Surgical Treatment Of PCOS

Timur Gürgan MD
Gürgan CLINIC, Kadın Sağlığı İnfertilite ve Tüp Bebek Merkezi
IIARG Türkiye
The Goals Infertility Treatment

To minimize the risk of complications (OHSS, multiples, bleeding, infection ..)

To optimize pregnancy rates

To produce healthy, genetically normal, singleton full-term deliveries
## A step-by-step approach to ovulation induction in PCOS

<table>
<thead>
<tr>
<th>Step</th>
<th>Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Weight loss if BMI ie elevated</td>
</tr>
<tr>
<td>2</td>
<td>Clomiphene citrate ± glucocorticoids</td>
</tr>
<tr>
<td>3</td>
<td>Insulin sensitizer as a single agent</td>
</tr>
<tr>
<td>4</td>
<td>Insulin sensitizer &amp; clomiphene citrate</td>
</tr>
<tr>
<td>5(3)</td>
<td>Gonadotropin treatment</td>
</tr>
<tr>
<td>6</td>
<td>Insulin sensitizer &amp; gonadotropin treat.</td>
</tr>
<tr>
<td>7(4)</td>
<td>Ovarian surgery</td>
</tr>
<tr>
<td>8</td>
<td><strong>IVF/ICSI &amp; IVM</strong></td>
</tr>
</tbody>
</table>

The potential problems of gonadotropin therapy

- Difficult to titrate the dose to achieve monofollicular ovulation.
- Multiple gestations (>30 percent)
- Risk of OHSS
- Need of careful monitoring
- High cost
- High spontaneous abortion rate

NICE Guidelines

Ovarian drilling

Women with PCOS who have not responded to CC should be offered laparoscopic ovarian drilling because it is as effective as gonadotrophin treatment and is not associated with an increased risk of multiple pregnancy.
## PCOS - SURGICAL TREATMENT

### Technical options

- Wedge resection
- Ovarian biopsy
- Capsule resection
- Electrodesiccation
- Laser vaporization
- Endocoagulation
Traditional Wedge resection

Side effects:
- POF rate 20-80%
- Pelvic adhesion rate 40-75%
- Lead to irreversible infertility

Laparoscopic ovarian drilling

Side effects:
- Pelvic adhesion rate: 19%-82%
- Ovulation dysfunction due to cicatrice on the surface of ovary
- Difficulty in control quality and depth of drillings

Iatrogenic exhaustion of ovarian reserve-POF?
Technique

- Two or three incision L/S approach
- 30-40 w per puncture for 3-5 seconds
- Avoid hilum avoid bleeding
- Continuous irrigation
- Various energy sources
- 5 to 6 punctures seems optimal
- One or both ovary, 2-3 mm çapında 3-4 mm derinlikinde

Tulandi T et al., 1998; Amer SA et al., 2003; Malkawi HY et al., 2005; Roy K et al., 2008
PCOS - OVARIAN DRILLING

Intraovarian mechanisms

Destruction of the androgen producing stroma

Drainage of follicles with high androgen and inhibin content

Alterations in the levels of various intraovarian growth factors
Central mechanisms

Markedly reduced LH amplitudes with no change in pulse frequency

Markedly attenuated response to GnRH challenge test
Why does ovarian surgery in PCOS help?

Endocrine implications

Ovarian surgery

- Rapid reduction in all ovarian hormones
  - With increased pituitary hormones

Initiation of folliculogenesis

Increase ovarian hormone production

Continuation of follicle growth in subsequent cycles after ovarian surgery occurs in an environment with less androgens and lower LH and FSH levels compared with pretreatment levels.

*Systematic review. Hendriks, ML et al. Hum Reprod 2007*
1. Is there still a role for surgical treatment?

