World Symposium on Endometriosis (WSE 2014)

Adhesion prevention techniques in gynecological minimal-access surgery

Atlanta
27st – 29th March 2014

Rudy Leon De Wilde, MD, ScD, PhD
Peritoneal Tissue Repair

- Peritoneal healing and adhesions
- Key molecular components
- Surgical technique
Peritoneal Cavity

Leukocytes

Phospholipids

Capillaries

Lymph vessels
Peritoneal Adhesions

- Result from an exaggerated response to peritoneal injury
- Attach organs that were previously separate
- Develop within the first 5 days of surgery
- Commence development during surgery
Any type and site of surgery are exposed to postoperative adhesions.

The problem affects …

Surgeons and Gynaecologists
Theatre, Nursing Teams
Other Healthcare Personnel
Health System
Patients
Pathophysiology of adhesions

Exaggerated response to peritoneal injury

Acute inflammatory response

Release of kinins, PGE, F histamine

Increased small vessel permeability

Fibrin-rich exudate
Adhesions pathogenesis

Peritoneal surface

Injury

Fibrinolysis

Restitution

Adhesion

Holmdahl L, Lancet 1999
Formation of Adhesions

Influencing factors during surgery

- Ischaemia
- Infection
- GI contents
- Abrasion
- Desiccation
- Heat
- Light
- Electrocautery
- Sutures
- Fibres
- Glove powder

Injury

Bleeding

Inflammation

Fibrin deposition

Adhesions
Protection against adhesions

Steps to reduce adhesions during surgery

- Increase vascular permeability
- Reduce infection risk
- Avoid GI contamination
- Minimise tissue handling
  - Careful technique
  - Microsurgery
- Reduce drying of tissues
  - Lubrication
- Limit use of cautery
- Limit use of sutures
- Avoid materials with fibres
- Use starch-free gloves
Adhesions - Pathophysiology

Peritoneal Injury

Blood → Increased vascular permeability

Fibrin Deposition

Fibrinolysis → Normal peritoneal repair

Impaired Fibrinolysis → Fibrin organisation → Adhesion Formation

Minimised by

• Avoiding desiccation
• Avoiding tissue handling
• Fine, non-reactive sutures
• Avoiding foreign bodies
• Use of magnification
• Avoiding infection
Adhesions - Pathophysiology

Peritoneal Injury

Blood → *Increased vascular permeability*

Fibrin Deposition

- Fibrinolysis
- Impaired Fibrinolysis → Fibrin organisation → Adhesion Formation
- Normal peritoneal repair

Modulated by

- NSAIDs
- Corticosteroids
  - intraperitoneal
  - intravenous
Adhesions - Pathophysiology

Peritoneal Injury

**Blood** → Increased vascular permeability

- Fibrin Deposition
  - Fibrinolysis → Normal peritoneal repair
  - Impaired Fibrinolysis → Fibrin organisation → Adhesion Formation

Serosal injury + blood = adhesion
No Serosal injury + blood = adhesion
Serosal injury + heparinised blood = reduced adhesion

Need for meticulous haemostasis
Adhesions - Pathophysiology

Exudate coagulates in 3 hours
- Fibrinous mass
- Fibrinous adhesions between peritoneal surfaces

Peritoneal Injury

Blood → Increased vascular permeability

Fibrin Deposition

Fibrinolysis → Normal peritoneal repair

Impaired Fibrinolysis → Fibrin organisation → Adhesion Formation
Fibrinolysis

Plasminogen Activator Inhibitor
PAI

Plasminogen

Plasminogen activator

Plasminogen activator

Plasmin

Plasminogen activator

Macrophages
Adhesions - Pathophysiology

Peritoneal injury

Blood → Increased vascular permeability

Fibrin deposition

Fibrinolysis

Fibrin organisation → Impaired fibrinolysis → Adhesion formation

Normal peritoneal repair
It’s Not All About Fibrinolysis

But it is about clinical impact!

