

Editorial

FROM SPECTACLES TO LASER; A PARADIGM SHIFT

The use of glass to magnify image was reported by an Arabian scientist, ibn al-Haytham. He mentioned this in his book, written in 11th century. The name of his book was Alhazen's book of optics. After hundred years this book was translated from Arabic to Latin. It took another hundred year to invent spectacles. This step of invention is attributed to an unknown Italian scientist. But that unknown Italian scientist kept this art to himself and sold glasses and did not share it with his colleagues.

A scientist of Pisa, Alessandro della Spina, started making eye glasses in 1313 on commercial basis. The *Ancient Chronicle of the Dominican Monastery of St. Catherine in Pisa* records: "Eyeglasses, having first been made by someone else, who was unwilling to share them, he [Spina] made them and shared them with everyone with a cheerful and willing heart". In the same era the sale of glasses started in the Venice too. Few anthropologists claim that eye glasses were also in use in India in those days, rather earlier than Europe. The glasses were used initially to correct Presbyopia and later they were used in Myopia.

An American scientist Benjamin Franklin was the one who invented bifocals, because he himself was myopic and presbyopic. The glasses for the correction of astigmatism were first introduced by a British in 1838. His name was George Airy and he was an astronomer. Later different types of mounts were produced to rest the glasses in front of eyes. After decades of alterations modern spectacles designs with minor variations in shape, color and material were introduced. Although the acceptance of spectacles was universal yet many people found it difficult to use particularly during outdoor activities and in hot and damp weather conditions. Moreover women found it to be cosmetically unacceptable. This led to the introduction of contact lens.

The idea of contact lens was conceived by Leonardo DaVinci in 1508. This idea came to his mind when he was studying the accommodation of human eyes and found that if the eyes were submerged in a transparent bowl of water, the vision could improve. In 1887 a German glassblower designed the first contact lens that very difficult to tolerate. The designs and materials were constantly improved till 1960s, when rigid lenses were commercially available. These rigid lenses were made of PMMA material. People using these lenses were satisfied with the vision but the complaints of intolerable irritation was very common. There was also higher incidence of corneal abrasions. To improve the oxygen permeability through the lenses, the scientists designed gas permeable lenses. Another breakthrough was the introduction of soft contact lenses. These lenses dominated the market due to their soft material and convenience to use. But all these products have the major disadvantage of being used on the corneal surface, which can damage the cornea. Secondly inconvenience of removal and reinsertion. Few users also develop allergy to the lenses or solution and it becomes impossible for them to use these lenses. In the last two decades Excimer laser photorefractive surgery became popular.

As most of the refractive power of the eye is contributed by cornea. It was assumed that altering the curvature of the cornea can overcome the refractive errors. The Russians invented a technique "radial keratotomy" in which radial incisions were applied to the peripheral cornea. It was a promising procedure but within a few years, to increase the accuracy of procedure, excimer laser was introduced to shave off the anterior surface of

cornea . This increased the visual outcome of refractive procedure. It also has its sideeffects Corneal nerves are damaged and the patients suffer from dry eyes. In another technique LASIK and ReLEXsmile , the surface remains intact and the corneal tissue is removed from deeper layers.

From the use of a condensing glass which was introduced by Ibn al-Haytham to the minimally invasive laser surgery, the refractive procedures are constantly improving. But still, the spectacles are the most acceptable and widely used.

Aamir Ali Choudhry
Professor of Ophthalmology,
University Medical & Dental College,
Faisalabad.

REFERENCES:

- Ibn al-Haitham--father of optics and describer of vision theory. Med Arh. 2008;62(3):183-8
- Frederiksberg C. Danish Ophthalmology - from start to 1865. Acta Ophthalmol. 2016 Mar;94(2):205-9. doi: 10.1111/aos.12775.
- Morgan PB¹, Efron N. The evolution of rigid contact lens prescribing. Cont Lens Anterior Eye. 2008 Aug;31(4):213-4.
- Gelvin JB¹ An introduction to excimer laser photorefractive keratectomy. J Am Optom Assoc. 1990 Nov;61(11):842-7.