2. How should surgery be performed?
# Ovulation and pregnancy rates

Table 1. Ovulation and pregnancy rates following laparoscopic ovarian drilling.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>n</th>
<th>Ovulation (%)</th>
<th>Pregnancy (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aakvaag and Gjonnaess&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1985</td>
<td>58</td>
<td>72</td>
<td>NA</td>
</tr>
<tr>
<td>Daniell and Miller&lt;sup&gt;b&lt;/sup&gt;</td>
<td>1989</td>
<td>85</td>
<td>71</td>
<td>56</td>
</tr>
<tr>
<td>Utsunomiya et al.&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1990</td>
<td>16</td>
<td>94</td>
<td>50</td>
</tr>
<tr>
<td>Campo et al.&lt;sup&gt;c&lt;/sup&gt;</td>
<td>1993</td>
<td>23</td>
<td>56</td>
<td>43</td>
</tr>
<tr>
<td>Gjonnaess&lt;sup&gt;a&lt;/sup&gt;</td>
<td>1994</td>
<td>252</td>
<td>92</td>
<td>84</td>
</tr>
<tr>
<td>Kriplani et al.&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2001</td>
<td>66</td>
<td>82</td>
<td>55</td>
</tr>
<tr>
<td>Felemban et al.&lt;sup&gt;a&lt;/sup&gt;</td>
<td>2000</td>
<td>112</td>
<td>73</td>
<td>58</td>
</tr>
</tbody>
</table>

Performed with <sup>a</sup>electrosurgery, <sup>b</sup>laser, <sup>c</sup>biopsy.

NA = not reported.
Cumulative probability of conception among 112 clomiphene-resistant anovulatory women with polycystic ovaries (median, 10.2 months).
Reproductive outcome

Table 1 Reproductive outcomes after electrocoagulation laparoscopic ovarian drilling

<table>
<thead>
<tr>
<th>Study</th>
<th>Mean follow-up (months)</th>
<th>Starting time of other OI agents (months)</th>
<th>Number of patients</th>
<th>Regular cycles (%)</th>
<th>Ovulation rate (%)</th>
<th>Pregnancy rate (%)</th>
<th>Abortion rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Aoi et al., 2006 [35⁷]</td>
<td>~29.7</td>
<td>–</td>
<td>45</td>
<td>93 NR</td>
<td>95 77 NR</td>
<td>64.4 NR</td>
<td>NR</td>
</tr>
<tr>
<td>Kucuk and Kilic-Okman, 2005 [36⁷]</td>
<td>12</td>
<td>6</td>
<td>22</td>
<td>68 NR</td>
<td>95 77 NR</td>
<td>54.5 NR</td>
<td>8.3</td>
</tr>
<tr>
<td>Maltawii and Qublan, 2005 [12⁷]</td>
<td>12</td>
<td>3</td>
<td>68</td>
<td>63.6 33 NR</td>
<td>57 33 17.5 6.3</td>
<td>59.8 NR</td>
<td>14.3</td>
</tr>
<tr>
<td>Palomba et al., 2005 [33⁷]</td>
<td>6</td>
<td>6</td>
<td>55</td>
<td>63.6</td>
<td>57 33 17.5 6.3</td>
<td>59.8 NR</td>
<td>14.3</td>
</tr>
<tr>
<td>Bayram et al., 2004 [20]</td>
<td>12</td>
<td>2</td>
<td>83</td>
<td>NR</td>
<td>NR NR NR</td>
<td>56.4 NR</td>
<td>29</td>
</tr>
<tr>
<td>Cleemann et al., 2004 [37]</td>
<td>12</td>
<td>3</td>
<td>57</td>
<td>NR</td>
<td>NR NR NR</td>
<td>78 NR NR NR</td>
<td>17.1</td>
</tr>
<tr>
<td>Amer et al., 2004 [16]</td>
<td>12</td>
<td>2</td>
<td>200</td>
<td>NR</td>
<td>78 57 21 NR</td>
<td>NR NR NR 50</td>
<td>9</td>
</tr>
<tr>
<td>Maltawii et al., 2003 [31]</td>
<td>12</td>
<td>3</td>
<td>97</td>
<td>78.4</td>
<td>83.5 70.4 22.6 2.1</td>
<td>59.8 10.3</td>
<td>NR</td>
</tr>
<tr>
<td>Amer et al., 2002 [22]</td>
<td>12</td>
<td>2</td>
<td>30</td>
<td>NR</td>
<td>80 NR NR NR</td>
<td>47 NR NR 43</td>
<td>11</td>
</tr>
<tr>
<td>Farquhar et al., 2002 [38]</td>
<td>6</td>
<td>6</td>
<td>75</td>
<td>NR</td>
<td>NR NR NR 23⁵</td>
<td>36.5 NR</td>
<td>NR</td>
</tr>
<tr>
<td>Felemban and Tunlandi, 2000 [9]</td>
<td>12</td>
<td>NR</td>
<td>112</td>
<td>NR</td>
<td>80 73.2 24.1 1.8</td>
<td>54² 77</td>
<td>NR</td>
</tr>
<tr>
<td>Li et al., 1998 [39]</td>
<td>12</td>
<td>No comment on starting time</td>
<td>118</td>
<td>79 NR</td>
<td>87 67 20 NR</td>
<td>54 6</td>
<td>72</td>
</tr>
<tr>
<td>Tulandi et al., 1997 [40]</td>
<td>12</td>
<td>–</td>
<td>34</td>
<td>NR</td>
<td>88.2 NR NR NR NR</td>
<td>70 NR NR 70³–80</td>
<td>4.2</td>
</tr>
<tr>
<td>Merchant, 1996 [41]</td>
<td>12</td>
<td>No comment on starting time</td>
<td>30</td>
<td>83.3</td>
<td>70 NR NR NR</td>
<td>70³–80 NR</td>
<td>4.2</td>
</tr>
<tr>
<td>Pelosi and Pelosi, 1996 [42]</td>
<td>12</td>
<td>3</td>
<td>74</td>
<td>100</td>
<td>100 98 12 NR</td>
<td>57³–94</td>
<td>10.7</td>
</tr>
<tr>
<td>Naether et al., 1994 [43]</td>
<td>72</td>
<td>No comment on starting time</td>
<td>145</td>
<td>92.2</td>
<td>86 NR NR NR</td>
<td>48.8–70 NR</td>
<td>18</td>
</tr>
</tbody>
</table>

