MEDICAL AND SURGICAL MANAGEMENT OF FIBROIDs

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Heavy menstrual bleeding: management

Discuss treatment options taking into account the woman’s choices & preferences:
- desire to retain fertility and/or uterus
- benefits and harms of treatment
- clinical considerations (comorbidities, multiple pathologies, size of uterus)

No identified pathology, fibroids < 3 cm, or adenomyosis
Take into consideration severity of symptoms

Submucosal fibroids

Fibroids ≥ 3 cm
Take into consideration size, location and number of fibroids, and severity of symptoms
Be aware that the effectiveness of pharmacological treatments may be limited for fibroids substantially greater than 3 cm in diameter

Consider LNG-IUS

Severe symptoms

Consider hysteroscopic removal

Consider referral to specialist care.
If treatment is needed while investigations and definitive treatment are being organised, offer tranexamic acid and/or NSAIDs

Alternative pharmacological treatment declined, not suitable, or failed

Consider LNG-IUS

Consider hysterectomy

Consider chemotherapy

Consider referral to specialist care. If treatment is needed while investigations and definitive treatment are being organised, offer tranexamic acid and/or NSAIDs

Consider surgical treatments:
- myomectomy
- hysterectomy

Consider pharmacological treatment:
- non-hormonal:
  - TXA
  - NSAIDs
- hormonal:
  - combined hormonal contraceptives
  - cyclical oral progestogens

Consider alternative pharmacological treatment:
- non-hormonal:
  - TXA
  - NSAIDs
- hormonal:
  - combined hormonal contraceptives
  - cyclical oral progestogens

Consider pharmacological treatment:
- non-hormonal:
  - TXA
  - NSAIDs
- hormonal:
  - LNG-IUS
  - combined hormonal contraceptives
  - cyclical oral progestogens

GnRH-a: gonadotropin-releasing hormone analogue; LNG-IUS: levonorgestrel-releasing intrauterine system; NSAIDs: non-steroidal anti-inflammatory drugs; TXA: tranexamic acid; UAE: uterine artery embolisation.

1References to ulipristal acetate (Ethinyl) were removed before publication because the European Medicines Agency is reviewing the use of Esmya for uterine fibroids and have introduced temporary safety measures. See the EMA website.
Heavy menstrual bleeding: management

Based on NICE's guideline on heavy menstrual bleeding (NG88).
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Discuss treatment options taking into account the woman’s choices & preferences:
- desire to retain fertility and/or uterus
- benefits and harms of treatment
- clinical considerations (comorbidities, multiple pathologies, size of uterus)

No identified pathology, fibroids < 3 cm, or adenomyosis
Take into consideration severity of symptoms

- Submucosal fibroids
  - Consider LNG-IUS
  - If LNG-IUS failed
    - Consider referral to specialist care

Severe symptoms

If LNG-IUS declined or not suitable
- Consider alternative pharmacological treatment:
  - non-hormonal: TXA, NSAIDs
  - hormonal: combined hormonal contraceptives, cyclical oral progestogens

Consider referral to specialist care

Alternative pharmacological treatment declined, not suitable, or failed

Consider surgical treatment:

- 2nd generation endometrial ablation
- hysterectomy

GnRHs: gonadotrophin-releasing hormone analogue; LNG-IUS: levonorgestrel-releasing intrauterine system; NSAIDs: non-steroidal anti-inflammatory drugs; TXA: tranexamic acid; UAE: uterine artery embolisation.

1References to ulipristal acetate (Elnvy) were removed before publication because the European Medicines Agency is reviewing the use of Esmeya for uterine fibroids and have introduced temporary safety measures. See the EMA website.
Heavy menstrual bleeding: management

Discuss treatment options taking into account the woman’s choices & preferences:
- desire to retain fertility and/or uterus
- benefits and harms of treatment
- clinical considerations (comorbidities, multiple pathologies, size of uterus)

**No identified pathology, fibroids <3 cm, or adenomyosis**
Take into consideration severity of symptoms

- Consider LNG-IUS
- If LNG-IUS declined or not suitable
  - Consider alternative pharmacological treatment:
    - non-hormonal: - TXA
    - NSAIDs
    - hormonal: - combined hormonal contraceptives
    - cyclical oral progestogens

**Severe symptoms**

- Consider referral to specialist care
- If LNG-IUS failed
  - Consider referral to specialist care

**Submucosal fibroids**

- Consider hysteroscopic removal
- +/− investigations

- Consider pharmacological treatment:
  - non-hormonal:
    - TXA
    - NSAIDs
  - hormonal:
    - LNG-IUS
    - combined hormonal contraceptives
    - cyclical oral progestogens

**Fibroids ≥3 cm**
Take into consideration size, location and number of fibroids, and severity of symptoms
Be aware that the effectiveness of pharmacological treatments may be limited for fibroids substantially greater than 3 cm in diameter

- Consider referral to specialist care.
  - If treatment is needed while investigations and definitive treatment are being organised, offer tranexamic acid and/or NSAIDs

**Consider surgery:**
- myomectomy
- hysterectomy

**Consider UAE**

- Prior to scheduling of UAE or myomectomy, the uterus and fibroids should be assessed by ultrasound. If further information is needed, MRI should be considered

**Consider 2nd generation endometrial ablation**

- Consider pharmacological treatment:
  - non-hormonal:
    - TXA
    - NSAIDs
  - hormonal:
    - [bullet removed]3
    - LNG-IUS
    - combined hormonal contraceptives
    - cyclical oral progestogens

3References to ulipristal acetate (Elnbay) were removed before publication because the European Medicines Agency is reviewing the use of Esmya for uterine fibroids and have introduced temporary safety measures. See the EMA website.

