Reproductive Surgery in the Era of ART
(Didactic)

PROGRAM CHAIR
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G. David Adamson, MD  Victor Gomel, MD  Keith B. Isaacson, MD
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Target Audience
Educational activities are developed to meet the needs of surgical gynecologists in practice and in training, as well as, other allied healthcare professionals in the field of gynecology.

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The development of Assisted Reproductive Technologies (ART), particularly in vitro fertilization (IVF), has dramatically changed the surgical approach to the infertile patient. At the same time, advances in minimally invasive surgery have allowed a broad range of pelvic procedures to be performed as outpatient surgery or in the office. As a result, surgical indications and approaches continue to evolve based on new information about the effects of pelvic pathology on infertility and new surgical and non-surgical technology. This course is a candid discussion by four reproductive surgeons who specialize in infertility about the important and shifting roles of reproductive surgery in the era of ART and IVF. The course will describe the most recent advances and recommendations for the diagnosis and surgical treatment of common causes of infertility, including endometriosis, hydrosalpinx, fibroids, pelvic adhesions, tubal occlusion, intra-uterine pathology and polycystic ovary syndrome.

Course Objectives

At the conclusion of this course, the participant will be able to: 1) List the fertility effects of common gynecologic conditions, including leiomyoma, hydrosalpinx, endometriosis and uterine septum; 2) evaluate the relative merits of the different methods for detecting intrauterine pathology in the infertile patient; 3) compare the advantages and disadvantages of the various surgical methods for diagnosing and treating endometriosis in infertile women; 4) demonstrate knowledge of when and how best to remove intramural fibroids in the infertile patient; and 5) distinguish and compare various surgical methods for treating hydrosalpinx in infertile women.

Course Outline

1:30 Welcome, Introductions and Course Overview W.W. Hurd
1:35 Tubal Reconstructive Surgery vs. ART V. Gomel
2:00 Hydrosalpinx and Other Indications for Laparoscopy for the Infertile Patient G.D. Adamson
2:25 When and How to Evaluate the Uterine Cavity:
   HSG vs. Sonohysterography vs Office Hysteroscopy K.B. Isaacson
2:50 When and How to Removal Intramural Fibroids to Improve Fertility W.W. Hurd
3:15 Questions & Answers All Faculty
3:25 Break
3:40 Tubal Ligation Reversal vs. IVF V. Gomel
4:05  Ovarian Surgery: Endometriomas and Ovarian Drilling  W.W. Hurd
4:30  Surgical Treatment of Uterine Anomalies: Indications and Techniques  K.B. Isaacson
4:55  Does Treating Endometriosis Improve infertility?  G.D. Adamson
5:20  Questions & Answers  All Faculty
5:30  Course Evaluation
PLANNER DISCLOSURE
The following members of AAGL have been involved in the educational planning of this workshop and have no conflict of interest to disclose (in alphabetical order by last name).
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Linda Michels, Executive Director, AAGL*
Jonathan Solnik
Other: Lecturer - Olympus, Lecturer - Karl Storz Endoscopy-America

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G. David Adamson
Consultant: LabCorp
Other: CEO and Founder - Advanced Reproductive Care
Victor Gomel*
Keith B. Isaacson
Consultant: Karl Storz Endoscopy
Joseph S. Sanfilippo*

Asterisk (*) denotes no financial relationships to disclose.
TUBAL RECOGNSTUCTIVE SURGERY VERSUS ART

Professor Victor Gomel

DISCLOSURE

• I have no financial relationships to disclose.

REPRODUCTIVE SURGERY-DEVELOPMENTS

• Microsurgery
• Surgical access by laparoscopy
• Surgical access by minilaparotomy
• Hysteroscopic surgical access
• Prevention of postoperative adhesions

The presence of a credible alternative with IVF, permits to operate in cases with better prognosis and obtain better results.

Most cases can be done by laparoscopy as part of initial diagnostic procedure.

Complex cases may require use of a minilap, performed on day care basis.

Gomel V. Reproductive Surgery in Reconstructive & Reproductive Surgery, Informa, London 2010

ART- USA: 2000-2009

SURGERY VERSUS IVF

COMMERCIALIZATION OF IVF SERVICES

*Both practice and teaching of surgery
NO. EMBRYO TRANSFERRED - USA 2008

Day 3
- One: 31.1%
- Two: 19.2%
- Three: 9.7%
- Four+

Day 5
- None: 4.6%
- One: 15.5%
- Two: 4.8%
- Three: 13.0%

ASSISTED REPRODUCTION - USA 2008

- Singletons: 64.3%
- Twins: 34.0%
- Triplets+: 1.7%

13,892 Live Births

CDC Reproductive Health; www.cdc.gov/art/ART 2008

ASSISTED REPRODUCTION - EUROPE: 2008

<table>
<thead>
<tr>
<th>Delivery/OPU</th>
<th>IVF</th>
<th>ICSI</th>
<th>Multi preg</th>
</tr>
</thead>
<tbody>
<tr>
<td>Europe</td>
<td>21.1</td>
<td>20.2</td>
<td>22.3</td>
</tr>
<tr>
<td>France</td>
<td>19.2</td>
<td>20.5</td>
<td>19.3</td>
</tr>
<tr>
<td>Germany</td>
<td>16.0</td>
<td>16.1</td>
<td>21.8</td>
</tr>
<tr>
<td>Italy</td>
<td>15.2</td>
<td>14.3</td>
<td>23.4</td>
</tr>
<tr>
<td>UK</td>
<td>26.4</td>
<td>27.5</td>
<td>17.9</td>
</tr>
</tbody>
</table>


IMPACT OF MULTIPLE BIRTHS

- Increased obstetrical complications
- Increased neonatal complications/deaths
- Responsible for major societal costs
- Significant financial burden and emotional costs for the parents.

FIRST IVF BABY MADE IN CANADA

- Born December 25, 1983
- Male factor infertility
- Age of female partner
- Tubal disease + Male factor
- Inoperable tubal disease
- Others: i.e. need for PGD

Gomel V. Reproductive Surgery in Reconstructive & Reproductive Surgery, Informa, London 2010
INFERTILITY - INVESTIGATION
• Clinical assessment*
• Semen analysis
• Assessment of ovulation
• Assess tubal factors - HSG

* Sonography is part of clinical assessment

HSG

HYDROSALPINX

DISTAL TUBAL DISEASE

LAPAROSCOPY
**LAPAROSCOPY**

**SALPINGO-OVARIOLYSIS**

**LIVE BIRTH RATE >50%**

**SALPINGOSTOMY**

**LIVE BIRTH RATE ≤30%**

**SALPINGOSTOMY BY MICROSURGERY**

<table>
<thead>
<tr>
<th>AFS Score*</th>
<th>Patients</th>
<th>#</th>
<th>Pregn.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mild</td>
<td>17</td>
<td>12</td>
<td>71</td>
<td></td>
</tr>
<tr>
<td>Severe</td>
<td>73</td>
<td>15</td>
<td>21</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>27</td>
<td>30</td>
<td></td>
</tr>
</tbody>
</table>

* AFS Classification

Gomel V, Erenus M: 1990

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Gomel V, McComb Pf: J Reprod Med. 2006; 51: 177-84.

---

Gomel V, Nader-Levy: 1977

---

**Salpingostomy by Laparoscopy**

**Victor Gomel, M.D.**

**Department of Obstetrics and Gynecology**

**Cedars Sinai Medical Center**

**Los Angeles, California**

---

**Salpingostomy for hydrosalpinx has traditionally been considered a poor surgical option. A recent publication has observed a pregnancy rate of 71% in patients undergoing microsurgical salpingostomy, which represents an improvement compared to the historical success rate of approximately 10-15%. In our experience, patients who achieve pregnancy after salpingostomy are often at risk for recurrent hydrosalpinx or blockage of the Fallopian tube.**

---

**Victor Gomel**

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**Laparoscopy**

**Victor Gomel**
Committee opinion: role of tubal surgery in the era of assisted reproductive technology

“The evidence is fair to recommend laparoscopic fimbrioplasty and neosalpingostomy for the treatment of mild hydrosalpinges in young women with no other significant infertility factors.”


INFLUENCE OF SALPINGOSTOMY FOR HYDROSALPINX ON IVF OUTCOMES

<table>
<thead>
<tr>
<th>Group</th>
<th>IMP/ET</th>
<th>PR/ET</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group I</td>
<td>2.8%</td>
<td>8.5%</td>
</tr>
<tr>
<td>Group II</td>
<td>18.8%</td>
<td>39%</td>
</tr>
<tr>
<td>Group III</td>
<td>16.7%</td>
<td>43.0%</td>
</tr>
<tr>
<td>Group IV</td>
<td>27.3%</td>
<td>60.0%</td>
</tr>
</tbody>
</table>

ASRM PRACTICE COMMITTEE

TUBO-TUBAL ANASTOMOSIS

REVERSAL OF STERILIZATION

REFERENCES


ASRM PRACTICE COMMITTEE

Fertil Steril. 2008; 90: S66-8


TUBO-CORNUAL ANASTOMOSIS

PROXIMAL TUBAL DISEASE

HSG

PROXIMAL TUBAL DISEASE

HSG

CORNUAL OCCLUSION

SELECTIVE SALPINGOGRAPHY

HSG

TUBAL CANNULATION

TUBO-CORNUAL ANASTOMOSIS
Excision of diseased isthmic segment

Placement of the first anastomotic suture

TUBO-CORNUAL ANASTOMOSIS

LIVE BIRTH RATE ± 50%

Musculo-epithelial layer approximated

MINI-LAPAROTOMY

COMBINES functions of wound protector and retractor
**TUBO-CORNUAL ANASTOMOSIS**

<table>
<thead>
<tr>
<th>Patients (n=48)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous abortion</td>
<td>3</td>
<td>6.2%</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>3°</td>
<td>6.2%</td>
</tr>
<tr>
<td>Viable birth</td>
<td>27</td>
<td>56.2%</td>
</tr>
</tbody>
</table>

* For proximal disease, by microsurgery.
° Two of these patients had viable births as well.

**Committee opinion: role of tubal surgery in the era of assisted reproductive technology**

"Unless the proximal blockage on HSG is clearly due to SIN, selective salpingography or tubal cannulation can be attempted."

"Before performing this procedure, there should be confirmation of normal distal tubal anatomy."

**UNUSUAL MICROSURGICAL PROCEDURES**

"... IVF is preferred to resection and microsurgical anastomosis."

