Prevention and Surgical management of Parastomal hernias; When to treat?

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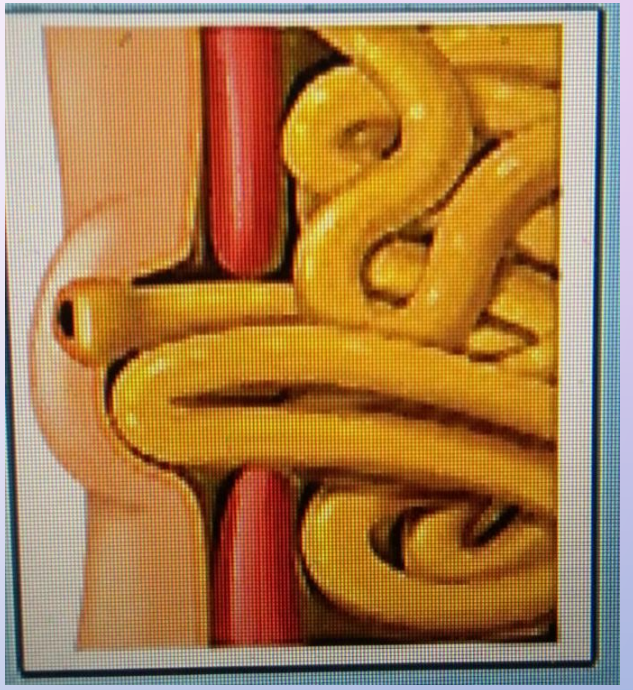
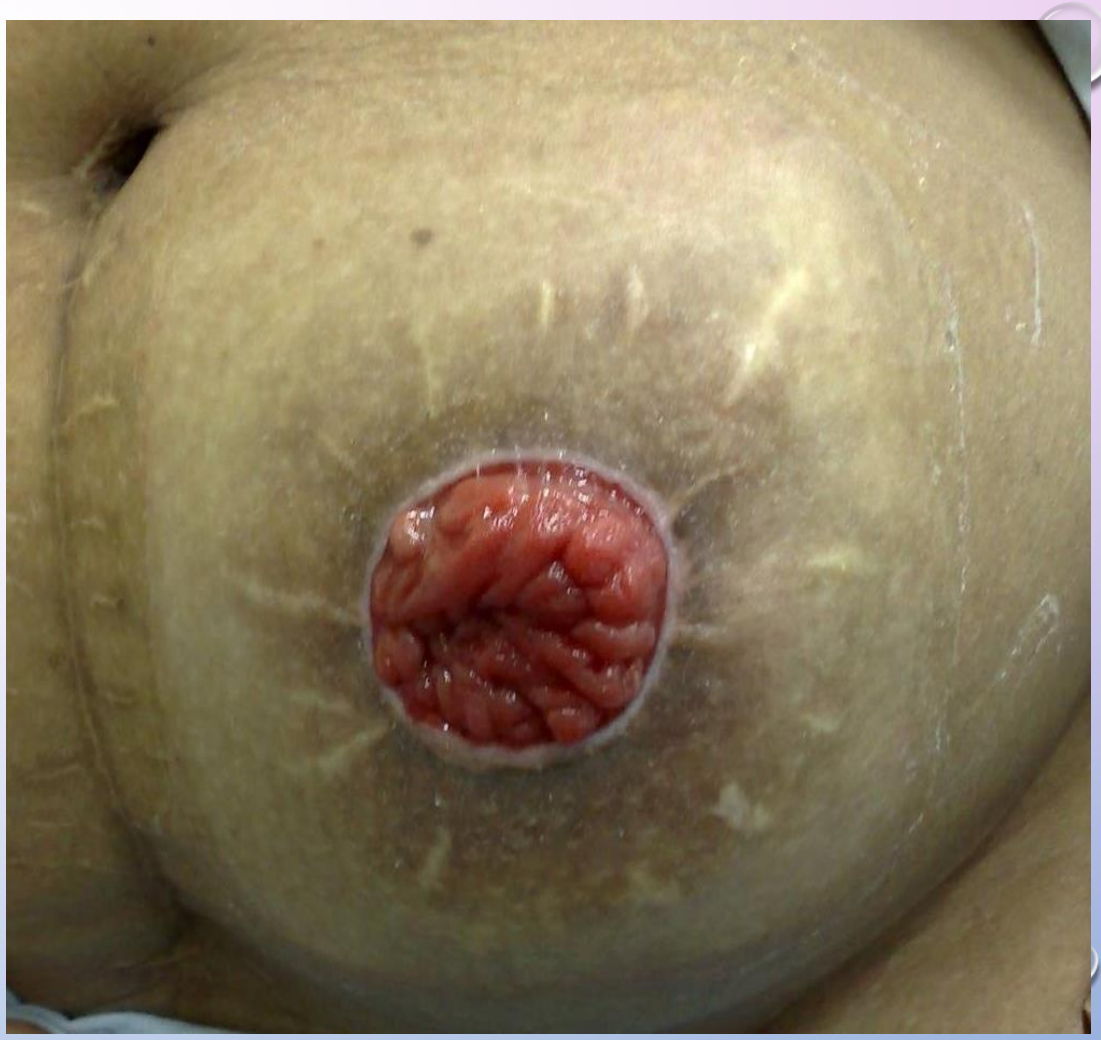
- It is an incisional hernia that develops at the site of colostomy or ileostomy.
- Hernial sac usually lies within the attenuated layers of the abdominal wall.
- The incidence varies from 1-50% of stoma cases, depending upon the type of ostomy





Incidence of parastomal hernia after end ileostomy				
Author	year	No. of patients	Parastomal hernia	Mean follow up (months)
Sjodahl	1988	45	1	7
Weaver	1988	111	9	--
Williams	1990	46	13	6.5
Leong	1994	150	16	9.2
Carisen	1995	224	4	2.6
Makela	1997	54	4	8

Incidence of parastomal hernia after end colostomy				
Author	year	No. of patients	Parastomal hernia	Mean follow up (months)
Von Smitten	1986	54	26	48
Sjodahl	1988	81	7	84
Allen	1988	123	55	----
Porter	1989	130	14	35
londono	1994	203	43	66
cheung	1995	156	56	38
Makela	1997	80	9	96
koltun	2000	25	1	84
moreno	2008	75	33	---

- It often results from one or more technical errors which underscore the importance of proper preoperative planning and close attention to detail in the operating room.

1- Size of abdominal wall aperture
2- Location
3- Intraperitoneal or extraperitoneal technique
4- Preoperative consultation by stoma therapist
5- Stoma fixation to the fascia
6- Elective or emergent stoma creation

General patient factors:

1- Obesity,

2- Malnutrition,

3- Increased intra-abdominal pressure (COPD, straining, ascites, trauma)

4- Steroid use

5- Malignancy

6- Postoperative sepsis,

7- Advanced age

- **Clinical presentation:**

1- Unsightly bulge

2- Occasional leakage from around the stoma

3- The hernia may grow to become cosmetically unacceptable.

4- Pain (common) (stretching of abdominal wall)

5- Peristomal skin irritation (leakage of stoma effluent)

6- Obstruction or strangulation (rare) (the necks are generally broad).

