**Definition**
Presence of endometrial glandular and stromal elements outside endometrial cavity and uterine musculature
Some define the ectopic tissue has to be functional too i.e difference between endometriosis & normal endometrium

**Prevalence**
An accurate prevalence is not determinable, because the definition requires a histological diagnosis. Estimates are:
- 2-20% in women undergoing sterilization / laparotomy
- 5 - 10% female child bearing population
- 15-30% of women with pelvic pain undergoing laparoscopy
- 20 - 40% infertility patients
- 50%-80% adolescents undergoing laparoscopy for significant pelvic pain

*average 10 years between symptoms and diagnosis endometriosis*

**Epidemiology**
Socio-demographic factors.
Endometriosis increases with:
- age - peak incidence 40 - 44s
  also distribution of endometriosis varies:
    1) POD / uterosacral ligaments / broad ligaments decrease with age
    2) Ovarian involvement increases with age
- High social status ( undergo more laparoscopies? )
- race Oriental > Caucasian > blacks (high prevalence in Japan)

Genetic
5% of 1st degree relatives have endometriosis; multi-factorial inheritance

Menstrual cycle
endometriosis increases with early menarche ≤ 11 ; cycle length < 27 days ; menses duration >7 days;
un-interrupted regular cycles ie no intervening pregnancies conversely endometriosis decreases with increasing parity

Environmental
- smoking and exercise → reduced risk secondary to reduced estrogen
- ETOH / caffeine ↑ risk
- OCP inconsistent risk

Weight
↑ BMI → ↓ endometriosis (related to ↑ anovulatory cycles??)

Autoimmune diseases
↑ endometriosis in patients with rheumatoid arthritis ; SLE ; Hypothyroidism etc.
Ovarian cancer

↑ incidence of ovarian cancer (clear cell + endometrioid) in endometriosis:
- RR 2 endometriosis
- RR 3 endometriomas

Endometriosis and cancer share common traits eg local invasion, neoangiogenesis, resistance to apoptosis etc

Risk factors:
- Menopause
- Endometriomas >9cm
- Unopposed estrogen

Incidence malignant transformation 1-2%

5% endometriosis occurs in P/M women:
- Unopposed HRT
- Endogenous aromatase production in endometriosis lesions

**Aetiology**

**Retrograde menstruation**
75-90% all females have retrograde menstruation

↑ incidence in congenital outflow obstruction

In adolescents with endometriosis, 10% congenital outflow obstruction

**Metaplasia**
Inductions agent (e.g. oestrogen) → metaplasia of coelomic tissue to endometrial tissue

Implies endometriosis can occur where no endometrium exists

Supported by:
- Endometriosis in males
- Extraperitoneal endometriosis
- Prepubertal endometriosis

Theory has never been proven

**Lymphatic / vascular dissemination**
30% pelvic nodes are involved in endometriosis

**Direct transplantation** e.g. surgical scar

The immune system plays central role in endometriosis

**Pathogenesis**
Central to pathogenesis is overexpression Estrogen receptor beta in endometriotic cells

1) attachment and invasion of ectopic endometrial cells
mediated by:
- Adhesion molecules
- ↑ matrix metalloproteinases (MMP) N.B progesterone ↓ MMP expression
- ↓ tissue inhibitor metalloproteinases (TIMP)
- Other cytokines
2) survival and proliferation of ectopic endometrium
   a) altered immune system
      ↓ CMI / NK → ↓ clearance of endometrial cells shed into pelvis
      ↑ B cell activation & antibody formation
      ↑ macrophage activation → production of PG / cytokines
      secretion of cytokines / growth factors leads to:
      • pain
      • toxicity to sperm / oocytes
      • adhesion formation
   b) abnormal hormonal environment
      ↑ aromatase activity → ↑ E2 production
      ↑ 17β hydroxysteroid dehydrogenase type 1 → ↑ E1 to E2
      ↓ 17β hydroxysteroid dehydrogenase type 2 → ↓ E2 to E1
      all → ↑ E2 environment
   c) environmental factors
      dioxin eg. Tetrachlorodibenzo-p-dioxin (TCDD) exposure → endometriosis in monkeys

Classification of endometriosis
Classification ideally:
1) reflects symptoms of pain and fertility
2) reflects prognosis with and without treatment
3) easily reproducible to allow communication between clinicians
parameters for pain different for fertility

rAFS scoring
problems with rAFS classification
1) correlates better for infertility than pain
2) does not account for morphological / functional activity of endometriosis eg.
   • Red lesion active growth
   • Black lesions less active
   • White lesion fibrotic
3) does not account for depth of lesions
4) large intra and inter observer variability
### AFS Classification of Endometriosis

<table>
<thead>
<tr>
<th>Patient's Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laproscopy</td>
<td>Laparotomy</td>
</tr>
<tr>
<td>Recommended Treatment</td>
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</table>

<table>
<thead>
<tr>
<th>Stage</th>
<th>(Minimal): 1-3</th>
<th>(Mild): 4-15</th>
<th>(Moderate): 16-40</th>
<th>(Severe): &gt;40</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>&lt;1cm</td>
<td>1-3cm</td>
<td>&gt;3cm</td>
<td></td>
</tr>
<tr>
<td></td>
<td>ENDOMETRIOSIS</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Superficial</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Deep</td>
<td>2</td>
<td>4</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>R. Superficial</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Deep</td>
<td>4</td>
<td>16</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>L. Superficial</td>
<td>1</td>
<td>2</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>Deep</td>
<td>4</td>
<td>16</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>POSTERIOR CULDESAC OBLITERATION</td>
<td>Partial</td>
<td>Complete</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OVARY</th>
<th>4</th>
<th>40</th>
</tr>
</thead>
<tbody>
<tr>
<td>ADHESIONS</td>
<td>&lt;1/3 Enclosure</td>
<td>1/3 – 2/3 Enclosure</td>
</tr>
<tr>
<td>R. Filmy</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dense</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>L. Filmy</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dense</td>
<td>4</td>
<td>8</td>
</tr>
<tr>
<td>R. Filmy</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dense</td>
<td>4*</td>
<td>8*</td>
</tr>
<tr>
<td>L. Filmy</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Dense</td>
<td>4*</td>
<td>8*</td>
</tr>
</tbody>
</table>

* If the fimbriated end of the fallopian tube is completely enclosed, change the point assignment to 16.

