

**THE EYES IN HISTORY – SOME EYE-OPENING OPHTHALMIC PRACTICES  
AROUND THE GLOBE****\*Dr. Ching Kay Li**

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**ABSTRACT**

This commentary is a written collection of ancient, contemporary and modern medical procedures and technology in human history involving the fascinating organ – the eyes. Relevant historical reports and articles were reviewed. The milestones provoke thinking of ophthalmic practice in academic, ethical and innovative ways, set by the origins of cataract surgery and prosthetic eye, the controversy of transorbital lobotomy to treat psychiatric patients, along with the new eye “super-glue” for globe rupture injuries.

**INTRODUCTION**

The sophisticatedly designed eyes render them one of the most intriguing subjects of studies throughout human history. There are numerous interesting and truly eye-opening practices involved in the study of the eyes, in the perspectives of cultures and customs, ailments and treatments, spirituality and superstition; from ancient oculus sinister (the “evil eye”), myokymia (eye twitching) to modern-day oculolinctus (eye licking). This article took a few glimpses into the river of the early times and explored the primitive technique of cataract surgery, the first artificial eye discovery, the “brutal” lobotomy through the eye socket for psychiatric conditions and the invention of an incredible sealant for ruptured eye globes in battlefield soldiers.

**Introline**

Collections of ophthalmic practice in a historical perspective that are unknown to many.

**Pre-historical cataract extraction**

Cataract surgery is a most commonly performed ophthalmic surgery in the world. Its history has several interesting twists. The earliest technique “couching”, applied around 800BC by the first known ophthalmologist, Sushruta, an Indian practitioner of healing, involved the forced, repetitive pushing of the “opaque phlegmatic matter”, i.e. the cloudy lens with curved needle.<sup>[1,2]</sup> In the era without anaesthetics, the lens was pushed out of the visual axis to the posterior chamber of the eye. Post-operative care constituted irrigation with breast milk, yolk-rinsed wool and rose essence applying directly onto the eye, and the other eye would also be covered in order to stop ocular movement while the operated eye was recovering. While secondary infection and glaucoma were often complicated from this

procedure, some remote and deserted parts of the world still remain such practice in recent times given its success rate around 30%, and if not operated, the blinding rate is 100%. Until 29AD around the Roman era, the Persian physician Muhammad ibn Zakariya al-Razi came up with bronze suction equipment to extract the cloudy lens. In the description of his procedures, he deployed a surgical assistant for oral suction, whose “lung capacity” must be “extraordinary” to suck the lens out of the eye.<sup>[2]</sup> It was not until some two thousand years after the “couching” technique did the French doctor Jacques Daviel invented the extra-capsular extraction in 18th century, subsequently started the journey of modernising the cataract surgery performed so commonly today.<sup>[1]</sup>

**Medieval eye implant**

Fast tracked to medieval times, it was found that artificial eye is no new technology. In 2006, archeologists in Iran discovered a female skeleton over 5000 years ago with a fitted eye prosthesis in the Burnt city, a mysterious, dominant civilisation and important crossroads between the East and the West in ancient Persia.<sup>[3]</sup> Careful examination and archeological recovery revealed the left eye prosthesis had been implanted into the eye socket, with its material made of tar and animal fat, in its eye-resembling half spherical shape. The eye’s surface was hand-crafted with radial and linear patterns, a central circle resembling the iris; its residual golden strings attached to the orbit with implant imprint and the skull showed signs of cranial surgery. After detailed reconstruction and clues from its surrounding objects, speculation had that the artificial eye was worn ante mortem by a young woman, probably a princess or some priestess personnel, aged in her 20’s or 30’s.<sup>[3]</sup> This was then recorded as the first artificial eye, indeed first body

organ prosthesis, in human history. Adding to the mystery, later in 2008, an older artificial eye was seen in the skull of a man around 40s, resided about 7000 years ago. Being found in Castellón Province, Spain, this older eye was much primitive in its design and structure compared to the Iranian woman.<sup>[4]</sup>

### Modern “soul surgery”

Then during the times of industrialisation, 19th and 20th centuries presented many advancements in medicine as biomedical sciences and sophisticated surgical techniques set the scene at historical stage. In the 1930's, the controversial lobotomy, became a popular surgical procedure separating the neuronal connection between prefrontal cortex to the rest of the brain; the justification was prefrontal cortex was believed to control emotions and mental state. The most advanced form of this procedure developed around 1930's and 1940's, where the “orbitoclast”, a sharp, ice-pick resembling instrument, was inserted into the eye socket with an aim of treating mental health conditions.<sup>[5,6]</sup> During those days, the booming success of industrialisation in some parts of the world was followed by the Great Depression. In the United States, this worst recession in economy also made it the “big state” of mental health problems with the large number of unemployment and significant financial insecurity having led to an unprecedentedly high rates of depression, substance abuse and suicides, melancholy, psychotic disorders.<sup>[6]</sup>