"... microsurgery may be considered after failed tubal cannulation if IVF is not an option for the patient, but it should be only by those with appropriate training."

```
Gomel V. Fertil Steril 1985; 43: 804-8

Gomel V. Fertil Steril 2012; 97: 539-459
```
Successful surgery offers the couple multiple cycles in which to achieve conception naturally, and the opportunity to have more than one pregnancy after a single surgical intervention.
**RATE OF BIRTHS USA 2001 -9**

Delivery/cycle initiated  28.5 %

Delivery/ 3 cycles initiated  54.0 %

> 50% of IVF Cycles were ICSI cycles.

CDC Reproductive Health: www.cdc.gov/art/ART 2009

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**IVF: TREATMENT CYCLES**

Several studies have shown conclusively that the majority of couples undergoing IVF-ET do not wish to complete 3 cycles of IVF.


Olivius K et al. Fertil Steril. 2002; 77: 505-10

Frydlman R. Convictions 2010; Bayard (Paris)

---

**THE WAY IN WHICH HUMAN LIFE NORMALLY BEGINS...**

---

**ENDOMETRIOSIS* - IVF**

<table>
<thead>
<tr>
<th>Cumulative Pregnancy*</th>
<th>III+IV (n=67)</th>
<th>Endo I+II (n=31)</th>
<th>Tubal (n=87)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fresh Embryo %</td>
<td></td>
<td></td>
<td>36.6</td>
</tr>
<tr>
<td>Fresh + Frozen %</td>
<td></td>
<td>&gt;50%</td>
<td>81.6</td>
</tr>
<tr>
<td>Fre + Fro Birth %</td>
<td>40.3</td>
<td>55.8</td>
<td>43.7</td>
</tr>
</tbody>
</table>

* Endometriosis associated infertility; 98 consecutive women treated with IVF or ICSI


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**TUBO-CORNAL ANASTOMOSIS- RESULTS**

<table>
<thead>
<tr>
<th>Outcome</th>
<th>no.</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viable births</td>
<td>27</td>
<td>45.8%</td>
<td></td>
</tr>
<tr>
<td>Of 32 with no births</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viable births</td>
<td>12</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Viable births total</td>
<td>39/ 59</td>
<td>66.1%</td>
<td></td>
</tr>
</tbody>
</table>

Tomasevich T et al. Hum Reprod 1996; 11: 2613
"The assimilation of microsurgical techniques and principles into our specialty made the gynecologist much more conscious of avoiding peritoneal trauma and more careful in tissue handling and tissue care. It made the gynecologist more conscious of conservation, and overall a better surgeon."


Reproductive surgery has a significant role in infertility.
- The cost of IVF is prohibitive for many.
- Refuse IVF for religious/ethical reasons.
- ≤50% fail to obtain a baby with IVF.
- A percentage need surgery before IVF for myomas, adnexal tumors, endometriosis, etc.

Training in reproductive surgery is essential
- to improve IVF outcome
- to ensure gynecologists remain refined surgeons
• Surgery and ART are complementary.
• Selection of treatment should be based on the clinical findings and the circumstances of each couple.

Gomel V. Minerva Gynecol. 2005; 57: 21-8

THANK YOU
MERCI
GRACIAS
ありがとうございました
OBRIGADO
TEŞEKÜRLER
GRAZZIE
ΕΥΧΑΡΙΣΤΩ
شكرا

TRANSPOSITION OF TUBE & OVARY

Transposed from Vol. 56, No. 1, July 1975

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Besides its diagnostic value, laparoscopy is a useful operative tool in the treatment of infertility. We have used dilation of phimotic tubal ostia and salpingolysis by laparoscopy as our primary approach. In the total series of 33 cases a pregnancy rate of 42.1% was obtained.

Gomel V. Fertil Steril 1985; 43: 804-8
Hydrosalpinx and Other Indications for Laparoscopy in the Infertile Patient

Las Vegas, NV
Tuesday, November 6, 2012

David Adamson, MD
Director, Fertility Physicians of Northern California
Clinical Professor, Stanford University
Associate Clinical Professor, UCSF

Objectives

- List the indications and contraindications for performing salpingectomy in an infertile patient.
- Describe pathological pelvic anatomical conditions that are potentially mitigated by surgery.
- Compare the relative advantages and disadvantages of laparoscopy vs. ART in the infertile patient.

Patient Selection

- Younger women (<37 years of age)
- Short duration of infertility (<4 years)
- Prior pregnancy
- Normal male factor
- Normal or treatable uterus
- Normal ovarian reserve and
- Normal ovulation or easily treatable ovulation disorder
- Limited prior treatment
- Appropriate candidate for laparoscopy
  - “Treatable” disease reasonably suspected (NNT)
  - No contraindications/risks for laparoscopy, pregnancy
  - Patient accepts 9 to 15 months interval to IVF

Factors That Will Affect the Choice of Treatment

- Family
  - Current socioeconomic status
  - Current size
  - Future plans
  - Time frame
- Treatment
  - Financial resources
  - Insurance coverage
- Desire for diagnosis
- Perspective on use of technology for reproduction
- Perspective on risks
  - Surgery
  - Multiple pregnancy
- Religious beliefs

Disclosures

- Grants/Research Support: Auxogyn, Bayer-Sherring, EMD-Serono
- Consultant: LabCorp
- Other: CEO and Founder - Advanced Reproductive Care
Phimosis and Hydrosalpinx


Surgery for Distal Tubal Disease—Good Prognosis

- Hydrosalpinges and fimbrial phimosis
- PID, Peritonitis, Prior surgery
- Good prognosis
  - Limited filmy adnexal adhesions
  - Mildly dilated tubes (<3 cm) with thin, pliable walls
  - Lush endosalpinx with preservation of the mucosal folds (1)

Surgery for Distal Tubal Disease—Good Prognosis

- Intrinsically normal tubes
  - Peritubal adhesions
  - Endometriosis
  - May mechanically impair oocyte capture

- Treatment outcomes
  - Laparotomy adhesiolysis at 12 months 40%
  - Untreated 8% (1)


Fimbrioplasty and Neosalpingostomy

- Pregnancy rates depend
  - Degree of tubal disease
  - More favorable with good-prognosis patients (1,2)

- Hydrosalpinges
  - Mild: IUP 58-77% vs. Severe 0-22%
  - Ectopic: 2% to 8% vs. 0-17%

- Irreversible deciliation


Fimbrioplasty and Neosalpingostomy

- Fimbrioplasty similar to neosalpingostomy
- Perform laparoscopically; results same, risk less (1,2)
- IVF preferred over neosalpingostomy
  - Older women, male factor, other factors
  - Salpingostomy may improve IVF success and allow spontaneous conception
  - Direct embryotoxic effect
  - Effect on endometrial receptivity


Does Hydrosalpinx Affect IVF-ET Outcome?

- Retrospective analysis
- Tubal Factor Controls
  - 940 patients had 1428 initiated cycles and 1150 ET
- Outcomes
  - Implantation 16% vs. 21% (P = 0.013)
  - Preclinical Loss 37% vs. 14% (P<0.001)
  - Miscarriage 25% vs. 10% (P=0.28)
  - Ectopic 8% vs. 3% (P=0.04)
  - Delivery/ET 26% vs. 34% (P=0.066)


Hydrosalpinges and IVF

- 14 different studies of IVF
- 5592 women
  - 1004 unilateral or bilateral hydrosalpinges
  - 4588 tubal blockage no hydrosalpinx
  - 8703 IVF embryo transfers

Effect of Hydrosalpinges on IVF Outcomes

- **PR** 19.7% vs. 31.2% (OR=0.64; 95% CI 0.56, 0.74).
- **IR** 8.5% vs. 13.7%
- **SAB** (miscarriage) 43.7% vs. 31.1% (OR 0.58; 95% CI, 0.49–0.69)
- Delivery rate 13.4% vs. 23.4%


Impact of Ultrasound Appearance of Hydrosalpinges

- Hydrosalpinges is Ultrasound-visible
  - Implantation and Ongoing Implantation
    - OR=0.33-0.46, C.I. 0.21-0.96
  - Cumulative chance ongoing pregnancy after 1+ cycles
    - Relative hazard 0.36, C.I. 0.22-0.59
- Hydrosalpinges not visible by ultrasound
  - IVF outcome not reduced


Indications for Salpingectomy or Tubal Occlusion

- **Indication**
  - Fallopian tube is damaged beyond repair by infection, endometriosis, or ectopic pregnancy
- **Poor prognosis**
  - Extensive, dense peritubal adhesions
  - Massively dilated tubes
  - Thick fibrotic walls, and/or
  - Sparse or absent luminal mucosa


Does Treatment + IVF Work?

- **3 RCT**
- **Pilot study of 90**
  - Hydro or SIN
  - LS and treatment vs. LS look only
  - PR per cycle 23.7% tx vs 16.3% none
- **204 patients with hydrosalpinges tx vs no**
  - delivery rate 28.6% vs 16.3% (P=.045)
  - If seen on U/S 40.0% vs 17.5% (P=.038)


Effect of Treating Hydrosalpinges Before IVF

- **2 Meta-analyses**
  - 6700 cycles in 11 studies & 4 abstracts
- **Pregnancy Rate**
  - Tubal infertility PR 31.2%
  - Hydrosalpinges PR 16.4%
    - PR 49% lower
  - Fresh and FET
- **Miscarriage**
  - 2.3-fold (95% CI, 1.6–3.5)


Surgical Treatment for Tubal Disease in Women Due to Undergo IVF (1)

- 5 RCT comparing surgical treatment vs. control group
  - N=646
  - Salpingectomy vs. No Treatment, 4 trials
  - Salpingectomy vs. Tubal occlusion, 2 trials
  - Aspiration vs. No Treatment, 1 trial

Outcomes Laparoscopic Salpingectomy
- Ongoing Pregnancy: Peto OR 2.14, 95%CI 1.23 to 3.73
- Clinical pregnancy: Peto OR 2.31, 95%CI 1.48 to 3.62


Surgical Treatment for Tubal Disease in Women Due to Undergo IVF (2)

- Laparoscopic occlusion vs. no intervention
  - Ongoing Pregnancy: Peto OR 7.24, 95%CI 0.87 to 59.57
  - Clinical Pregnancy: Peto OR 4.66, 95%CI 2.47 to 10.01

- Tubal occlusion to salpingectomy
  - Ongoing Pregnancy: Peto OR: 1.65, 95%CI 0.74, 3.71
  - Clinical Pregnancy: Peto OR 1.28, 95%CI 0.76 to 2.14

- US-guided aspiration (1 RCT)
  - Clinical Pregnancy: Peto OR 1.97, 95%CI 0.62 to 6.29

- No significant differences in adverse effects of surgical treatments


Proximal Tubal Occlusion by Hysteroscopic Approach

- Essure coil inserts
  - Data on IVF success rates are limited to a few very small case series (1,2).
  - 7 Trailing coils have potential to act as an IUD intrauterine
  - Complete tissue encapsulation coils 17% of patients within 1 year & 25% at 13–43 months (3).