Holmdahl ACPGI 2001
Adhesions – The impact

- 93% of patients develop adhesions after abdominal / pelvic surgery

- Impact of adhesions is often underestimated
  - Consequences of adhesions occur unpredictably
  - Many readmissions are to a different departments
  - We usually don’t see the adhesion-related consequences of our own surgery
Adhesions – The impact

Impact on patients

- **Significant clinical problem**
  - Small bowel obstruction: 74% adhesion-related
  - Chronic pelvic pain: 40% adhesion-related
  - Secondary infertility in women: 20-40% adhesion-related
  - Reoperative complications: 56% adhesion-related

- Delayed SBO diagnosis
  = gangrene and perforation of strangulated bowel
Adhesions – The impact

Impact on surgeons

• Increased workload
  – High number of reoperations
  – Increased hospital stays

• Prolongs and complicates surgery
  – Extend reoperation time by median 18 minutes
  – 19% risk of inadvertent enterotomy
  – 10–25% risk of bowel injury during laparoscopic adhesiolysis
  – Injury to blood vessels and the bladder
  – Risk of post-operative complications
  – Increasing medico-legal risk!
Epidemiology of adhesions

- A well-recognized consequence of surgery

- Prior to 1999 the epidemiology and burden was not well determined
The SCAR Study

Surgical and Clinical Adhesions Research confirmed the extent and burden of the problem
SCAR study: objectives

- To investigate the extent and burden of adhesions
- To provide epidemiological data on the burden of post-operative adhesions

Why might Laparoscopic Surgery be Adhesiogenic?

- CO₂
- Pressure
- Toxic gases
- Jet cooling and desiccation
- Surgical technique
  - Insufficient Training
  - Not following Micro surgical principles!

Adhesions - Preventive Strategies

- Careful surgical technique
- Minimise Inflammatory response
  - Steroids
  - NSAID
  - Antibiotics
- Augmentation of fibrinolysis
  - Tissue plasminogen activator
- Adhesion reduction agents
Paradox of surgery...

...the method proposed to treat adhesions is the one that induces adhesions

Need for clinical & cost-effective agents to reduce adhesion development
The SCAR study patients

- Used Scottish Medical Record Database
  - Unique and validated patient record linkage database
  - 5.1 million patients
- Assessed adhesion-related readmissions in patients undergoing open abdominal or pelvic surgery in 1986
- All readmissions followed up over 10 years
- Annual prevalence of adhesion-related admissions
Timing of Readmissions

The problem does not go away….

(Parker, 2001)
(Lower, 2000)
Total burden adhesion-related readmissions for gynaecological surgery

Cumulative total number of adhesion-related readmissions

Years after initial surgery

Laparoscopic

Open

Possibly related, operative
Possibly related, non-operative
Directly related, operative
Directly related, non-operative
Directly or possibly adhesion-related readmission rates

Cumulative readmissions as a percentage of initial cohort

Years after initial surgery

Laparoscopic

Open

0 5 10 15 20 25

1 2 3 4 1 2 3 4
Risk of directly or possibly adhesion-related readmission for gynaecological surgery conducted in 1996, 1997 and 1998

High-risk laparoscopy and open surgery

Follow-up (months)

First adhesion-related readmission (cumulative hazard)

High-risk laparoscopy

Open surgery

1996–97
1997–98
1998–99
## Adhesions risk

<table>
<thead>
<tr>
<th>Type of surgery (% of procedures in Scotland)</th>
<th>Definite Readmission Risk Adhesiolysis or adhesion-related procedure within 1 year of surgery</th>
<th>Possible Readmission Risk Possibly due to adhesions within 1 year of surgery</th>
</tr>
</thead>
<tbody>
<tr>
<td>Laparoscopy</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Low Risk (59 %)</td>
<td>1 in 500</td>
<td>1 in 40</td>
</tr>
<tr>
<td>Fallopian tube sterilisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Medium / High Risk (37 % / 4 %)</td>
<td>1 in 70 / 1 in 80</td>
<td>1 in 10 / 1 in 7</td>
</tr>
<tr>
<td>Therapeutic/ diagnostic procedures &amp; adhesiolysis</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ovary (4 %)</td>
<td>1 in 50</td>
<td>1 in 6</td>
</tr>
<tr>
<td>Fallopian Tubes (5 %)</td>
<td>1 in 120</td>
<td>1 in 7</td>
</tr>
<tr>
<td>Uterus (91 %)</td>
<td>1 in 170</td>
<td>1 in 20</td>
</tr>
</tbody>
</table>
WHAT ABOUT ADHESION FORMATION IN EXPERIMENTAL LAPAROSCOPIC OR OPEN SURGERY?