Invented in Portugal by neurologist Dr Antonio Egas Moniz (Nobel Prize Winner for Medicine in 1949) and colleague Almeida Lima, their US counterpart psychiatrists Drs Walter Freeman and James Watts modified the procedure.<sup>[5,6]</sup> Within several years, it evolved from laborious trephination in rooms with specialised set-ups, to a simple transorbital lobotomy that can be performed within 10 minutes in the office. Such procedure dramatically improved overcrowding problems in mental health facilities at the time as most patients treated reported improvement in mental state. In the US, there was over 50,000 people treated, including Rosemary Kennedy, the sister of former President Kennedy, whose indication was “moody and rebellious” in her teenage years and was rendered intellectually disabled after lobotomy. Some of the people treated with such technique developed complications and died.<sup>[5,6]</sup> A follow-up study by Miller in 1967 collected data a decade after 150 patients who had lobotomy performed, 67% patients had not required psychiatric admissions, 26% had relapsed illness, significant complications were epilepsy in 12% of patients and 116 of these sustained personality defects, e.g. having difficulty learning, planning and were inflexible to life changes.<sup>[7]</sup> Lobotomy was thought to alter cerebral regulation of intracranial pressure, rendering many with black eyes after the procedure; there was no way in finding out the long term ophthalmic sequelae then.<sup>[8]</sup> The procedure was considered unethical, extreme and became problematic in many other places, namely Ireland being one of the

first.<sup>[5]</sup> It was eventually abandoned as non-invasive, less complicated antipsychotic medications and electroconvulsive therapies were developed.<sup>[5,6]</sup>

### Contemporary “super” eye glue

The 21st century welcomed a more benign and ethical approach towards scientific endeavour than the earlier centuries. Ophthalmic research also takes on the ride along with the booming development of science and medicine. As latest research in recent months, a special hydrogel material made of PNIPAM (poly-N isopropylacrylamide) had been developed for penetrative eye injuries by the translational medical team at the University of Southern California.<sup>[9]</sup> Such injuries are commonly seen in the battlefields where soldiers are exposed to bullets that potentially fly from unexpected directions, and the fields often present difficult logistics in their challenging environment, temperature, travel time and preservation methods for surgical materials. As a result, PNIPAM was developed as a temporising agent to prevent the loss of intra-ocular pressure in globe ruptures which require urgent surgery. The liquid form of PNIPAM in cool temperature is used as an “eye glue” for application on the spot of rupture in the eye. As soon as it touches the warm, heated surface of an eye, it turned into a semi-solid strong adhesive which “patches” up the eye globe.

Additionally, designed specifically for war zone logistics, the chemical calcium ammonium nitrate is put into a syringe chamber that carries the “eye glue”; when water is poured into the chamber, temperature cools and turns PNIPAM into the “glue” liquid form for its readily use. Its physical reaction is within seconds, and conveniently it is non-toxic to the eye. By temporarily “sealing” the eyeball, the wounded soldiers would have time to be transported to an operating site, allowing for a time critical operation to be delayed. When they are ready for surgery, the ophthalmic surgeon simply pours cool water and the sealant liquefies, and the surgeon would be able to repair the globe appropriately. This is anticipated to significantly reduce the chances of radial eye removal surgery, i.e. enucleation, as well as to increase the restoration of eye sight for such injuries. Experiments with rabbit models showed considerable improvement in wound healing, and at 30 days, with the absence of inflammation or toxicity; its use can be anticipated in human trials this year.<sup>[9]</sup>

Conclusively, this article depicted some of the interesting preceding historical stories that form the basis of our medical practice today, browsing through the barehanded cataract lens extraction, sensational artificial eye implant to the “soul-fixing” transorbital lobotomy for mental ailments as well as the transformational eye “glue” that prevents eye and sight loss. Being an innovative branch of medicine and surgery, ophthalmology continues making steps with its exciting developments, such as new multifocal design of intraocular lens for cataract surgery, stem cell therapy for glaucoma patients, laser

crafting and transplant for corneal disease and the investigational use of specialised angiography with optical coherence tomography for retinal vascular problems and many more.<sup>[10]</sup> It is important we are reminded that the above snippets of advancement in ophthalmic science and medicine only represent a small piece of the jigsaw puzzles in the whole of vast, gigantic and inspirational leaps of medicine and its discovery of human diseases and treatments throughout history. As humans, medicine, with its art and craft, will continue going far as the human history evolves, advancing in discoveries, ethics and applicable technology.

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