### Additional Endometriosis:

- To Be Used with Normal Tubes and Ovaries
- L. L
- R. L
- To Be Used with Abnormal Tubes and/or Ovaries
- R. R

### Associated Pathology:

- 

### EXAMPLES & GUIDELINES

#### STAGE I (MINIMAL)

- PERITONEUM
  - Superficial Endo: <1cm
  - Deep Endo: -2
- R. OVARY
  - Filmy Adhesions: ≤1/3
- L. OVARY
  - Dense Adhesions: ≤1/3

**TOTAL POINTS:** 4

#### STAGE II (MILD)

- PERITONEUM
  - Superficial Endo: ≤1cm
  - Deep Endo: >3cm
- R. OVARY
  - Filmy Adhesions: ≤1/3
- L. OVARY
  - Deep Endo: >3cm

**TOTAL POINTS:** 6

#### STAGE III (MODERATE)

- PERITONEUM
  - Superficial Endo: >3cm
  - Deep Endo: 1/3
- R. OVARY
  - Filmy Adhesions: ≤1/3
- L. OVARY
  - Dense Adhesions: ≤1/3

**TOTAL POINTS:** 8

#### STAGE IV (SEVERE)

- PERITONEUM
  - Superficial Endo: >3cm
  - Deep Endo: >3cm
- R. OVARY
  - Filmy Adhesions: ≤1/3
- L. OVARY
  - Dense Adhesions: ≤1/3

**TOTAL POINTS:** 14

**Note:** Points assigned must be counted and totaled. Aggregation of points indicates stage of disease (minimal, mild, moderate, or severe). The presence of endometriosis of the ovary should be considered “additional endometriosis.” Other pathology such as tubal occlusion, leiomyomata, uterine anomaly, etc., should be documented under “additional endometriosis.” All pathology should be depicted as specifically as possible on the sketch of pelvic organs and means of observation (laparoscopy or laparotomy) should be noted.

Determination of the stage of disease based on a weighted point system. Distribution of points has been arbitrarily determined and may require further revision or refinement as knowledge of the disease increases.

To ensure complete evaluation, inspection of the pelvis in a clockwise or counterclockwise fashion is encouraged. Number, size and location of endometrial implants, plaques, endometriomas, and/or adhesions are noted. For example, five separate 0.5 cm superficial implants on the peritoneum (2.5 cm total) would be assigned 2 points. The surface of the uterus should be considered peritoneum. The severity of the endometriosis or adhesions should be assigned the highest score only for peritoneum, ovaries, tube, or cul-de-sac.

For example, a 4 cm superficial and a 2 cm deep implant of the peritoneum should be given a score of 6 (not 8). A 4 cm deep endometriosis of the ovary associated with more than 3 cm of superficial disease should be scored 20 (not 24).

In those patients with only one adnexa, points applied to disease of the remaining tube and ovary should be multiplied by two. **Points assigned must be counted and totaled. Aggregation of points indicates stage of disease (minimal, mild, moderate, or severe).**
**ENZIAN classification (DIE)**

Complementary to rAFS

Anatomical Scoring for DIE

Surgical / histological staging (denoted by prefix ENZIAN) which can be provisionally based on clinical / US / MRI + diagnostic laparoscopy. (denoted by prefix C)

---

**Figure 1.53 ENZIAN Classification – Compartments A–C.**

A = rectovaginal space  
B = pelvic side wall including uterosacral ligaments  
C = rectum

1 = <1 cm; 2 = 1-3 cm; 3 = >3 cm lesions

---

Page 5 of 29
**Fig. 1.57** The suffixes FA, FA, Fl and FO are part of the ENZIAN classification scheme addressing the sites of endometriotic implants detected outside the lesser pelvis.\(^8\)

F denotes other sites endometriosis.
Endometriosis Fertility Index (EFI)
Good prognostic indicator fecundity to guide future treatment options (Adamson 2010)

**TABLE 1**

<table>
<thead>
<tr>
<th>Structure</th>
<th>Dysfunction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube</td>
<td>Mild</td>
<td>Slight injury to serosa of the fallopian tube</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Moderate injury to serosa or muscularis of the fallopian tube; moderate limitation in mobility</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>Fallopian tube fibrosis or mild/moderate salpingitis isthmica nodosa; severe limitation in mobility</td>
</tr>
<tr>
<td></td>
<td>Nonfunctional</td>
<td>Complete tubal obstruction, extensive fibrosis or salpingitis isthmica nodosa</td>
</tr>
<tr>
<td>Fimbria</td>
<td>Mild</td>
<td>Slight injury to fimbria with minimal scarring</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Moderate injury to fimbria, with moderate scarring, moderate loss of fimbrial architecture and minimal intrafimbrial fibrosis</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>Severe injury to fimbria, with severe scarring, severe loss of fimbrial architecture and moderate intrafimbrial fibrosis</td>
</tr>
<tr>
<td></td>
<td>Nonfunctional</td>
<td>Severe injury to fimbria, with extensive scarring, complete loss of fimbrial architecture, complete tubal occlusion or hydrosalpinx</td>
</tr>
<tr>
<td>Ovary</td>
<td>Mild</td>
<td>Normal or almost normal ovarian size; minimal or mild injury to ovarian serosa</td>
</tr>
<tr>
<td></td>
<td>Moderate</td>
<td>Ovarian size reduced by one-third or more; moderate injury to ovarian surface</td>
</tr>
<tr>
<td></td>
<td>Severe</td>
<td>Ovarian size reduced by two-thirds or more; severe injury to ovarian surface</td>
</tr>
<tr>
<td></td>
<td>Nonfunctional</td>
<td>Ovary absent or completely encased in adhesions</td>
</tr>
</tbody>
</table>


Least Function score (LFS) is a surgical assessment after treatment of the least function of each side the tube / fimbriae / ovary. Accounts 30% EFI

**ENDOMETRIOSIS FERTILITY INDEX (EFI) SURGERY FORM**

**LEAST FUNCTION (LF) SCORE AT CONCLUSION OF SURGERY**

<table>
<thead>
<tr>
<th>Score</th>
<th>Description</th>
<th>Left</th>
<th>Right</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>Normal</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Mild Dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Moderate Dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Severe Dysfunction</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>Absent or Nonfunctional</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

To calculate the LF score, add together the lowest score for the left side and the lowest score for the right side. If an ovary is absent on one side, the LF score is obtained by doubling the lowest score on the side with the ovary.

