Fractional CO2 Laser for Vulvovaginal Atrophy

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Disclosures

• Lumenis: Travel money received for “round table discussion” conference
Vulvovaginal Atrophy

Epidemiology

An Epidemic

• 50% of post menopausal women
• Negative effect of quality of life, sexual health and emotional well-being
• Often progressive and unlikely to resolve over time


It’s time to talk about VVA

- Embarrassing
- Private subject
- “Normal” part of aging

- 59% of US women felt that information on VVA was lacking
- 56% of patients have discussed with their HCP
- Only 7% reported that conversation was initiated by the HCP!
It’s not a laughing matter
Increase in Vaginal Dryness With Age

- **Premenopause**
  - Pre-menopause: 3% (n = 172)
  - Late perimenopause: 21% (n = 106)

- **Perimenopause**

- **Postmenopause**
  - 1 year post-menopause: 25% (n = 72)
  - 2 years post-menopause: 32% (n = 54)
  - 3 years post-menopause: 47% (n = 31)

Dryness increased significantly in late perimenopause and postmenopause ($P < .001$)

Vaginal Health: Insights, Views and Attitudes.

- 80% negative affect on life
- 75% negative sex life
- 68% less sexual
- 36% feel old
- 33% relationship effects
- 26% self esteem
- 25% lowers QoL

Etiology of Vulvovaginal Atrophy

• Natural menopause
• Surgical menopause
• Medication induced menopause
  – GnRH agonists
• Cancer treatments that inactivate ovarian function
  – Chemotherapy
  – Aromatase inhibitors
  – Pelvic radiation
Anatomy and Pathophysiology of Vulvovaginal Atrophy

• Premenopausal Histology
  • Mucosa
    • Epithelium - Thick stratified squamous nonkeratinized
    • Lamina propria- Loose fibroelastic connective tissue with rich blood supply and lymphocytic infiltration
    • Rugated
  • Muscularis
    • Smooth muscle cells
  • Adventitia
    • Dense fibroelastic connective tissue
    • Attaches vagina to surrounding structures
Histology and Pathophysiology of Vulvovaginal Atrophy

- Decreased levels of estrogen and progesterone
- Thin epithelium
- Loss of elastic fibers in lamina propria
- Decrease in vaginal moisture
- Change in vaginal glycogen content
Vulvovaginal Atrophy
Symptoms

- Vaginal itching
- Vaginal burning
- Vaginal dryness
- Dyspareunia
- Vaginal bleeding
- Pelvic pain

- Urinary symptoms
  - UTIs
  - Dysuria
  - Frequency
  - Urgency
  - Incontinence

- Pelvic floor disorders
  - Prolapse
  - Fecal incontinence
Differential diagnosis

- Vaginitis- yeast or bacterial
- Lichen sclerosis
- STDs
- Vulvar cancer
- HSV
- Dermatitis
- UTI
Diagnosis: Physical Exam

- Vagina and Epithelium
  - Thin, dry
  - Erythema and/or petech
  - Loss of rugae
  - Brown or yellow secretion
  - Narrow introitus
  - Shorted vaginal vault

- Labia: loss of definition between minora and majora

- Urethral meatus: caruncle, atrophic

- Clitoris: recede, phimosis
Physical Exam

• Vaginal pH
  – Typically >5.0

• Wet mount
  – Parabasal cells
  – Reduced/absent lactobacilli
  – Repopulation with diverse flora
    (enteric bacteria associated with UTIs)
  – WBCs
Vulvovaginal atrophy treatments

• Goal: Alleviate symptoms
  Improve quality of life
  Restore functional status

  – Long acting vaginal moisturizes
  – Low-dose vaginal estrogen
  – Oral hormone therapy
  – Regular sexual activity if able
  – Vaginal physical therapy
Vaginal moisturizers