- DOG MODEL: LESS ADHESIONS (SCHIPPERS, 1998)
- RABBIT MODEL: LESS ADHESIONS (LUCIANO, 1989)
- PIG MODEL: LESS ADHESIONS (FOWLER, 1994)
WHAT ABOUT ADHESION FORMATION IN NON-GYNECOLOGIC LAPAROSCOPIC AND OPEN PELVIC SURGERY?

FOLLOW-UP (10 YEARS) AFTER BOWEL CANCER SURGERY IN THE PELVIS: SIGNIFICANTLY LESS ADHESION-RELATED BOWEL OBSTRUCTION REQUIRING RE-INTERVENTION (Ng, 2009)
DO WE HAVE ADHESIONS AFTER OPEN MYOMECTOMY?

- 100 % (TULANDI, 1993)
- 100 % (STARKS, 1988)
- 100 % (BERKELEY, 1993)
DO WE HAVE ADHESIONS AFTER LAPAROSCOPIC MYOMECTOMY?

- 2% (DI GREGORIO, 2002)
- 27% (DUBUISSON, 1998)
  29% (TAKEUSHI, 2002)
  33% (MALZONI, 2003)
- 94% (TULANDI, 1993)
DO WE HAVE ADHESIONS AFTER OPEN MICROSURGICAL MYOMECTOMY?
IS THERE A DIFFERENCE IN „TAKE-BABY-HOME“-RATE?

IS PREGNANCY RATE A MARKER FOR ADHESIONS IN INFERTILITY PATIENTS?

• NO DIFFERENCE: 40 – 50 %
  (PALOMBA, 2007; SERACCHIOLI, 2000; JIN, 2009)

• BETTER IN LAPAROSCOPY (HASSON, 1992; TAKEUCHI, 2002)

RISK OF UTERINE RUPTURE IN PREGNANCY 1 %
WHY DO WE PREFER LAPAROTOMY?

• GOOD OLD TECHNIQUE; NO SPECIAL KNOWLEDGE OR INSTRUMENTS NECESSARY

• BETTER PALPATION (FAUCONNIER, 2000)

• BETTER OVERVIEW (JIN, 2009)

• HIGH NUMBER OR BIG SIZE OF MYOMATA (PARKER, 2006)
WHY DO WE PERFORM LAPAROSCOPIC MYOMECTOMY?

• BETTER CLOSE-UP VIEW (NEZHAT, 1991)

• FASTER SOCIOECONOMIC REINTEGRATION (MAIS, 1996)

• LESS COMPLICATIONS (DUBUISSON, 1996)

• REDUCED SCARRING (CHAPRON, 1996)

• LESS BLOOD LOSS (JIN, 2009)
WHAT MAKES THE RISK OF ADHESIONS HIGHER IN LAPAROSCOPIC MYOMECTOMY?

- A POSTERIOR WALL MYOMA (TULANDI, 1993; DIAMOND, 1996; DUBUISSON, 1998)
- A LARGER UTERINE INCISION (NEZHAT, 1991)
- MULTIPLE INCISIONS (UGUR, 1996)
- SUTURING MATERIAL (SARAVELOS, 1996)
- ASSOCIATED SURGICAL PROCEDURES (DUBUISSON, 1998)
- PREEXISTING ADHESIONS (HASSON, 1992)
DISCUSSION AND PERSONAL OPINION
WHAT CAN WE DO (BETTER)?

(1) „GOOD SURGICAL TECHNIQUE“

(2) „OPTIMIZING THE MICRO-CLIMATE“

(3) „ADHESION PROPHYLACTIC AGENTS“

(4) „RIGHT EVALUATION“
WHAT CAN WE DO (BETTER)? (1)

GOOD SURGICAL TECHNIQUE IS THE KEY AND DEFINES THE GOLD STANDARD.
Adhesions - Pathophysiology

- Peritoneal Injury
  - Blood
    - Increased vascular permeability
      - Fibrin Deposition
        - Fibrinolysis
          - Normal peritoneal repair
        - Impaired Fibrinolysis
          - Fibrin organisation
            - Adhesion Formation

Serosal injury + blood = adhesion
No Serosal injury + blood = adhesion
Serosal injury + heparinised blood = reduced adhesion

Need for meticulous haemostasis
WHAT CAN WE DO (BETTER)? (2)

EVENTUALLY OPTIMIZING THE MICRO-CLIMATE

... PRESSURE (ARIKAN, 2005)
... TEMPERATURE (HASEBROEK, 2002)
... MOISTURING (BINDA, 2006)
... OXYGENATION (KONINCKX, 2009)

TO MINIMIZE NEGATIVE IMPACTS OF THE MINIMAL ACCESS TECHNIQUE.
WHAT CAN WE DO (BETTER)? (3)

No matter how good your technique and operative skills are, adhesions will occur in some extent.