- Adiana: no data
  - Radiofrequency energy to stimulate interstitial scarring followed by insertion of a small silicone elastomer matrix

Aspiration and Neosalpingostomy Before IVF

- Ultrasound-guided aspiration of hydrosalpinges at the time of oocyte retrieval yielded conflicting results in two small retrospective studies (1,2)
- A randomized study comparing ultrasound-guided aspiration with a nontreated control reported significantly higher clinical pregnancy rates with aspiration (3).
- Intuitively, it makes sense that laparoscopic neosalpingostomy before IVF should improve the pregnancy rate, but there are still no confirmatory studies.


Conclusions: Surgical Treatment for Tubal Disease in Women Due to Undergo IVF (3)

- Surgical treatment should be considered for all women with hydrosalpinges prior to IVF treatment.
- Laparoscopic tubal occlusion is an alternative to laparoscopic salpingectomy in improving IVF PR.
- Further research is required to assess the value of aspiration of hydrosalpinges prior to or during IVF procedures and also the value of tubal restorative surgery as an alternative (or as a preliminary) to IVF.


Effect of Unilateral Hydrosalpinges on IVF Pregnancy Rates

- Even patients with a unilateral hydrosalpinx have been shown to have lower pregnancy rates with IVF (1,2)
- Unilateral salpingectomy resulted in a significant improvement in IVF pregnancy rates in these patients (3)
- Salpingectomies for bilateral hydrosalpinges yielded higher IVF pregnancy rates than for unilateral hydrosalpinges (4)

Chances for Pregnancy After Unilateral Salpingectomy

- 25 women with one hydrosalpinx
  - 18 salpingectomy or 7 tubal ligation
  - pregnancy rates naturally without IVF
- 88% women achieved pregnancy
  - Salpingectomy quicker
- Mean time to pregnancy 5.6 months


Technical Aspects of Salpingectomy

- Coagulate and divide tube close to cornua
- Serially coagulate and cut the mesosalpinx
- Stay close to the tube to avoid
  - thermal injury to the ovary
  - Vascular injury of ovarian blood supply
- Ovarian injury possible but avoidable (1-3)

Summary and Conclusions

1. The live birth rate achieved with IVF among women with hydrosalpinges is approximately one half that observed in women without hydrosalpinges.
2. In women with hydrosalpinges, preliminary laparoscopic salpingectomy or proximal tubal occlusion improves subsequent pregnancy and live birth rates achieved with IVF. For every six women with hydrosalpinges, one more ongoing pregnancy will be achieved if salpingectomy or tubal occlusion is performed before IVF.
3. Data are insufficient to permit recommendations regarding the effectiveness of alternative treatments such as laparoscopic neosalpingostomy, transvaginal aspiration of hydrosalpingeal fluid, hysteroscopic tubal occlusion, or antibiotic treatment.

Adhesions

Significance of Peritubal Adhesions

- 433 infertile women had laparoscopy
- Peritubal adhesion effect equal to unilateral tubal obstruction
- 25% reduction


Effectiveness of Adhesiolysis

- Improved Pregnancy Rates Following Adhesiolysis

<table>
<thead>
<tr>
<th>Time</th>
<th>Not treated</th>
<th>Treated</th>
</tr>
</thead>
<tbody>
<tr>
<td>12 months</td>
<td>11%</td>
<td>32%</td>
</tr>
<tr>
<td>24 months</td>
<td>16%</td>
<td>45%</td>
</tr>
</tbody>
</table>

$p<0.000$

Conclusions

- **Advantages of Laparoscopy**
  - More than one pregnancy
  - Fewer multiple pregnancies
  - Repair pathology
  - Mitigate problems in addition to infertility

- **Disadvantages of laparoscopy**
  - Time required to attempt pregnancy
  - Risks of surgery
  - Costs of surgery
  - Not all conditions are treatable or improved

References (1)


References (2)

When and How to Evaluate the Uterine Cavity: HSG vs. Sonohysterography vs Office Hysteroscopy

Keith Isaacson MD
Director MIGS and Infertility, NWH
Associate Prof Ob/Gyn
Harvard Medical School
kisaacson@partners.org

Indications for Uterine Cavity Evaluation

- Evaluation of Abnormal Uterine Bleeding (AUB)
- Infertility evaluation
- Location of foreign bodies/ lost IUD
- Identification of focal endometrial cancers
- Complications of pregnancy
- Cervical examination

Indications for Uterine Cavity Assessment

- Pre and post-surgical evaluation
- Evaluation of Post-menopausal bleeding

Indications for Cavity Assessment

- Evaluation of Abnormal Uterine Bleeding
- Infertility
- Location of foreign bodies/ lost IUD
- Identification of focal endometrial cancers
- Complications of pregnancy
- Cervical examination

Learning Objectives

- At the conclusion of this presentation, the participant will be familiar with:
  - The indications to evaluate the uterine cavity
  - The strengths and limitations of HSG, sonohysterogram and office hysteroscopy

Disclosures

- Consultant – Karl Storz Endoscopy
**Evaluation of AUB**

**Normal Menstrual Cycles**
- Cycle length - 28 +/- 7 days
- Duration of flow - 4 +/- 2 days
- Blood loss/cycle - 40 +/- 20 ml

**Excessive Uterine Bleeding**
- Cycle length < 21 days
- Duration of flow > 7 days
- Blood loss/cycle > 80 ml
- 67% develop anemia

**Clinical Indicators**
- Increase in >2 sanitary pads/day
- Duration lasting > 3 days more than usual
- Intermenstrual bleeding
- Cycles > 2 days shorter than usual
- Blood clots and socially embarrassing bleeding

**Subjective Assessment**
- One third of women with >80 ml/cycle feel their bleeding is normal
- 15% of women with a flow <15 ml/cycle feel their flow is heavy

**Causes of abnormal uterine bleeding (AUB)**
- Dysfunctional
- Iatrogenic
- Organic
Dysfunctional Uterine Bleeding (anovulatory bleeding)

- Abnormal uterine bleeding with no identifiable organic disease
- Bleeding due to irregular ovulation with periods of unopposed estrogen
  - perimenarche
  - perimenopause
  - PCO

Iatrogenic AUB

- IUD’s
- Steroid contraceptives
  - Norplant
  - Depot Provera
  - OCP
- Other medications
  - Tranquilizers

Organic Conditions and AUB

- Complications of pregnancy
  - Retained placenta
- Malignancy
- Infection
- Systemic diseases
  - coagulopathies
  - hypothyroidism
  - liver disease

Organic lesions and AUB

- Benign pelvic lesions
  - submucous myomata
  - intramural myomata (less common)
  - endometrial and endocervical polyps
  - adenomyosis

Evaluation of AUB: Step I

- History
  - Past medical history (systemic disease)
  - Medications
  - Contraceptive use
  - Age of AUB onset
  - LMP - r/o pregnancy
  - Cycle regularity
  - Abnormal bleeding from other sites

Evaluation of AUB: Step II

- Ovulatory vs Anovulatory
  - Regular cycle - 95% ovulatory
  - BBT
  - LH kit
  - Luteal Progesterone
  - U/S
Anovulatory AUB
- Hormonal evaluation
  - PCO (FSH, LH, E2)
  - Hypothalamic amenorrhea (FSH, E2)
  - Prolactin
  - TSH
- Hormonal therapy
  - Progestins, E2/P4, OCPs, thyroid replacement, parlodel
  - Mirena IUD - continuous release of local levonorgestrel

Ovulatory AUB
- Coagulopathies (15-20% of adolescents with excessive regular uterine bleeding)
  - primary hemostasis (formation of platelet plug)
  - secondary hemostasis (stabilization of platelet plug with fibrin deposition)
  - orderly dissolution of clot (fibrinolysis)

Evaluation of Coagulopathies
- CBC and Platelet count
- PT - factors II, V, VII, X, fibrinogen
- APTT - factors VIII, IX, XII, II, V, X
- Bleeding time - platelet function, platelet number, von Willebrand factor, vascular integrity.
- Platelet function test - replace bleeding time
- vWF screen - vWF Ag, vWF:RCo (marker for vWF activity, Factor VIII:C coagulant capacity
  - Type O have low nl vWF and high E2 elevates vWF

Evaluation of the Reproductive Tract
- Rule out malignancy
  - Endometrial biopsy (> 35 y/o)
  - Vaginal U/S if post menopausal
  - Pap smear +/- colposcopy and biopsy
  - Guiac
- Rule out infection
  - cervical cultures
  - EB to rule out chronic endometritis
- Rule out adenomyosis - MRI, ?hysteroscopy

Indications for Uterine Cavity Evaluation
- Premenopausal and ovulatory
- Premenopausal and anovulatory but fails hormonal therapy
- Postmenopausal bleeding off HRT
- Unexpected postmenopausal bleeding on HRT

Evaluation of the Uterine Cavity
- D&C
- Hysterosalpingogram
- Ultrasound
- Sonohysterography
- Office hysteroscopy
3-D Ultrasound

- As sensitive and specific for congenital uterine anomalies as MRI
  - Arcuate uterus
  - Septum
  - Bicornuate uterus
  - Didelphys

Vaginal Probe Ultrasound

- Useful for post menopausal bleeding > 5 mm endometrium risk of CA is <3%
  - Sensitivity and specificity 56% and 49% (hysteroscopy 100% and 50%)
  - PPV 83%, NPV -83%
- Can evaluate intramural and subserosal fibroids.
- Not helpful for focal endometrial lesions such as polyps, myomas or focal cancers.

Hysteroscopic findings in women with AUB

- Menstrual blood loss >60 ml
  - 64% with lesion at hysteroscopy (Fraser IS Am J Obstet Gynecol, 162:1264, 1990)
- Post menopausal bleeding
  - PPV 78%
  - Negative predictive value 99.4% (Clark T et al. JAMA. 288:1610, Oct 2002)

Indications for Office Hysteroscopy

- Evaluation of Abnormal Uterine Bleeding
- Infertility
- Location of foreign bodies/lost IUD
- Identification of focal endometrial cancers
- Complications of pregnancy
- Cervical examination
Uterine Conditions Affecting Fertility

- Uterine fibroids
  - submucous
  - intramural
- Endometrial polyps
- Intrauterine synechia
- Congenital defects
- Adenomyosis?