Griseofluconol, gonadotrophin-releasing hormone analogue; LNG-IUS, levonorgestrel-releasing intrauterine system; NSAIDs, non-steroidal anti-inflammatory drugs; TXA, tranexamic acid; UAE, uterine artery embolisation.
Heavy menstrual bleeding: management

Discuss treatment options taking into account the woman’s choices & preferences:
• desire to retain fertility and/or uterus
• benefits and harms of treatment
• clinical considerations (comorbidities, multiple pathologies, size of uterus)

No identified pathology, fibroids <3 cm, or adenomyosis
Take into consideration severity of symptoms

Consider LNG-IUS

Severe symptoms

Consider hysteroscopic removal

Submucosal fibroids

Fibroids ≥3 cm
Take into consideration size, location and number of fibroids, and severity of symptoms
Be aware that the effectiveness of pharmacological treatments may be limited for fibroids substantially greater than 3 cm in diameter

Consider referral to specialist care.
If treatment is needed while investigations and definitive treatment are being organised, offer tranexamic acid and/or NSAIDs

Consider surgery:
• myomectomy
• hysterectomy

Consider UAE

Consider 2nd generation endometrial ablation

Consider pharmacological treatment:
• non-hormonal:
  - TXA
  - NSAIDs
• hormonal:
  - combined hormonal contraceptives
  - cyclical oral progestogens

Alternatively, pharmacological treatment, not suitable, or failed

+/- investigations

Consider alternative pharmacological treatment:
• non-hormonal:
  - TXA
  - NSAIDs
• hormonal:
  - combined hormonal contraceptives
  - cyclical oral progestogens

Consider LNG-IUS

If LNG-IUS failed

If LNG-IUS declined or not suitable

Consider referral to specialist care

Consider pharmacological treatment:
• non-hormonal:
  - TXA
  - NSAIDs
• hormonal:
  - LNG-IUS
  - combined hormonal contraceptives
  - cyclical oral progestogens

GnRHa, gonadotrophin-releasing hormone analogue; LNG-IUS, levonorgestrel-releasing intrauterine system; NSAIDs, non-steroidal anti-inflammatory drugs; TXA, tranexamic acid; UAE, uterine artery embolisation.

1References to ulipristal acetate (Eln tyre) were removed before publication because the European Medicines Agency is reviewing the use of Eln tyre for uterine fibroids and have introduced temporary safety measures. See the EMA website.
One hundred fifty-six of 177 patients admitted to the St. Luke’s/Roosevelt Hospital Center between November 1973 and November 1988 for hysteroscopic treatment of menorrhagia and/or uterine leiomyomas were followed for long-term complications and necessity for repeat surgery. Ninety-four patients underwent submucous resection alone and 62 patients underwent endometrial ablation with or without submucous resection. Among the submucous-resection group, 24.5% reported late postoperative problems and 15.9% underwent further surgery. After 9 years of follow-up, 83.9% of the patients had not required further surgery. Among the ablation group, 22.5% experienced recurrence of increased bleeding and 8.1% had another surgical procedure. After 6 years of follow-up, 91.3% of the patients had not required further surgery. Twenty-one patients became pregnant after submucous resection, with 18 infants delivered. No patients who underwent endometrial ablation became pregnant. This modality of treatment appears to be effective over the long term, although effectiveness appears to diminish with time. (Obstet Gynecol 77:391, 1991)

Abstract

STUDY OBJECTIVE: To evaluate the effect of endometrial ablation on the outcome of premenopausal patients undergoing hysteroscopic myomectomy for menorrhagia or menometrorrhagia

DESIGN: Retrospective cohort study (Canadian Task Force classification II-2).

SETTING: Private practice.

PATIENTS: One hundred seventy-seven women with one or more submucosal myomas experiencing menorrhagia or menometrorrhagia.

INTERVENTION: Hysteroscopic myomectomy without endometrial ablation in 104 patients and with concomitant endometrial ablation in 73 patients.

MEASUREMENTS AND MAIN RESULTS: Bleeding was controlled in 95.9% of patients with endometrial ablation and in 80.8% of patients without endometrial ablation (p = .003). Complete removal of the myoma led to better results (p = .039), which were further improved by endometrial ablation (p = .022). Endometrial ablation improved bleeding in patients whose myomas could not be completely removed, but the difference was not statistically significant (p = .23). Subsequent hysterectomies were not decreased by endometrial ablation (p = .48) or by complete removal of the myoma (p = .83). Hysterectomies for bleeding problems were decreased by endometrial ablation. Pain and dysmenorrhea were a frequent cause of hysterectomy.

CONCLUSION: Endometrial ablation at the time of hysteroscopic myomectomy improves results in the control of bleeding.