<table>
<thead>
<tr>
<th>Lubricants</th>
<th>Moisturizers</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Water based</strong></td>
<td></td>
</tr>
<tr>
<td>Astroglide Liquid</td>
<td>Replens</td>
</tr>
<tr>
<td>Astroglide Gel Liquid</td>
<td>Me Again</td>
</tr>
<tr>
<td>Astroglide</td>
<td>Vagisil</td>
</tr>
<tr>
<td>Just Like Me</td>
<td>Feminease</td>
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<tr>
<td>K-Y Jelly</td>
<td>K-Y SILK-E</td>
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<tr>
<td>Pre-Seed</td>
<td>Luvena</td>
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<tr>
<td>Slippery Stuff</td>
<td>Silken Secret</td>
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<tr>
<td>Liquid Silk</td>
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<tr>
<td><strong>Silicone based</strong></td>
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<tr>
<td>Astroglide X</td>
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<td>ID Millennium</td>
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<td>K-Y Intrigue</td>
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<tr>
<td>Pink</td>
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<td>Pjur Eros</td>
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<tr>
<td><strong>Oil based</strong></td>
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<tr>
<td>Elégance Women’s Lubricants</td>
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<tr>
<td>Olive oil</td>
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</tbody>
</table>
| **Abbreviation:** VVA, vulvovaginal atrophy.
# Vaginal Estrogen

<table>
<thead>
<tr>
<th>Composition</th>
<th>Product name</th>
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</thead>
<tbody>
<tr>
<td><strong>Vaginal creams</strong></td>
<td></td>
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<tr>
<td>17β-estradiol</td>
<td>Estrace Vaginal Creama</td>
</tr>
<tr>
<td>Conjugated estrogens</td>
<td>Premarin Vaginal Cream</td>
</tr>
<tr>
<td>Estrone</td>
<td>Estragyn Vaginal Creamb</td>
</tr>
<tr>
<td><strong>Vaginal rings</strong></td>
<td></td>
</tr>
<tr>
<td>17β-estradiol</td>
<td>Estring</td>
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<tr>
<td>Estradiol acetate</td>
<td>Femringa</td>
</tr>
<tr>
<td><strong>Vaginal tablet</strong></td>
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<tr>
<td>Estradiol hemihydrate</td>
<td>Vagifem</td>
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</tbody>
</table>
VVA Barriers to treatment

• Unresponsive to conventional treatments
• Cost
• Contraindication to hormone treatment
  – Gynecologic cancer
  – DVT
  – Stroke
• Presence of uterus?
  – Use of concomitant progesterone not indicated with vaginal estrogen only
A new option for VVA treatment

Vaginal Laser Rejuvenation
CO2 Laser for VVA

- 2014: CO2 Laser (DEKA and Cynosure) cleared by FDA for “incision, excision, vaporization and coagulation of body soft tissue in various medical specialties...” including genitourinary surgery

- Laser systems available being used for the treatment of VVA
  - MonaLisa Touch (Cynosure)
  - FemTouch (Lumenis)
  - CO2RE Intima (Syneron)
  - IntimaLase/Incontilase (Fontana) (Er: YAG laser)

- Currently no laser has been cleared specifically for the treatment of vaginal atrophy
A Little Laser Science

- **Light Amplification by Stimulated Emission of Radiation**
- Light is the product of a laser
  - Light is made from spontaneous emission of photons
- **Stimulated emission of radiation**
  - Generation of high intensity energy through an atomic process
  - Release of identical and unidirectional photons
Electromagnetic Spectrum

Light Spectrum

Excimer ArF (193 nm)
Excimer KrF (245 nm)
Excimer XeCl (308 nm)
Excimer XeF (351 nm)
Argon Ar (488 nm)
Argon Ar (514 nm)
KTP (Doubled Nd:YAG) (532 nm)
HeNe (632 nm)
Diode (810-980 nm)
Nd:YAG (1,064 nm)
Ho:YAG (2,900 nm)
Er:YAG (10,600 nm)

100 nm 400 nm 750 nm 100,000 nm
Ultraviolet Visible Infrared
Fractional CO2 Technology

- A pattern of small thermal ablative wounds is created without damaging the surrounding area
- CO2 wavelength has high affinity with the water of the vagina

Mechanism of Action

• Tissue remodeling
  – Cytokine response to the laser thermal injury
    • Transforming growth factor B–1
  – Fibroblast activation
  – Synthesis of a new extracellular matrix
    • Neocollagenesis
    • Neovascularization
    • Glycogen rich epithelial cells are increased
Histologic changes

Post menopause
Normal premenopause

After CO2 Laser

Literature Review

• Safety and the efficacy of CO$_2$ lasers was evaluated in 9 clinical studies
• ~400 patients were treated
• No adverse events were reported
• A significant clinical improvement in VVA symptoms was noticed
## Literature Review – CO2 Treatments for VVA