**ENDOMETRIOSIS FERTILITY INDEX (EFI)**

**Historical Factors**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>If age is &lt; 35 years</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>If age is 36 to 39 years</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>If age is ≥ 40 years</td>
<td>0</td>
</tr>
<tr>
<td>Years Infertile</td>
<td>If years infertile is &lt; 3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>If years infertile is ≥ 3</td>
<td>0</td>
</tr>
<tr>
<td>Prior Pregnancy</td>
<td>If there is a history of a prior pregnancy</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>If there is no history of prior pregnancy</td>
<td>0</td>
</tr>
</tbody>
</table>

**Surgical Factors**

<table>
<thead>
<tr>
<th>Factor</th>
<th>Description</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>LF Score</td>
<td>If LF Score = 7 to 8 (high score)</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>If LF Score = 4 to 6 (moderate score)</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>If LF Score = 1 to 3 (low score)</td>
<td>0</td>
</tr>
<tr>
<td>AFS Endometriosis Score</td>
<td>If AFS Endometriosis Lesion Score is &lt; 16</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>If AFS Endometriosis Lesion Score is ≥ 16</td>
<td>0</td>
</tr>
<tr>
<td>AFS Total Score</td>
<td>If AFS total score is &lt; 71</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>If AFS total score is ≥ 71</td>
<td>0</td>
</tr>
</tbody>
</table>

**Total Historical Factors**

**Total Surgical Factors**

**EFI = TOTAL HISTORICAL FACTORS + TOTAL SURGICAL FACTORS:**

Page 7 of 29
Prognosis modified from Adamson 2010

<table>
<thead>
<tr>
<th>EFI score</th>
<th>Years 1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-3</td>
<td>&lt;10%</td>
<td>&lt;10%</td>
<td>&lt;10%</td>
</tr>
<tr>
<td>4</td>
<td>10%</td>
<td>10%</td>
<td>30%</td>
</tr>
<tr>
<td>5-6</td>
<td>30%</td>
<td>40%</td>
<td>50%</td>
</tr>
<tr>
<td>7-8</td>
<td>35%</td>
<td>50%</td>
<td>60%</td>
</tr>
<tr>
<td>9-10</td>
<td>60%</td>
<td>70%</td>
<td>75%</td>
</tr>
</tbody>
</table>

Sites for Endometriosis

Genital Tract

Ovary > POD > UV peritoneum > posterior broad ligament > uterosacral ligaments > other sites

<table>
<thead>
<tr>
<th>location</th>
<th>Implants</th>
<th>Number of patients</th>
<th>%</th>
<th>Adhesions</th>
<th>Number of patients</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anterior cul-de-sac</td>
<td></td>
<td>63</td>
<td>34.6</td>
<td></td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td>Posterior cul-de-sac</td>
<td></td>
<td>62</td>
<td>34.0</td>
<td></td>
<td>20</td>
<td>11.0</td>
</tr>
<tr>
<td>Right ovary</td>
<td></td>
<td>57</td>
<td>31.3</td>
<td></td>
<td>26</td>
<td>14.3</td>
</tr>
<tr>
<td>Left ovary</td>
<td></td>
<td>81</td>
<td>44.0</td>
<td></td>
<td>45</td>
<td>24.7</td>
</tr>
<tr>
<td>Right anterior broad ligament</td>
<td></td>
<td>2</td>
<td>1.1</td>
<td></td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Left anterior broad ligament</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td></td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Right round ligament</td>
<td></td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Left round ligament</td>
<td></td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>2</td>
<td>1.1</td>
</tr>
<tr>
<td>Right fallopian tube</td>
<td></td>
<td>3</td>
<td>1.6</td>
<td></td>
<td>20</td>
<td>11.0</td>
</tr>
<tr>
<td>Left fallopian tube</td>
<td></td>
<td>8</td>
<td>4.3</td>
<td></td>
<td>28</td>
<td>15.4</td>
</tr>
<tr>
<td>Right posterior broad ligament</td>
<td></td>
<td>39</td>
<td>21.4</td>
<td></td>
<td>30</td>
<td>16.5</td>
</tr>
<tr>
<td>Left posterior broad ligament</td>
<td></td>
<td>46</td>
<td>25.2</td>
<td></td>
<td>50</td>
<td>27.5</td>
</tr>
<tr>
<td>Right uterosacral ligament</td>
<td></td>
<td>28</td>
<td>15.3</td>
<td></td>
<td>5</td>
<td>2.7</td>
</tr>
<tr>
<td>Left uterosacral ligament</td>
<td></td>
<td>38</td>
<td>20.8</td>
<td></td>
<td>8</td>
<td>4.4</td>
</tr>
<tr>
<td>Uterus</td>
<td></td>
<td>21</td>
<td>11.5</td>
<td></td>
<td>6</td>
<td>3.3</td>
</tr>
<tr>
<td>Sigmoid</td>
<td></td>
<td>7</td>
<td>3.8</td>
<td></td>
<td>22</td>
<td>12.1</td>
</tr>
<tr>
<td>Right ureter</td>
<td></td>
<td>3</td>
<td>1.6</td>
<td></td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Left ureter</td>
<td></td>
<td>2</td>
<td>1.1</td>
<td></td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Anterior bladder flap</td>
<td></td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>1</td>
<td>0.5</td>
</tr>
<tr>
<td>Small bowel</td>
<td></td>
<td>1</td>
<td>0.5</td>
<td></td>
<td>4</td>
<td>2.2</td>
</tr>
<tr>
<td>Anterior abdominal wall</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td></td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>Omentum</td>
<td></td>
<td>0</td>
<td>0.0</td>
<td></td>
<td>4</td>
<td>2.2</td>
</tr>
</tbody>
</table>