Parastomal hernia; Management:

1- Preventive measures

2- Conservative measures (most of cases)

3- Surgical intervention (10 – 20 % of cases)

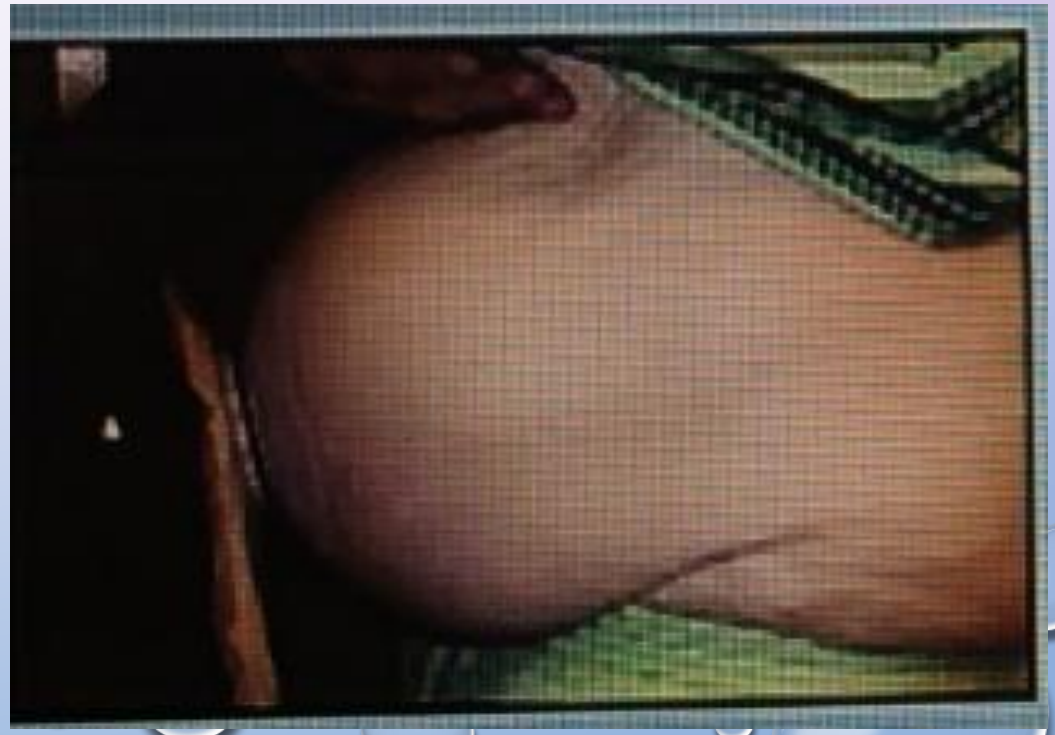
a- Local aponeurotic repair

b- Relocation

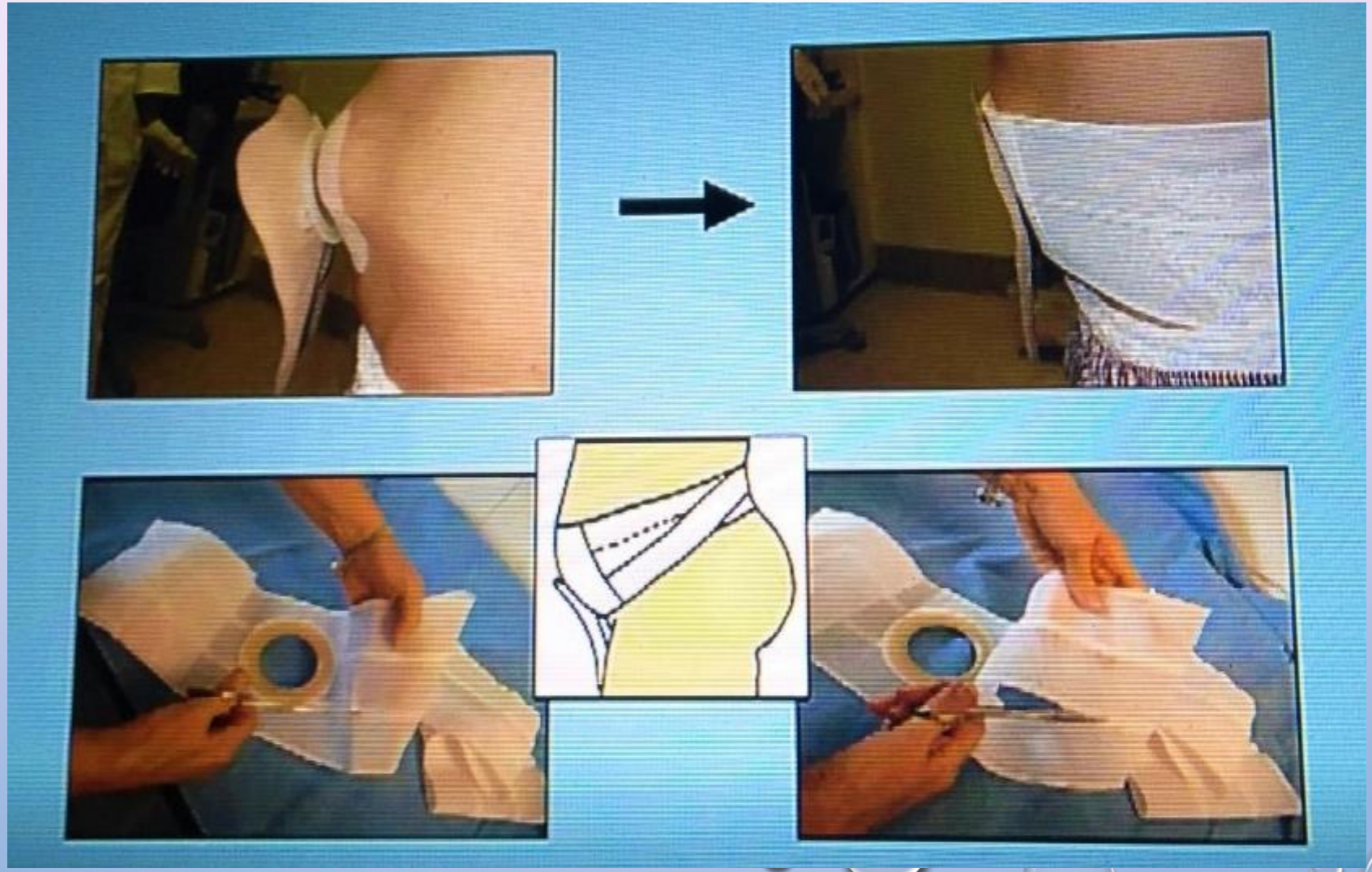
c- Mesh repair

- Open
- Laparoscopic

d- Closure



Parastomal hernia, Conservative management

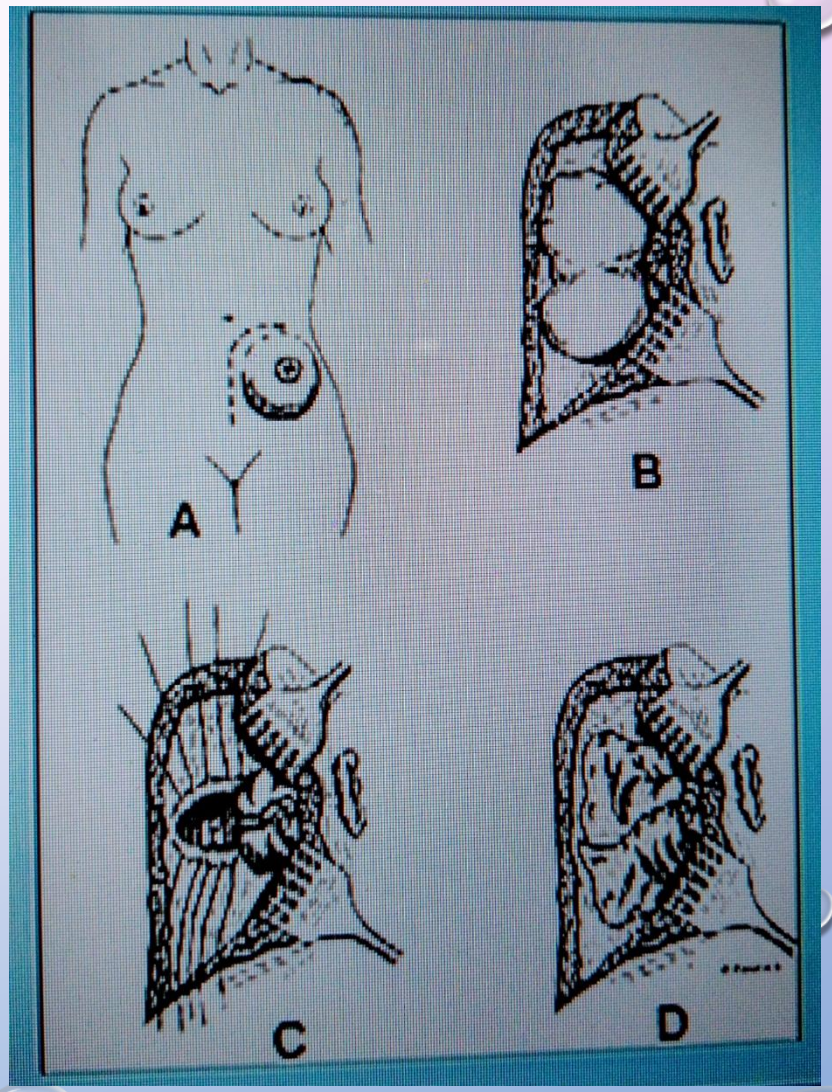


