Laparoscopic surgery for pelvic organ prolapse

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Laparoscopic surgery for Pelvic organ prolapse

- **DeLancey levels pelvic support**
- **Apical:**
  - Uterosacral vault suspension
  - Sacro-colpopexy
  - Uterosacral ligament uterine suspension
  - Sacro-cervicopexy
- **Anterior:** Paravaginal repair
- **Posterior:** Enterocele and rectocele
DeLancey levels of pelvic floor support: Level 1 (apical suspension) and level 2 (lateral attachment)

Level 1: paracolpium suspends the vaginal apex from the lateral pelvic sidewall via the uterosacral-cardinal complex.
Level 2: the anterior vaginal wall is attached laterally to arcus tendinous fascia pelvis and the posterior vaginal wall is attached laterally to the facia overlying the levator ani muscle.

Pelvic Organ Prolapse (POP)

- Muscular contraction
- Fixation by ligaments
- Mechanical pressure-barrier
  - Formed by the levator muscles
MUSCULAR CONTRACTION

= abdominal pressure

= pelvic organs

= abdominal cavity

= muscular contraction

= genital hiatus
FIXATION BY LIGAMENTS

THE LEVATOR MUSCLE FORMING A MECHANICAL PRESSURE-BARRIER
## 3 level defects

<table>
<thead>
<tr>
<th>Level</th>
<th>Fixation by</th>
<th>Anatomical structure</th>
<th>defect leads to...</th>
</tr>
</thead>
<tbody>
<tr>
<td>Level 1</td>
<td>suspension</td>
<td>Parametrium/paracolpium</td>
<td>prolapse</td>
</tr>
<tr>
<td>Level 2</td>
<td>connection (tissue-mediated)</td>
<td>connection of vagina to arcus tendineous fasciae pelvis (Fascia pubocervicalis, Fascia rectovaginalis)</td>
<td>cystocele (lateral defect type) rectocele</td>
</tr>
<tr>
<td>Level 3</td>
<td>tensioning</td>
<td>direct fixation of vagina to surrounding structures by ligaments (Ligg. pubourethralia)</td>
<td>incontinence</td>
</tr>
</tbody>
</table>

(attachment)

(fusion)
Pelvic organ support

ATFP: arcus tendinous fascia pelvis; OIMF: Obturator internus muscle fascia; PCF: pubo-cervical fascia; PUL: pubo-urethral ligament; SS: sacrospinous ligament
Laparoscopic approaches to pelvic floor

• Advantages
  – Improving visualization
  – Decreasing blood loss
  – Magnifying the pelvic floor defects
  – Less postoperative pain
  – Shorter hospital stay
  – Shorter recovery time
  – Earlier return to a better quality of life

• Disadvantages
  – Technical difficulties
  – Increased operative time and associated increased costs
  – Longer learning curve
Anatomy of pelvic support
Level I: utero-sacral ligament cardinal complex (USC)
After dissecting the bladder and rectum off the anterior and posterior vaginal walls, respectively, a Y-shaped graft is sutured to the anterior and posterior endopelvic fascia with a series of permanent sutures.

Courtesy of Peter L Rosenblatt, MD.
Sacrococcolpopexy: sacral suture

Following anterior and posterior vaginal attachment of the polypropylene mesh, the mesh is sutured to the anterior longitudinal ligament.

Courtesy of Peter L Rosenblatt, MD.
## Laparoscopic sacro-colpopexy

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Type</th>
<th>Comparison Group</th>
<th>N</th>
<th>Length of Follow-up</th>
<th>Objective Cure</th>
<th>Subjective Cure*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sarlos et al⁹</td>
<td>Prospective cohort</td>
<td>None</td>
<td>101</td>
<td>Median 12 mo</td>
<td>92%</td>
<td>93%</td>
<td>Objective cure defined as &lt; stage 1 prolapse on POP-Q exam. Largest prospective trial.</td>
</tr>
<tr>
<td>Klauschke et al⁵</td>
<td>Retrospective cohort</td>
<td>Laparoscopic</td>
<td>43</td>
<td>Mean 7.4 mo</td>
<td>100% apical 93% anterior 93% posterior</td>
<td>91%</td>
<td>Apical success defined as point C &lt; 1/2 TVL.</td>
</tr>
<tr>
<td></td>
<td>Retrospective cohort</td>
<td>Abdominal</td>
<td>41</td>
<td>Mean 10.6 mo*</td>
<td>100% apical 88% anterior 93% posterior</td>
<td>95%</td>
<td>Anterior and posterior success defined as points Aa, Ba, Ap, and Bp of &lt; 0.5</td>
</tr>
<tr>
<td>Rivoire et al⁷</td>
<td>Retrospective cohort</td>
<td>None</td>
<td>138</td>
<td>34 mo</td>
<td>89%</td>
<td>88%</td>
<td>Objective cure defined as ≤ stage 2 prolapse on POP-Q. Subjective cure defined as “functional recurrent prolapse”.</td>
</tr>
</tbody>
</table>
# Laparoscopic sacro-colpopexy