NR: not reported; OI: ovulation induction; GnRHα: gonadotropin releasing hormone analogs.

²Spontaneous (in original table).
Lapar. ovarian drilling
Crude ovulation and preg. rates

**Ovulation rates**
- Electrocoagulation - 64-92%
- Laser - 55-70%

**Pregnancy rates**
- Electrocoagulation - 52-80%
- Laser - 0-56%

Late endocrine effects of ovarian electrocautery in women with PCOS

Ovarian electrocautery normalizes ovarian function, including androgen production and the results seem to be stable for 18-20 years

<table>
<thead>
<tr>
<th>Observation period</th>
<th>normal weight</th>
<th>overweight</th>
<th>all</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>3 mo</td>
<td>78(21/27)</td>
<td>65(13/20)</td>
<td>72(34/47)</td>
<td>NS</td>
</tr>
<tr>
<td>1 y</td>
<td>89(24/27)</td>
<td>65(11/17)</td>
<td>80(35/44)</td>
<td>NS</td>
</tr>
<tr>
<td>3 y</td>
<td>79(19/24)</td>
<td>50(10/20)</td>
<td>66(29/44)</td>
<td>&lt;.05</td>
</tr>
<tr>
<td>10 y</td>
<td>68(12/15)</td>
<td>71(12/17)</td>
<td>69(29/42)</td>
<td>NS</td>
</tr>
<tr>
<td>&gt;10 y</td>
<td>80(12/15)</td>
<td>69(11/16)</td>
<td>74(23/31)</td>
<td>NS</td>
</tr>
</tbody>
</table>

Long term observational study; 165 infertile PCOS women (Gjonnaess H. - F&S 1998 April 69;4: 697-701)
The Evidence

Is it better than gonadotrophins?
## LOD versus FSH

Bayram et al, 2004

<table>
<thead>
<tr>
<th>Treatment Regimen</th>
<th>No of women</th>
<th>Pregnant (%)</th>
<th>Miscarry</th>
<th>Multiple</th>
<th>LB (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOD strategy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LOD</td>
<td>83 (100)</td>
<td>31 (37)</td>
<td>3</td>
<td>-</td>
<td>28 (34)</td>
</tr>
<tr>
<td>LOD + CC</td>
<td>45 (54)</td>
<td>14 (31)</td>
<td>1</td>
<td>-</td>
<td>13 (29)</td>
</tr>
<tr>
<td>LOD + CC + FSH</td>
<td>23 (28)</td>
<td>18 (78)</td>
<td>3</td>
<td>1</td>
<td>12 (52)</td>
</tr>
<tr>
<td>LOD strategy total</td>
<td>83</td>
<td>63 (76)</td>
<td>7</td>
<td>1</td>
<td>53 (64)</td>
</tr>
<tr>
<td>FSH</td>
<td>85</td>
<td>64 (75)</td>
<td>7</td>
<td>9</td>
<td>51 (60)</td>
</tr>
</tbody>
</table>
Conclusions of study