Indications for surgical treatment:

- 1- Abdominal Pain
- 2- Subacute intestinal obstruction
- 3- Irreducibility
- 4- Associated with prolapse
- 5- difficult to manage stoma
- 6- Patient discomfort
- 7- Incarceration
- 8- Stoma necrosis

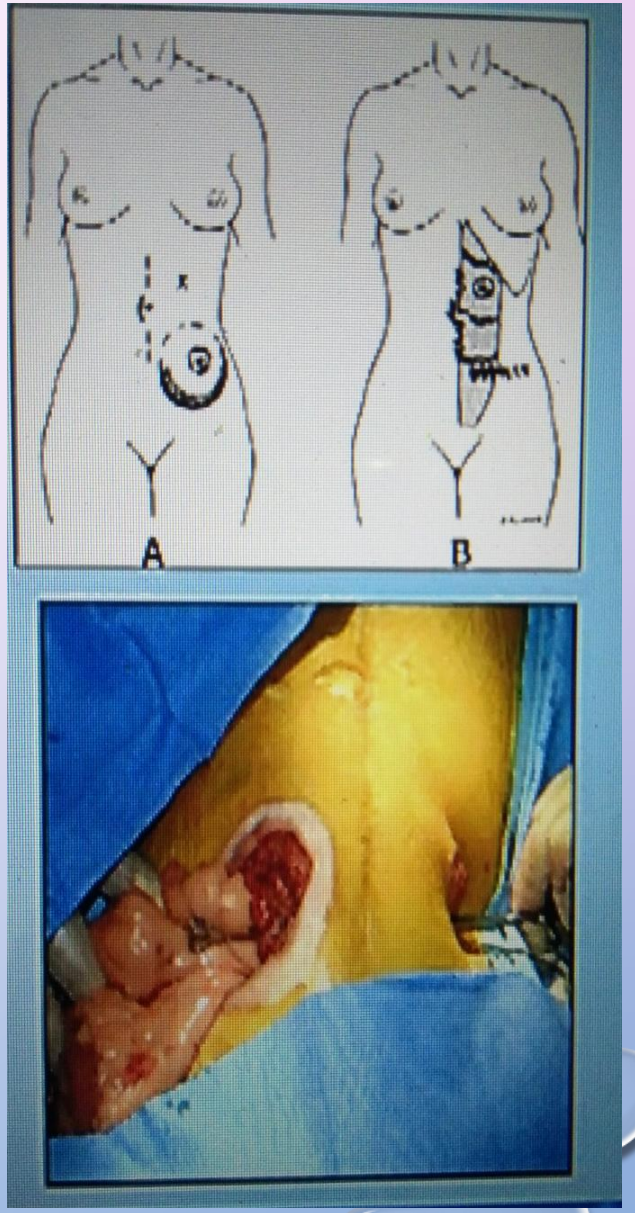
a- Local aponeurotic repair

- Technically simple
- Poor results
- Recurrence rates (46 – 100%)



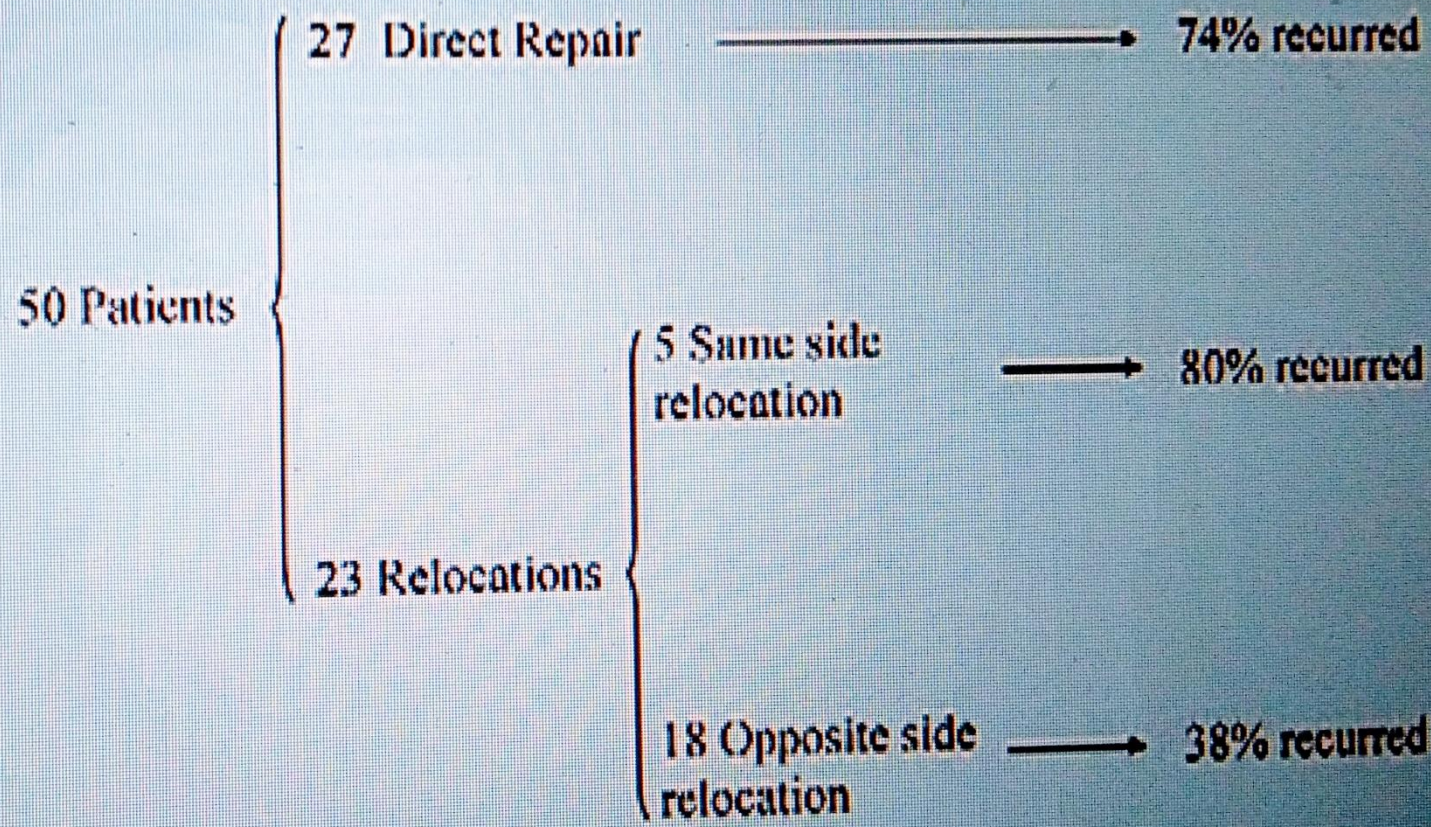
B- Stoma Relocation:

- Relocation to the other side of abdominal wall is associated with lower recurrence rates (57 vs. 86)
- It seems appropriate to prophylactically reinforce the new stoma
- Possible relocation sites may be limited due to prior surgery
- Can be done with or without formal laparotomy



Surgery of Recurrent Parastomal Hernia: Direct Repair or Relocation?

- Retrospective chart review : 1990-2005
- Aim: compare outcomes between direct repair vs. relocation
- Mean Follow up: 2 years
- No significant difference:
  - Demographics
  - Comorbidities
  - Steroid use



Outcome of parastomal hernia repair with & without midline laparotomy

- Retrospective review, 1992-2001
- 27 patients:
  - 11 patients without laparotomy (41%) 3 prior abdominal surgery
  - 16 patients with laparotomy (59%) 9 prior abdominal surgery

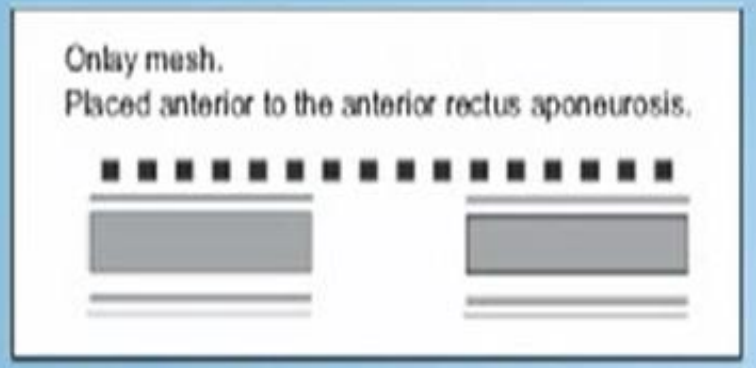
	Without Laparotomy (n=11)	With Laparotomy (n=16)
Adhesions	+	+++
Operative time (min)	97	124
Hospital stay (days)	5.5	9.5
Wound infection	3	3
Follow up (months)	37	57
Recurrence	1	3

C- Mesh repair:

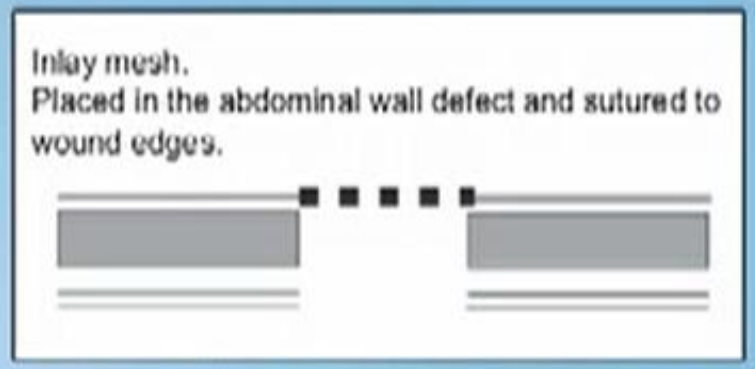
- Polypropylene
- Polytetrafluorethylene
- Polyvenylidene fluoride
- Biological graft
    - * Human
    - * Porcine
    - * Bovine

Mesh repair

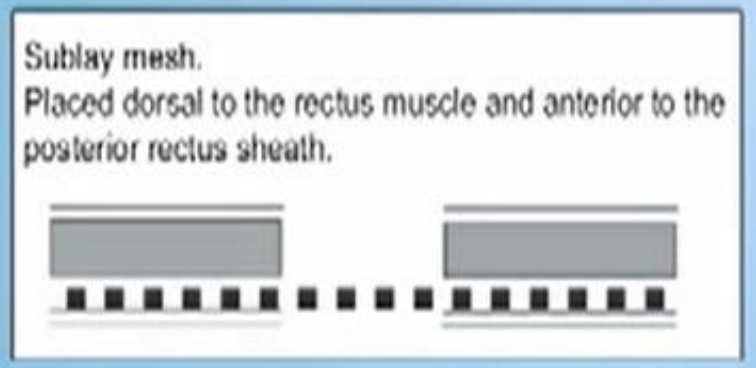
- 4 techniques



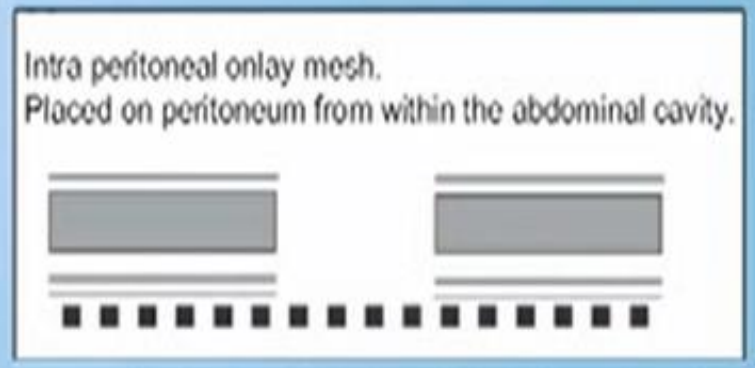
Mesh anchored to anterior rectus aponeurosis