Improving results of hysteroscopic submucosal myomectomy for menorrhagia by concomitant endometrial ablation

Franklin D. Loffer, MD
Long term follow up of hysteroscopic myomectomy assessed by survival analysis

Roger Hart Clinical Research Fellow, Béla G. Molnár Visiting Research Fellow, Adam Mugos Consultant (Obstetrics and Gynaecology)

Minimally Invasive Therapy Unit and Endoscopy Training Centre, University Department of Obstetrics and Gynaecology, The Royal Free Hospital, London

Fig. 1. Hysteroscopic myomectomy: overall outcome.

Fig. 6. Hysteroscopic myomectomy: outcome as a function of age. Relative risk of requiring further surgery is less in older women ($\chi^2 = 4.32; P = 0.038$). $\circ$ = $<40$ years; $\bullet$ = $>40$ years.

Fig. 2. Hysteroscopic myomectomy: outcome as a function of uterine size. Relative risk of requiring further surgery if uterine size is $<7$ weeks gestation equivalent is $0.21$ compared to $\geq 7$ weeks (95% CI 0.05 to 0.92; $P = 0.0217$). $\circ$ = $<7$ weeks; $\bullet$ = 7–10 weeks; $\triangle$ = $>10$ weeks.
Classification of submucosal fibroids
FIGO classification of submucous leiomyomas. Reproduced, with permission granted by FIGO, from: Munro et al 2001 [9].

**Leiomyoma Subclassification System**

<table>
<thead>
<tr>
<th>SM1: Submucosal</th>
<th>SM1: Submucosal</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>Pedunculated Intracavitary</td>
</tr>
<tr>
<td>1</td>
<td>&lt;50% Intramural</td>
</tr>
<tr>
<td>2</td>
<td>≥50% Intramural</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Q: Other</th>
<th>Q: Other</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>Contacts endometrium; 100% Intramural</td>
</tr>
<tr>
<td>4</td>
<td>Intramural</td>
</tr>
<tr>
<td>5</td>
<td>Subserosal ≥50% Intramural</td>
</tr>
<tr>
<td>6</td>
<td>Subserosal &lt;50% Intramural</td>
</tr>
<tr>
<td>7</td>
<td>Subserosal Pedunculated</td>
</tr>
<tr>
<td>8</td>
<td>Other (specify e.g. cervical, parasitic)</td>
</tr>
</tbody>
</table>

**Hybrid Leiomyomas (impact both endometrium and serosa)**

<table>
<thead>
<tr>
<th>Hybrid</th>
<th>Hybrid</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-5</td>
<td>Submucosal and subserosal, each with less than half the diameter in the endometrial and peritoneal cavities, respectively.</td>
</tr>
</tbody>
</table>
Equipment

- Gynaecological resectoscope
- Hysteroscopic morcellator/tissue removal systems/shaver
- 5 Fr bipolar electrodes
- 5-7 Fr Mechanical instruments
Gynaecological resectoscope

- Monopolar
  - Non-electrolyte distension medium
- Bipolar
  - Electrolyte distension medium
Fluid management

BSGE/ESGE guideline on management of fluid distension media in operative hysteroscopy

Samneer Umrania1, T. Justin Clark2, Ertas Saridogan3, Dimitrios Miligos4, Karna Ramchurn5, Emma Torbe6, Rudi Campos7, Attilio Di Spiezo Sardo8, Vasiliou Tamos9, Grigorios Grimbizis9, British Society for Gynaecological Endoscopy, European Society for Gynaecological Endoscopy Guideline Development Group for Management of Fluid Distension Media in Operative Hysteroscopy

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Heavy menstrual bleeding: management

Discuss treatment options taking into account the woman’s choices & preferences:
- desire to retain fertility and/or uterus
- benefits and harms of treatment
- clinical considerations (comorbidities, multiple pathologies, size of uterus)

No identified pathology, fibroids < 3 cm, or adenomyosis
Take into consideration severity of symptoms

Consider LNG-IUS

Severe symptoms

Consider referral to specialist care

If LNG-IUS declined or not suitable

Consider alternative pharmacological treatment:
- non-hormonal:
  - TXA
  - NSAIDs
- hormonal:
  - combined hormonal contraceptives
  - cyclical oral progestogens

If LNG-IUS failed

Consider referral to specialist care

Alternative pharmacological treatment declined, not suitable, or failed

Consider surgical treatment:
- myomectomy
- hysterectomy

Fibroids < 3 cm
Take into consideration size, location and number of fibroids, and severity of symptoms

Be aware that the effectiveness of pharmacological treatments may be limited for fibroids substantially greater than 3 cm in diameter

Consider hysteroscopic removal

Submucosal fibroids

Consider LNG-IUS

Consider hysteroscopic removal

+/− investigations

Consider referral to specialist care

Myometrectomy

Consider UAE

Consider 2nd generation endometrial ablation

GnRHs: gonadotropin-releasing hormone analogues; LNG-IUS: levonorgestrel-releasing intrauterine system; NSAIDs: non-steroidal anti-inflammatory drugs; TXA: tranexamic acid; UAE: uterine artery embolisation.

