Evolution and history of contact lenses

Dear Sir,

Originally, the concept of contact lenses was an idea of Leonardo da Vinci (1508) who thought about neutralizing the irregular surface of an eye by means of a regular surface full of water, thus substituting the cornea with a new refraction surface. In turn, Descartes (1836) designed a pre-corneal lens without direct support in the eye with a water interface with the same purpose. The first set of devices appeared in the late nineteenth century. Fick (Zürich, 1888) manufactured a prosthesis that he called “contact Crystal” which he utilized to correct corneal irregularities, placing said crystal over the cornea and the sclera. This glass had power to correct refractive errors. In turn, Kalt (Paris, 1888) was the first to utilize contact lenses as “a pressure treatment for keratocones”. Müller (Kiel, 1888) coined the term “corneal lenses” and was able to endure on his own eye (he was myopic, −14.00 diopters) one of these contact lenses for up to 30 min.1,2

For over 2 decades, the work of these pioneers was considered as an interesting but hardly practical idea. Glass contact lenses were difficult and expensive to manufacture and the weight and thickness made them virtually unbearable. Occasionally, the edges thereof caused ocular damage and glass broke easily. In 1936, the first contact lenses were made with translucent polymethylmethacrylate in the USA (Rhom & Haas). These plastics could be lathe cut to produce consistent and easily reproducible lenses. In addition, the lens was much thinner and therefore the intolerance gave way to the possibility of comfortable use. In 1940, T. Obring was the first to manufacture scleral contact lenses with transparent plastic. We must also credit Obring with the idea of examining the lens utilizing ultraviolet fluorescein light. In 1947, K. Tuohy was the first to manufacture contact lenses supported on the cornea instead of the sclera, having diameters of 11–12.5 mm and thickness of about 0.4 mm. G. Butterfield (1950) corrected some of the problems of the Tuohy lenses, adding peripheral curves to the internal surface in order to match the curvature of the cornea.3

All of the above achievements up to the 1950s were based on rigid and relatively waterproof materials. Before scientists understood the way in which the cornea received oxygen, they saw no need to find oxygen-permeable materials. In 1952, the history of contact lenses gave a turn with the development of hydrogel-type materials. O. Wichterle, a Czech chemist, realized that hydrogel was the perfect material for manufacturing contact lenses due to its high biocompatibility. However, the manufacturing procedure for making lenses with this material was not known until the development of the spincast centrifugal system. These new hydrogel lenses were completely different from the previous rigid ones because they contained water within a plastic matrix and therefore achieved a very important increase in comfort of use, together with allowing the passage of oxygen to the cornea. At any rate, the success of soft lenses was not immediate because they had to overcome a number of problems, including poor visual acuity and even some discomfort issues caused by their thickness despite the material they were made of.1,2

N. Gaylord developed a hybrid material, silicon acrylate polymer, which is more stable and permeable. At present, contact lenses continue to evolve and comprise a broad range of modern materials. However, one factor remains constant, which is that the contact lens must correct the refractive error...
in addition to being comfortable to use and causing the least possible adverse effects on the eyes.

REFERENCES


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