Mesh cut to size of the abdominal wound defect and sutured to the wound edges



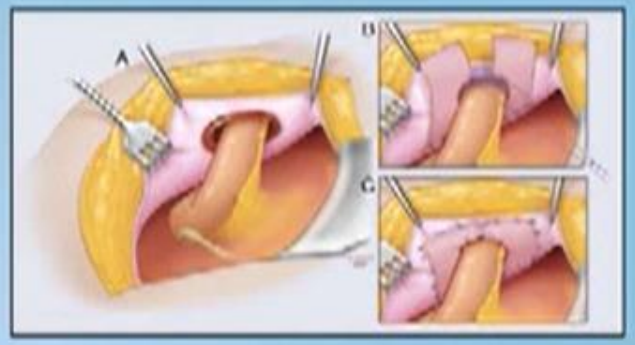
Prevents displacement of the mesh

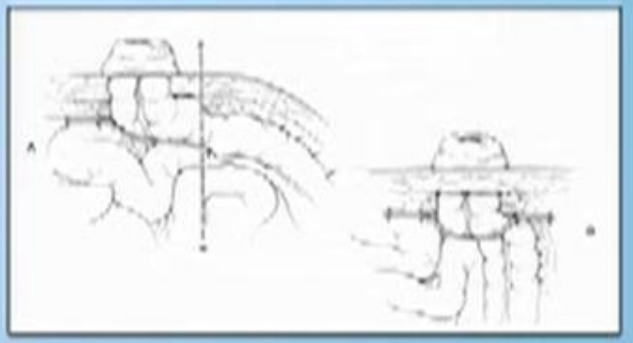


Can be performed open or laparoscopic

Laparoscopic Parastomal Hernia Repair

- Key Hole
- Sugarbaker
- Sandwich
- 2 Mesh Technique





Laparoscopic Keyhole Technique

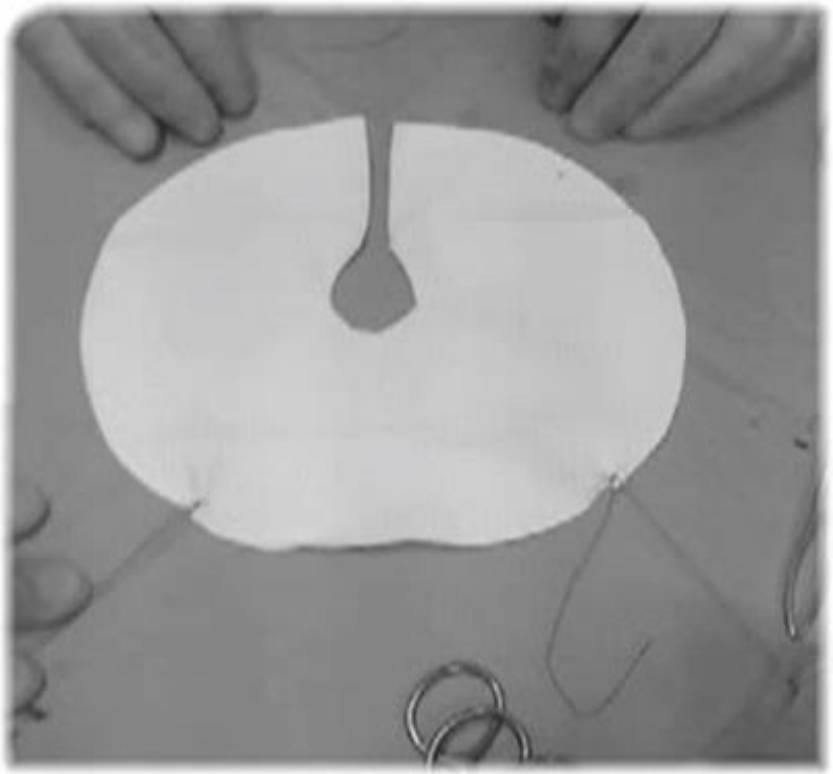


Figure 3. The mesh was fashioned with a 2-cm central keyhole and a radial incision of 5 mm.

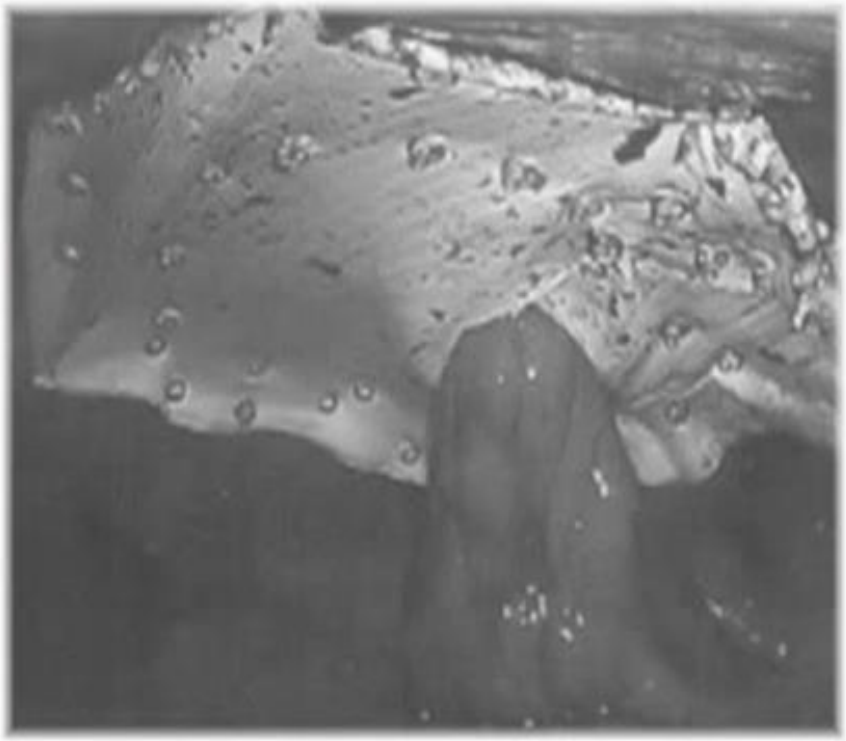


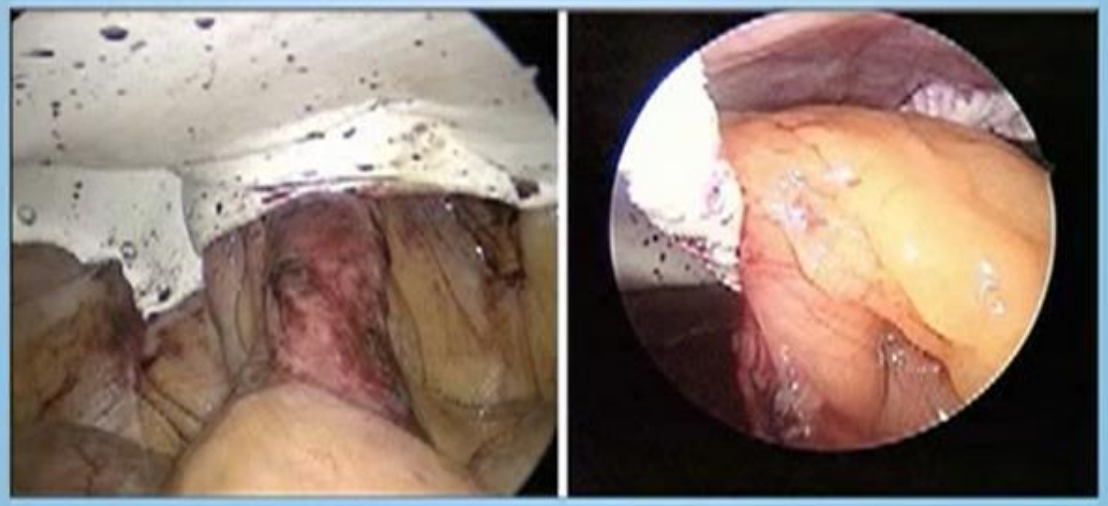
Figure 4. Laparoscopic view of position of mesh in completed parastomal hernia repair.