Implants and adhesions by anatomic location. (from the American College of Obstetricians and Gynecologists, Obstetrics and Gynecology, 1986, 67: 335—338.)
**Extra genital tract** (affects older population)

**Bowel** (5-15%)
- commonly recto-sigmoid 85%
- small bowel 5%
- appendix / others 10%

Most bowel endometriosis invasion through serosa/muscularis only
10% cases invades mucosa therefore sigmoidoscopy rarely helpful.

When endometriosis >3cm and invades to submucosa, >40% circumference bowel is involved. Bowel resection is recommended
60% bowel lesions multifocal, indicating bowel resection.

**Presentation**
- Most asymptomatic
- Pain
- Dyschezia / tenesmus
- Haematochezia
- Diarrhoea / constipation
- Bowel obstruction rare (<1%)
  - If there is bowel obstruction (small bowel > colon)
- Perforation (rare), occurs with pregnancy

Management depends on:
- Symptoms
- Fertility desires
- Extent and severity of endometriosis
- Complications eg. Obstruction

If significant symptoms are present, often surgery is required.

**Aim of surgery:**
- Relief symptoms esp pain
- Reduce recurrence
- Improve fertility (no RCTs)

High morbidity associated with surgery

*Endometriosis is NOT cancer, therefore primary aim is minimize the amount of bowel resected but at the same time maximize symptom relief which may mean not clear margins / incomplete resection.*

- Shaving bowel lesions
  - Superficial lesion on serosa
- Disc resection
  - <3cm diameter
  - <3 lesions
  - <30% circumference
  - Invasion deeper than muscularis bowel wall

Techniques:
- endorectal resection with EES circular stapler
- transrectal linear stapler
  - for higher lesion
- transanal pull through with linear stapler resection
  - for low lesions within 2 cm anus
- laparoscopic wedge resection with manual suture

- Anterior Bowel resection
  - >3cm size
  - >50% circumference bowel
  - multifocal lesions

layers of the bowel.
Urinary tract (1 - 4%)  
increased incidence recently due to improved diagnosis  
associate with RV nodules >30mm  
sites:  
• bladder  90% symptoms in 70%  
• ureter  10% symptoms 10-15% often non specific  
• renal / urethra  rare  
symptoms:  
• dysuria / frequency  
• pain suprapubic / flank  
• haematuria  
investigations:  
• IVP  
• US  
• CT or MRI  
• Cystoscopy and Laparoscopy  
Management depends on:  
• Renal function  
• Location and extent of disease  
• Symptoms  
• Age and desire for fertility  
a) medical  
often hormonal therapy is required for longer periods compared to treatment for pelvic endometriosis.  
b) surgical  
• cystectomy  
• ureterolysis (if external compression)  
• ureteral resection with reanastomosis or reimplantation  

Diaphragm  
<1% endometriosis  
R (95%) >L (4%) 3.5% bilateral  
Typical presents with cyclic pain upper quadrant radiating to shoulder + arms  
Treatment:  
• medical  
• ablation  
• excision
**Lungs**
peritoneal / pleural (direct spread)
parenchymal (related to pelvic Sx & haematogenous spread)
R > L  9:1

**Presentations**
Catamenial and recurrent:
  - pneumothorax   75%
  - haemothorax    15%
  - haemoptysis   5%
  - lung nodule   5%

definitive diagnosis = regression of symptoms with endometriosis treatment:
  - medical
  - surgical excision at video assisted thoracoscopy (VATS)
  - complications eg. Pneumothorax

**Others:**
  - umbilicus
  - scar tissue
  - limbs
  - nervous system etc

every organ has been documented except the spleen (sanctuary site ?)

**Types of Endometriosis**
  - Superficial
  - DIE >= 5mm beyond peritoneum
  - Endometrioma

**Presentations**
Asymptomatic (discovered incidentally at laparoscopy)
These patients do not need to be treated unless symptomatic as cohort study over 15 years by Moen et al showed women with asymptomatic endometriosis have less pain than controls over time.

**Symptoms**
**Pelvic pain**
Including dysmenorrhoea / dyspareunia / dyschezia / pain on micturition
Pain is not proportional to volume of disease
Depends on:
  - Site
  - Activity
  - Depth of invasion

**Irregular bleeding**
due to
  - ovarian dysfunction
  - antegrade loss of blood

**Pelvic mass**
need to exclude malignancy

**Infertility**
Diagnosis of endometriosis

Clinical
Up to 40% sensitivity for ovarian endometriomas

Imaging
Most imaging cannot detect peritoneal disease.
TV ultrasound
- Accurate for endometriomas
- SVG US
  - Negative sliding sign sensitivity 85% rectovaginal disease
  - Can also look DIE Uterosacrals / bladder + softmakers indicating adhesions

TR Ultrasound
- Similar sensitivity TV US
- Used virgins

MRI
- Endometriomas / DIE sensitivity 95%

Biomarkers
Ca 125
- Indicates active disease rather than extent/severity

Endometrial nerve fibres
PGP9.5
- Increased in patient with uterine pain eg endometriosis / fibroids / adenomyosis

Laparoscopy (gold standard)
appearances maybe atypical

Important to stage endometriosis presurgery to assess the extent of surgery required especially in extra genital involvement.