1References to ulipristal acetate (Elnonym) were removed before publication because the European Medicines Agency is reviewing the use of Esmya for uterine fibroids and have introduced temporary safety measures. See the EMA website.
Treatments for women with fibroids of 3 cm or more in diameter

1.5.7 Consider referring women to specialist care to undertake additional investigations and discuss treatment options for fibroids of 3 cm or more in diameter. [2018]

1.5.8 If pharmacological treatment is needed while investigations and definitive treatment are being organised, offer tranexamic acid and/or NSAIDs\(^\text{[a]}\). [2007]

1.5.9 Advise women to continue using NSAIDs\(^\text{[a]}\) and/or tranexamic acid for as long as they are found to be beneficial. [2007]

1.5.10 For women with fibroids of 3 cm or more in diameter, take into account the size, location and number of fibroids, and the severity of the symptoms and consider the following treatments:

- pharmacological:
  - non-hormonal:
    - tranexamic acid
    - NSAIDs\(^\text{[a]}\)
  - hormonal:
    - ulipristal acetate (see recommendations 1.5.11 and 1.5.12)
    - LNG-IUS\(^\text{[a]}\)
    - combined hormonal contraception\(^\text{[a]}\)
- cyclical oral progestogens

- uterine artery embolisation

- surgical:
  - myomectomy
  - hysterectomy. [2018, amended Nov 2018]
1.5.12 When ulipristal\textsuperscript{[4]} is used for intermittent treatment in women who are not eligible for surgery, for example where the risks of surgery outweigh the benefits or where the woman declines surgical treatment:

- Offer ulipristal acetate 5 mg (up to 4 courses) to women with heavy menstrual bleeding and fibroids of 3 cm or more in diameter, and a haemoglobin level of 102 g per litre or below.

- Consider ulipristal acetate 5 mg (up to 4 courses) for women with heavy menstrual bleeding and fibroids of 3 cm or more in diameter, and a haemoglobin level above 102 g per litre. [Nov 2018]
1.5.11 If ulipristal acetate[^a] is the preferred treatment option, be aware of measures to reduce the risk of rare but serious liver injury:

- discuss the relative benefits and harms of ulipristal acetate with women, including recognising the signs and symptoms of liver injury, to enable an informed decision

- monitor liver function for the first 2 treatment courses, and as clinically indicated, in line with current prescribing guidance. [Nov 2018]
1.5.13 Be aware that the effectiveness of pharmacological treatments for HMB (excluding ulipristal acetate) may be limited in women with fibroids that are substantially greater than 3 cm in diameter. [2018, amended Nov 2018]
Heavy menstrual bleeding: management

Discuss treatment options taking into account the woman’s choices & preferences:
- desire to retain fertility and/or uterus
- benefits and harms of treatment
- clinical considerations (comorbidities, multiple pathologies, size of uterus)

No identified pathology, fibroids < 3 cm, or adenomyosis
Take into consideration severity of symptoms

Submucosal fibroids

Fibroids ≥ 3 cm
Take into consideration size, location and number of fibroids, and severity of symptoms
Be aware that the effectiveness of pharmacological treatments may be limited for fibroids substantially greater than 3 cm in diameter

Consider LNG-IUS
- If LNG-IUS declined or not suitable
  - Consider alternative pharmacological treatment:
    - non-hormonal:
      - TXA
      - NSAIDs
    - hormonal:
      - combined hormonal contraceptives
      - cyclical oral progestogens
- If LNG-IUS failed
  - Consider referral to specialist care
  - +/- investigations

Severe symptoms

Consider hysteroscopic removal
Consider referral to specialist care.
If treatment is needed while investigations and definitive treatment are being organised, offer tranexamic acid and/or NSAIDs

Consider surgery:
- myomectomy
- hysterectomy

Consider UAE
Consider 2nd generation endometrial ablation

Consider pharmacological treatment:
- non-hormonal:
  - TXA
  - NSAIDs
- hormonal:
  - LNG-IUS
  - combined hormonal contraceptives
  - cyclical oral progestogens

Pretreatment with GnRHs before surgery should be considered if uterine fibroids are causing an enlarged or distorted uterus [recommendation amended]¹

Prior to scheduling of UAE or myomectomy, the uterus and fibroids should be assessed by ultrasound. If further information is needed, MRI should be considered

GnRHs: gonadotrophin-releasing hormone analogues; LNG-IUS: levonorgestrel-releasing intrauterine system; NSAIDs: non-steroidal anti-inflammatory drugs; TXA: tranexamic acid; UAE: uterine artery embolisation.

¹References to ulipristal acetate (Elnora) were removed before publication because the European Medicines Agency is reviewing the use of Esmya for uterine fibroids and have introduced temporary safety measures. See the EMA website.
Comparability of perioperative morbidity between abdominal myomectomy and hysterectomy for women with uterine leiomyomas

Stephen W. Sawin, MD, a Nicole D. Pilevsky, MD, a Jesse A. Berlin, ScD, b and Kurt T. Barnhart, MD, MSCE a, b

Philadelphia, Pennsylvania

CONCLUSION: No clinically significant difference in perioperative morbidity between myomectomy and hysterectomy was detected. Myomectomy should be considered a safe alternative to hysterectomy. (Am J Obstet Gynecol 2000;183:1448-55.)
Uterine artery embolization for symptomatic uterine fibroids (Review)

Gupta JK, Sinha A, Lumsden MA, Hickey M
UAE vs surgery: Patient satisfaction @ 2 and 5 y

Figure 3. Forest plot of comparison: 1 UAE versus surgery, outcome: 1.1 Satisfaction with treatment up to 24 months.