<table>
<thead>
<tr>
<th>Study</th>
<th>Study Type</th>
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<th>N</th>
<th>Length of Follow-up</th>
<th>Objective Cure</th>
<th>Subjective Cure*</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Marciekiewicz et al⁶</td>
<td>Retrospective cohort</td>
<td>Laparoscopic</td>
<td>60</td>
<td>Median 34 mo</td>
<td>75%</td>
<td>78%</td>
<td>Objective cure defined as recurrent prolapse requiring reoperation</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Vaginal sacrospinous</td>
<td>51</td>
<td>Median 38 mo</td>
<td>92%</td>
<td>88%</td>
<td>No vault prolapse noted in the vaginal sacrospinous ligament fixation group</td>
</tr>
<tr>
<td>Hsiao et al⁴</td>
<td>Case series</td>
<td>Laparoscopic</td>
<td>25</td>
<td>Mean 11 mo</td>
<td>100%</td>
<td>N/A</td>
<td>Objective cure defined as “persistent fixation of the vaginal apex”</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Abdominal</td>
<td>22</td>
<td>Mean 6 mo*</td>
<td>95%</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>None</td>
<td>74</td>
<td></td>
<td>100%</td>
<td>99%</td>
<td></td>
</tr>
</tbody>
</table>

**Objective Cure**

- Defined as recurrent prolapse requiring reoperation.

**Subjective Cure**

- Defined as “persistent fixation of the vaginal apex.”

**Comments**

- High failure rate early in the study prompted a transition from staples to suturing at the sacral promontory.
Complications for LSC sacro-colpopexy

(Sarlos et al 2008 IUJ) 12 mon f/u, 101 cases

- 4 (4%), bladder injuries, 3 (3%) rectal injuries, and 1 (1%) postoperative ileus.
- The cystotomies were repaired intraoperatively using laparoscopy.
- One mesh erosion into the bladder 6 months after the initial cystotomy repair.
- Two of the bowel injuries were noted intraoperatively, and one postoperatively.
- Twenty-four patients (23.8%) also presented with postoperative stress urinary incontinence,
Complications for LSC sacro-colpopexy

- A systematic review of abdominal sacrocolpopexy (Nygaard 2004 Obstet Gynecol)
- comparable rates of
  - cystotomy (3.1%),
  - enterotomy (1.6%),
  - ileus/ small bowel obstruction (4.7%),
  - erosion (3.4%).
Complications for LSC sacro-colpopexy

- Laparoscopic sacrocolpopexy, Rivoire J M IG 200757 of 138 women (46%) reported stress urinary incontinence postoperatively. (Rivoire 2007 J Minim Invasive Gynecol)
  - 86% of cases were deemed “slight incontinence,”
women undergoing surgery for POP

asymptomatic SUI

planned vaginal approach, e.g. SSF, TVM

planned abdominal approach, e.g. ASC

concomitant surgery for POP and SUI

symptomatic SUI

concomitant surgery for both (+, -) prolapse reduction test

prolapse reduction test (-)

staged surgery

prolapse reduction test (+)

concomitant surgery
Uterosacral ligament vault suspension

Dissection of the bladder off the anterior vaginal wall (and underlying fascia) is performed and permanent or delayed-absorbable sutures are used to unite the anterior and posterior fascia before anchoring the vaginal apex to the proximal uterosacral ligaments.

Courtesy of Peter L Rosenblatt, MD.
Laparoscopic modified Haban colpopexy

Wu MP 1997 J Gynecol Surg
The changing trends of uterine preservation in POP

![Graph showing the changing trends of uterine preservation in POP from 1997 to 2007. The graph displays the number of total hysterectomies, hysterectomies, and uterine suspensions over the years.](image-url)
Table The patients’ age and associated procedure were the determinants for the choices of surgical types.

