed in estimation of a shorter saccade amplitudes, and doctors keep as well the gaze necessary in the surgical interface. Recently, the importance of eye tracking use in surgical research has emphasized, spread among surgeons and used as an inspector of surgeon's cognition, attention and the most abundant use while using laparoscope and the ability of Eye-tracking technology (ET) to precise the appropriate zoom according to the distance between the surgical monitor and the pupil. A study about eye-gaze data indicated the ability of an algorithm with a minimum of information sources and maximum of fault tolerance, to ameliorate the conditions of surgical activities and enrich their methods, while using instruments for tracking signals, which assure the best surgical condition [2]. ET reduces errors in real time of examinations and surgical operations, in a jumbled environment, and supervising key elements utilization accurately as well, during clinical anatomy. ET work as a vigil supervisor while monitoring surgical interfaces, laparoscopic zoom, validity of content, vigilance, fatigue and individual vigilance alike the vigilance of the whole team, and steering them with a feedback. ET technologies adding a mark of specification, limitations confronted by glasses to avoid data loss and algorithms used for assessment of gaze metrics [3]. To resume teams of medical and biological research have been debt to the equipment, and technologies performing their methods of work.

Stress and anxiety of the surgery room, and careless of nurses in some countries, as the eye surgery could be realized with mere local anesthesia, whence the consciousness of the patient aggravated the sensation of fear. In order to earn the trust of patients, doctors work always harder to ameliorate the conditions and performance of their work. Trying to guarantee a safe hospital departure, doctors have developed a new method more secure for eye surgery before healing. To avoid long-term hospital stays and ensure eye protection in case the patient leave the hospital just after the surgery, the orbital rims of the eye have been sutured with a plastic eye shield, which accelerate the healing of operated open globe. Surgeons, to ensure a permanent healing of the injured globe fixed with the plastic eye shield during surgery, which offer extended protection even the patient careless of his health. To sum, fixation of a plastic eye shield during surgery relieves the doctor's conscience.

Surgical teams confirmed that a surgical simulator is required for the performance of residents' training, the generalization of surgical training of all residents will assure enhancement of competencies between residents, whilst, residents found difficulties in achieving within a time frame the residency program, which lead to a heaped surgical training in the last year. Such problems could only be solved with prolongation of the residency training, and providing simulator early in training to prevent a training end with least operations, which ensure professional teams in eye surgery with minimum errors.

Performance of daily life routines remain the key way to prevent ocular diseases as the healthy nutrition, and exerting sport preserving a healthy lifestyle, which lead to preclude vision deficiency, and constitute a main key to prevent inflammation.

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