Submucosal Myoma

- Submucus fibroids block or decrease the normal vascular supply to the trophoblastic tissue.
- Present in 8% of infertile women
- Present in >50% of ovulatory women with menorrhagia

Narayan et al. (JAAGL, 1994)

- 100 failed IVF cycles with good embryos
  - 73 normal cavity (control group)
  - 27 SM myomata
    - 16/27 had myomectomy, rest shrunk with GnRHa
  - Take home baby rate
    - 37% - myomectomy group
    - 19% - controls

Bernard et al. (Eu J Gyn/OB, Jan 2000)

- Retrospective study of 31 infertile patients with SM myoma undergoing myomectomy
  - Followed for 3 years
  - 11/31 pregnant (35%)
  - Lower pregnancy rate with >1 myoma and with concurrent intramural myomata

Submucous Myoma Therapy

- 30% - 60% pregnancy rates
  - Bernard et al, 2000
  - Vercillini et al, 1999
  - Giatras et al, 1999

Endometrial Polyps

- Impact on fertility?
- Present in 24% of infertile women
- Present in >50% of ovulatory women with midcycle spotting
**Intrauterine synechia**

- Increasing incidence worldwide
  - D & C after delivery or missed abortion
  - Tuberculosis
  - Uterine insult in immunocompromised patients


**Intrauterine Adhesions**

- Impact on fertility proportional to degree of scarring
  - density of adhesions
  - degree of cavity occlusion
  - scarring on the uterine wall


**Congenital Uterine Abnormalities**

- 0.2% - 10% of general population
  - Septum - decrease vascularity - recurrent Ab
  - Bicornuate
  - Didelphys
  - T-shape

**Prevalence of Uterine Abnormalities in Asymptomatic Patients Undergoing IVF**

- Shamma et al (1992) - 12/28 (42%)
- Giovanni et al (1998) - 18/100 (18%) all had a normal HSG and 2 failed cycles
- Kim et al (1999) - 8/72 (11%)
- Ayida et al (1997) - 16/47 (34%)

- 37.5% clinical pregnancy rate without intrauterine lesions
- 8.3% clinical pregnancy rate with lesions

Sharmaa et al (1992)

**Indications for Office Hysteroscopy**

- Evaluation of Abnormal Uterine Bleeding
- Infertility
- Location of foreign bodies/ lost IUD
- Identification of focal endometrial cancers
- Complications of pregnancy
- Cervical examination

**Office Based Detection of Endometrial CA**

Vaginal probe ultrasound + office hysteroscopy + Pipelle endometrial biopsy = Hysteroscopy and D&C for the detection of endometrial cancer.

Tahir M et al. BJOG 107:1058 Aug 2000
Does hysteroscopy influence the prognosis of early stage Endometrial Cancer?

- Means of diagnosis compared
  - Endometrial biopsy
  - Hysteroscopy
- Results
  - Higher recurrence with endometrial biopsy
  - No difference in peritoneal cytology or 5 yr. survival rates.

Indications for Office Hysteroscopy

- Evaluation of Abnormal Uterine Bleeding
- Infertility
- Location of foreign bodies/lost IUD
- Identification of focal endometrial cancers
- Complications of pregnancy
- Cervical examination

Indications for Office Hysteroscopy

- Pre and post-surgical evaluation
- Evaluation of Post-menopausal bleeding
- Minor surgical procedures
  - Visual biopsy
  - Insertion of tubal occlusion device
  - Adhesiolysis
  - Polypectomy

Information Changes Management

- Submucous myomata
  - Type 0 - 100% w/in cavity
  - Type I - > 50% w/in cavity
  - Type II - < 50% w/in cavity


Office hysteroscopy non-disposable equipment

- Hysteroscope
  - Flexible
  - Rigid
    - 12, 25, 30 degree angled lenses
  - Operative instruments
- Cart
  - Light source, light cable, monitor, camera (on cart or built into scope, image capture)

State-of-the-Art Flexible Hysteroscopy for Office Gynecologic Examinations

Linda D. Bradley, MD
Theresa Wiedrich, MD
Journal of the AAGL, 1995, P. 263
Costs and Reimbursements

- Capital equipment - $12,000-$15,000
  - Flexible scope
  - Monitor
  - Light source
  - Camera
  - Cart

Questions

- Appropriate modalities to evaluate the uterine cavity include all of the following except:
  a) Vaginal probe ultrasound
  b) 3-D ultrasound
  c) HSG
  d) Office hysteroscopy
  e) Saline sonography

- Indications for evaluation of the uterine cavity include which of the following:
  a) Pelvic pain
  b) Recurrent yeast infection
  c) Dyspareunia
  d) Recurrent miscarriage

- Sonohysterography has a better sensitivity and specificity than HSG for detecting endometrial polyps
  - True
  - False

- Office hysteroscopy is a procedure that most often requires local anesthesia for pain management
  - True
  - False
When and How to Remove Intramural Fibroids to Improve Fertility

William W. Hurd, MD
Professor of Gynecology and Obstetrics
University Hospitals Case Medical Center
Case Western Reserve University School of Medicine

Disclosures
I have no financial relationships to disclose.

Learning Objectives
At the conclusion of this presentation, the participant should be able to:
1. Discuss what is known about the relationship between fibroids and infertility
2. List guidelines for when to perform myomectomies in patients with infertility
3. Distinguish the relative advantages of the various surgical approaches for myomectomy

Incidence of Fibroids

- Hysterectomy specimens 70%
- Reproductive-age women 40%
- Infertility women 10%
- Unexplained infertility ?

Fibroids and Infertility

Some fibroids:
- Decrease fertility
- Increase spontaneous abortions
- Increase pregnancy complications

Questions
1. When should we remove fibroids in infertile women?
2. How?

Types of Fibroids

- Intracavitary
- Submucosal (Distorts cavity)
- Intramural
- Subserosal
- Pedunculated
Fibroids and Infertility: Possible Mechanisms

1. Interference with sperm/embryo transport
   - Occlusion of the tubal ostia
   - Changes in uterine contractility
   - Elongation of the uterine cavity

2. Impair implantation
   - Intracavitary/Submucosal
   - Intramural?

Do Submucosal and Intracavitary Fibroids Decrease Fertility?

Compared with infertile women without fibroids:

- ↓ Implantation rate
- ↓ Clinical pregnancy rate
- ↓ Ongoing
- ↓ Pregnancy/live birth rate
- ↑ Spontaneous abortion rate

Do Intramural Fibroids Decrease Fertility?

Effects of intramural fibroids on IVF:

<table>
<thead>
<tr>
<th></th>
<th>Fibroids</th>
<th>Control</th>
<th>OR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Implantation rate</td>
<td>16%</td>
<td>28%</td>
<td>.62 (.48-.80)</td>
</tr>
<tr>
<td>Delivery rate</td>
<td>31%</td>
<td>41%</td>
<td>.69 (.50-.95)</td>
</tr>
</tbody>
</table>

Do Intramural Fibroids Decrease Fertility?

Intramural Fibroids <7 cm (Not Compressing Uterine Cavity)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th>IVF-ICSI Results (n=245)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Fibroid</td>
<td>Pregnancy Miscarriage</td>
</tr>
<tr>
<td>Implantation rate</td>
<td>16%</td>
<td>28%</td>
<td>.62 (.48-.80)</td>
</tr>
<tr>
<td>Delivery rate</td>
<td>31%</td>
<td>41%</td>
<td>.69 (.50-.95)</td>
</tr>
</tbody>
</table>

Effects of Size and Position on IVF-ICSI

<p>| | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>Subserosal 0.2 - 2.0 cm</td>
<td>Subserosal 2.0 - 4.0 cm</td>
</tr>
<tr>
<td>Pregnancy</td>
<td>33%</td>
<td>28%</td>
<td>23%</td>
</tr>
<tr>
<td>Miscarriage</td>
<td>10%</td>
<td>15%</td>
<td>12%</td>
</tr>
</tbody>
</table>

Obstetric and delivery outcomes for women with and without leiomyomas

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Infertile leiomyomas (n=6,500)</th>
<th>Non-leiomyomas (n=6,500)</th>
<th>Unadjusted Relative Risk 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birthweight preterm&lt;32 wks</td>
<td>1.2 (0.9-1.9)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Maternal preeclampsia</td>
<td>1.4 (0.6-3.0)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>3.1 (2.7-3.8)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Angiography</td>
<td>1.4 (1.1-1.9)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Preeclampsia</td>
<td>10.4 (5.2-1.4)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Intracavitary/submucosal leiomyoma</td>
<td>13.7 (5.3-3.8)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Pregnancy before 37 wks</td>
<td>13.5 (5.3-3.8)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Pregnancy before 34 wks</td>
<td>3.2 (1.6-1.0)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
<tr>
<td>Intravenous fibrinogen</td>
<td>3.6 (1.0-1.6)</td>
<td>1.0 (1.0-1.0)</td>
<td></td>
</tr>
</tbody>
</table>

(Stout 2010)
Fibroids >5 cm and Pregnancy Complications

Obstetric outcomes comparing women with leiomyomas <5 cm to those with leiomyomas >5 cm (Stout 2010)

<table>
<thead>
<tr>
<th>Outcome</th>
<th>≤5 cm or Smaller (n=1,899)</th>
<th>Larger Than 5 cm (n=593)</th>
<th>Relative Risk (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cesarean sectiona</td>
<td>1.4</td>
<td>6.4</td>
<td>4.5 (2.5-8.3)</td>
</tr>
<tr>
<td>Preterm delivery</td>
<td>14.6</td>
<td>35.2</td>
<td>2.4 (1.0-5.5)</td>
</tr>
<tr>
<td>Preeclampsiaa</td>
<td>7.5</td>
<td>7.5</td>
<td>0.6 (0.4-0.8)</td>
</tr>
<tr>
<td>SICER</td>
<td>15.0</td>
<td>15.7</td>
<td>0.9 (0.7-2.3)</td>
</tr>
<tr>
<td>PEFNE</td>
<td>1.1</td>
<td>1.1</td>
<td>1.0 (0.3-3.4)</td>
</tr>
<tr>
<td>Preterm birth &lt;37 w</td>
<td>1.5</td>
<td>1.7</td>
<td>1.1 (0.8-1.5)</td>
</tr>
<tr>
<td>Preterm birth &lt;32 w</td>
<td>1.4</td>
<td>4.0</td>
<td>2.9 (0.7-2.0)</td>
</tr>
</tbody>
</table>

Myomectomy and Pregnancy Rate

The only RCT (Casini 2006)

- Intramural or Subserosal Fibroids >5 cm
- Retrospective, n = 51

Myomectomy and Spontaneous Abortion Rates

- Intramural or Subserosal Fibroids >5 cm
- Retrospective, n = 51

Uterine Evaluation for Infertility

- Transvaginal Ultrasound
- Hysterosalpingogram
- Sonohysterogram
- 3-D ultrasound?
- MRI?