We need additional support of adhesion prophylactic agents after demonstration of safety and efficacy in randomized, when possible double-blind, studies (until now, mostly better case reports or small, single-arm studies are published).
WHAT CAN WE DO (BETTER)? (4)

CAN
THIS SURGEON
OPERATE
THIS PATIENT
WITH
THIS UTERUS
USING
THIS TECHNIQUE
?
ESGE Consensus on the Management of Adhesions

Rudy Leon De Wilde on behalf of the Expert Adhesions Working Party of the ESGE
Postoperative abdominal adhesions and their prevention in gynaecological surgery. Expert consensus position

Rudy Leon DeWilde · Geoffrey Trew ·
on behalf of the Expert Adhesions Working Party
of the European Society of Gynaecological Endoscopy (ESGE)

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Abstract Adhesions are the most frequent complication of abdominopelvic surgery, yet many surgeons are still not aware of the extent of the problem and its serious consequences. While adhesions may cause few or no detrimental effects to patients, in a considerable proportion of cases there are major short- and long-term consequences, including small-bowel obstruction, infertility and chronic pelvic pain. Adhesions complicate future surgery with important associated morbidity and expense—and a considerable risk of mortality. Despite advances in surgical techniques in recent years, the burden of adhesion-related complications has not changed. Adhesions should now be considered the most common complication of abdominopelvic surgery. Adhesiolysis remains the main treatment, despite the fact that adhesions reform in most patients. Developments in adhesion-reduction strategies and new agents now offer a realistic possibility of reducing the risk of adhesions forming and can improve the outcomes for patients and the associated onward burden. This consensus position represents the collective views of 35 gynaecologists with a recognised interest in adhesions. The position is presented in two parts. The first part reviews the published literature on the extent of the problem of adhesions, and the

Part 2—steps to reduce adhesions

Rudy Leon DeWilde · Geoffrey Trew ·
On behalf of the Expert Adhesions Working Party
of the European Society of Gynaecological Endoscopy (ESGE)

Received: 12 July 2007 / Accepted: 12 July 2007
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Abstract This consensus position represents the collective views of 35 gynaecologists with a recognised interest in adhesions. The first part of the position was presented in the previous issue of Gynecological Surgery and reviewed the published literature on the extent of the problem of adhesions. In this part, the opportunities to reduce their incidence are considered. Collective proposals on the actions that European gynaecologists should take to avoid causing adhesions are provided. Importantly, in this part, the need to now inform patients of the risks associated with adhesion-related complications during the consent process is discussed. With evidence increasing to support the efficacy of adhesion-reduction agents to complement good

Introduction

Adhesions are the most frequent complication of abdominal surgery and may represent one of the greatest unresolved medical problems in medicine today [1], yet, many surgeons are still not aware of the extent of the problem and its serious consequences.

Recent epidemiological data have demonstrated that, despite advances in surgical techniques in recent years, the burden of adhesion-related complications has not changed [2, 3]. While laparoscopic procedures are commonly believed to be less adhesiogenic and cause fewer de novo adhesions to form compared to open surgery [4, 5], for
ESGE Adhesions Management Consensus
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<tr>
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<td>Italy</td>
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</table>
Why did the ESGE decide to develop a consensus position?
Adhesions Background

• The most frequent postoperative complication
  – open and laparoscopic surgery
Burden & Risk

• Incidence and impact now well documented
  – SCAR and other studies

• Risk to patients is considerable
  – Some conditions and surgery more at risk
  – Primary *de novo* formation and reformation
Surgical Awareness and Acceptance

- Generally Poor
  - Importance and extent of the problem
  - Impact on healthcare outcomes and resources
  - Surgeons’ responsibilities
  - Responsibility to inform patients of risk
  - Medicolegal implications
Action on Adhesions

- Reducing adhesions should
  - reduce
    - morbidity and mortality of patients
    - costs for Society
  - improve
    - surgical outcomes
    - patients’ lives
Project Aims

• Agree a collective European expert Consensus
  – Adhesions Management in Gynaecological Surgery