<table>
<thead>
<tr>
<th>Surgical types</th>
<th>uterine suspension</th>
<th>hysterectomy</th>
<th>Total</th>
<th>ChiSQ</th>
<th>P</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>no.</td>
<td>%</td>
<td>no.</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>2921</td>
<td>9.4</td>
<td>28117</td>
<td>80.6</td>
<td>31038</td>
</tr>
<tr>
<td>Patient Age</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;50</td>
<td>2056</td>
<td>25.1</td>
<td>6128</td>
<td>74.9</td>
<td>8184</td>
</tr>
<tr>
<td>50-59</td>
<td>397</td>
<td>6.4</td>
<td>5770</td>
<td>93.6</td>
<td>6167</td>
</tr>
<tr>
<td>60-69</td>
<td>263</td>
<td>2.9</td>
<td>8669</td>
<td>97.1</td>
<td>8932</td>
</tr>
<tr>
<td>&lt;69</td>
<td>205</td>
<td>2.6</td>
<td>7550</td>
<td>97.4</td>
<td>7755</td>
</tr>
<tr>
<td>with anti-incontinence</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>no</td>
<td>2507</td>
<td>8.8</td>
<td>25923</td>
<td>91.2</td>
<td>28430</td>
</tr>
<tr>
<td>yes</td>
<td>414</td>
<td>15.9</td>
<td>2194</td>
<td>84.1</td>
<td>2608</td>
</tr>
</tbody>
</table>

Compassion、Accountability、Effectiveness 閣懷、專業、效率
An alternative procedure for uterine suspension involves suturing the posterior vagina and cervix to the sacrum using an intervening graft, which may be either synthetic (eg, polypropylene, polyester) or natural (eg, fascia, dermis).

Courtesy of Peter L Rosenblatt, MD.
Sacrocervicopexy

The polypropylene mesh has been attached to the posterior vaginal wall and cervix, and has been sutured to the anterior longitudinal ligament of the sacrum.

Courtesy of Peter L Rosenblatt, MD.
Sacrocervicopexy

After the suspension, the peritoneum is reaproximated over the mesh with either a running stitch of delayed absorbable suture, or interrupted sutures.

Courtesy of Peter L Rosenblatt, MD.
Laparoscopic sacro-cervicopexy

- Literature on laparoscopic sacrohysteropexy is scarce. (Krause et al Krause 2005 IUJ)
- prospectively followed 81 women after sacrohysteropexy.
- 67/ 76 (88%) were subjectively cured, whereas 54 of 57 (95%) were objectively cured.
The surgeon identifies the proximal portion of the uterosacral ligament and uses permanent sutures to bind it to the distal aspect of the ligament, near its insertion into the lower uterine segment and cervix.

*Courtesy of Peter L Rosenblatt, MD.*
Uterosacral ligament suspension
high McCall colpopexy

