CHAPTER 21

VERTEX CHARTS, CHEAT SHEETS, GRADING SCALES AND OTHER USEFUL STUFF

Prof. Nathan Efron's grading scales can be downloaded at the following website:
www.jnjvisioncare.co.uk/sites/default/…grading_scale/120217gsaarticlefinal3.pdf

Over 200 000 copies have been distributed around the world and can be found in almost all contact lens practice consulting rooms. These scales are very useful to record complications caused by contact lens wear.

VERTEX CONVERSION CHART

Table 60: Vertex conversion chart

-	12 mm	+	-	12 mm	+	-	12 mm	+
-3.87	4.00	+4.25	-9.37	10.50	+12.00	-18.00	23.00	+31.75
-4.00	4.25	+4.50	-9.75	11.00	+12.75	-18.37	23.50	+32.62
-4.25	4.50	+4.75	-10.12	11.50	+13.37	-18.62	24.00	+33.62
-4.50	4.75	+5.00	-10.50	12.00	+14.00	-18.87	24.50	+34.75
-4.75	5.00	+5.25	-10.87	12.50	+14.75	-19.25	25.00	+35.75
-5.00	5.25	+5.62	-11.25	13.00	+15.50	-19.50	25.50	+36.75
-5.12	5.50	+5.87	-11.62	13.50	+16.12	-19.87	26.00	+37.75
-5.37	5.75	+6.12	-12.00	14.00	+16.75	-20.12	26.50	+38.87
-5.62	6.00	+6.50	-12.37	14.50	+17.50	-20.37	27.00	+40.00
-5.75	6.25	+6.75	-12.75	15.00	+18.25	-20.75	27.50	+41.00
-6.00	6.50	+7.00	-13.00	15.50	+19.00	-21.00	28.00	+42.25
-6.25	6.75	+7.37	-13.50	16.00	+19.75	-21.25	28.50	+43.50
-6.50	7.00	+7.62	-13.75	16.50	+20.50	-21.50	29.00	+44.50
-6.62	7.25	+8.00	-14.12	17.00	+21.50	-21.87	29.50	+45.66
-6.87	7.50	+8.25	-14.50	17.50	+22.25	-22.12	30.00	+47.00
-7.12	7.75	+8.50	-14.75	18.00	+23.00	-22.37	30.50	+48.12
-7.25	8.00	+8.87	-15.12	18.50	+23.75	-22.62	31.00	+49.50
-7.50	8.25	+9.12	-15.50	19.00	+24.75	-22.87	31.50	+50.75
-7.75	8.50	+9.50	-15.87	19.50	+25.50	-23.12	32.00	+52.12
-7.87	8.75	+9.75	-16.12	20.00	+26.37	-23.37	32.50	+53.50

Contd…

-	12 mm	+
-8.12	9.00	+10.12
-8.37	9.25	+10.37
-8.50	9.50	+10.75
-8.75	9.75	+11.00
-8.87	10.00	+11.37

-	12 mm	+
-16.50	20.50	+27.11
-16.75	21.00	+28.12
-17.12	21.50	+29.00
-17.37	22.00	+29.87
-17.75	22.50	+30.87

-	12 mm	+
-23.62	33.00	+54.62
-23.87	33.50	+56.12
-24.12	34.00	+57.50
-24.50	34.50	+59.50
-24.75	35.00	+60.62

CHEAT SHEET

RGP Base Curve Selection

Amount of Corneal Astigmatism	Contact Lens Base Curve
Spherical	On K or 0.25D (0.05 mm) < K
0.25 to 1.00D	On K or 0.25D (0.05 mm) > K
1.00 to 2.00D	0.50D (0.1 mm) > K
>2.00D	K + ΔK/3 or 1/3 steeper than K
>2.50	K + ΔK/3 or 1/3 steeper than K in Asticon or Toric Secondary Curve Design
>3.50D	Toric Base Curve or Bitoric Lenses

Toric Base Curve Lens Formula

The base curve is selected as follows: Flat meridian on K or slightly steeper 0.25D (0.05 mm) than K. The steeper meridian is fitted K + ΔK/3 or 1/3 steeper than K. This will improve the fitting relationship between the cornea and the lens and take care of the corneal astigmatism.

Soft Lens Bas Curve Selection

Normally between 0.80 to 1.00 mm flatter than K

With Aspheric Lenses, this Rule of Thumb does not apply, and these lenses are typically fitted slightly steeper than 0.80 mm

Tear Lens Changes with Base Curve Changes

- For every 0.25D (0.05 mm) that the Base Curve is Steeper than K, add -0.25D to Lens Power
- For Every 0.25D (0.05 mm) that the Base Curve is Flatter than K, add +0.25D to the Lens Power
- OR for every 0.1 mm change in base curve = 0.50D change in lens power

This rule does not apply if corneal curve is steeper than 6.9 mm and the following rule should then be used:

- For every 0.05 mm = 0.50D change in lens power with lenses steeper than 6.90 mm

DIOPTER CONVERSION FORMULAS

The following formulas can be used to easily convert from diopters to millimeters and millimeters to diopters.

Diopters = 337.5/mm

Millimeters = 337.5/D

Residual Astigmatism

$A_1 = A_c + A_r$

Legend

A_1 = Total astigmatism, A_c = Corneal astigmatism, A_r = Residual astigmatism

CAN IOP BE MEASURED WITH A SOFT CONTACT LENS IN SITU?

The following section highlights the results of the authors PhD thesis [589].

The biomechanical properties of the cornea (viscoelasticity and elasticity) are influenced by corneal geometric parameters, such as CCT, corneal diameter, corneal curvature and astigmatism [590]. It is also influenced by age [stiffness increases with age [591]], corneal hydration, disease (such as keratoconus, Fuch's endothelial dystrophy, glaucoma and high myopia) and intraocular pressure. Following a period, in which attention has been limited to the importance of CCT when measuring IOP, there is currently growing appreciation and renewed interest among researchers regarding the role of corneal biomechanics in IOP measurements. It seems there is a widespread realisation that corneal stiffness or biomechanics more than the parameters affecting it should be considered, when improving the accuracy of IOP measurements.

The main purpose of this programme of research was to determine, whether it would be possible to accurately measure IOP with soft contact lenses *in situ.* The results showed that IOP could be measured accurately (within 2 mmHg) with thin minus power, low or moderate modulus of elasticity hydrogel and silicone hydrogel lenses, while the subjects were wearing the lenses. Further analyses of the data revealed that although CCT and corneal curvature had some influence on the IOP measurements with the ICare RBT and ORA, the biomechanical properties of the cornea and ocular surface behaviour were more important to consider and had a greater influence on the accuracy of the IOP measurements with these two instruments. Furthermore, neither the ICare RBT nor the ORA could measure IOP with high plus (≥ +12.00 D), high modulus of elasticity, thick (0.32 to 0.49 mm) silicone aphakic lenses (Silsoft – etafilcon A [Bausch & Lomb]) *in situ*.

The results of the research further showed that the ICare RBT and ORA IOPg measurements were clinically, as well as statistically comparable (differences < 0.6 mmHg), but the difference seemed not to be affected by the presence of a contact lens on the eye. Although the test-retest reliability of the ICare RBT was not as good as that reported for GAT, it compared favourably with noncontact tonometers. It was also determined that the OPA does affect the test-retest reliability of the ORA IOPcc and IOPg, but the CH and CRF repeatability was excellent. Finally, repeated measurements by independent experienced clinicians with the same ICare RBT produced repeatable and consistent results.