- An electrocautery strategy and ovulation induction with recombinant follicle stimulating hormone are similarly effective in inducing ovulation

- No OHSS

- Multiple pregnancies can largely be avoided by electrocautery and clomifene citrate before rFSH
# Ovarian drilling ± Med ovulation vs gonadotropin: Ovulation rate

## Analysis 01.06. Comparison 01 Ovarian drilling +/- medical ovulation induction versus gonadotrophins only, Outcome 06 Ovulation rate

**Review:** Laparoscopic “drilling” by diathermy or laser for ovulation induction in anovulatory polycystic ovary syndrome

**Comparison:** 01 Ovarian drilling +/- medical ovulation induction versus gonadotrophins only

**Outcome:** 06 Ovulation rate

<table>
<thead>
<tr>
<th>Study</th>
<th>Ovarian Drilling</th>
<th>Gonadotrophins</th>
<th>Odds Ratio (Fixed)</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farquhar 2002</td>
<td>15/29</td>
<td>13/21</td>
<td></td>
<td>100.0</td>
<td>0.66 [0.21, 2.07]</td>
</tr>
</tbody>
</table>

Total (95% CI) 29 21

Total events: 15 (Ovarian Drilling), 13 (Gonadotrophins)

Test for heterogeneity: not applicable

Test for overall effect $z=0.71$ $p=0.5$

Laparos. Drilling-Cochrane Library 2005, Issue 3
### LOD v METFORMIN

*Palomba et al, 2004*  
*JCEM*

<table>
<thead>
<tr>
<th></th>
<th>CCR, 6 months **</th>
</tr>
</thead>
<tbody>
<tr>
<td>Metformin</td>
<td>39 / 54 (72.2%)</td>
</tr>
<tr>
<td>LOD</td>
<td>31 / 55 (56.4%)</td>
</tr>
</tbody>
</table>

** p=0.1
## Analysis 01.03. Comparison 01 Ovarian drilling +/- medical ovulation induction versus gonadotrophins only, Outcome 03 Miscarriage rate (per pregnancy)

Review: Laparoscopic "drilling" by diathermy or laser for ovulation induction in anovulatory polycystic ovary syndrome

Comparison: 01 Ovarian drilling +/- medical ovulation induction versus gonadotrophins only

Outcome: 03 Miscarriage rate (per pregnancy)

<table>
<thead>
<tr>
<th>Study</th>
<th>Ovarian drilling n/N</th>
<th>Gonadotrophins n/N</th>
<th>Odds Ratio (Fixed)</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bayram 2004</td>
<td>7/63</td>
<td>7/64</td>
<td></td>
<td>49.5</td>
<td>1.02 [0.34, 3.09]</td>
</tr>
<tr>
<td>Farquhar 2002</td>
<td>3/8</td>
<td>3/7</td>
<td></td>
<td>16.0</td>
<td>0.80 [0.10, 6.35]</td>
</tr>
<tr>
<td>Lazoviz 1998</td>
<td>0/14</td>
<td>3/9</td>
<td></td>
<td>32.5</td>
<td>0.06 [0.00, 1.43]</td>
</tr>
<tr>
<td>Veggetti 1998</td>
<td>2/3</td>
<td>1/5</td>
<td></td>
<td>2.0</td>
<td>8.00 [0.31, 206.37]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>88</td>
<td>85</td>
<td></td>
<td>100.0</td>
<td>0.81 [0.36, 1.86]</td>
</tr>
</tbody>
</table>

Total events: 12 (Ovarian drilling), 14 (Gonadotrophins)

Test for heterogeneity chi-square=4.63 df=3 p=0.20 I² =35.3%

Test for overall effect z=0.49 p=0.6
Pregnancy Rates and Outcomes - Abortion

- Women with PCOS have a higher than average frequency of spontaneous abortions (SAB), 40 to 53%.
- The SAB rates following LOD range from 8 to 21% (similar to normal population) (Felemban A et al., 2000; Colacurci N, et al., 1997)
- LOD may therefore reduce the SAB rates in PCOS patients by normalizing high LH levels?
- AND reduction in androgen levels and insulin resistance may also contribute to lower SAB rates by improving oocyte quality or endometrial receptivity
Multiple Pregnancy