Ultrasonography

Measure:
- Location
- Number
- Size
Hysterosalpingogram
Determines
• Tubal patency
• Distortion of the uterine cavity

Sonohysterogram
Determines
• Size
• Location relative to the uterine cavity

3-D Ultrasonography
Uncertain role
Future: 3-D sonohysterogram

MRI
• Most accurate
• Most expensive
• Offers little more information

When to Remove Fibroids
1. Symptomatic fibroids
   – Menorrhagia
   – Pressure symptoms related to size
2. Infertile patients
   – All Intracavitary or Submucosal fibroids
   – Intramural Fibroids >5 cm
   – Infertility unresponsive to therapy?
3. Robotic
   • Single Intramural
4. Open
   • Large Submucosal
   • Intramural

Surgical Approaches to Fibroids in the Infertile Patient
**Hysteroscopic Approach**

- Intracavitary
- Submucosal
  - Increased risk of
    - Uterine perforation
    - Infertility related to Asherman’s adhesions
    - Placenta accrete

**Brazil Classification**

<table>
<thead>
<tr>
<th>Point</th>
<th>Penetration</th>
<th>Size</th>
<th>Base</th>
<th>Location</th>
<th>Lateral</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>&lt;2 cm</td>
<td>&lt;1/3</td>
<td>lower</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>&lt;50%</td>
<td>2-5 cm</td>
<td>1/3-2/3</td>
<td>middle</td>
<td>Yes</td>
</tr>
<tr>
<td>3</td>
<td>&gt;50%</td>
<td>&gt;5 cm</td>
<td>&gt;2/3</td>
<td>upper</td>
<td></td>
</tr>
</tbody>
</table>

**Suggested Approach**

- 0-4: Hysteroscopic: Low complexity
- 5-6: Hysteroscopic: High complexity
- 7-9: Non-hysteroscopic

(Lasmar 2005)

**Hysteroscopic Approaches**

1. Resectoscope
   - Advantage
     - Deeper resection
     - Reaches corners
     - Less Expensive

2. Intra-uterine morcellator (Myosure®) (TrueClear®)
   - Advantages
     - No electrosurgery
     - Normal saline
     - Easier

**Hysteroscopic Myomectomy Pearls**

- Preoperative GnRH agonist if >2 cm
- Vasopressin injection into cervix (10 u/50 cc NS)
- Careful Is & Os
  - Good adhesion of bag to perineum
  - Weighing device
  - Know when to quit

**Laparoscopic Approach**

Fibroids involving myometrium
- Submucosal
- Intramural
- Submucosal

**Robotically Assisted Laparoscopic Approach**

- Single submucosal/intramural fibroids
Risk of Laparoscopic Approach for the Infertility Patient

- Uterine rupture during pregnancy

ASRM Guideline: “the inability to effectively close the myometrium laparoscopically could contribute to a higher incidence of this complication” (ASRM 2004)

Laparoscopic Myomectomy Pearls

- Vasopressin injection (10 u/50 cc NS)
- V-lock® suture
  - Cover with adhesion barrier
- Adhesions Barrier

Laparotomy Myomectomy

Decreased
- Blood Loss?
- Subsequent uterine rupture?
- Recurrence?

Increased
- Discomfort
- Wound infection
- Adhesions

Laparotomy Myomectomy Pearls

- Preoperative GnRH agonist
- Vasopressin
- Tourniquets
- Adhesion barrier

Adhesion Prevention after Myomectomy

- Proven to decrease adhesions:
  - Oxidized regenerated cellulose Interceed®
  - Hyaluronatecarboxymethylcellulose film Seprafilm® (laparotomy only)
- No data on subsequent fertility or other long-term outcomes
- No benefit:
  - 4% icodextrin solution: Adept®

(ASRM 2004)

Summary Fibroids in Infertile Women

1. All infertility patients are evaluated for fibroids
2. Fibroids should be removed in infertile patients when they are
   - Intracavitary
   - Submucosal
   - Intramural fibroids >5 cm
3. Surgical approach depends on location, size, equipment, and training

(Robertson 2010) (Trew 2011)
References


Questions?
The first option (reversal) is designed to restore tubal function. Whereas, the second (IVF), replaces it.

Although performed less frequently than before, reversal procedures have as yet not suffered the abandonment other anastomotic tubal procedures have experienced. Yet, microsurgery finds its ultimate application in tubo-tubal anastomosis.

The precision afforded by the microsurgical technique and use of magnification allow precise dissection of the occluded ends, proper alignment of the proximal and distal segments of tube, and excellent apposition of each layer with very fine non-reactive sutures.

DISCLOSURE

I have no financial relationships to disclose.

The advantages and drawbacks of IVF have been discussed in my earlier presentation and will not be repeated here.

However, we will review the important factors that must be taken into account in recommending the proper treatment modality.
Furthermore since in the vast majority of reversal cases the available tubal segments are normal, the outcome is an anatomically and physiologically normal, albeit shortened fallopian tube.
### STERILIZATION REVERSAL - LAPAROSCOPY

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>118</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.U. pregnancy</td>
<td>64</td>
<td>62.7%</td>
<td></td>
</tr>
<tr>
<td>Viable births</td>
<td>49</td>
<td>50.5%</td>
<td></td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>5</td>
<td>4.9%</td>
<td></td>
</tr>
</tbody>
</table>

*Single suture tubal anastomosis.

*Pre-selected by laparoscopy for length of tube: proximal > 3 cm, distal > 4 cm.

Bissonnette F et al Fertil Steril 1999;72: 549

---

### STERILIZATION REVERSAL - MICROSDUGERY

<table>
<thead>
<tr>
<th>Authors</th>
<th>Kim SY*</th>
<th>Kim JD°</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total followed</td>
<td>922/118</td>
<td>35/387</td>
</tr>
<tr>
<td>Total I.U. pregn.</td>
<td>463 (50%)</td>
<td>329 (90%)</td>
</tr>
<tr>
<td>Viable births</td>
<td>366 (40%)</td>
<td>295 (82%)</td>
</tr>
<tr>
<td>Ongoing preg.</td>
<td>31 ( 3%)</td>
<td>8 ( 2%)</td>
</tr>
<tr>
<td>Spontaneous abort</td>
<td>90 (10%)</td>
<td>14 ( 4%)</td>
</tr>
<tr>
<td>Ectopic preg.</td>
<td>42 ( 5%)</td>
<td>6 ( 2%)</td>
</tr>
</tbody>
</table>

*Followed more than 5 years. °Followed more than 2 years.

Kim SY et al Fertil Steril 1997;68:865-70
Kim JD et al Fertil Steril 1997;68:875-80

---

### STERILIZATION REVERSAL - LAPAROSCOPY

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total patients</td>
<td>20</td>
<td>16.9%</td>
<td></td>
</tr>
<tr>
<td>Not pregnant</td>
<td>2</td>
<td>1.7%</td>
<td></td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>96</td>
<td>81.4%</td>
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</tr>
<tr>
<td>Viable birth</td>
<td>93</td>
<td>78.8%</td>
<td></td>
</tr>
</tbody>
</table>

*Long term follow up.


---

### STERILIZATION REVERSAL - MICROSDUGERY

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total IU. Pregnancy</td>
<td>17</td>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>IU&gt; pregn &lt;38 years</td>
<td>10</td>
<td>59%</td>
<td></td>
</tr>
<tr>
<td>Viable births</td>
<td>13</td>
<td>41%</td>
<td></td>
</tr>
</tbody>
</table>

*B* (34%) patients lost to follow-up, 8 did not try to conceive.

Post-op hospital stay 2-3 days


---

### STERILIZATION REVERSAL - LAPAROSCOPY

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total followed</td>
<td>922</td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.U. pregnancy</td>
<td>463</td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>Viable births</td>
<td>366</td>
<td>40%</td>
<td></td>
</tr>
<tr>
<td>Ongoing preg.</td>
<td>31</td>
<td>3%</td>
<td></td>
</tr>
<tr>
<td>Spontaneous abort</td>
<td>90</td>
<td>10%</td>
<td></td>
</tr>
<tr>
<td>Ectopic preg.</td>
<td>42</td>
<td>5%</td>
<td></td>
</tr>
</tbody>
</table>

1Follow up >12 m


---

### STERILIZATION REVERSAL - LAPAROSCOPY

<table>
<thead>
<tr>
<th>Outcome</th>
<th>No.</th>
<th>Patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total followed</td>
<td>186</td>
<td>93%</td>
<td></td>
</tr>
<tr>
<td>I.U. pregnancy</td>
<td>154</td>
<td>83%</td>
<td></td>
</tr>
<tr>
<td>Viable births</td>
<td>98</td>
<td>53%</td>
<td></td>
</tr>
<tr>
<td>Ongoing preg.</td>
<td>31</td>
<td>17%</td>
<td></td>
</tr>
<tr>
<td>Spontan abort.</td>
<td>25</td>
<td>13%</td>
<td></td>
</tr>
<tr>
<td>Ectopic preg.</td>
<td>5</td>
<td>3%</td>
<td></td>
</tr>
</tbody>
</table>

Lost to follow up (n=15), not attempting preg.(n=1).

STERILIZATION REVERSAL - LAPAROSCOPY

<table>
<thead>
<tr>
<th>Patients* (n=51)</th>
<th>No.</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spontaneous abortion</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Viable birth</td>
<td>12</td>
<td>23.5%</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>12</td>
<td>23.5%</td>
</tr>
</tbody>
</table>

- Retrospective study.
- Single 5-0 Vicryl suture to mesosalpinx and single 7-0 Vicryl suture to approximate the two segments of tube at 12 o'clock position.

Ayoubi JM. In print. 2012

ROBOTIC TUBAL ANASTOMOSIS

<table>
<thead>
<tr>
<th>OUTCOME</th>
<th>ROBOT (n=18)</th>
<th>OPEN (n=10)</th>
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</thead>
<tbody>
<tr>
<td>IU pregnancy</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Spont. abortion</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Tubal pregnancy</td>
<td>4</td>
<td>1</td>
</tr>
</tbody>
</table>


- "Robotic-assisted surgery appears to provide the same surgical outcomes and cost effectiveness when compared with traditional open tubal anastomoses.
- The high patency rates provide optimism for the role of robotics in training programs."


FACTORS AFFECTING OUTCOME

- Age of female partner

Gamal V. Reproductive Surgery in Reconstructive & Reproductive Surgery, Informa, London 2010
Microsurgical tubal anastomosis yields a birth rate that exceeds 60%, without increased risk of multiple pregnancy.

It offers the couple multiple cycles in which to achieve conception naturally, and the opportunity to have more than one pregnancy from a single intervention.