Wu MP: Int J Gynecol Obstet 1997
LSC uterosacral ligament uterine suspension

• A retrospective cohort by (Diwan et al 2006 IUJ)
• Laparoscopic uterosacral ligament uterine suspension vs vaginal hysterectomy with a sacrospinous ligament suspension or vaginal uterosacral ligament suspension.
• There were 25 pairs matched
  – The uterine conservation patients
  – Better vault support postoperatively (P=0.001)
  – Less reoperations for failure (1 vs. 3).
  – Less blood loss (P<0.0001)
  – Shorter hospital stay (P=0.002).
• The most commonly reported complication is ureteral kinking.
<table>
<thead>
<tr>
<th>Author</th>
<th>Procedure</th>
<th>No. Patients</th>
<th>Follow-up (months)</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ostrzenski&lt;sup&gt;93&lt;/sup&gt;</td>
<td>Colpexy</td>
<td>15</td>
<td>6–24</td>
<td>Prolapse 0%</td>
</tr>
<tr>
<td>Vancallie &amp; Butler&lt;sup&gt;115&lt;/sup&gt;</td>
<td>Enterocoele repair</td>
<td>18</td>
<td>3–12</td>
<td>Conversion to open 1/18 (6%) Vaginal prolapse 1/18 (6%)</td>
</tr>
<tr>
<td>Nezhat et al.&lt;sup&gt;116&lt;/sup&gt;</td>
<td>Sacral colpexy</td>
<td>15</td>
<td>3–40</td>
<td>Prolapse 0%</td>
</tr>
<tr>
<td>O’Brien &amp; Ibrahim&lt;sup&gt;117&lt;/sup&gt;</td>
<td>Uterine suspension&lt;sup&gt;*&lt;/sup&gt;</td>
<td>9</td>
<td>3</td>
<td>Uterine prolapse 8/9 (89%)</td>
</tr>
<tr>
<td>Tsin et al.&lt;sup&gt;118&lt;/sup&gt;</td>
<td>Vaginal suspension to abdominal fascia</td>
<td>10</td>
<td>12</td>
<td>Infection 1/10 (10%) Suture extrusion 1/10 (10%) Prolapse 0%</td>
</tr>
<tr>
<td>Ostrzenski&lt;sup&gt;110&lt;/sup&gt;</td>
<td>Colpexy</td>
<td>16</td>
<td>6</td>
<td>Vault prolapse 1/16 (6%) Vault prolapse 5/16 (31%)</td>
</tr>
<tr>
<td>Lyons &amp; Winer&lt;sup&gt;120&lt;/sup&gt;</td>
<td>Colpexy + PVR Rectocele repair</td>
<td>11</td>
<td>up to 42</td>
<td>Vault prolapse 1/11 (9%) Persistent symptoms 4/20 (20%) by phone; no exam</td>
</tr>
<tr>
<td>Ross&lt;sup&gt;121&lt;/sup&gt;</td>
<td>Sacral colpexy</td>
<td>19</td>
<td>12</td>
<td>GSI 1/15 (7%) PVD 2/15 (13%) Rectocele 3/15 (20%)</td>
</tr>
<tr>
<td>Wu&lt;sup&gt;122&lt;/sup&gt;</td>
<td>Uterosacral ligament suture hysteropexy</td>
<td>7</td>
<td>9–17</td>
<td>Prolapse 0%</td>
</tr>
<tr>
<td>Fedele et al.&lt;sup&gt;123&lt;/sup&gt;</td>
<td>Vault suspension&lt;sup&gt;*&lt;/sup&gt; Enterocoele repair uterosacral vault suspension</td>
<td>12</td>
<td>9–28</td>
<td>Prolapse 2/12 (16.7%)</td>
</tr>
<tr>
<td>Miklos et al.&lt;sup&gt;24&lt;/sup&gt;</td>
<td></td>
<td>17</td>
<td>6 (1–17)</td>
<td>Vault prolapse 2/17 (12%)</td>
</tr>
<tr>
<td>Matsumoto et al.&lt;sup&gt;95&lt;/sup&gt;</td>
<td>Round ligament uterine suspension during pregnancy</td>
<td>3</td>
<td></td>
<td>No prolapse</td>
</tr>
<tr>
<td>Lee et al.&lt;sup&gt;125&lt;/sup&gt;</td>
<td>Sacrospinous</td>
<td>12</td>
<td>26 (12–36)</td>
<td>Vault prolapse 1/12 (8%)</td>
</tr>
<tr>
<td>Carter et al.&lt;sup&gt;126&lt;/sup&gt;</td>
<td>Enterocoele repair; uterosacral vault suspension</td>
<td>8</td>
<td>6</td>
<td>0%</td>
</tr>
<tr>
<td>Maher et al.&lt;sup&gt;127&lt;/sup&gt;</td>
<td>Hysteropexy</td>
<td>43</td>
<td>12 (6–32)</td>
<td>Uterine prolapse 9 (21%)</td>
</tr>
</tbody>
</table>
Level II: attachment

- Pubocervical fascia
- Paracolpium
- Rectovaginal fascia
- Arcus tendineus fasciae pelvis
- Top of perineal body
- Urethra
- Rectum
- Levator ani
Level II: ATFP (White line)
Anterior wall defect: Cystocele
Anterior vaginal wall prolapse

vesico-vaginal layer
recto-vaginal layer
arcus tendinious

X
Site-specific repair

- Site of midline defects
- Site of paravaginal defects
- Site of transverse defects

Bladder
Site-specific repair

Miklos JR 2002 Curr Opin Obstet Gynecol
Laparoscopic paravaginal defect repair
Laparoscopic paravaginal defect repair

• The literature regarding laparoscopic paravaginal defect repair, and rectocele repair is sparse. (Price 2009 Maturitas).

• A few retrospective observational studies have reported success rate ranging from 76 to 93% (Maher 2006 IUJ)
  – similar to abdominal and vaginal approach (76 - 100%) (Speights 2000 JAAGL)
  – The success rate of anterior colporrhaphy is poor and varies widely between 37 and 100% (Maher 2004 Cochrane Review)
  – The use of mesh or graft inlays at the time of anterior repair may reduce the risk of recurrence
    – (RR 1.39, 95%CI 1.02-1.90) (RR 2.72, 95%CI 1.20-6.14)
Complication

- There are limited data reviewing the complication rate
- Bladder injury (2.3%), no ureteral injury (Miklos 2002 Curr Opin Obs Gyn).
- Blood loss, bowel injury and unintended laparotomy were the potential complications
Surgery for POP

- Posterio Bridge Re
- Anterior Bridge Repair
- Lateral Fornix Repairs
Surgery for POP

A L P

Sacropexy (Posterior IVS)

Slingplasty
Laparoscopic approaches to PFR

MISS: minimal invasive suburethral sling; PVR= para-vaginal repair; SSVS : sacral spinous vaginal suspension ; USS: utero-sacral suspension; VOS: vaginal obturator shelf;
Sagittal section of pelvis, showing relative position of rectocele and enterocele