Cornea/Contact Lens CAQ Assessment Topical Outline

A. Contact Lens Optics/Designs/Materials/Modalities: 40% (16 questions)

1. General optical principles
    a. Vertex distance: when is it clinically relevant; how to apply
    b. Spherical equivalent: when to consider; pros and cons
2. Soft lenses
    a. Designs: spherical; aspherical; astigmatic (toric); monovision; multifocal; astigmatic multifocal; myopia control; bandage/therapeutic; keratoconus/irregular cornea; tinted/cosmetic/costume
        i. Stabilization designs for toric lenses: prism-ballasted; periballasted; dynamic stabilization; accelerated stabilization; back surface toric; truncation
        ii. Multifocal designs: aspheric; alternating/translating; simultaneous (distance vs. near center)
    b. Modality/replacement: daily, bi-weekly, monthly; quarterly; annual/conventional; extended wear
    c. Materials
        i. HEMA: Group 1 (low water, nonionic); Group 2 (high water, nonionic); Group 3 (low water, ionic); Group 4 (high water, ionic)
        ii. Silicone hydrogel
    d. Advantages/disadvantages of soft vs. rigid CLs: comfort, cost, durability, infection rate
3. Gas permeable (rigid) lenses
    a. Optical considerations
        i. Tear lens, CL power, over-refraction
        ii. When to consider front surface toric, back surface toric, or bitoric lenses
    b. Designs: spherical, front surface toric; back surface toric; bitoric; aspheric; aspheric multifocal; translational multifocal (segmented, annular/concentric); keratoconus design (Rose-K, Rose-K2, CLEK); reverse geometry/orthokeratology/corneal reshaping; scleral/mini-scleral
    c. Modality: daily wear, extended wear
    d. Materials: fluoro-silicone/acrylate; silicone/acrylate
    e. Permeability: low Dk (25 to 50); High Dk (51 to 90); hyper Dk ($\geq$100)
    f. Advantages/disadvantages of rigid vs soft CLs: more durable; cost-effective; longer adaptation time
    g. Surface treatments
        i. Types: plasma; tangible hydra-PEG; made from polyethylene glycol (PEG)
        ii. Benefits
4. Hybrid lenses: Synergeyes
5. Piggy-back

B. Contact Lens Solutions and Solution Complications: 10% (4 questions)

1. Types of solutions: cleaning; disinfecting; multipurpose; hydrogen peroxide solutions; saline solutions; daily cleaners; enzymatic protein removers
2. Complications of contact lens solutions
    a. Allergic or toxic response on the ocular surface
        i. Signs: bulbar conjunctival injection; lower lid follicular reaction; superficial punctate keratitis; eyelid dermatitis
        ii. Symptoms: discomfort with lens wear; reduced CL wearing time; redness; itching
3. Scleral lens solutions and complications
    a. Types: application solutions; buffed/non-buffered solutions
    b. Solution-induced toxic reaction
        i. Extended contact time with reservoir fluid on the ocular surface
            1. Chronic exposure to preservatives may lead to toxic keratopathy
        ii. Prevented by avoiding products with preservatives
            1. Use preservative-free saline solution in lens bowl and preservative-free cleaning solution
    c. Scleral lens fogging – anterior surface fogging; posterior surface fogging
        i. Resolved with additional cleaners or surface treatments
4. New guidelines for handling of multi-patient CLs in the clinical setting
    a. Disinfection guidelines based on category of CL
        i. Soft CLs: silicone-hydrogels and HEMA-hydrogels
        ii. Gas permeable (GP) CLs: includes corneal and scleral lenses
        iii. Hybrid CLs (composite): GP center attached to outer “skirt” made of a soft CL material