The real dilemma lies with the ‘commercialization’ of IVF, and its frequent use as primary treatment for infertility.

The dilemma is heightened by the fact that reconstructive tubal microsurgery is being taught and practiced less and less, thereby eliminating this credible surgical option in most centers.
Comparable results may be obtained by laparoscopy if the procedure is performed "in an identical fashion to open microsurgical tubal anastomosis." Operating times are prolonged. "Only surgeons who are very facile with laparoscopic suturing and who have extensive training in conventional tubal microsurgery should attempt this procedure."
Ovarian Surgery to Improve Fertility: Endometriomas and Ovarian Drilling

William W. Hurd, MD
Professor of Obstetrics and Gynecology
University Hospitals Case Medical Center
Case Western Reserve University School of Medicine

DISCLOSURES
I have no financial relationships to disclose.

LEARNING OBJECTIVES
At the conclusion of this presentation, the participant should be able to:
1. Discuss what is known about the relationship between endometriomas and infertility
2. Distinguish the relative advantages of the various surgical approaches to endometriomas
3. List guidelines for when to treat polycystic ovaries with ovarian drilling

ENDOMETRIOMA
• A “chocolate cyst” arising from growth of ectopic endometrial tissue within the ovary
• Often adherent to surrounding structures, (peritoneum, fallopian tubes, bowel)
• Chocolate fluid: menstrual debris from the shedding and bleeding from implants

INCIDENCE
Endometriosis
• 10% of all women
• 30% of women with chronic pelvic pain
• 20-40% of infertile women

Endometriomas
• 10% of all women with endometriosis
• 60% of women with moderate/severe endometriosis

How Does Endometrial Tissue Get into the Ovary?
Hypothetical possibilities:
1. Retrograde menstruation
   • Progressive invagination of ovarian cortex
   • Invades ovary
   • Enters ovarian cysts at the time of ovulation
2. Embryonic Rests
3. Metaplasia of epithelial inclusions in the ovary (“coelomic metaplasia”)
**Ultrasound Appearance of Endometriomas**

- Ground glass appearance: homogeneous low to medium level echoes
- Thick walled, cystic mass
- Uni- or multi-locular
- Can have a solid, nodular component

**Differential Diagnosis**

1. Hemorrhagic functional cyst (resolves over time)
2. Ovarian malignancies
   - Develop in <1% of women with endometriosis
   - Cell types: clear cell and endometrioid Ca
   - CA-125 is of little help (usually elevated)
   - Always send tissue for histopathology diagnosis

**SYMPTOMS**

- Symptoms of endometriosis
- Often asymptomatic
- Ruptured endometrioma = PID or appendicitis:
  - Peritonitis
  - ↑WBC
  - Fever
- What should we do when we puncture a cyst and find chocolate fluid?

**Endometrioma Treatment Options**

- Observation
- Medical Therapy
- Surgery

**Observation**

Candidates:
- Previous histological diagnosis of endometriosis
- Recurrent asymptomatic adnexal mass consistent with an endometrioma
- Size <4 cm

**Observation Management Plan**

- Ultrasound every 6 months x 1 year, then annually
  - Repeat surgery for changes in:
    - Symptoms
    - Cyst size or complexity
Medical therapy

Medical options:
– GnRH Agonists
– Progestins
– OCPs

• Treatment for endometriosis symptoms
• Will not resolve endometrioma

Surgical Management of Endometriomas

Indications:
• Pain
• Exclusion of malignancy
• Infertility
  – Prior to IVF?

Endometriomas and Infertility

Endometrioma removal is controversial!

• Advantage:
  Treatment of pelvic endometriosis (outside the ovary) improves fertility

• Disadvantage:
  Endometrioma resection damages the ovary

Risk of Endometrioma Resection

• Decreased “ovarian reserve”

• Mechanism: Follicles adjacent to the cyst destroyed

• Measurable changes after resection:
  – Increased ovarian resistance to ovulation induction
  – Decreased oocyte number and quality for IVF
  – Premature ovarian failure (2% if bilateral)

(Tsoumpou 2009) (Busacca 2006)

Should Endometriomas be Resected Prior to IVF?

Endometrioma resection results in:
• Slower follicle growth (longer stimulation)
• ↑FSH requirements
• ↓ Mature oocytes
• No change in rates of
  – Fertilization
  – Pregnancy

(Tsoumpou 2009)

Recommendation Prior to IVF

Remove endometriomas >4 cm prior to IVF

Rationale:
• Confirm the diagnosis histologically
• Improve access to follicles

(Kennedy 2005)
Surgical Approaches

- Oophorectomy
- Aspiration
- Cyst wall resection (stripping technique)
- Fenestration and ablation

Oophorectomy

- Best Approach After childbearing completed
- Recurrence uncommon
- Most likely to relieve pain
- Removing attached peritoneum with ovary might minimize the risk of ovarian remnant syndrome

Aspiration

- Puncture without aspiration can result in peritonitis
- Cyst should be completely drained and rinsed
- Recurrence rate: 88%

Cyst wall resection

- Remove entire cyst wall using a stripping technique
- Recurrence rate: 6%

Fenestration and ablation

- Technique:
  - Remove section of the cyst wall
  - Irrigate cyst
  - Coagulate (or laser vaporization) inside of cyst
- Less symptom relief
- Lower pregnancy rate
- Recurrence rate: 30%

Why are Recurrence Rates so High?

Cyst wall resection: 6%
Fenestration/ablation: 30%
Aspiration: 88%

Reason: endometrial glands and stroma involves 60% (10-90%) of cyst wall for a depth of <2 mm

(Hart 2005)

(Muzii 2007)
How to Decrease Recurrence

- Pregnancy
- Breast Feeding
- Estrogen-progestin OCPs

(Protective effect disappears after OCP cessation)

(Muzii 2000) (Seracchioli 2010)

Bottom Line: Endometriomas

- Most endometriomas should be removed
- Cyst wall resection is the goal
- Recurrence is always a risk
- OCPs after surgery for those not attempting pregnancy

Ovarian Drilling for PCOS: Ovarian Diathermy

- Laparoscopic “wedge resection” equivalent for PCOS
- Electrocautery or a laser is used to destroy parts of the ovaries
- Ovulation temporarily resumes in most women

Indications

- Women with PCOS who do not ovulate with fertility medicines:
  - Metformin
  - Clomiphene citrate
  - FSH
- Women with PCOS who do not respond to clomiphene citrate and cannot afford FSH or IVF

Ovarian Drilling Technique

(No standard technique)

- Laparoscopy
- Puncture ovary 4-10 times using electrosurgical needle (or laser fiber)
- Probe: 8 mm distal stainless steel needle with insulated shaft
- Electrosurgical setting: 30 watts for 5 seconds
- Stay on side away from tube and peritoneum

(Amer 2002)

Results

- Androgens decrease within days
- Spontaneous ovulation occurs in most women
How Well does it Work?

No randomized controlled trials

Based on several series totaling >1,000 women:
- 80% ovulate
- 50% become pregnant (in women with no other fertility problems)

Best Prognosis:
- Younger women
- BMI < 25 Kg/M²

(Stegmann 2003)

Risks of Ovarian Drilling

1. Risks related to laparoscopy (<1/1,000)
2. Risk specific to ovarian drilling
   - Peri-ovarian adhesions (usually mild)
   - Premature ovarian failure?

Bottom Line: Ovarian Drilling

- Relatively safe surgical treatment for women with PCOS resistant to fertility drugs
- Spontaneous pregnancy rates within 6 months of surgery are remarkable
- Ovarian adhesions are the primary concern

Questions?

REFERENCES

Amer SA, Li TC, Cooke B. Laparoscopic ovarian diathermy in women with polycystic ovarian syndrome: a retrospective study in the influence of the amount of energy used in the outcome. Hum Reprod 2002; 17 (11): 1046-51.


Surgical Treatment of Uterine Anomalies: Indications and Techniques

Keith Isaacson, MD
Associate Professor of Obstetrics and Gynecology
Harvard Medical School
Boston, MA
USA

Objectives

- Identify uterine pathology that impacts fertility
- Define the uterine surgical techniques that will enhance fertility
- Review the complications and the success rates of uterine surgery that enhances fertility

Infertility Evaluation

- Semen Analysis
- Ovarian Reserve Assessment
- Tubal patency
- Uterine assessment
  - Vaginal probe ultrasound
  - HSG
  - Saline sonography
  - Office hysteroscopy

Should OH be a routine part of the infertility evaluation?

- Lorusso, F et al 2008 (866 cycles)
  - 555 pts before first IVF
  - 311 after 2 or more failed IVF
  - 40% with intrauterine pathology

- Hinkley MD J SLS 2004 (Stanford Med)
  - 1000 patients prior to IVF
  - 32% with polyps
  - 3% submucous myomas
  - 3% adhesions
  - 0.5% septum
  - 0.3% retained POCs
  - 0.3% bicornuate

Disclosures

- Consultant – Karl Storz Endoscopy

Intrauterine pathology impacting fertility

- Uterine fibroids
- Intrauterine Adhesions
- Intrauterine polyps
- Proximal Tubal occlusion
- Uterine septum
- Adenomyosis
Information Changes Management

- **Submucous myomata**
  - Type 0 - 100% w/in cavity
  - Type I - > 50% w/in cavity
  - Type II - < 50% w/in cavity


Myomas and reproductive function

1. Cervical displacement can reduce exposure to sperm
2. Enlargement or deformity of the uterine cavity that may interfere with sperm migration and transport
3. Obstruction of the proximal fallopian tubes
4. Altered tubo-ovarian anatomy, interfering with ovum capture
5. Increased or disordered uterine contractility that may hinder sperm or embryo transport or nidation
6. Distortion or disruption of the endometrium and implantation due to atrophy or venous ectasia over or opposite a submucous myoma
7. Impaired endometrial blood flow
8. Endometrial inflammation or secretion of vasoactive substances


Fertility after Hysteroscopic Resection of Submucous Myomas

- No prospective randomized trials
- Giatras et al. 1999 JMIG
  - 41 infertile patients
  - 61% pregnancy rate
  - 94% delivery rate
- Betocchi et al F&S 2008
  - Beneficial treatment of SM myomata <1.5 cm in IVF patients
- Shokeir TA (Arch of Gynecol Obstet 2005)
  - 3% to 63% after resection del rate
  - Ab rate reduced from 61% to 26% after resection

Yu et al. Fertil Steril 2008;89:759-79

Intrauterine adhesions and fertility

- 6%-20% of women with primary infertility
- 25% of women with recurrent Ab
- 25%-40% after post partum D&C
- 6% of women with 2 or more failed IVF with good embryo quality
- Found after myomectomy, UAE, Infection
- 43% of women with Asherman’s present with infertility

Therapy for Asherman’s

- Recurrence of adhesions
  - 20%-60% depending on severity
- Methods to prevent recurrence
  - OCPs
  - IUD
  - Foley balloon
  - HA
  - Estrogen
  - Second look hysteroscopy
Success of Asherman’s therapy

- Pace et al, pregnancy rate improved from 28.7% before surgery to 53.6% after hysteroscopic treatment.
- Woman with two or more previous unsuccessful pregnancies, the live birth rate improved from 18.3% preoperatively to 68.6% postoperatively.
- The pregnancy rate after hysteroscopic lysis of intrauterine adhesions in women who wanted to have a child has been about 74% (468 out of 631), which is much higher than found in untreated women (46%).
- The pregnancy rate after treatment in women with infertility is about 45.6% (104 out of 228); the successful pregnancy rate after treatment in severe cases is reported to be consistently lower (18 out of 55 or 33%). For women with previous pregnancy wastage, both the pregnancy rate and the live birth rate after treatment are reasonably high (121 out of 135 or 89.6% and 104 out of 135 or 77.0%, respectively).