Appearance of endometriosis
Correct visual identification of endometriosis depends on the experience of the surgeon, with identifying non-pigmented lesions
- Less experienced surgeons ID correctly 40%
- More experienced surgeons ID correctly 80%

appearance is quite diverse:
1) classical black lesions (burnt out disease in older patients)
2) red / polypoid lesions (most active lesions)
3) white endometriosis = scarring
4) peritoneal defects / clear lesions 80% associated with endometriosis
   28% endometriosis patients have defects
5) deeply infiltrating disease (Cullen’s disease) → puckering / nodules

Differential diagnosis
- old sutures / residual carbon
- epithelial inclusions
- malignancy
- endosalpingiosis
- inflammatory lesions
Management of endometriosis
Endometrosis is a chronic disease requiring lifelong management with medical treatment for suppression and pain control and surgery when indicated.

treatment depends on:
1) severity of symptoms
2) extent of endometriosis and location
3) desire for fertility
4) age

treatment options:
1) expectant
2) symptomatic
3) Hormonal suppression
4) Surgical
5) Combination

Treatment of pain
Pathophysiology of pain
1) inflammatory mediators eg. PGs
2) direct invasion and irritation of neural tissue (depth of invasion correlates with pain)
3) adhesions → mechanical disruption
Observation
applicable in absence of symptoms after routine laparoscopy, although long term suppression with OCP or progestins logical if one presumes endometriosis is a progressive disease.

NSAIDs
Effective for relieving pain
Used in combination with hormonal supression

Medical therapy cannot treat infertility / endometrioma except dienogest may

Ovarian suppression
Aim pain therapy is to inhibit ovulation and produce amenorrhoea
Hormonal therapy is better than no treatment for pain (see table)
Overall medical suppression relieves pain 80-90% effective whilst on medications
No one regime is more effective than another, but SE profiles different

OCP
Continuous OCP → constant hormonal milieu which theoretically should treat endometriosis.
Major SE in 30% (BTB, bloating etc) → discontinuation
Monthly regimes may help mild symptoms
3 monthly regimes more effective than monthly, but less effective than GnRHa for dysmenorrhoea theoretically high progestin content OCP or Dienogest
**GnRH analogues**

Studies suggest no difference in outcome:
- Pain
- AFS scores

Between GnRHa and Danazol, but different SE profile → ↑ compliance and less discontinuation rates

SE:
- Flashes
- Mood changes
- Osteoporosis (↓ BMD 3-5% over 6/12 reversible)

Starting in luteal phase is ideal → ↓ flare response and Amenorrhoea by 4 weeks

If started in follicular phase → ↑ flare and Amenorrhoea by 8 weeks

Success rate 50% after 6/12 but 10-20% recurrence per year

Menses return after 60-90 days after depot

GnRH analogues + addback is effective for relief of pain, but higher oestrogen doses → ↑ pain.

Ideally use:
- Tibolone
- Kliovance
- Primolut etc

No studies looking at addback therapy > 12/12

**Progestins**

Can be used long term > 6/12

efficacy as effective as Danazol (100mg daily MPA)

- Depot Provera 150mg IM q3months
- Provera PO 10mg tds – 100mg
- Primolut 5mg daily
- Duphaston 10-20mg daily (can conceive but less effective cf other progestogens)

(luteal phase duphaston is no better than placebo)

**Dienogest (Visanne)**

19 nortesterone derivative synthetic progestin

mechanism of action at level endometrium:
- Progestational (antiproliferative)
- Anti gonadotropic (mildly anti oestrogenic)
- Reduction production aromatase / cyclooxygenase-2 / PGE2 in endometriotic cells (anti-inflammatory + anti angiogenic)

2mg daily used up to 5 years with cumulative efficacy
similar pain relief versus GnRHa
continued effect after cessation for up to 24 weeks

**Mirena IUCD**

Mirena similar efficacy to GnRHa and DMPA with less SE and better compliance

Ideal after surgery for continued suppression
**GnRH antagonist (elagolix)**

Oral antagonist  
Doses 150mg daily and 200mg bd had significant reduction dysmenorrhea + non menstrual pain (vs placebo (approximately 50% / 75% / 20% reduction))  
Higher dosage associated with hypoestrogenic SE  
Duration 6 months

**Antiprogestosterone (RU 486)**  
50-100mg daily  
suppresses ovulation  
induces endometrial atrophy  
pilot studies suggest  
- Reduced pain  
- Reduced endometriosis by 50%  
Theoretical risk of endometrial hyperplasia
Danazol
600-800mg daily divide doses (lower doses are less effective)
Mechanism of actions:
• inhibits LH/FSH mid-cycle surge
• directly inhibits steroidogenesis enzymes
• binds to androgen / progesterone, but not estrogen receptor though
• ↑ androgen directly and displaces testosterone from SHBG
• immunological
Inhibits ovulation after 4-6 weeks ∴ 1st month use barrier contraception
Side effects (up to 80% will experience SE therefore compliance major issue)
(a) androgenic : acne / weight gain / hirsutism
(b) hypo-estrogenic: hot flushes / ↓ libido / vaginal dryness / mood changes
(c) others : GIT changes / cramps / headache and dizziness

80% symptomatically improve, however after cessation 15-20% recurrence after 1st year then 5% pa thereafter up to 50% after 5 years ie Cumulative recurrence 50% after 5 years
60% improvement in AFS scoring after 6/12 compared with 20% without treatment
Can be given PV for rectovaginal endometriosis!
Recurrence related stage of endometriosis:
   25% mild
   50% moderate
   60% severe disease

Gestrinone 2.5-5.0mg x 2 / week
Progestosterone partial agonist with mild androgen profile
Similar efficacy to danazol with less SE
Mechanism of action
• inhibits mid-cycle FSH/LH
• anti- estrogen/ progesterone
• SHBG → ↑ testosterone

Aromatase inhibitors
Cause profound reduction in circulating oestrogen levels → enhanced hypoestrogenic environment. A1 with (NET / OCP or GnRHa) better than GnRHa alone
Need ovarian suppression as AI alone lead cyst formation / bone loss
Letrazole 2.5mg daily