Laparoscopic Keyhole Technique

Laparoscopic view of final appearance of mesh and ostomy with keyhole technique

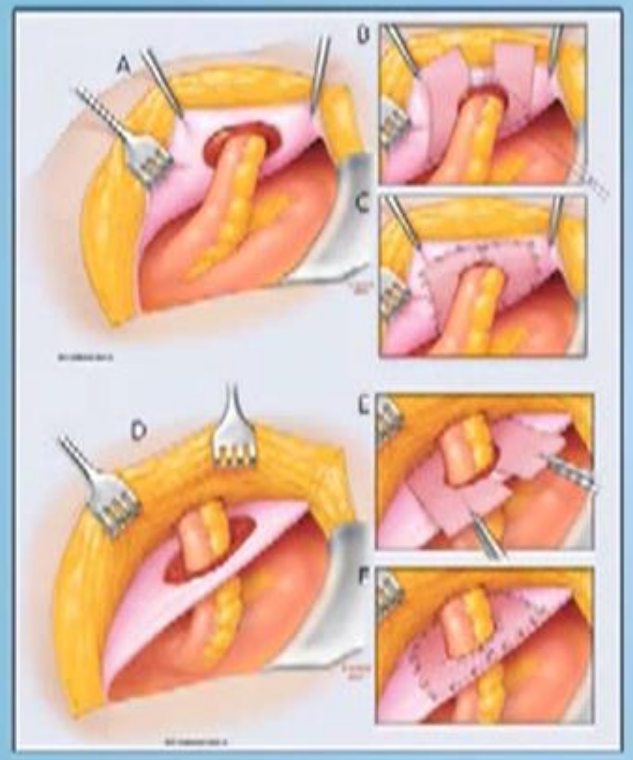
Sugarbaker Technique

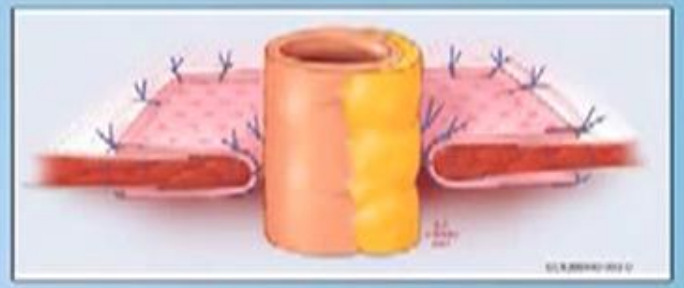
↓ Technically less demanding
↓ Operative time
↓ ?Recurrence rate

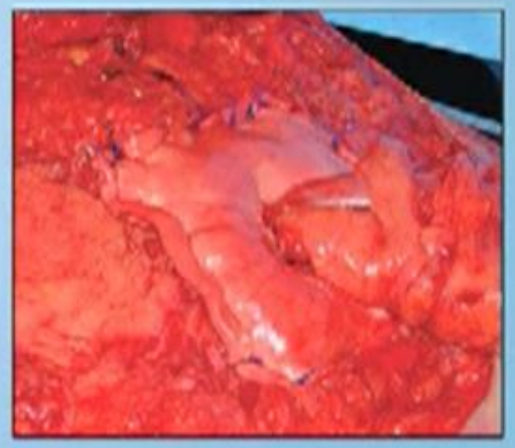


Biologic Mesh Repair

- Retrospective review of 13 patients with IBD: 7 Crohn's, 6 UC
- Sandwich Technique with Human Acellular Dermal Matrix (Alloderm®)

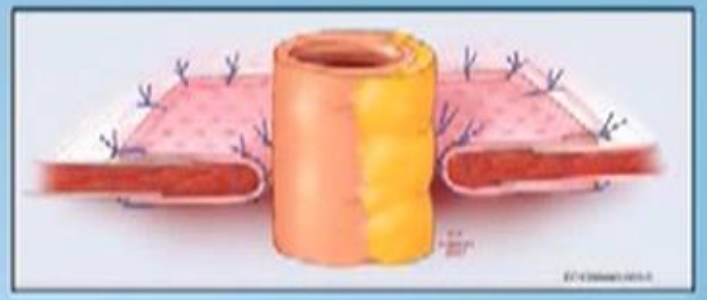






Biologic Mesh Repair

- Follow up clinic visits and CT scan
- Follow up for a mean of 290 days (range 137-509)



Complications	
Seroma	2 (15%)
Superficial wound infection	1 (8%)
Incisional separation	2 (15%)
Recurrence	2 (15%)
Reoperation	0

Parastomal Hernia Repair

Author, year	No.	Technique	Mesh	Ap.	Rec.	F/U (months)
Berger, 2007	66	Sugarbaker 41 2 Mesh Tech 25	ePTFE PVDF+PP	Lap	12% 0%	24 12
Craft, 2007	21	Keyhole	ePTFE	Lap	5%	14
Emmanouil, 2008	4	Keyhole	ePTFE	Lap	25%	9
Berger, 2008	47	2 Mesh	PVDF+PP	Lap	1%	20
Hansson, 2009	55	Keyhole	ePTFE	Lap	37%	36
Taner, 2009	13	Sandwich	Alloderm®	Open	15%	10
Ellis, 2010	20	Sugarbaker	Surgisis®	Open	9%	18

Parastomal Hernia Repair

- Meta-analysis of 30 studies in the literature
  - Primary outcome – recurrence after one year follow-up
  - Secondary outcomes – moratlity and post-op morbidity

Summary of Pooled Proportions of Outcome Measures Per Surgical Technique for Parastomal Hernia Repair

Technique	No. Studies	No. Repairs	Complications (95% CI)			Recurrence, %* (95% CI)
			Wound Infection	Mesh Infection	Other	
Suture repair	5	106	11.8% (6.1–20.2)	-	10.8% (5.3–18.9)	69.4% (59.7–78.3)
Onlay mesh	8	176	1.9% (0.4–5.5)	2.6% (0.7–6.4)	8.3% (4.5–13.7)	17.2% (11.9–23.4)
Sublay mesh	3	42	4.8% (0.6–16.2)	0% (0.0–8.4)	7.1% (1.5–19.5)	6.9% (1.1–17.2)
Open intraperitoneal mesh	5	65	-	-	-	-
Sugarbaker	1	20	5.0% (0.1–24.9)	0 (0.0–16.8)	10.0% (1.2–31.7)	15.0% (3.2–37.9)
Keyhole	4	45	2.2% (0.0–11.8)	2.2% (0.0–11.8)	17.8% (8.0–32.1)	7.2% (1.7–16.0)
All laparoscopic mesh	12	338	3.3% (1.6–5.7)	2.7% (1.2–5.0)	12.7% (10.2–17.5)	14.2% (10.7–18.0)
Sugarbaker	6	110	—	—	—	11.6% (6.4–18.0)
Keyhole	7	160	—	—	—	34.6% (13.1–60.3)
Sandwich	1	47	2.1%	0	2.1%	2.1%

*Weighted pooled proportion using only studies with 12 months mean follow-up.