Pregnancy rates after Polypectomy

- 83 patients with primary infertility and endometrial polyps by hysteroscopy.
- 61% pregnancy rate, 52% delivery rate post polypectomy in 3-18 mos post procedure.
- Lass A et al J Assist Repro and Genet 1999 (Bourne Hall)
  - 24 cases – reduction in miscarriage rate with polypectomy

Recurrent IVF failure

- 421 pts - randomized
  - 211 with no OH - 21% PR
  - 210 with OH
    - 154 normal cavities – 32% PR
    - 56 abnormal cavities (26%) repaired at diagnosis– 30% PR P=0.044

Dimirolo A, Gurgan T Reproductive Med Online 8:590 2004

Hysteroscopic tubal occlusion for hydrosalpinx

- Rosenfield R et al F&S 2005
  - One obese patient, one pregnancy
- Hitkari et al F&S 2007
  - 5 patients with hydrosalpinx and prior surg.
    - Successful placement in 4/5
    - 0 pregnancies
- Kerin J et al F&S 2007
  - 2 patients, 2 pregnancies
  - Tissue encapsulation of proximal insert between 4-43 mos in 545 women

Uterine septum repair

- 119 patients (32%, 14% IVF failure, SAB) with septum age matched to 116 controls (20%, 6% IVF fail, SAB)
- After repair - Both groups equal
- Miscarriage rate drops from 91% to 17% (Sanders J Repro Med 51 2006)

Ozgur, k et al Reproductive Biomedicine Online 14:335 2007

VERSAPoint System for Bipolar Hysteroscopic Surgery

- 1.6 mm (5 F) in diameter
- Two poles separated 2 mm at distal shaft by ceramic insulator
- Electrodes designed for variable tissue effects
  - Ball tip – precise vaporization and desiccation
  - Spring tip – rapid tissue vaporization and desiccation
- Twizzle tip – vaporization and needle-like cutting
- Given small size and focused tissue effects, best for
  - polypectomy, adhesiolysis, vaporization of smaller submucous myomata
Uterine Vascularity

Compostion1 of Gases Found by Hysteroscopic Electrosurgical Vaporization*

<table>
<thead>
<tr>
<th></th>
<th>Bipolar (normal saline)</th>
<th>Unipolar (glycine)</th>
<th>Air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hydrogen</td>
<td>51.0</td>
<td>49.0</td>
<td>0.00005</td>
</tr>
<tr>
<td>CO</td>
<td>25.7</td>
<td>26.1</td>
<td>0.00001</td>
</tr>
<tr>
<td>CO₂</td>
<td>6.5</td>
<td>7.5</td>
<td>0.0314</td>
</tr>
<tr>
<td>O₂</td>
<td>2.9</td>
<td>3.0</td>
<td>20.9476</td>
</tr>
<tr>
<td>N</td>
<td>1.4</td>
<td>2.3</td>
<td>78.084</td>
</tr>
<tr>
<td>C₂H₂</td>
<td>3.6</td>
<td>4.1</td>
<td></td>
</tr>
<tr>
<td>CH₄</td>
<td>2.8</td>
<td>2.5</td>
<td>0.0002</td>
</tr>
<tr>
<td>Misc₂</td>
<td>6.0</td>
<td>5.6</td>
<td></td>
</tr>
</tbody>
</table>

1 - Measured in mole percent
2 - Acetylene, Propane, C3 Olefin, Isobutane, n-Butane, C4 Alkene, C5 Hydrocarbon

Munro et al. JAAGL Nov 2001

Monitoring Venous Air Embolism

- Doppler, TE echo 0.1 - 0.25
- End title CO2 or Nitrogen tension .025 - 0.5
- CVP and Pulmonary artery P increase .05 - 0.75
- Mean Art P decrease 0.75 - 1.25
- Ventricular dysrhythmias 1.25
- Mill-wheel murmur 1.5
- Cardiovascular collapse 2.0

Sensitivity mL/Kg/min air entrapment

Cervical Stenosis

- Pabuccu R et al JMIG 2005
  - Hysteroscopic shaving for cervical stenosis
  - 3 patients, 3 pregnancies

Operative Office Hysteroscopy

- Standard Approach
  - Speculum – preferable side opening
  - Tenaculum
- Vaginoscopic approach
  - No speculum or tenaculum
Vaginoscopy: Technique

Office Hysteroscopic procedures
- Diagnostic Hysteroscopy
- Visually directed endometrial biopsy
- Polypectomy
- Myomectomy
- Adhesiolysis
- Metroplasty
- Proximal tubal recanalization

Test questions
1. Congenital anomalies that affect fertility include
   a) Uterine Septum
   b) Uterine Didelphys
   c) Vaginal septum
   d) Uterine fibroids

Test Question
2. Hysteroscopic adhesiolysis must be performed under laparoscopic guidance to avoid uterine perforation
   a) True
   b) False

Test question
- Hysteroscopic myomectomy increases the risk of uterine rupture during pregnancy
  - True
  - False

Test question
- Methods proven to prevent recurrence of intrauterine adhesions include
  a) Estrogen therapy
  b) Foley catheter in the uterine cavity
  c) Post op adhesiolysis
  d) Soy products
  e) IUD
Does Treating Endometriosis Improve Fertility?

AAGL 41st Global Congress
November 6, 2012

David Adamson, MD
Director, Fertility Physicians of Northern California
Adjunct Clinical Professor, Stanford University
Associate Clinical Professor, UCSF

Learning Objectives
• Describe the role of observation, ovarian stimulation, ovarian suppression, surgery and combined treatments.
• List the clinical indications for performing ART.
• Explain confounding variables affecting management of endometriomas.

Treatment Options
• Observation/Symptomatic
• Surgery
• Medical Treatments
  — Ovarian Suppression
  — Combined suppression and surgery
  — Intrauterine insemination (IUI)
  — Controlled Ovarian Stimulation (COS)
• Assisted Reproductive Technologies (ART)

Disclosures
Grants/Research Support: Auxogyn, Bayer-Sherring, EMD-Serono
Consultant: LabCorp
Other: CEO and Founder - Advanced Reproductive Care

Surgery
### Appearance Changes With Age

<table>
<thead>
<tr>
<th>Appearance</th>
<th>Mean Age</th>
<th>Age Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear only</td>
<td>21.5</td>
<td>17-26</td>
</tr>
<tr>
<td>Red only</td>
<td>26.3</td>
<td>16-38</td>
</tr>
<tr>
<td>White only</td>
<td>29.5</td>
<td>20-39</td>
</tr>
<tr>
<td>Black only</td>
<td>31.9</td>
<td>20-52</td>
</tr>
</tbody>
</table>

### Disease Progression in Infertility

- Laparoscopy for unexplained infertility
  - Patients with normal pelvis
- Those negative not preg repeat L/S 2 years
  - 20% macroscopic endometriosis

Pepperell and McBain, Br J OG 1985: 92; 569-580

---

### Infertility Outcomes: Surgery

**Minimal/Mild Disease**
- Controversial for many years
- Summary non-randomized studies
  - Surgery vs. no treatment: 58% vs. 45%
  - Fertility not different: 6-7%
  - Endocan RCT (NNT 7.7): 37.5% vs. 22.5%
  - Gruppo Italiano RCT: 19.6% vs. 22.2%
  - Combined Endocan/Italy OR 1.66 (1.09-2.51)
- Cochrane: laparoscopy may improve PR (1)
- ESHRE, RCOG (A level 1a): ablation/lysis effective (2,3)


### Surgical Treatment of Minimal Endo

- 341 women
- Stage I-II
- 36 week follow-up
- Pregnancy rates
  - 31% vs. 18%
  - Italian 29 vs 24%
  - OR 1.7

Surgical indicated for invasive adhesive cystic
Surgery indicated for invasive, adhesive, cystic endometriosis (Evidence level 3) (2,3)


### Infertility Outcomes: Surgery

**Moderate/Severe Disease**
- Severe anatomic distortion
- Very low background pregnancy rate
- Numerous uncontrolled trials show benefit
- L/S > laparotomy: RR 1.87; p=0.031 (1)
- Surgery indicated for invasive, adhesive, cystic endometriosis (Evidence level 3) (2,3)
- Conservative surgical therapy with laparoscopy and possible laparotomy are indicated. (4)

2. RCOG Guideline No XX. 2005.

### Pregnancy Rates Following Surgical Excision: Negative Correlation With Stage

<table>
<thead>
<tr>
<th>CPR</th>
<th>Ref</th>
<th>Stage of Endometriosis</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Min</td>
<td>Mild</td>
</tr>
<tr>
<td>1 year</td>
<td>Guzik</td>
<td>39%</td>
<td>31%</td>
</tr>
<tr>
<td>1 year</td>
<td>Adamson</td>
<td>45%</td>
<td>--</td>
</tr>
<tr>
<td>1.5 years</td>
<td>Osuga</td>
<td>45%</td>
<td>--</td>
</tr>
</tbody>
</table>

Endometrioma Treatment

• Cyst >5 cm (Endometrioma)
  – According to protocol
  • Endometriomas
  – Unknown
  – ? > 3-4 cm
• Technique
  – Stripping preferred where possible (1 2)
  – Stripping preferred where possible (1, 2)
• Lower recurrence rate
  – Drainage and coagulation (3)
• Avoid damage to normal ovarian tissue

Complete Posterior Cul-de-sac Obliteration and DIE

Estimated Life Table Pregnancy Rates (1)