Neuropathic pain treatments
Surgical treatment
Surgical treatment of endometriosis esp. complete excision results in pain relief but 20-25% patients requiring additional surgery at 5 years
*NB Recurrent pain may not be associated with recurrent endometriosis*

Conservative
Resection of implants with ureterolysis / shaving but conserving viscus.
Aims:
- removal / ablation of all visible endometriosis
- restoration of normal pelvic anatomy including ventral suspension
- symptom relief via LUNA, pre-sacral neurectomy etc

Endpoints
- symptom relief
- treatment of visible disease
- pregnancy

Surgery compared with medical therapy or observation:
- Hefni et al 1998 in RCT on laser laparoscopy (60% improvement) versus diagnostic laparoscopy (20%) criticism = the diagnosis of endometriosis
- J Abbot et al 2004. RCT laparoscopic excision of endometriosis versus placebo showed significant improvement in symptoms for all stages versus placebo.
  Placebo arm over 6/12:
  - 50% progression
  - 30% static
  - 20% improved

Excision vs ablation
Both are better than no treatment regarding pain relief.
Healy et al 2014 RCT with 5 years FU n= 178 excision vs ablation for genital endometriosis (included DIE) showed better pain relief with dyspareunia (VAS reduction 6 vs 3) + less medical therapy with excision 20% vs 31%, otherwise other pain symptoms NS
JMIG meta analysis 2017 of 3 trials showed excision better improvement at 12 months:
- dysmenorrhoea
- dyschezia
- chronic pelvic pain

Excision preferred over ablation as:
- deep implants can be treated esp infiltrating nodules
- vital structures identified
- histological confirmation

Excisional surgery preferred for bladder / bowel / ureter endometriosis, as failure to excise → high recurrence symptoms

surgical excision with adjuvant medical treatment results in better
  (1) symptom relief
  (2) objective eradication of endometriosis
**Adjuvant treatments**

Pre-operative medical Rx can:
- relief pain
- reduce endometrial implants
- reduce endometrioma size

but there is no data
- improved pain vs surgery alone
- improved fertility
- disease recurrence

main indication is relief of symptoms prior to surgery (especially pain)

Post-operative medical Rx
Aim to suppress residual microscopic endometriosis with long term OCP/progestins /Mirena / GnRHa if pregnancy is not desired
- reduced pain
- reduced recurrent disease at 12 months

Vercillini et al 2003 mirena post op → reduced dysmenorrhoa / dyspareunia and ↑ patient satisfaction rates at 1 year.

most pregnancy naturally conceived will occur within 18/12 post-op

**Hysterectomy with conservation of ovaries**

HE results in good pain relief with 25% requiring additional surgery up to 7 years vs <10% if BSO also performed (RR0.25)

**Key is to remove all endometrial implants with HE**

BSO needs to be individualised depending:
- severity endometriosis
- completeness of surgery
- ovarian involvement
- age of patient

Suggest retention of ovaries
- if ovaries are normal
- all endometriosis is cleared / less severe disease
- younger patient e.g < 45 years???

**BSO**

Role of BSO needs to be individualized

BSO in premenopause without HRT:
- increased osteoporosis
- increased CVD
- increase mortality

25% require further surgery especially for residual ovary syndrome & recurrent endometriosis

Recurrence:
- 5% Stage I / II
- 40% Stage III / IV

conserving ovaries vs BSO:
- ↑ recurrent pain
- ↑ repeat surgery    RR 4
May be role of adjuvant medical therapy if not all residual disease removed after surgery

**Radical excision DIE**
Resection of bladder / ureter / bowel with repair
See management extra genital endometriosis
*Currently a move towards nerve sparing radical EO endometriosis to preserve bladder + bowel function.*

**LUNA**
results in 50-85% pt improvement in pain scores short term although no RCT .
no evidence of long term pain relief better than placebo
Maybe role ?? in negative laparoscopy gp & severe dysmenorrhoea / central pain

**Presacral neurectomy**
Effective for treatment of midline pain / dysmenorrhoea
Technically challenging surgery operating around major vessels
Major SE constipation / urine retention

**HRT with past endometriosis**
Women with history of endometriosis especially with surgically induced menopause need to be counseled and HRT individualized
Concern HRT esp unopposed estrogen:
  - recurrence endometriosis
  - malignant transformation
Data is unclear, but likely:
  - HRT does increase risk recurrence up to 2%
  - Increased risk malignant transformation esp endometrioid adenocarcinoma most common (absolute risk uncertain)
  - No data if delaying HRT beneficial, but wise if there is incomplete resection, to delay giving HRT
  - Theoretically tibolone or continuous E + P better and lead to less recurrence vs Estrogen only or potential SERMS eg bazedoxifene
  - Recurrence can occur without HRT
Other risk factors recurrence:
  - Incomplete excision
  - Hyperestrogenemia eg obesity
  - Genetics
Case reports isoflavones and recurrent endometriosis + malignant transformation
Management of endometriomas
20-40% of patients with endometriosis have endometriomas adversely affect AMH, IVF eggs retrieved, but PR not reduced compared with no endometrioma IVF

Pathogenesis:
- originate from invagination of endometriosis on the ovarian cortex from retrograde menstruation, associated with scarring of the ovary.
- Metaplasia

In symptomatic patients removal of cyst improves symptoms and natural fertility, but also stripping does reduce ovarian reserve:
- Removes normal primordial follicles with stripping (care needs to be taken with cystectomy minimize removing normal tissue with sharp dissection). NB Histology shows ovarian capsule contain damaged primordial follicles.
- Thermal damage with bipolar (minimize this)
- Compromised blood supply from physical damage, inflammation and oedema.