- Meta-analysis of 5 RCTs
- Multiple pregnancy with LOD is significantly lower (OR = 0.13, CI 0.17-0.98) than godadotrophin therapy

Consensus on infertility treatment related to polycystic ovary syndrome. Human Reprod 2008, 23:462
Repeat LOD: Ovulation / Pregnancy

Prev. responders (n=12) 75%
Prev. non-responders (n=12) 29%
Overall (n=20) 53%

Laparoscopic Ovarian Drilling and in Vitro Fertilization

- LOD improves the effectiveness of gonadotropin treatment
- PCOS patients have a higher rate of cycle cancellation due to an exaggerated response to gonadotropin therapy with an associated increased risk of OHSS.
- Ovaries pretreated with LOD tend to respond to stimulation with parenteral gonadotropins in a more controlled fashion, similar to non-PCOS ovaries
Ovarian Drilling & IVF

1. Improves effectiveness to gonadotropin treatment / Decreases the number of ampulles used
2. Decreases OHSS rate
3. Decreases cancellation rate
4. Decreases Abortion rate
5. Decreases multiple pregnancy rate
6. Increase pregnancy rate

Tozer AJ et al., 2011
PCOS - OVARIAN DRILLING

Advantages

Avoids the need for intensive cycle monitoring

Produces a normal hormonal environment

Induces resumption of spontaneous ovulation

Enables more favourable response with subsequent gonadotropin stimulation

Avoids OHSS

Avoids multiple gestation
Social Factors

- Cost effectiveness
- Patient preference for treatment with LOD
- Minimally invasive procedure that eliminates the inconvenient daily injections and frequent office visits required for gonadotropin treatment
## LOD vs GONADOTROPHIN ECONOMIC CONSIDERATIONS

### Cost per live birth
- **Farquhar et al, 2004**
  - **LOD:** US $21095
  - **Gonadotrophins:** US $28744

### Cost per live birth + delivery
- **Wely et al, 2004**
  - **LOD:** Euro 11301
  - **Gonadotrophins:** Euro 14489

Cost of term pregnancy: LOD 22-33% lower
PCOS - OVARIAN DRILLING

Complications

- Related to lapsc. and energy use
- Avulsion of the uteroovarian ligament
- Bleeding from the drilled holes
- Ovarian atrophy
- Adhesion formation
- Premature ovarian failure ?
- Ovarian cancer ?
### Table 2. Postoperative adhesions following laparoscopic ovarian drilling.

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>n</th>
<th>Adhesions (% of patients)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Weise et al.</td>
<td>1991</td>
<td>10</td>
<td>70</td>
</tr>
<tr>
<td>Gurgan et al.</td>
<td>1992</td>
<td>20</td>
<td>68</td>
</tr>
<tr>
<td>Corson and Grochmal</td>
<td>1990</td>
<td>30</td>
<td>3</td>
</tr>
<tr>
<td>Portuondo et al.</td>
<td>1984</td>
<td>24</td>
<td>0</td>
</tr>
<tr>
<td>Naether et al.</td>
<td>1994</td>
<td>62</td>
<td>19</td>
</tr>
<tr>
<td>Felemban et al.</td>
<td>2000</td>
<td>15</td>
<td>27</td>
</tr>
</tbody>
</table>

Performed with \(^{a}\)electrosurgery, \(^{b}\)laser, \(^{c}\)biopsy.

Gomel V et al. RBM Online 2004;9:35-42
PATIENT SELECTION

Everything in medicine is patient selection – the chief determinant of results
LH and Pregnancy rates in LOD

Pregnancy rate

- LH < 10 iu/l: 60%
- LH > 10 iu/l: 40%
Free Androgen Index and the outcome of LOD

%<br>

<4 4-14.9 >14.9

FAI

Ovulation Pregnancy

* P < 0.05
** P < 0.01
*** P < 0.001
BMI and the outcome of LOD

BMI (kg/m²)

Ovulation
Pregnancy

* P < 0.05
** P < 0.01
*** P < 0.001
With proper patient selection, the pregnancy rate after laparoscopic ovarian diathermy is up to 80%.
The value of measuring AMH in women with anovulatory polycystic ovary syndrome undergoing laparoscopic ovarian diathermy

