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31st Annual Controversies, Problems and Techniques in Surgery

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Synthetic mesh in contaminated fields: are you crazy!!??

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Disclosures

- **Research Grant**
  - **W. L. Gore**
  - **LifeCell**
  - **Bard/Davol**

Take Home Message

- What is the historical experience with synthetic mesh in a contaminated field?
- Have recent modifications in mesh material changed our options?
- How much does technique affect outcome?
- What is the current evidence supporting this practice?

What do I do?

- First: Define the groups we are talking about
- Second: Discuss Scientific data supporting synthetic meshes ability to clear bacteria
- Third: Present clinical data of synthetic mesh usage in contaminated fields

Table 3. USA National Research Council system of wound classification

Wound classification	Criteria	Examples
Clean	An incised wound through uninflamed tissue created at elective surgery and closed primarily; only a closed system of drainage employed Oropharyngeal, tracheobronchial, gastrointestinal, biliopancreatic, genito-urinary tracts are not entered No breach in aseptic technique	*Non-implant* Mastectomy Herniorrhaphy *Implant* Hip replacement Hernioplasty
Clean-contaminated	Wound (that is otherwise clean) created at emergency surgery Reoperation via clean incision within 7 days Elective controlled entry into visceral tracts with minimum spillage of contents Minor break in aseptic technique	Cholecystectomy Elective lung resection
Contaminated	Wounds left open; fresh accidental wounds; penetrating trauma <4 hours old Operations with gross spillage of gastrointestinal contents; major breaks in sterile technique	Stab wound Non-perforated appendicitis
Dirty	Presence of pus Preoperative perforation of oropharyngeal, tracheobronchial, gastrointestinal, biliopancreatic, genito-urinary tracts Penetrating trauma >4 hours' old	Laparotomy wound for sigmoid diverticular perforation

T = Hernia Width
N = Comorbidities (Grade 2)
M = Contamination (Grade 3)

	<10cm	10-20cm	≥20cm
GRADE 1	T1, N0, M0	T2, N0, M0	T3, N0, M0
GRADE 2	T1, N1, M0	T2, N1, M0	T3, N1, M0
GRADE 3	T1, N0/1, M1	T2, N0/1, M1	T3, N0/1, M1

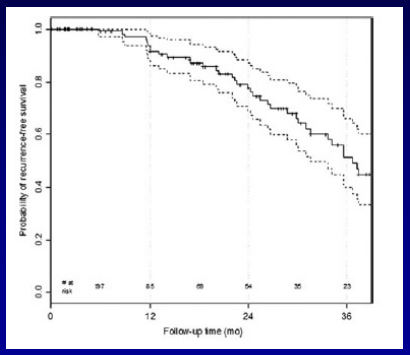
	SSO RATE	RECURRENCE RATE
STAGE I	6.7%	6.7%
STAGE II	12.6%	10.3%
STAGE III	26.1%	15.3%
STAGE IV	42.3%	34.6%

ORIGINAL ARTICLE

A 5-Year Clinical Experience With Single-Staged Repairs of Infected and Contaminated Abdominal Wall Defects Utilizing Biologic Mesh

Michael J. Rosen, MD, David M. Krpata, MD, Bridget Ermlich, RN, and Jeffrey A. Blatnik, MD

- N=128 patients
- Clean contaminated/contaminated
- Defect size 431 cm^2
- Mean follow up 22 months
- Recurrence rate 31%



Rosen et al 2013 Annals of Surgery

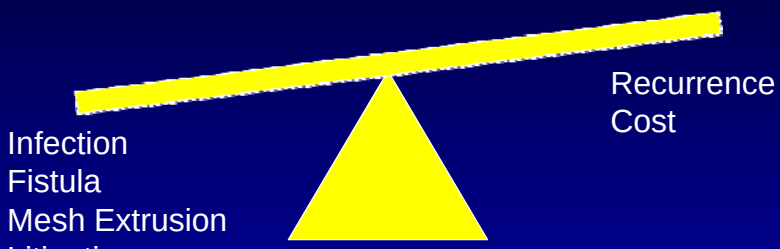
Can I use synthetic mesh in a contaminated field?