Good RCT evidence excision/stripping better than drainage and ablation:
- ↓ recurrence
- ↑ pain relief
- ↑ pregnancy rates (in natural conception but not IVF)
- provides histology and excludes malignancy

endometrial glands penetrate up to 3mm into capsule and ablation results in variable depth penetration

Beretta et al 1998 RCT FU 26 months

<table>
<thead>
<tr>
<th>Stripping</th>
<th>Drainage ± ablation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recurrence of severe pain</td>
<td>15% at 2 years</td>
</tr>
<tr>
<td>Recurrence of endometrioma</td>
<td>5-10%</td>
</tr>
<tr>
<td>Cumulative PR (natural)</td>
<td>66% at 2 years</td>
</tr>
</tbody>
</table>

Postoperative hormonal suppression reduces recurrence endometriomas (8% vs 32% RR0.12)

Ablation may not reduce ovarian reserve as much as stripping especially with bilateral cysts and larger cysts (>5cm). Potentially use of laser or plasma jet may minimize thermal damage and preserve eggs, but to date careful stripping considered gold standard.

Techniques for haemostasis:
- bipolar. Should be minimized in view of thermal damage
- suturing. Don't strangulate tissues (theoretically better)
  some data shows suturing may less reduction ovarian reserve compared to bipolar, but not real differences in fertility outcome (lack of power in studies?)
- sealants eg floseal
  may be effective and reduce need to bipolar, but some concern of post op inflammation + SBO
- vasopressin
  may reduce the need for bipolar

Techniques for cystectomy to minimize ovarian damage:
- ID correct plane ? use of saline or vasopressin
- Accurate pin point bipolar with aqua wash out to ID exact bleeding points
- Careful suturing (not to strangulate) and judicious use sealants
Other factors to consider:
• Bilateral endometriomas have lower AMH and after greater loss of AMH after surgery
• Larger endometriomas lower AMH with greater loss of AMH after surgery (cut off? 5-7cm?)
• After cystectomy AMH drops which may improve up to 1 year, but often does not recover fully.

INFERTILITY
Prevalence of infertility 50% in women endometriosis vs 10% non endometriosis women
MFR 2-10% vs 15-20% in fertile couples
Mechanism of infertility in endometriosis:
Secretion of inflammatory factors leading to:
• Mechanical distortion from adhesions and scarring
• Peritoneal toxic factors
  Macrophages →
  • PG
  • Free radicals
  • Lymphokines/cytokines/angiogenic factors etc
  Which inhibits sperm /oocyte and embryo development and interaction
• Impaired oocyte release
• Reduced sperm / embryo transport
• Reduced endometrial receptivity with Progesterone resistance
• Auto-immunity leading↑ Ig cross react with ovarian tissue / gametes etc

Management of endometriosis in infertility patients depends on:
1) female age
2) severity of endometriosis
3) presence of adhesions and other infertility factors
4) symptoms

Treatment options:
1) expectant
2) surgery goals
  • resect all endometriosis
  • restore anatomy
  • prevent adhesions
  1st surgery PR up to 40% vs 22% with repeat second surgery
3) Clomid / Letrazole + IUI
4) FSH + IUI MFR 15% versus 2-5% in controls
twin pregnancy 20%
≥ triplets 8%
5) IVF

Medical treatment does NOT enhance natural fertility in endometriosis
No Treatment Better
Surgery Only Better
Laparotomy Better
None or Medical Better
Surgery
±
Medical Better

Medical Treatment Better
Surgery + Medical Better
Laparoscopy Better
Laparotomy Only Better
Laparotomy + Medical Better
Laparoscopy Only Better
Laparoscopy + Medical Better
Surgery ± Medical Better

Relative Risk of Pregnancy

Figure 1. Meta-analysis estimates of relative risk of pregnancy (point estimate and 95% confidence interval) for different endometriosis treatment comparisons. (From Adamson GD, Pasta DJ: Surgical treatment of endometriosis-associated infertility: Meta-analysis compared with survival analysis. Am J Obstet Gynecol 171:1488, 1994)
**Minimal / Mild endometriosis**

**Expectant**
Up to 60% will conceive naturally after 24/12 with MFR 3-10%

**Surgery**
laparoscopic ablation / excision leads to improved fertility outcome with MFR 5% versus 2.5% (Marcoux 1997) NND 12

**super-ovulation ± IUI**
after surgery may further improve fecundity 15% per cycle (max 6 cycles)

**IVF**

**Moderate / Severe endometriosis**
Overall natural conception rate (MFR 1-3%)
- Moderate 25% without adhesions up to 50% may conceive
- Severe <5%
each additional infertility factor reduces MFR by 50% e.g. infertility >12 months, age >35 etc

**EFI post surgery is good predictor natural fertility after surgery**
NO RCT comparing surgery vs expectant rx and PR

**Surgery**
MFR up to 5%
DIE bowel resection MFR 2.3% vs <1% of bowel disease left behind
most occur within 24/12
add superovulation + IUI
Repeat surgery does not improve fertility. Only role is if significant pain
Risks surgery need to be considered especially with bowel resection

**IVF**
Advanced age
Failed surgery after 6-12 months
Dense adhesions/ tubal blockage (EFI <5)
Other infertility factors present

Role of surgery for DIE prior to IVF needs to be individualized. Limited non randomized cohort studies indicating improved PR 41% with sx + IVF vs 24% IVF alone
Endometriosis and IVF

Endometriosis does affect IVF:

- Reduced ovarian response to Gntp, esp. with endometriomas
- Reduced oocyte quality
- Reduced fertilization rates esp. stage 3+4

Women undergoing IVF reduced PR vs tubal factor infertility (RR 0.56)

Good evidence pretreatment GnRHa 3 months → increased PR versus standard IVF (RR = 3.4) (Surrey et al 2002)

Analysis 01.02. Comparison 01 GnRH agonist versus no agonist before IVF or ICSI, Outcome 02 Clinical pregnancy rate per woman

<table>
<thead>
<tr>
<th>Study</th>
<th>GnRH agonist n/N</th>
<th>Control n/N</th>
<th>Odds Ratio (Fixed) 95% CI</th>
<th>Weight (%)</th>
<th>Odds Ratio (Fixed) 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rieks 2002</td>
<td>2/18</td>
<td>9/19</td>
<td></td>
<td>39.4</td>
<td>3.33 [0.96, 11.54]</td>
</tr>
<tr>
<td>Surrey 2002</td>
<td>20/25</td>
<td>14/26</td>
<td></td>
<td>40.4</td>
<td>3.43 [0.99, 11.93]</td>
</tr>
<tr>
<td>Total (95% CI)</td>
<td>88</td>
<td>77</td>
<td></td>
<td>100.0</td>
<td>4.28 [2.00, 9.15]</td>
</tr>
</tbody>
</table>

Total events: 52 (GnRHa agonist), 25 (Control)
Test for heterogeneity chi-square = 0.83 df=2 p=0.66 I² =0.0%
Test for overall effect z=1.75  p=0.0002.