- Parastomal hernia; Prevention

All patients in whom a stoma is planned should be evaluated by the surgeon as well as a specialist stoma nurse, the stoma site being marked away from bony prominences, skin folds, scars and belt lines, the patient having been examined standing, lying and sitting. A stoma should not be brought out through the laparotomy incision

Both intraperitoneal and extraperitoneal techniques of construction are commonly performed.

The intraperitoneal method would seem more popular, a survey of 245 American surgeons showing 83.8% using this technique

If an intraperitoneal stoma is constructed, there is debate as to whether the trephine should be made lateral to or through the rectus abdominis muscle, it having been stated that stomas emerging through the rectus muscle have a lower incidence of herniation

It is important that the trephine made in the abdominal wall is of the correct size and not too larges (about 2.5 – 3 cm).

Ruiter and Bijnen explained how the trephine is stretched open by tangential forces working on the circumference of the opening.

According to the law of Laplace, the radial force (Frad) on a normal abdominal wall is related to the pressure (P) in the abdominal cavity and the radius (R1) of the abdominal cavity according to the formula:

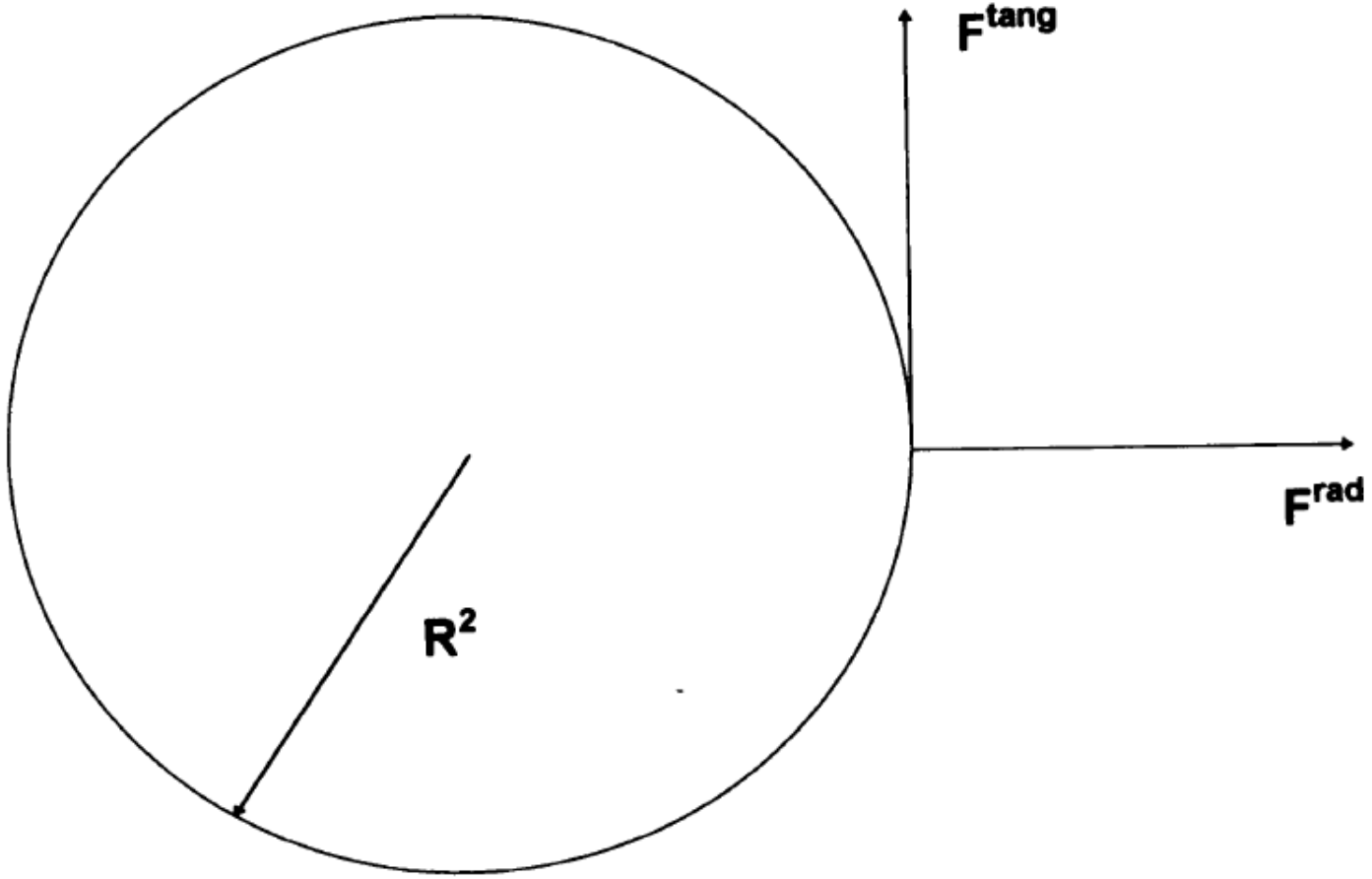


Figure 1. $F_{tang} = F_{rad} \times R_2$.

$$Frad = PxR1/2$$

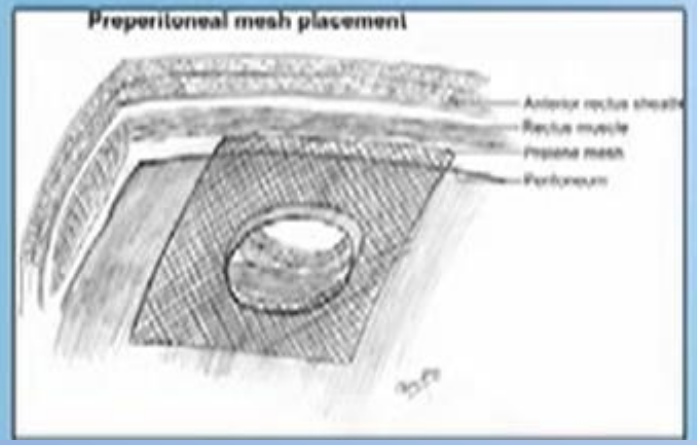
After construction of a trephine opening in the abdominal wall the tangential force (Ftang) on the edge of the opening is related to the radial force (Frad) and the radius of the trephine opening (R2) according to the formula:

$$Ftang = Frad \; X \; R2$$

Therefore, the trephine opening should be constructed as small as will safely transmit the intestine to the skin surface. So, skin opening should be just large enough to admit the tips of two fingers

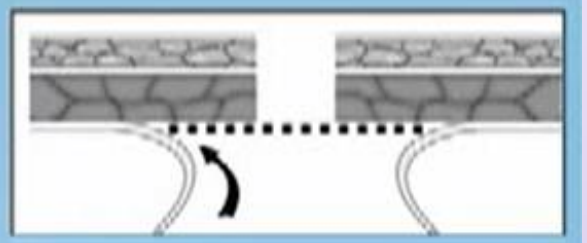
Parastomal hernia: Prevention

- 18 patients with permanent stoma (mean follow-up 16 months)
- Time to place mesh: 12 – 22 minutes
- One patient:
  - Stoma necrosis → Revision
- No hernia / prolapse / stenosis / retraction / fistula / obstruction