• Practical recommendations

• For local adoption and implementation
  – National
  – Regional
  – Hospital
  – Surgeon’s own practice
Developing Consensus

• The evidence is clear
  – Adhesions are a major surgical complication
  – Advances in surgical techniques have little impact
  – Patients need to be advised of the risks
  – Adhesion reduction strategies exist
  – As surgeons we need to adopt them
Adhesions – A major surgical complication

Patients

• 93% after any abdominal / pelvic surgery
• 74% cause of small bowel obstruction
• 20-40% cause of 2ndry infertility in women
• 56% reoperative complication involvement

– Delayed SBO diagnosis death
Adhesions – A major surgical complication

Surgeons

• High number of reoperations

• Increased hospital stays

• Extend reoperation time (median 18 minutes)

• Enterotomy risk 19% open

  10–25% laparoscopy
Surgical Responsibility
Risk Information Provided During Consent

• ‘..*discuss any serious or frequently occurring risks*’

<table>
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<tr>
<th>RISK INFORMATION AT CONSENT</th>
<th>RISK</th>
<th>INFORMATION DISCUSSED</th>
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<tbody>
<tr>
<td>General anaesthesia complications</td>
<td>&lt;1:100</td>
<td>Yes</td>
</tr>
<tr>
<td>General laparoscopic surgery complications</td>
<td></td>
<td></td>
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<tr>
<td>Pain</td>
<td>1:1000 (sterilisations)</td>
<td>Yes</td>
</tr>
<tr>
<td>Bleeding</td>
<td>1:500 (other procedures)</td>
<td></td>
</tr>
<tr>
<td>Infection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Damage to the bowel/bladder/urethra</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adhesion-related readmissions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Direct (Adhesiolysis) after 5 years: Open</td>
<td>1:20-30</td>
<td></td>
</tr>
<tr>
<td>Direct (Adhesiolysis) after 5 years: Laparoscopy</td>
<td>1:33-50</td>
<td></td>
</tr>
</tbody>
</table>
Surgical Responsibility and Informed Consent

International Adhesions Society Patient Survey

- 10.4% adhesions mentioned as part of consent process
  - 14.4% adhesions discussed but not part of consent

- **Adhesiolysis** patients
  - 54% given some information before surgery
  - 46% given specific information about anti-adhesion agents

- Non-adhesiolysis only 10% patients advised about adhesions
  - Only 6% given information on anti-adhesion agents
Adhesion-reduction steps

- Meticulous surgical technique
  - Microsurgical principles
- Re-emphasise in
  - Laparoscopy
  - Endometriosis
- Heightened inflammatory response & angiogenesis

Any surgery at any site can cause adhesions
Adhesion-reduction steps

• Laparoscopy vs Laparotomy
• Carefully handle tissue
  – field enhancement (magnification) techniques
• Focus on planned surgery
  – question the risk benefit of surgical treatment on any secondary pathology before proceeding
• Perform diligent haemostasis
  – but ensure diligent use of cautery
• Reduce cautery time and frequency
  – aspirate aerosolised tissue following cautery
• Excise tissue - reduce fulguration
Adhesion-reduction steps

• Reduce duration of surgery
• Reduce pressure & duration of pneumoperitoneum in laparoscopy
• Reduce risk of infection
• Reduce drying of tissues  
  – limit heat and light
• Use frequent irrigation & aspiration in laparoscopy & laparotomy
• Limit use of sutures  
  – choose fine non-reactive sutures
• Avoid foreign bodies - eg materials with loose fibres
• Minimal use of dry towels or sponges in laparotomy
• Use starch- and latex-free gloves in laparotomy
Protection against Adhesions

Patient Selection

- High risk patients
  - Previous surgery
  - Endometriosis
  - PID
- Surgical pre-treatment
Managing adhesions

• Adhesiolysis causes adhesions
  – Traumatic disruption
  – 85% reformation plus de novo formation
  – Resulting adhesions more dense and severe

• Prevention is better than cure!
Choosing an Adhesion Reduction Agent

- Quality of research variable
- Adhesions as key endpoint
- Most compare an agent with no treatment
  - Some compare within same patient
- Few studies blinded
  - Subjective assessments
- Comparing agents almost impossible
- Few studies consider clinical outcomes
  - Research complicated – multifactorial, ethics and study powering issues
Choosing an Adhesion Reduction Agent