Figure 4. Forest plot of comparison: 1 UAE versus surgery, outcome: 1.2 Satisfaction with treatment at 5 years.
Figure 6. Forest plot of comparison: I UAE versus surgery, outcome: 1.10 Further interventions within 2 years.

### Analysis 1.11. Comparison I UAE versus surgery, Outcome II Further interventions within 5 years.

**Comparison:** I UAE versus surgery

**Outcome:** II Further interventions within 5 years

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>UAE</th>
<th>Surgery</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td></td>
<td></td>
<td>M-H.Random(95% CI)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>1.10.1 UAE versus hysterectomy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EMMY 2010</td>
<td>19</td>
<td>81</td>
<td>6.73</td>
<td>23.9%</td>
<td>3.4 (1.28, 9.12)</td>
</tr>
<tr>
<td>Ruskären 2010</td>
<td>5</td>
<td>26</td>
<td>3</td>
<td>28</td>
<td>11.8%</td>
</tr>
<tr>
<td>Subset (95% CI)</td>
<td>107</td>
<td>102</td>
<td>36.7%</td>
<td>2.09</td>
<td></td>
</tr>
<tr>
<td>Total events</td>
<td>24</td>
<td>9</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity:</td>
<td>Chi²</td>
<td>df = 1</td>
<td>P = 0.59</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 2.68 (P = 0.009)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **1.10.2 UAE versus hysterectomy or myomectomy** | | | | | |
| June 2012       | 12  | 82      | 6.62       | 37.4%  | 1.41 (0.55, 3.64) |
| REST 2011 (1)   | 21  | 106     | 1           | 0.01   |
| Subset (95% CI) | 168 | 113     | 43.0%      | 2.83   |
| Total events    | 33  | 10      |            |        |             |
| Heterogeneity:  | Chi² | df = 1  | P = 0.60   |        |             |
| Test for overall effect: Z = 2.58 (P = 0.010) |

| **1.10.3 UAE versus myomectomy** | | | | | |
| FLAME 2012 (2)  | 9   | 63      | 3           | 13.7%  |
| Maria 2008      | 19  | 58      | 2           | 6.7%   |
| Subset (95% CI) | 121 | 121     | 20.4%      | 6.89   |
| Total events    | 28  | 5       |            |        |             |
| Heterogeneity:  | Chi² | df = 1  | P = 0.13   |        |             |
| Test for overall effect: Z = 3.88 (P = 0.0001) |

| **Total (95% CI)** | 396 | 336 | 100.0% | 3.72 (2.26, 6.04) |
|                    |     |     |        |             |
| **Total events**   | 85  | 24  |        |             |
| Heterogeneity:     | Chi² | df = 2 | P = 0.32 |        |             |
| Test for subgroup differences: Chi² = 2.26, df = 2 (P = 0.32), P = 13.3% |

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Notes:
1. In this study 5 women randomised to surgery chose myomectomy.
2. 9 women in the UAE and 3 in the myomectomy group changed treatment.

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Graph showing the forest plot with odds ratios and confidence intervals for each comparison.
Minimally invasive surgical techniques versus open myomectomy for uterine fibroids (Review)

Bhave Chittawar P, Franik S, Pouwer AW, Farquhar C
## Postoperative pain

### Analysis 1.1. Comparison | Laparoscopic myomectomy versus open myomectomy (all types), Outcome 1

**Postoperative pain at 6 hours.**

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Laparoscopic</th>
<th>Open myomectomy</th>
<th>Mean difference</th>
<th>95% CI</th>
<th>Z value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic vs. Open myomectomy</td>
<td>74</td>
<td>74</td>
<td>-2.60</td>
<td>[-2.88, -1.92]</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>

### Analysis 1.3. Comparison | Laparoscopic myomectomy versus open myomectomy (all types), Outcome 3

**Postoperative pain at 48 hours.**

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Laparoscopic</th>
<th>Open myomectomy</th>
<th>Mean difference</th>
<th>95% CI</th>
<th>Z value</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopic vs. Open myomectomy</td>
<td>41</td>
<td>41</td>
<td>-3.90</td>
<td>[-2.80, -1.00]</td>
<td>100.0%</td>
<td></td>
</tr>
</tbody>
</table>
### Analysis 1.7. Comparison 1 Laparoscopic myomectomy versus open myomectomy (all types), Outcome 7 In-hospital adverse events: postoperative fever.

#### Study or subgroup

<table>
<thead>
<tr>
<th>Laparoscopic myomectomy</th>
<th>Myomectomy at min-laparotomy</th>
<th>Odds Ratio</th>
<th>Weight</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>mN</td>
<td>mN</td>
<td></td>
<td>mH (Hse/95% CI)</td>
</tr>
<tr>
<td>1 Laparoscopic myomectomy versus open myomectomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hui 1995</td>
<td>1 / 20</td>
<td>1 / 20</td>
<td>2.4 %</td>
<td>1.00 [0.06, 17.18]</td>
</tr>
<tr>
<td>Sarmiento 2000</td>
<td>8/16</td>
<td>17/65</td>
<td>37.7 %</td>
<td>0.39 [0.15, 0.98]</td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>86</strong></td>
<td><strong>85</strong></td>
<td>40.1 %</td>
<td><strong>0.43 [0.18, 1.02]</strong></td>
</tr>
<tr>
<td>Total events: 9 (Laparoscopic myomectomy), 18 (Myomectomy at min-laparotomy)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heterogeneity: CH² = 0.36, df = 1 (P = 0.54), I² = 0.0%</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test for overall effect: Z = 1.32 (P = 0.055)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2 Laparoscopic myomectomy versus myomectomy at min-laparotomy