- **Key Questions**
  - **How much contamination?**
  - **Why am I in a contaminated situation?**
  - **Do I have to fix the hernia in a single setting?**
  - **What type of mesh am I going to use?**
  - **What layer in the abdominal wall am I going to place the mesh?**

Contaminated Field Options

- **Skin closure**
- **Primary suture repair**
  - **With / without myofascial release**
- **Mesh repair**
  - **Synthetic permanent mesh**
  - **Biologic mesh**
  - **Synthetic absorbable mesh**

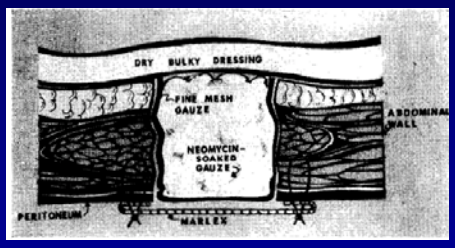
What are the risks?



Use of Marlex Mesh in Infected Abdominal War Wound

Maj. Henry J. Schmitt, Jr., mc, usaf, and Capt. George L. B. Grinnan, mc, usaf,
Clark Air Base, Republic of the Philippines

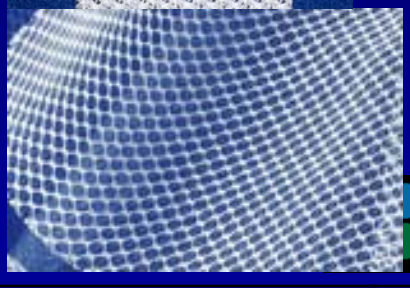
- Schmitt et al
- Clark Air Base, Philippines
- Vietnam War
- 1967
- N=3
- Polytrauma
- Abdominal wall full thickness soft tissue loss, Marlex mesh



Experience through 1980s

- Severely contaminated wounds
- Open wounds
- Heavyweight polypropylene mesh
- Bridging mesh with exposed viscera below
- Remove mesh or mobilized skin coverage

Can Newer Synthetic Mesh Resist Infection?



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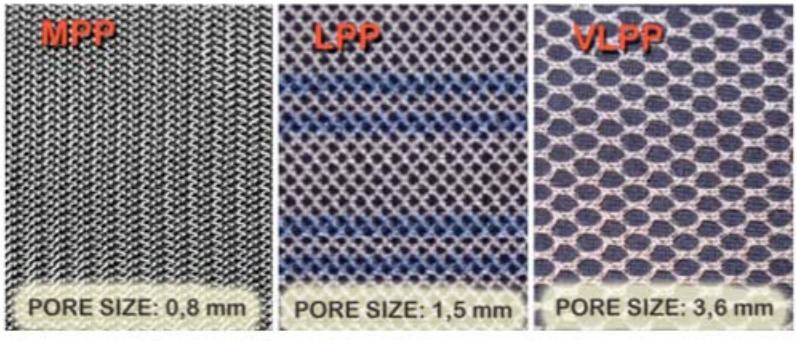
Hernia (2011) 15:173–179
DOI 10.1007/s10029-010-0762-0

ORIGINAL ARTICLE

Searching for the best polypropylene mesh to be used in bowel contamination

A. Díaz-Godoy · M. Á. García-Ureña · J. López-Monclús · V. Vega Ruíz · D. Melero Montes · N. Erquinigo Agurto



30% 33% 0%

Randomized trial

Randomized clinical trial of postoperative hernia prophylaxis in open bariatric surgery

J. M. Strzelczyk[1], D. Szymański[1], M. E. Nowicki[1], W. Wilczyński[1], T. Gaszynski[2] and L. Czupryniak[3]

- **Randomized controlled trial**
- **N=74**
- **Open Gastric Bypass**
- **No mesh n=38**
- **Mesh n=36**
  - **Polypropylene Mesh**
  - **8 cm wide**
  - **Retrorectus/ Transfascial fixation**
- **Mean Follow up 28 months**

Br J Surg 2006

Results

	Mesh	No Mesh
Length of Stay	8 days	10 days
Hernia Formation	0%	21%
Wound infection	14%	11%
Mesh removal	0	

Prophylactic mesh to prevent incisional hernia: A note of caution

Garth S. Herbert, M.D.*, Timothy J. Tausch, M.D., Preston L. Carter, M.D.