<table>
<thead>
<tr>
<th>% Pregnant</th>
<th>Laparoscopy</th>
<th>Laparotomy</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Year</td>
<td>29.6 ± 14.4</td>
<td>0 ± 0.0</td>
</tr>
<tr>
<td>2 Years</td>
<td>29.6 ± 14.4</td>
<td>23.7 ± 12.2</td>
</tr>
</tbody>
</table>

• No clarity as to best surgical approach (2,3)
• Complication rates 0-13% (3)

ESHRE Guidelines

• Insufficient evidence whether surgical excision of moderate-severe disease enhances pregnancy rates (1-3)
• Probable negative correlation between stage of endometriosis and pregnancy rate after surgical removal (4)

Surgical Techniques

• Minimize number of surgeries (1)
• Use least invasive approach: laparoscopy (1)
• Minimize tissue trauma (1)
• Remove all disease (no RCT proof)
• Consider adhesion barrier (1)
  – No evidence on any benefit of improving pregnancy outcomes (2,3)

Fecundity (f) Following Treatment of Endometriosis

Conclusion

• Endometriosis Fertility Index (EFI)
  – Simple, robust and validated clinical tool
  – Predicts pregnancy rates for patients following surgical staging of endometriosis
  – Very useful in developing treatment plans for infertile endometriosis patients

• Prospective validation by other clinicians should encourage widespread application of the EFI to benefit patients

Ovarian Suppression For Fertility

• No evidence of fertility benefit from ovarian suppression: 25 RCTs (1)
  – Costs and delay time to pregnancy
• GnRHa treatment before IUI is not recommended
  – 1 RCT suggesting benefit IVF and IUI
  – Insufficient evidence to determine benefit in IUI alone (2)


Infertility Outcomes: Ovarian Suppression and Surgery

• Adjunct to Surgery (16 RCTs)
  – Preoperative
    • No data conclusively show benefit (1)
  – Postoperative
    • No data show benefit (1)
    • Does not improve fertility (A. Level 1b)(2,3)
  – Delay in attempting pregnancy, costs, side effects render ovarian suppression not appropriate

(3) RCOG. Guideline No XX. 2005.
Endometriosis Treatment Stage I and II

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Cycle fecundity in women with stage I or II endometriosis, according to treatment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td>Unexplained infertility</td>
</tr>
<tr>
<td>Treatment</td>
<td>Gutzik et al. (27)</td>
</tr>
<tr>
<td>No treatment or subclinical inervation</td>
<td>0.02</td>
</tr>
<tr>
<td>IU</td>
<td>0.05a</td>
</tr>
<tr>
<td>Uterine</td>
<td>—</td>
</tr>
<tr>
<td>Cervical</td>
<td>—</td>
</tr>
<tr>
<td>Uterine/Cervical</td>
<td>0.04a</td>
</tr>
<tr>
<td>Gonadal/Cervical</td>
<td>0.02a</td>
</tr>
<tr>
<td>IU/COS</td>
<td>0.03a</td>
</tr>
</tbody>
</table>

* P<.05 for treatment vs. no treatment.

COS + IUI Appropriate BEFORE Laparoscopy

IUI +/- COS

- IUI with COS effective in improving fertility in minimal/mild endometriosis (1,2)
- Role of unstimulated IUI is uncertain (2)
- Double insemination should be considered (3)

When To Do Laparoscopy?

- Younger women (<37 years of age)
- Short duration of infertility (<4 years)
- Normal male factor
- Normal or treatable uterus
- Normal ovulation, or
- Easily treatable ovulation disorder
- Limited prior treatment
- Appropriate candidate for laparoscopy
  - "Treatable" disease reasonably suspected (NNT)
  - OR= 1.66 (1)
  - No contraindications to laparoscopy
  - Patient accepts 9-15 months attempting before IVF

Impact of Endometriosis Stage on IVF Outcomes

- Only observational studies for ART (e.g. Rosenwaks 2002; Barnhart 2002)
- With laparoscopic retrieval, probably yes
- With transvaginal retrieval, probably no
- No studies have had sufficient power to evaluate the impact of extensive disease (AFS Score >71) (1)
- IVF PR lower in endometriosis (Level 1a) (2)

**ENDOMETRIOSIS AND IVF**

References:

Role of IVF in Endometriosis

- Although IVF may be less effective for IVF than for other causes of infertility, it should be considered for use to improve the success rate above expectant management.

(3) Soliman. 1993 Jun 5;90(9):1239-44.

IVF and Endometriosis

- For women with stage III/IV endometriosis who fail to conceive following conservative surgery or because of advancing reproductive age, IVF is an effective alternative (1)
- IVF is appropriate treatment especially if tubal function is compromised, if there is also male factor infertility, and/or other treatments have failed (Level IIb) (2,3)

(2) RCOG. Guideline No XX. 2005.

Endometriomas and Endometriosis Before IVF

- Laparoscopy for 3 cm endometriomas (GPP) (1-3)
  - Confirm histologic diagnosis
  - Reduce risk of infection
  - Improve access to follicles
  - Possibly improve ovarian response
- Explain risk of poor ovarian response post-op
- Reconsider decision if previous ovarian surgery
- No evidence of benefit of surgery for endometriosis before IVF (4)

(1) RCOG. Guideline No XX. 2005.
(4) RCOG. Guideline No XX. 2005.

Role of Ovarian Suppression Before IVF

- No RCT's with adequate controls
  - Generally not helpful for infertility
  - Does not improve endometriomas
- Some data supporting improved pregnancy rates when suppression precedes IVF (2,3)
  - GnRHa for 3-6 months increases PR 4X (A. Level 1a) (3,4)
  - Prolonged treatment with GnRHa in mod/severe should be considered because improved pregnancy rates have been reported (A. Level 1b/5)
  - Optimal duration of treatment unknown (range 2-26 weeks)
  - Our practice treats additional 4-12 weeks for moderate/severe endometriosis
- No data on oral contraceptives

(1) RCOG. Guideline No XX. 2005.
(4) RCOG. Guideline No XX. 2005.

Endometrioma Treatment Before ART

- 4 Trials; n=312
- GnRH vs. GnRH antagonist
  - CPR: No difference
  - NMOR and Ovarian Response: GnRHs > Antagonist
- Surgery (Aspiration or Cystectomy) vs. Expectant Management
  - CPR: No difference
  - NMOR and Ovarian Response: Aspiration > Expectant
- Cystectomy vs. Expectant
  - COS response less with cystectomy
- Aspiration versus cystectomy
  - CPR and NMOR: No difference


Failed IVF Treatment Endo

<table>
<thead>
<tr>
<th>Comparison of patients with a history of prior failed IVF cycles, who underwent hysteroscopic treatment of endometriomas to patients who did not undergo hysteroscopic treatment.</th>
<th>Laporoscopy</th>
<th>No hysteroscopy</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of endometriomas</td>
<td>36</td>
<td>35</td>
<td>0.13</td>
</tr>
<tr>
<td>Average age (y)</td>
<td>52.9</td>
<td>57</td>
<td>0.26</td>
</tr>
<tr>
<td>Average FSH (IU/L)</td>
<td>8.9</td>
<td>8.1</td>
<td>0.25</td>
</tr>
<tr>
<td>Average no. of failed IVF cycles</td>
<td>2</td>
<td>2.5</td>
<td>0.54</td>
</tr>
<tr>
<td>Pregnancy rate</td>
<td>0.07</td>
<td>0.04</td>
<td>0.13</td>
</tr>
<tr>
<td>Spontaneous pregnancy rate</td>
<td>0.52</td>
<td>0.28</td>
<td>0.13</td>
</tr>
</tbody>
</table>

SUMMARY

Management Summary (1)
• Pelvic Pain
  — Initially analgesics, NSAID’s, OC’s
• Infertility with other factors normal
  — CC 100mg CD 3-7 + IUI for 3-6 cycles, depending on age
  — Other ovarian stimulation regimen
• Persistence of pain and/or infertility without other significant infertility factors
  — Laparoscopy, diagnostic & operative

Management Summary (2)
• Surgery well performed is effective treatment
  — All stages endometriosis & endometriomas
  — Infertility and Pain
• Ovarian suppression generally effective for pain
• Repeat surgery
  — Limited benefit for fertility, some for pain
• Pre-IVF treatment ONLY
  — Suppression: reasonable extensive disease
• Surgery: 2 large > 3-4 cm endometriomas
• Endometriosis NO effect on IVF LBR except
  — Extensive disease +/- or endometriomas

References

THANK YOU!
CULTURAL AND LINGUISTIC COMPETENCY

Governor Arnold Schwarzenegger signed into law AB 1195 (eff. 7/1/06) requiring local CME providers, such as the AAGL, to assist in enhancing the cultural and linguistic competency of California’s physicians (researchers and doctors without patient contact are exempt). This mandate follows the federal Civil Rights Act of 1964, Executive Order 13166 (2000) and the Dymally-Alatorre Bilingual Services Act (1973), all of which recognize, as confirmed by the US Census Bureau, that substantial numbers of patients possess limited English proficiency (LEP).

California Business & Professions Code §2190.1(c)(3) requires a review and explanation of the laws identified above so as to fulfill AAGL’s obligations pursuant to California law. Additional guidance is provided by the Institute for Medical Quality at http://www.imq.org

Title VI of the Civil Rights Act of 1964 prohibits recipients of federal financial assistance from discriminating against or otherwise excluding individuals on the basis of race, color, or national origin in any of their activities. In 1974, the US Supreme Court recognized LEP individuals as potential victims of national origin discrimination. In all situations, federal agencies are required to assess the number or proportion of LEP individuals in the eligible service population, the frequency with which they come into contact with the program, the importance of the services, and the resources available to the recipient, including the mix of oral and written language services. Additional details may be found in the Department of Justice Policy Guidance Document: Enforcement of Title VI of the Civil Rights Act of 1964 http://www.usdoj.gov/crt/cor/pubs.htm.

Executive Order 13166, “Improving Access to Services for Persons with Limited English Proficiency”, signed by the President on August 11, 2000 http://www.usdoj.gov/crt/cor/13166.htm was the genesis of the Guidance Document mentioned above. The Executive Order requires all federal agencies, including those which provide federal financial assistance, to examine the services they provide, identify any need for services to LEP individuals, and develop and implement a system to provide those services so LEP persons can have meaningful access.

Dymally-Alatorre Bilingual Services Act (California Government Code §7290 et seq.) requires every California state agency which either provides information to, or has contact with, the public to provide bilingual interpreters as well as translated materials explaining those services whenever the local agency serves LEP members of a group whose numbers exceed 5% of the general population.

If you add staff to assist with LEP patients, confirm their translation skills, not just their language skills. A 2007 Northern California study from Sutter Health confirmed that being bilingual does not guarantee competence as a medical interpreter. http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=2078538.