- Safety
- Efficacy
- Ease of use
- Value

Operation site:
- Throughout the abdominal cavity
- Site specific

Balance cost with clinical impact

General surgery
Gynaecology
Open & Laparoscopy

ESHRE 2002 Survey, EACP 2002 Survey
Anti-adhesion agents

• Pharmacological agents
  – Experimental only

• Physical separators
  – Site specific mechanical barriers
  – Gel barriers
  – Broad coverage fluid agents

• Future
  – Combination agents
  – Surgical environment
    • Pneumoperitoneum
<table>
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<tr>
<th>Agent</th>
<th>Approval</th>
<th>Safety</th>
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<td></td>
<td>Europe</td>
<td>US</td>
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<tr>
<td>Site Specific</td>
<td>✓</td>
<td>✓</td>
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<tr>
<td>Prelude</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td>Suture in place</td>
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<td>Interceed</td>
<td>✓</td>
<td>✓</td>
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<td>Incompatible with blood</td>
<td>Many</td>
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<td></td>
<td></td>
<td>Remove irrigants Handling</td>
<td>- One limited pregnancy outcome</td>
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<tr>
<td>Seprafilm</td>
<td>✓</td>
<td>✓</td>
<td>✓ but anastomosis</td>
<td>Remove irrigants Handling</td>
<td>Number of studies - SBO study - limited results</td>
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<td>Laparoscopy difficult</td>
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<td>Complex &amp; Capital Equipment</td>
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<tr>
<td>Hyalobarrier Gel</td>
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<td>✓</td>
<td>Handling</td>
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<td></td>
<td></td>
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<td>No irrigation before application</td>
<td>- One limited pregnancy outcome</td>
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<tr>
<td>SurgiWrap</td>
<td>✓</td>
<td>No</td>
<td>?</td>
<td>Peritoneal replacement film No clinical data re adhesions Suture in place</td>
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<td>Oxiplex AP Gel</td>
<td>✓</td>
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<td>Not approved yet</td>
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<td>- Double blind study - Active control</td>
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Medicolegal considerations

• Laws governing negligence changing

• Negligence cases becoming more common

• Obligation to routinely warn patients of the risks of adhesions prior to surgery

• Failure to take precautions to prevent adhesions may have medicolegal consequences
ESGE Consensus recommendations
Actions to reduce adhesions

1. Recognition that adhesions are the most frequent complication of abdominal surgery

2. Increase awareness and understanding of adhesions and the associated healthcare burden and costs by surgeons, other healthcare workers, budget holders and policy makers - and take active steps to reduce this

3. Inform patients of the risk of adhesions - given that adhesions are now the most frequent complication of abdominal surgery

4. Surgeons who do not advise of the risk of adhesions may put themselves at risk of claims for medical negligence
ESGE Consensus recommendations
Actions to reduce adhesions

5 Fulfil duty of care to protect patients by providing the best possible standards of care
   - includes taking steps to reduce adhesion formation

6 Adopt a routine adhesion-reduction strategy at least in surgery at high risk
   - including ovarian surgery, endometriosis surgery, tubal surgery, myomectomy, adhesiolysis

7 Good surgical technique is fundamental to any adhesion reduction strategy
Consider the use of adhesion-reduction agents as part of the adhesion-reduction strategy

- give special consideration to agents with data to support safety in routine surgery and efficacy in reducing adhesions

- practicality and ease of use of agents plus cost of any agent will influence acceptability in routine practice
ESGE Consensus recommendations

Actions to reduce adhesions

9 Progress further research to understand the impact that adhesion reduction agents have on clinical outcomes

10 Research towards more effective preventative agents Should be encouraged
   - including use of combinations of agents to prevent formation of *de novo* adhesions as well as adhesion reformation

11 Surgeons need to act now to reduce adhesions and fulfil their duty of care to patients
ESGE Consensus Summary

- Adhesions are a major problem
- Lack of awareness and acceptance of problems need to be rectified
- Cost of the problem is considerable
- Patients' need to be informed of risks
- Possible medico-legal considerations
ESGE Consensus Summary

• Employ anti-adhesion strategies
  - Good surgical technique is essential
  - Use anti-adhesion agents routinely

• Anti-adhesion agents must be
  - Safe
  - Effective
  - Easy to use
  - Affordable
  - Continue research toward full prevention of *de novo* and reformed adhesions