Introduction

Aberration is defined as the difference that exists between the ideal image that we would expect to see when luminous rays are refracted in the perfect optical system (Snell's law) and what is actually achieved. These differences are characteristic of each optical system and vary from simple defocus to highly aberrated wavefronts. Aberrations can be described quantitatively using Zernike polynomials, named after Frits Zernike, Dutch mathematician and astronomer**.** The term aberration derives from the Latin word ab-erratio, which means going off-track or deviating. [80]

Aberrations can be divided into two groups: chromatic and monochromatic. Until recently, essentially all ophthalmologists typically ignored higher-order aberrations for some reasons. They are normally so small that they have little effect on vision. There was no way to clinically measure these subtle refractive errors. Even if higher-order aberrations were significant and measurable, there was no practical way to correct them.

Modern eye care, especially refractive surgery, has changed this, and now higher-order aberrations are a clinically significant consideration for many patients, higher-order aberrations are now important to routine optometric practice, especially following refractive surgery, an increasing number of patients have experienced poor vision due to significant higher-order aberrations. In the course of reshaping the cornea to correct sphere and cylinder, refractive surgeries can inadvertently increase higher-order aberrations, now it is possible to measure higher-order aberrations, and clinical methods have become available to correct higher-order aberrations. [36]

A breakthrough in measuring and accurately calculating higher order aberrations of the eye was the use of wavefront sensing technology in ophthalmology field; Wavefront sensing is both new and old. In the clinical literature on ophthalmology and optometry, the first applications of wavefront sensing to refractive surgery and ocular disease appeared less than 10 years ago. [56] The fundamental principle by which contemporary aberrometers measure