<table>
<thead>
<tr>
<th>Name of study</th>
<th>Author &amp; Publication</th>
<th>N</th>
<th>Treatment protocol</th>
<th>Outcomes</th>
</tr>
</thead>
</table>
| Vaginal fractional CO2 lasers: a minimal invasive option for vaginal rejuvenation | Gaspar et al. The American Journal of Cosmetic Surgery 2011 | 92  | CO2 laser with platelet rich plasma and pelvic floor exercise vs. Platelet rich plasma and pelvic floor exercise | • Improvement in vaginal histology  
• Decreased discomfort during sex |
| A 12-week treatment with fractional CO2 laser for vulvovaginal atrophy: a pilot study | Salvatore et al. Climacteric Aug 2014                       | 50  | 3 treatment sessions over 12 weeks                                                 | At 12 weeks improvement was shown in:  
• VVA symptoms  
• VHIS from 13.1 to 23.1  
• Quality of life scores (SF-12)  
• 84% of patient were satisfied with the procedure |
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| Sexual function after fractional microablative CO₂ laser in women with vulvovaginal atrophy | Salvatore et al. Climacteric Apr 2015 | 77 | 3 applications every 4 weeks | At 12 weeks:  
• Improvement in VVA symptom  
• Significant improvement in the total score FSFI  
• 85% of the women not sexually active regained a normal sexual life |
| Microscopic and ultrastructural modifications of postmenopausal atrophic vaginal mucosa | Zerbiniati et al. Lasers Med Sci 2015 | 5 patients (from the original 50 treated) | Lateral vaginal wall vaginal biopsies Pretreatment 1 month | At two months following treatment:  
• Restoration of vaginal mucosa structure  
• Restoration of the vaginal thick |
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<tr>
<td>Vulvo-vaginal atrophy: A new treatment modality using thermo-ablative fractional CO2 laser</td>
<td>Perino et al. Maturitas 2015</td>
<td>48</td>
<td>3 treatment sessions spaced over at least 30 days</td>
<td>30 days post-treatment:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>• Improvement in VHI scores</td>
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<tr>
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<td></td>
<td></td>
<td>• Sig. Improvement in all VAS parameters (dryness, burning, itching, dyspareunia)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>• 91.7% of patients were satisfied with the procedure</td>
</tr>
<tr>
<td>Microablative Fractional CO2 Laser for Vulvovaginal Atrophy in Women With a History of Breast Cancer</td>
<td>Maggiore et al. The journal of minimal invasive gynecology 2015</td>
<td>40</td>
<td>5 laser applications every 4 weeks</td>
<td>At 20 weeks significant improvement</td>
</tr>
</tbody>
</table>
Limitations

• Small sample size
• No sham controlled studies
• Long term follow up lacking
Patient selection

• Patients with one or more symptoms of vaginal atrophy
• Typically peri or post menopausal woman
• Prior breast/ovarian/uterine cancer
Not a candidate for treatment

• Severe vaginal stenosis
• Active genital infection
• Active urinary tract infection
• Current or previous vulvar/vaginal cancer
• Unevaluated uterine/vaginal bleeding
• Previous vaginal mesh surgery?
• Advanced pelvic organ prolapse
• HSV history should have anti-viral prophylaxis
Patient preparation for treatment

- Counsel on expectations and need for multiple treatments
- Treat in dorsal lithotomy position
- Laser glasses
- J & J Baby oil
- Vibratory sensation during intravaginal treatments
- Increased pain at introitus level
  - Topical anesthetic necessary if doing external treatments
Actual treatment time is about 2 minutes.
Post procedure care

• Vaginal moisturizer post procedure
• No intercourse 48-72 hours
• Most patients resume other normal activity after the procedure
• May experience slight tingling sensation for a few hours
Treatment Recommendations

• 3 Treatments at 4-6 week intervals
• Yearly maintenance treatments
Other possible uses for CO2 Laser

• Incontinence?
  – Stress
  – Urge
• UTI prevention?
• Lichen Sclerosis?
• Low grade Prolapse?
• Vulvodynia?
Barriers to treatment

- No CPT code
- Cost is $600-1000 per treatment
- Cost of the laser to a medical practice
Conclusion

• Ask your patients about VVA symptoms
• Significant QoL issue for many women
• CO2 vaginal laser may be a treatment option for women unable or refractory to vaginal moisturizers or vaginal estrogen
Thank You