C. Clinical examination of the cornea and contact lenses: 25% (10 questions)

1. Instrumentation used in CL practice
    a. Slit lamp and the various types of illumination
    b. Specular microscopy
    c. Keratometry
    d. Tearscope
    e. Radiuscope
    f. Topography
2. Imaging of the cornea and adjacent structures in relation to CLs
    a. Anterior segment OCT
    b. Profilometry
    c. Meibography
    d. Aberrometry
3. Topographical analysis
    a. Topography vs tomography
    b. Types: Placido Disk, Scheimflug image
    c. Axial

d. Tangential
e. Elevation maps
f. Comparison analysis
g. Belin/Ambrosio analysis
h. Different topographical maps
    i. Post-refractive surgery
    ii. Post-therapeutic surgery
    iii. Keratoconus
    iv. Pellucid Marginal Degeneration
    v. Orthokeratology
i. Scleral profilometry

D. CL Complications: 10% (4 questions)

1. Infectious: bacterial; viral; parasitic; fungal; microbial keratitis
2. Inflammatory: GPC; MGD/blepharitis; infiltrates; tight lens/CLARE; hypoxia; folds; blebs; scar
3. Mechanical: abrasions; FB tracking; dessication/3-9 o'clock staining; CL warpage; VLK; SEAL; polymegathism; pleomorphism; solution-based toxicity; dimple veil; bullae; conjunctival hypertrophy; limbal stem cell disease

E. Possible contraindications for CL wear: 5% (2 questions)

1. Infectious conditions
2. Inflammatory conditions
3. Chronic allergy
4. Lacrimal system/tear film pathologies
5. Eyelid abnormalities
6. Trauma

F. Medical use of contact lenses: 10% (4 questions)

1. Definitions
    a. Therapeutic or bandage CL
    b. Rehabilitative CL
2. Medical indications for complex ocular conditions
    a. High refractive error: myopia; hyperopia
    b. Aphakia
    c. Primary or secondary corneal ectasia
    d. Ocular surface disease
    e. Disfiguring conditions
3. Clinical applications of soft therapeutic lens / bandage soft contact lenses
    a. OSD protection
        i. Indications: persistent epithelial defects; after trauma or surgery; corneal dystrophies.
        ii. FDA approved therapeutic indication
            1. Hydrogel: silicone hydrogel; 30-day (balafilcon A, lotrafilcon A); 7-day (senofilcon A)

2. Benefits: readily available; fits most normal corneas
3. Microbial keratitis risk
    a. Requires topical antibiotic prophylaxis
        i. Moxifloxacin (non-preserved)
        ii. Monitor for MK (fungal)
    b. Reduce steroid if possible
4. Role for custom soft non-FDA-approved SCL
    a. Irregular corneas, keratoprosthesis (K-pro), and bleb leaks
        i. Requires more customized parameters

b. Disfiguring disease
    i. Tint: photophobia; headache; migraine; sports
    ii. Cosmesis: central clear pupil
    iii. Occlusion: diplopia; black central pupil; customized optic zone; retainer for amniotic membranes
c. Drug delivery
    i. Approval for allergic conjunctivitis
    ii. Antihistamine extended release

4. Clinical applications for gas permeable (rigid) lenses
    a. Ocular disease: scleral lens use
        i. Mechanical protection
        ii. Continuous hydration
            1. Lens creates an artificial environment
            2. The cornea and ocular surface can thrive and reach homeostasis under the lens
        iii. FDA approval: Materials, not designs
            1. hexafocon A, hexafocon B, roflufocon D, and roflufocon E
        iv. Benefits
            1. Decreases treatment burden
            2. Reduced use of ocular lubricants
            3. Improves quality of life
        v. Considerations
            1. Handling: application and removal
            2. Solutions
            3. Acute corneal response
                a. Sattler's Veil?
                b. Microcystic edema & bullae
                c. Global corneal thickness
5. Custom scleral options
    a. Impression
    b. Notch
    c. Channel
    d. Central or peripheral elevation

6. Amniotic membranes
    a. Amniotic membranes indications
    b. Corneal epithelial defects
    c. Treatment of epithelial defects due to surgery or unresponsive PEDs
    d. Soft contact lens over amniotic membranes to promote retention

Cornea/Contact Lens CAQ Assessment Suggested References

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