Randomized controlled prospective trial of the use of a Mesh to Prevent Parastomal Hernia

- Implanted a lightweight mesh using a sublay technique
- 27 patients in each group
- Median Follow up: Every 6 months for a mean of 29 (13-49) months



	With Mesh	Without Mesh	*P*
Mean age	67.5	67.2	ns
Sex (M:F)	19 : 5	16 : 8	ns
BMI	25.6	27.3	ns
Type of surgery APR LAR	 23 4	 22 5	ns
Mean Surgical Time	173	189	ns (p=0.1)

Randomized controlled prospective trial of the use of a Mesh to Prevent Parastomal Hernia

	Patients with Mesh (n=27)	Patients Without Mesh (n=27)	*P*
Postoperative mortality	0	0	ns
Postoperative morbidity (%)	45.3%	41.7%	ns (p=0.6)
Infection of laparotomy wound	3/27 (11.1%)	3/27 (11.1%)	ns
Peristomal infection	1/27 (3.7%)	1/27 (3.7%)	ns
Necrosis colostomy	1/27 (3.7%)	1/27 (3.7%)	ns
Mesh intolerance	0	-----	-----
Reintervention due to mesh rejection	0	-----	-----
Clinical Parastomal Hernia	**4/27 (14.8%)**	**11/27(40.7%)**	***p*=0.033**
CT Scan Parastomal Hernia	6/27 (22.2%)	12/27 (44.4%)	p=0.083

Parastomal hernia: Prevention

- Retrospective review of 93 patients who underwent stoma creation between April 2003 and November 2006
  - 75 patients had Ultrapro® mesh placed in a sublay fashion
  - 18 patients had no mesh placement
    - 9 due to technical difficulty, 9 due to surgeon's decision
  - Mesh was used in 19 of 29 (65%) dirty wounds and in 56 of 64 (87%) contaminated wounds
  - At least one year follow-up

Parastomal hernia: Prevention

Surgical Site Infection

	No prophylactic mesh	Prophylactic mesh
Surgical site infection, *n* (95% CI)	4 of 15 (27% 1 52)	6 of 73 (8% 2 15)
Minor infection, *n*	3	5
Major infection, *n*	1	1
Wound contaminated		
Surgical site infection, *n*	1 of 7	3 of 55
Wound dirty		
Surgical site infection, *n*	3 of 8	3 of 18

Complications

	No prophylactic mesh	Prophylactic mesh
Parastomal hernia, *n* (95% CI)	8 of 12 (67% 35 98)	8 of 61 (13% 4 22)
Colostomy	7 of 8	7 of 52
Ileostomy	1 of 4	1 of 9
Fistula, *n*	0	0
Stenosis, *n*	0	0
Mesh removed, *n*		0

Prevention of Parastomal Herniation with Biologic/ Composite Prosthetic Mesh: A Systematic Review and Meta-analysis of Randomized Controlled Trials

129 pts from 3 trials

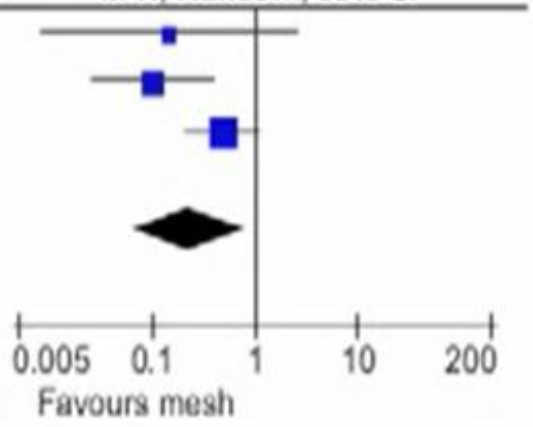
Author, year	n	Stoma	Mesh	Position
Hammond, 2008	20	Loop ileostomy	Permacol (porcine derived acellular collagen matrix)	Preperitoneal
Jänes, 2009	54	End colostomy	Vipro mesh (prolene and vicryl)	Sublay
Serra-Aracil, 2009	55	End colostomy	Ultrapro (prolene and monocryl)	Sublay

Prevention of Parastomal Herniation with Biologic/ Composite Prosthetic Mesh: A Systematic Review and Meta-analysis of Randomized Controlled Trials

	Mesh		Conventional			Risk Ratio	Risk Ratio
Study or Subgroup	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI
Hammond 2008	0	10	3	10	15.0%	0.14 [0.01, 2.45]	
Janes 2009	2	27	20	27	36.2%	0.10 [0.03, 0.39]	
Serra-Aracil 2009	6	28	12	27	48.8%	0.48 [0.21, 1.10]	
Total (95% CI)		**65**		**64**	**100.0%**	**0.23 [0.06, 0.81]**	
Total events	8		35				

Heterogeneity: $Tau^2 = 0.68$; $Chi^2 = 4.57$, df = 2 (P = 0.10); $I^2 = 56\%$

Test for overall effect: Z = 2.29 (P = 0.02)



Meta-analysis of the risk of parastomal herniation after mesh reinforcement of stomas versus conventional stoma formation

- No increased risk of postoperative morbidity

Parastomal hernia: Prevention

- Extraperitoneal stoma created by tunneling laterally between the posterior rectus sheath and peritoneum
- Meta-analysis of 1,071 patients comparing extra-peritoneal vs. intraperitoneal route for permanent colostomy

Review: Impact of Extraperitoneal colostomy on Parastomal Hernia
Comparison: 01 Extraperitoneal vs. Intraperitoneal
Outcome: 01 Parastomal hernia

Study or sub-category	Extraperitoneal n/N	Intraperitoneal n/N	OR (fixed) 95% CI	Weight %	OR (fixed) 95% CI
Harshaw 1974	0/17	9/92		7.47	0.22 [0.01, 3.98]
Marks 1975	1/37	22/150		15.88	0.21 [0.03, 1.62]
Whittaker 1976	8/89	28/162		41.00	0.47 [0.21, 1.09]
von Smitten 1986	5/32	21/42		12.39	0.71 [0.20, 2.61]
Hwang 1990	1/41	2/100		2.09	1.70 [0.15, 19.24]
Londono-Schimmer 1994	1/28	24/170		14.85	0.23 [0.03, 1.74]
Ding 2007	0/26	3/37		6.47	0.19 [0.01, 3.76]
Total (95% CI)	250	821		100.00	0.41 [0.23, 0.73]

Total events: 16 (Extraperitoneal), 109 (Intraperitoneal)
Test for heterogeneity: Chi² = 3.30, df = 6 (P = 0.77), I² = 0%
Test for overall effect: Z = 3.04 (P = 0.002)

0.01 0.1 1 10 100
Extraperitoneal Intraperitoneal

Parastomal Hernias: Avoidance and Management

- Incidence of parastomal hernias is quite high
- Conservative therapy can be appropriate in asymptomatic patients
- Surgical managament
  - Simple repair should not be performed
  - Stoma relocation to the contralateral side
  - Laparoscopic repair with synthetic mesh (Keyhole or Sugerbaker)
  - Open repair with biologic mesh
- Prevention with placement of mesh at the time of stoma creation

Thank You