

IOL CALCULATION WORKSHEET FOR POST REFRACTIVE SURGERY PATIENTS

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THE AUTHOR HAS NO FINANCIAL OR PROPRIETARY INTEREST IN ANY MATERIAL OR METHOD MENTIONED

The IOL calculation worksheet is downloadable at www.eyephysician.com.

The number of patients in the world that have had refractive surgery is in the millions and increases daily. Refractive surgery has been commonplace for almost two decades. As this group of patients age, the number of these patients presenting for cataract surgery will increase. The surgeon is confronted with a double fold dilemma. First, these patients have already demonstrated intolerance for visual handicap. Second, we as the surgeon are confronted with the task of restoring their vision with IOL calculations that are well known to be challenging in this set of patients. Several authors noted almost two decades ago the tendency for hyperopic overcorrections in these patients (1,2).

The reasons for this trend are twofold. First, the mathematical assumptions that standard keratometry and to some extent topography instruments use are not valid in post refractive surgery patients. In incisional surgery, the anterior and posterior curvatures are flattened such that the few points that a manual or automated keratometer measure do not reflect true central corneal dioptric power. Topography is better but certain mathematical assumptions made by topography machines render some inaccuracy. In ablative procedures, the relationship of the now flattened anterior surface of the cornea and unchanged posterior surface of the cornea lead to inaccurate optical assumptions that change the validity of the measurements. Additionally, irregular astigmatism and higher order aberrations from incisional and ablative procedures leads to inaccuracies on keratometric readings. Second, corneal power is used by many formulas – SRK-T, Hoffer Q, Holliday 1 and Holliday 2, to indirectly extrapolate effective

lens position. In eyes that have had myopic refractive surgery, use of corneal power underestimates anterior chamber depth and results in an IOL of insufficient power.(3)

The number of ways to calculate intraocular lens power in the setting of previous refractive surgery seems to expand with each month's publication.(4) As is the case when there are many choices, it is often a testament that none of the approaches are perfect. When a post refractive surgery patient presents to the ophthalmologist, often an article or two are pulled from a drawer, inefficiencies are incurred as one scours the article for the pertinent data needed, and anxiety would creep into the surgeon as he/she hoped that this article would lead to an accurate result in this patient that wishes spectacle freedom.

This flow sheet attempts to solve some of the time consuming problems with the post refractive surgery patient seeking cataract surgery. First it begins with a list of the data that is needed to the use formulas. This helps the surgeon delegate this time consuming task to staff. Second, several formulas are summarized in a short hand so that the surgeon can have multiple formulas calculated quickly.(5,6,7,8,9,10,11,12)

New advances in technology will hope to make the task of accurate IOL calculation in the post refractive surgery patient more accurate. The Holliday IOL Consultant software (13) is a commercially available software that contains programming for the post refractive surgery patient. The IOL master (Zeiss – Meditec) has in its newer versions software updates that facilitate post refractive surgery IOL calculations. The Pentacam (Oculus) images the anterior and posterior surface of the cornea and should enable more accurate direct measurement of true corneal power and effective lens position.

The surgeon uses the worksheet as in the following example case of a 62 y/o white female who had undergone lasik in March 2000 OU. By 2005, early Nuclear cataract OD was noted and by 2007 progression to 20/50 vision caused the patient to progress to cataract surgery.

The DATA NEEDED was obtained and recorded in the appropriate area. The CALCULATIONS METHODS were then filled in with the appropriate data needed.

Several printouts representing each of the various formulas were produced.

The surgeon selected an IOL power for each formula, typically -.50 to -.075 more than the intended final refraction.

Surveying the various IOL power selections, an IOL power was selected, regressing to the mean or average for the various formulas. In this example, IOL choices range from 18.50 to 21.50 where the surgeon used the right side of the worksheet as a "scratchpad". The surgeon considered a 19.00 as a possible selection.

The surgeon then “backcalculated” and used the left side of the worksheet as a “scratchpad”, calculating the predicted final refraction for each formula with a 19.00 diopter lens.

The surgeon found a range of -1.19 to +0.88. This range had some chance of resulting in hyperopia. The surgeon decided to choose a 19.50 intraocular lens.

The final actual refraction in this case ended as a 20/40 SC, $-1.25 +1.25 \times 75 = 20/20-2$