| Authors 2006         | 0/74                       | 0/74       | Not estimable |
| Citro & 2009         | 5/40                       | 10/40      | 21.9 %        | 0.43 [0.13, 0.99] |
| Paredes 2007         | 2/68                       | 5/68       | 12.2 %        | 0.38 [0.07, 3.04] |
| Sesi 2009            | 7/30                       | 12/30      | 25.8 %        | 0.52 [0.18, 1.44] |
| **Subtotal (95% CI)**| **232**                   | **232**    | 59.9 %        | **0.46 [0.23, 0.92]** |
| Total events: 14 (Laparoscopic myomectomy), 27 (Myomectomy at min-laparotomy) | | | | |
| Heterogeneity: CH² = 0.11, df = 2 (P = 0.95), I² = 0.0% |
| Test for overall effect: Z = 2.19 (P = 0.029) |

**Total (95% CI)**

| 318                   | 317                   | 100.0 %    | 0.44 [0.26, 0.77] |

**Total events: 23 (Laparoscopic myomectomy), 45 (Myomectomy at min-laparotomy)**

Heterogeneity: CH² = 0.51, df = 4 (P = 0.77), I² = 0.0%

Test for overall effect: Z = 2.91 (P = 0.0037)

Test for subgroup differences: CH² = 0.02, df = 1 (P = 0.91), I² = 0.0%
### Length of hospital stay

**Analysis 1.9. Comparison 1 Laparoscopic myomectomy versus open myomectomy (all types), Outcome 9 Length of hospital stay (hours).**

**Review:** Minimally invasive surgical techniques versus open myomectomy for uterine fibroids

**Comparison:** 1 Laparoscopic myomectomy versus open myomectomy (all types)

**Outcome:** 9 Length of hospital stay (hours)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Laparoscopic myomectomy</th>
<th>Open myomectomy</th>
<th>Mean Difference</th>
<th>Fixed 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>Mean (SD)</td>
<td>N</td>
<td>Mean (SD)</td>
<td></td>
</tr>
<tr>
<td>1 Laparoscopic myomectomy versus open myomectomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Serschack 2000</td>
<td>66 73.61 (37.09)</td>
<td>65 142.8 (34.6)</td>
<td>-67.19 [-79.47, -54.91]</td>
<td></td>
</tr>
<tr>
<td>2 Laparoscopic myomectomy versus mini-laparotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alessandri 2006</td>
<td>74 38 (12)</td>
<td>74 48 (12)</td>
<td>-10.00 [-13.87, -6.13]</td>
<td></td>
</tr>
<tr>
<td>Cicinelli 2009</td>
<td>40 50.4 (14.4)</td>
<td>40 79.2 (12)</td>
<td>-28.80 [-34.61, -22.99]</td>
<td></td>
</tr>
<tr>
<td>3 Laparoscopic myomectomy versus laparoscopically-assisted mini-laparotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tan 2008</td>
<td>36 43.44 (13.68)</td>
<td>26 48.96 (15.84)</td>
<td>-5.52 [-13.56, 2.52]</td>
<td></td>
</tr>
</tbody>
</table>

**Note:** The table shows the mean length of hospital stay for different study groups, with the mean difference and 95% confidence interval for each comparison.
### Analysis 1.10. Comparison of Laparoscopic myomectomy vs. open myomectomy (all types), Outcome 10 Operating time (minutes)

**Review:** Minimally invasive surgical techniques versus open myomectomy for uterine fibroids

**Comparison:** Laparoscopic myomectomy vs. open myomectomy (all types)

**Outcome:** 10 Operating time (minutes)

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Laparoscopic myomectomy</th>
<th>Mean(SD)</th>
<th>Open myomectomy</th>
<th>Mean(SD)</th>
<th>Mean Difference</th>
<th>Weight</th>
<th>Mean Difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hofer 2006</td>
<td>19</td>
<td>99 (37)</td>
<td>21</td>
<td>68 (22)</td>
<td>-3.3% 31.00 [11.89, 50.11]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mass 1995</td>
<td>20</td>
<td>100 (31)</td>
<td>20</td>
<td>93 (27)</td>
<td>-3.7% 70.00 [-11.02, 25.02]</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sessa-Rohl 2000</td>
<td>66</td>
<td>100.23 (38.34)</td>
<td>65</td>
<td>88.85 (26.91)</td>
<td>6.4% 11.38 [8.05, 22.71]</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>105</strong></td>
<td></td>
<td><strong>106</strong></td>
<td></td>
<td><strong>16.4% 14.33 [5.76, 22.91]</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Heterogeneity: CH² = 3.02, df = 2 (P = 0.05), I² = 40%

Test for overall effect: Z = 3.28 (P = 0.001)