- Retrospective Study
- N=16
- Open Gastric Bypass
- Intraperitoneal mesh placement
  - C Qur n=12
  - Proceed n=2
  - Sepramesh n=2
- Transfascial fixation sutures

Am J Surg 2009

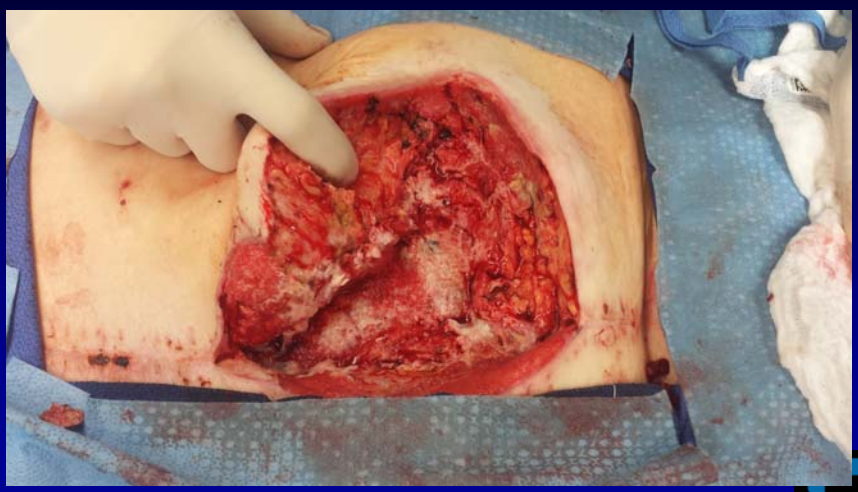
Explanted Mesh

• C Qur	4/12	33%
• Proceed	0/2	0%
• Sepramesh	½	50%

- Recurrence 6%
- High mesh infection rate if placed intraperitoneal position

What about mesh exposure?

POD 8 Open Parastomal Hernia Repair



2 Weeks

6 Weeks

Outcomes of Synthetic Mesh in Contaminated Ventral Hernia Repairs

Alfredo M Carbonell, DO, FACS, Cory N Criss, MD, William S Cobb, MD, FACS, Yuri W Novitsky, MD, Michael J Rosen, MD, FACS