NO RCT Surgery preIVF enhances PR, in contrast to natural fertilization.

Endometriosis and IVF

Cystectomy for endometriomas improves:

- natural PR
- pain symptoms
- cyst recurrence
- but do not affect IVF PR rates
- reduces ovarian reserve. This is a concern with low baseline ovarian reserve e.gAMH <10, bilateral endometriomas.

Larger endometriomas (>4cm?) →

- ↓ ovarian response
- ↓ oocyte per retrieval
- ↓ fertilization
- ↑ infection

patients need to be carefully counseled about mx options of endometriomas and IVF:

- cystectomy if pain, large size with good ovarian reserve
- drainage + GnRHa if large size and low AMH, bilateral
- move straight to IVF if small size
Effect of Endometriosis on Pregnancy

Endometriosis associated adverse pregnancy outcome.
Saraswat et al 2016 Cohort 14665 women (of which 5373 women with surgical diagnosed endometriosis were compared to those without endometriosis) over 30 years 1981-2010 found:

- increase MC RR 1.76
- increased EP RR 2.7
- placenta previa RR 2.24
- PPH RR 1.3
- PT birth RR 1.26

### Table 2. Univariable and multivariable analysis for early pregnancy outcomes in women with and without endometriosis

<table>
<thead>
<tr>
<th>Early pregnancy outcomes</th>
<th>Endometriosis (n = 5375 (%))</th>
<th>No endometriosis (n = 8280 (%))</th>
<th>Odds ratio (95% confidence interval)</th>
<th>P-value</th>
<th>Adjusted odds ratio* (95% confidence interval)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Miscarriage</td>
<td>662 (12.3)</td>
<td>450 (5.4)</td>
<td>2.44 (2.16, 2.77)</td>
<td>&lt;0.001</td>
<td>1.76 (1.44, 2.15)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Ectopic pregnancy</td>
<td>86 (1.6)</td>
<td>51 (0.6)</td>
<td>2.62 (1.85, 3.71)</td>
<td>&lt;0.001</td>
<td>2.70 (1.09, 6.72)</td>
<td>0.03</td>
</tr>
<tr>
<td>Termination of pregnancy</td>
<td>395 (7.3)</td>
<td>1072 (12.9)</td>
<td>0.53 (0.47, 0.60)</td>
<td>&lt;0.001</td>
<td>1.12 (0.74, 1.69)</td>
<td>0.59</td>
</tr>
</tbody>
</table>

*Adjusted for age, parity, socio-economic status and year of pregnancy.

### Table 3. Univariable and multivariable analysis for pregnancy outcomes (>24 weeks’ gestation) in women with and without endometriosis

<table>
<thead>
<tr>
<th>Pregnancy outcomes (&gt;24 weeks)</th>
<th>Endometriosis (n = 4232 (%))</th>
<th>No endometriosis (n = 6707 (%))</th>
<th>Odds ratio (95% confidence interval)</th>
<th>P-value</th>
<th>Adjusted odds ratio* (95% confidence interval)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hypertensive disorders of pregnancy</td>
<td>350 (8.3)</td>
<td>452 (6.7)</td>
<td>1.25 (1.08, 1.44)</td>
<td>0.003</td>
<td>1.06 (0.91, 1.24)</td>
<td>0.57</td>
</tr>
<tr>
<td>Placenta previa</td>
<td>72 (1.7)</td>
<td>54 (0.8)</td>
<td>2.13 (1.50, 3.04)</td>
<td>&lt;0.001</td>
<td>2.24 (1.52, 3.31)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Placental abruption</td>
<td>18 (0.4)</td>
<td>27 (0.4)</td>
<td>1.05 (0.59, 1.91)</td>
<td>0.85</td>
<td>0.91 (0.48, 1.74)</td>
<td>0.78</td>
</tr>
<tr>
<td>Unexplained APH</td>
<td>270 (6.4)</td>
<td>281 (4.2)</td>
<td>1.57 (1.33, 1.86)</td>
<td>&lt;0.001</td>
<td>1.67 (1.39, 2.00)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Postpartum haemorrhage</td>
<td>844 (19.9)</td>
<td>786 (11.7)</td>
<td>1.88 (1.69, 2.09)</td>
<td>&lt;0.001</td>
<td>1.30 (1.61, 1.46)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*Adjusted for age, parity, socio-economic status and year of pregnancy.

from Saraswat et al 2016

Those pregnant with endometriosis were:

- Older
- More likely nulliparous
- Higher SES

Theorised Mechanism: defective remodeling of spiral arteries during placentation.
Endometriosis in Adolescents

Considered to be different and more aggressive than adult endometriosis.

Pathogenesis relate to neonatal retrograde menstruation and implantation of “stem” cells that are activated with oestrogen leading to growth of highly angiogenic implants.

Principles of mx:
- Early diagnosis with laparoscopy (80% pts with CPP non responsive to conventional medical therapy have endometriosis). Often atypical appearance
- Surgery effective treatment for pain, reducing infertility and reducing disease progression.
- Minimise damage of the ovary with endometriomas
- Long term medical suppression until wanting fertility
- Consider ovarian cryopreservation in girls with significant endometriomas

REFERENCES