2 Laparoscopic myomectomy vs. myomectomy at mini-laparotomy

Alessandrini 2004 | 72 | 98 (13) | 74 | 85 (14) | 62.8% 13.00 [8.62, 17.38] |        |                |
| Cicelli 2009     | 40 | 80 (23) | 40 | 71 (18) | 14.7% 9.00 [0.05, 18.05] |        |                |
| **Total (95% CI)**| **112**                 |          | **114**        |          | **77.5% 12.24 [8.30, 16.18]** |        |                |

Heterogeneity: CH² = 0.61, df = 1 (P = 0.44), I² = 0%

Test for overall effect: Z = 6.08 (P = 0.000)

3 Laparoscopic myomectomy vs. laparoscopic submuscular mini-laparotomy

Tan 2008 | 26 | 96 (24.2) | 26 | 75.5 (25.7) | 6.1% 20.50 [6.39, 34.61] |        |                |
| **Total (95% CI)**| **243**                 |          | **246**        |          | **6.1% 20.50 [6.39, 34.61]** |        |                |

Heterogeneity not applicable

Test for overall effect: Z = 1.85 (P = 0.064)

**Total (95% CI)**

Heterogeneity: CH² = 5.5, df = 5 (P = 0.33), I² = 13%

Test for overall effect: Z = 7.39 (P = 0.000)

Test for subgroup difference: CH² = 1.32, df = 2 (P = 0.52), I² = 0%
Recurrence of fibroids

<table>
<thead>
<tr>
<th>Study or subgroup</th>
<th>Laparoscopic myomectomy</th>
<th>Open myomectomy</th>
<th>Odds Ratio M-H (95% CI)</th>
<th>Weight</th>
<th>Odds Ratio M-H (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n/N</td>
<td>n/N</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1. Laparoscopic myomectomy versus open myomectomy (all types)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rossetti 2001</td>
<td>11/41</td>
<td>9/40</td>
<td>30.7 %</td>
<td>1.26 [0.46, 3.48]</td>
<td></td>
</tr>
<tr>
<td>Senthil 2000</td>
<td>12/86</td>
<td>12/85</td>
<td>45.5 %</td>
<td>0.08 [0.90, 3.28]</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>107</strong></td>
<td><strong>105</strong></td>
<td><strong>76.2 %</strong></td>
<td><strong>1.09 [0.56, 2.13]</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total events 23 (Laparoscopic myomectomy), 21 (Open myomectomy)</strong></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heterogeneity: <em>I</em>² = 0.13, df = 1 (<em>P</em> = 0.71), <em>I</em>² = 0%</td>
<td></td>
<td></td>
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</tr>
<tr>
<td></td>
<td>Test for overall effect: <em>Z</em> = 0.27 (<em>P</em> = 0.79)</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>2. Laparoscopic myomectomy versus open myomectomy at mTHLaparotomy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Alessandri 2006</td>
<td>0/74</td>
<td>0/74</td>
<td></td>
<td>Not estimable</td>
<td></td>
</tr>
<tr>
<td>Sesh 2008 (1)</td>
<td>7/50</td>
<td>6/50</td>
<td>23.8 %</td>
<td>1.19 [0.37, 3.84]</td>
<td></td>
</tr>
<tr>
<td><strong>Subtotal (95% CI)</strong></td>
<td><strong>124</strong></td>
<td><strong>124</strong></td>
<td><strong>23.8 %</strong></td>
<td><strong>1.19 [0.37, 3.84]</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>Total events 7 (Laparoscopic myomectomy), 6 (Open myomectomy)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Heterogeneity: not applicable</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Test for overall effect: <em>Z</em> = 0.30 (<em>P</em> = 0.77)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Total (95% CI)</strong></td>
<td><strong>231</strong></td>
<td><strong>229</strong></td>
<td><strong>100.0 %</strong></td>
<td><strong>1.12 [0.63, 1.99]</strong></td>
<td></td>
</tr>
</tbody>
</table>

Note: *I*² is the percentage of total variation across studies that is due to heterogeneity rather than chance.
Doctors Eye Cancer Risk in Uterine Procedure

Popular Technique to Remove Growths Comes Under Question

By JENNIFER LEWITZ

Updated Dec. 18, 2013 1:21 p.m. ET

An increasingly popular method of removing common uterine growths is coming under assault by some doctors worried about the risk of spreading a potentially deadly cancer.

Brigham and Women’s Hospital, a prominent Boston medical center, said Tuesday it plans to impose new limits on the procedure, called morcellation. And Massachusetts
Laparoscopic Uterine Power Morcellation in Hysterectomy and Myomectomy: FDA Safety Communication

Date Issued: April 17, 2014

Audience:

- Health Care Providers
- Medical Professional Associations
- Cancer Advocacy Organizations
- Health Care Facilities/Hospitals

Women with Symptomatic Uterine Fibroids who are Considering Surgical Options
Food and Drug Administration

Quantitative Assessment of the Prevalence of Unsuspected Uterine Sarcoma in Women Undergoing Treatment of Uterine Fibroids

Summary and Key Findings:
April 17, 2014

The FDA conducted a review of published and unpublished scientific literature, including patients operated on from 1980 to 2011 to estimate the prevalence of unsuspected uterine sarcoma and uterine leiomyosarcoma in patients undergoing hysterectomy or myomectomy for presumed benign fibroids (leiomyoma). The review included cohort and cross-sectional studies with a numerator (cases of uterine sarcoma or leiomyosarcoma (LMS)) and denominator (total patient population assessed), regardless of sample size. FDA’s primary analysis included 9 of the 18 identified studies.  