Human Reproduction 2009
Amer, Li, and Ledger

High AMH (>7.7ng/ml) predicts poor response
<table>
<thead>
<tr>
<th></th>
<th>AMH &lt; 7.7</th>
<th>AMH &gt; 7.7</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>ovulation</td>
<td>18/19 (95%)</td>
<td>6/10 (60%)</td>
<td>0.036</td>
</tr>
<tr>
<td>pregnancy</td>
<td>12/19 (63%)</td>
<td>3/10 (30%)</td>
<td>0.095</td>
</tr>
</tbody>
</table>
Indications

- Patients going diagnostic or operative laparoscopy
- who have completed six ovulatory cycles without pregnancy / Not eligible for gonadotropin therapy
- PCOS patients with dysfunctional uterine bleeding and /or endometrial hyperplasia
- LOD as first line treatment / same results

Cleemann L et al.,2004; Amer SA et al.,2009
Randomized controlled trial comparing laparoscopic ovarian diathermy with clomiphene citrate as a first-line method of ovulation induction in women with polycystic ovary syndrome

Amer, Li, Metwally, Emarh & Ledger
Human Reproduction 2009
<table>
<thead>
<tr>
<th></th>
<th>LOD group (n=33)</th>
<th>Clomiphene group (n=32)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ovulation</td>
<td>64%</td>
<td>76%</td>
</tr>
<tr>
<td>Conception after first treatment</td>
<td>27%</td>
<td>44%</td>
</tr>
<tr>
<td>Conception after second treatment (at 12m)</td>
<td>53%</td>
<td>63%</td>
</tr>
<tr>
<td>miscarriage</td>
<td>12%</td>
<td>10%</td>
</tr>
<tr>
<td>Live Birth</td>
<td>46%</td>
<td>56%</td>
</tr>
</tbody>
</table>
Disadvantages of LOD is the requisite of laparoscopy?

- Less invasive techniques?
- Transvaginal hydrolaparoscopy
  
  Gordts et al., 2009

- Transvaginal ultrasound guided interstitial Nd-YAG laser or unipolar needle
  
  Kaajik et al., 1997; Api et al., 2009

- Simple aspiration of follicles under ultrasound guidance
  
  Badaway et al., 2009
Ovarian interstitial YAG-laser: An effective new method

- Transvaginal ultrasound guided ovarian interstitial laser-coagulation treatment in anovulatory women with PCOS.
  - Spontaneous ovulation rate of 84.2%, during the 6-month postoperative period.
  - Decrease in serum LH and testosterone
- No significant operative complications were encountered.
- The ultrasound-guided transvaginal ovarian interstitial laser treatment may be an effective new method to manage anovulation in PCOS patients.

Ultrasound-guided immature follicle aspiration (IMFA) to treat severe PCOS

Schematic diagram for ultrasound microinvasive surgery

A Ovary before puncture
B Reinspection two weeks after puncture
Laparoscopic ovarian diathermy, a very simple form of surgery, has a high success rate and has a definite, useful role in the management of anovulatory infertility in women with PCOS.
Laparoscopic ovarian diathermy is an excellent example to illustrate that the key to success of endoscopic surgery depends very much on:

1. careful patient selection
2. the use of proper techniques
Approach to ovulation induction in women with PCOS

Guzick DS, Clin Obs Gyn 2007;1;255-267
LOD’un Avantajları

Tek tedavi ile, medikal tedavilerdeki gibi tekrarlayan kür gereksinimini olmaksızın, tekrarlayan fizyolojik ovulasyonların ve olası gebeliklerin oluşmasını sağlar.

Daha önemlisi, monoovulasyon sağlayarak eskisinden fazla olmayan çoğul gebeliklere neden olur.

Aksine CC tedavisi, %5-10 ikiz gebelikle birliktedir. Üçüz gebelik insidansında yüksek bildirilmiştir.

LOD, CC ile karşılaştırıldığında, **Abortus oranı anlamlı şekilde düştürtür.** (LH ve/veya Androjenlerin serum sevye ve/veya Androjenlerin serum sevye normalizasyonu nedeniyle)

**Abdel-Gadir et al. 1990.**

Hipotetik olarak, CC’nin uzun süreli kullanımları, artmış **over kanseri riski** ile birliktedir. LOD, bu riski arttırmamıştır.