- Overall Surgical Site Occurrence - 31%
- Class 2 - 26.2%
- Class 3 - 34%

- Overall Surgical Site Infection - 14%
- Class 2 - 7.1%
- Class 3 - 19%

Recurrence - 7%

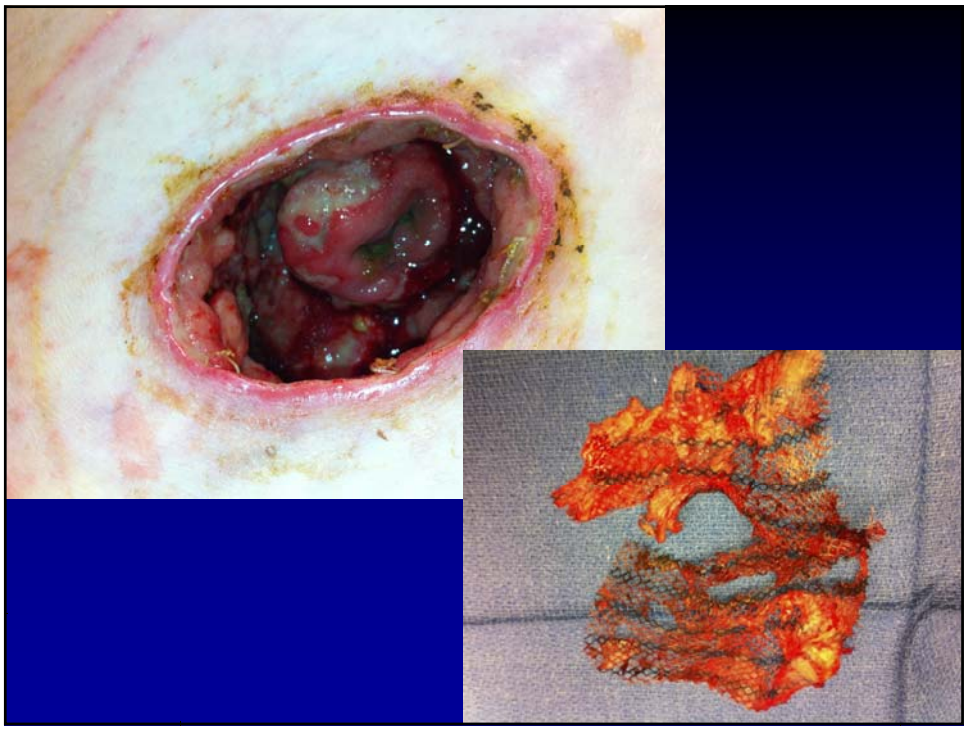
JACS 2014

Contaminated Scenarios

- **Colon and small bowel resection**
- **Ostomy reversal**
- **Parastomal hernia**
- **Fistula**
- **Hysterectomy and prostatectomy**
- **Chronic, suppurative wound**
- **Liver and gallbladder resection**
- **Infected mesh**
- **Gastrostomy closure**

Mesh Removal

- Mesh removal 4.0 %
- (2) Anastomotic leak
- (1) Mucocutaneous disruption of colostomy
- (1) Colocutaneous fistula after parastomal hernia repair

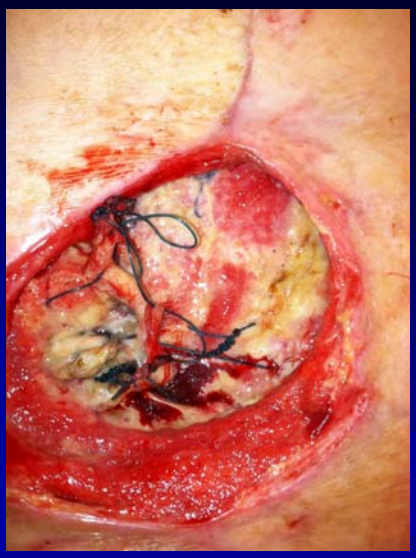


Patient

- 55 yo
- BMI 48
- s/p OVHR with CST underlay biologic
- POD#2 Massive PE/ECMO
- Wound hematoma
- Infected
- Chronic Ulcerations/ Bleeding on anti-coagulation

- Retro-rectus repair
- Medium weight Polypropylene mesh
- Fascia reapproximated

POD # 21



6 weeks NS wet to dry

4 months

1 Year Follow up

Summary

- TECHNIQUE IS CRITICAL TO SUCCESS
  - Onlay- high chance of subcutaneous infection, but might not matter long term?
  - Intraperitoneal-fistula/infection rates high
  - Retrorectus-good ingrowth, protected on both sides

Conclusion

- Synthetic mesh is safe in contaminated fields
- It will not always work, and things will not always be perfect
- There is no easy way to deal with these challenges
- Must accept risk/reward approach

Randomized Controlled Trial Comparing Strattice versus Davol Soft Mesh for clean contaminated and contaminated ventral hernia repairs

- Investigational Device Exemption FDA
  - G120130/S002
- Clinical Trials.Gov
  - NCT01746316