Estimated prevalence of unsuspected sarcoma

The 18 identified studies are listed in the TABLE1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18. Five of the nine studies in the primary analysis were conducted in the United States. Hysterectomy was the sole surgical procedure in six of the studies, hysterectomy or myomectomy in one study and myomectomy alone in two studies. Sample sizes ranged from 104 to 1429 (mean=1018; median=1115). The number of patients with unsuspected uterine sarcoma in each study ranged from 0 to 7, as it did for LMS (mean=2.1; median=1.0).

During hysterectomy or myomectomy for presumed benign leiomyoma, the prevalence of unsuspected uterine sarcoma and LMS, was 2.8 (95% CI: 1.8-4.5) per 1,000 persons and 2.0 (95% CI: 1.1-3.8) per 1,000 persons, respectively. These translate to an unsuspected uterine sarcoma in 1 in 352 women and an unsuspected LMS in 1 in 498 women undergoing hysterectomy or myomectomy for presumed benign leiomyoma. There were insufficient data to stratify by age.

Conclusion

This analysis indicates that the prevalence of unsuspected uterine sarcoma in patients undergoing hysterectomy or myomectomy for presumed benign leiomyoma is 1 in 352 and the prevalence of unsuspected uterine leiomyosarcoma is 1 in 498.

1 The 9 studies comprising the primary analysis consisted of 8 full publications and 1 abstract. Nine studies were excluded from the primary analysis because they either included patients undergoing hysterectomy for non- leiomyoma-related conditions (n=7), contained insufficient detail (n=1) or were published in a non-English language (n=1).
2 Prevalence estimates were calculated using a random effects model using a generalised linear mixed model in SAS 9.3 (PROC GLIMMIX). Proportions and 95% confidence intervals (calculated using the exact binomial method) were converted to rates per 1000 persons. Additional analyses using a simple pooled approach and a random-effects model based on the DerSimonian-Laird method produced similar prevalence estimates.
Conclusion

This analysis indicates that the prevalence of unsuspected uterine sarcoma in patients undergoing hysterectomy or myomectomy for presumed benign leiomyoma is 1 in 352 and the prevalence of unsuspected uterine leiomyosarcoma is 1 in 498.
If laparoscopic power morcellation is performed in women with unsuspected uterine sarcoma, there is a risk that the procedure will spread the cancerous tissue within the abdomen and pelvis, significantly worsening the patient’s likelihood of long-term survival. For this reason, and because there is no reliable method for predicting whether a woman with fibroids may have a uterine sarcoma, the FDA discourages the use of laparoscopic power morcellation during hysterectomy or myomectomy for uterine fibroids.
Morcellation During Uterine Tissue Extraction

AAGL Advancing Minimally Invasive Gynecology Worldwide

The Tissue Extraction Task Force members had no commercial, proprietary, or financial interest in the products or companies described in the report. On May 6, 2014, the report was approved by members of the AAGL Board of Trustees who have no commercial, proprietary, or financial interest in the products or companies described in the report.

Dr. Cesar Nezhat, President of AAGL, voluntarily recused himself from discussion of the Tissue Extraction Task Force report and from any vote related to the report in accordance with the AAGL Conflict of Interest Disclosure and Dissociation Policy for Executive Committee Members.
UPDATED Laparoscopic Uterine Power Morcellation in Hysterectomy and Myomectomy: FDA Safety Communication

The following information updates our April 17, 2014 communication ([7993/20170722215727/https://www.fda.gov/MedicalDevices/Safety/AlertsandNotices/ucm393576.htm]).

Date Issued: Nov. 24, 2014

Because of this risk and the availability of alternative surgical options for most women, the FDA is warning against the use of laparoscopic power morcellators in the majority of women undergoing myomectomy or hysterectomy for treatment of fibroids.
Options on fibroid morcellation: a literature review

Hans Brillmann · Vesilind Tamas · Grigoris Grimblic · Thomas Ind · Kevin Philips · Thierry van den Bosch · Saumir Suvalje · Lukas van den Haak · Frank-Willem Janssen · Johanna Pijnenborg · Flavie-Andrei Taran · Sara Breuer · Armand Wartiaux · Raul Campo · Peter O'Donnell · Rudi Leus de Wilde ·
On behalf of the European Society of Gynaecological Endoscopy (ESGE) steering committee on fibroid morcellation

Diagram:
- Patient having indication for fibroid morcellation
  - TVU: necrosis and high vascularity
    - ≥ 40 years
    - Additional characteristics:
      - postmenopause
      - US/MRI single fibroid
      - US/MRI size largest fibroid ≥ 8 cm
      - LDH elevated
      - Abnormal uterine bleeding
  - Not reassuring
    - Counsel against morcellation
  - TVU: no necrosis and high vascularity
    - < 40 years
    - Reassuring
      - Counsel on minimal invasive management including morcellation
Conclusions – Fibroids and HMB

- Consider hysteroscopic myomectomy for submucosal fibroids
- Consider ulipristal acetate for fibroids > 3 cm in women who are ineligible for surgery
- Consider myomectomy for fibroids in women with fibroids > 3 cm and who wish to preserve fertility or uterus