**Rossing et al. 1994**

Ayrıca LOD, **pelvik anatomiyi**, HSG’ye gerek duyulmaksızın, **tubal geçirgenliği** değerlendirme ve **fertiliteyi etkileyen** (endometriosis, adezyon gibi) faktörleri tedavi etme imkanı vermektedir.

**Amer et al. 2009**
LOD’un etki mekanizması:

- LOD, LH ve Androjenlerin (T,A,DHEAS) serum sevyesini anlamlı olarak azaltır.

- LOD sonrası, AMH, LH ve Androjenlerdeki azalma dolaşımmdaki FSH’ya folliküllerin duyarlılığını artırarak, follikül büyümesine ve ovulasyona neden olacaktır. Dolayısıyla Gebeliğe neden olacaktır.

Endikasyonlar

- CC-dirençli, nonobes, başka infertilite faktörü olmayan PCOS,
- Başka amaçla L/S planlanan veya OI sürecinde yakının monitorizasyonu mümkün olmayan anovulatuar PCOS.

Diğer (rölatif)

- Persistan LH hipersekreşyonu,
- Menstrüel irregülarite,
- Hyperandrogenism

ASRM/ESHRE Consensus Workshop, 2008
Ovulasyon


- LOD’dan sonra, ovulasyon oranı(%64), CC’den sonraki orandan (%76) istatistiksel olarak farklı değildir.

- İkinci bir tedavi ilave edilirse, her iki yöntem de sırasıyla artış göstermiştir. (%85, %84)
Figure 2 Cumulative proportion of women with a first live birth in the group allocated to electrocautery and the group allocated to immediate treatment with recombinant follicle-stimulating hormone (log rank: 0.24, $P = 0.63$).

Figure 3 Cumulative proportion of women with a second live birth in the group allocated to electrocautery and the group allocated to immediate treatment with recombinant follicle-stimulating hormone (log rank: 4.77, $P = 0.03$).
Results from the meta-analysis of the randomized, controlled trials of laparoscopic ovarian surgery versus gonadotropins for (a) live-birth rate and (b) multiple pregnancy rate. Notes: Test for heterogeneity: chi-square = 0.36, df = 1 (P = .55), I² = 0%. Test for overall effect: Z = 0.14 (P = .89). (Farguellar et al., Cochrane Database Syst Rev 2007:3;CD001122. Copyright Cochrane Collaboration, reproduced with permission.)
5RCT ile LOD ve Gonadotropin etkinliği karşılaştırılmış:

- **Canlı doğum** oranında fark gösterilmemiştir.
- **Çoğul gebelik**, gonadotropin kolunda anlamlı şekilde yüksek.
- **Düşük oranı** fark yok.
- 2 RCT’nin **ekonomik analizinde** LOD, direkt ve indirekt costu azaltmaktadır.
Eve Giden Mesaj

- LOD, CC-Rezistans kadınlara yapılabilir.
- LOD, OHSS ve çoğul gebelik riski olmadan Monofolliküler ovulasyon sağlar.
- LOD sonrası follikül gelişimi için monitorizasyona gerek yoktur.
- LOD tekniğine uygun yapılmalıdır.
- LOD, hala gonadotropinlerle birlikte, ikinci seçenek tedavi olup, gonadotropinlere alternatif olabilir.
- LOD, LH/FSH oranı: >2 olan ve non-obes hastalarda ve monitorizasyonun imkansız olduğu kişilerde daha etkilidir.
Eve Giden Mesaj

- Ünilateral/Bilateral LOD arasında, sonuçlar açısından fark yoktur.
- LOD, deneyimli bir cerrah tarafından sadece bir defa yapılmalıdır.
- Cerrahinin riskleri minimal olup, L/S ‘nin riskleri yanında adezyon, over tahribatı da düşünülmelidir.
- Adezyonları azaltmak için tek overe özellikle sağ tarafa, mümkünse Laser, monopolar enerji ile LOD yapılmalıdır.
- Over volümü üzerine dayalı LOD tercih edilmelidir. 60j/cm3
- Adezyon oluşumunda delik sayısı önemli değildir.
Eve Giden Mesaj

LOD, nonfertilite endikasyonlar için yapılmamalıdır.

Gelecekte fertiloskop ile LOD daha popüler olabilir.