Hernias, Mesh and Complications of Treatment

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- Hernia Types & Epidemiology
- Mesh Evolution
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Background

- Astley Cooper ; 1804 has defined hernia as “a protrusion of a tissue, viscus or part of a viscus outside the cavity which normally contains it . Also known as rupture ! The protruded parts are generally contained in a sac-like structure, formed by the membrane with which the cavity is naturally lined”

- Eubanks S. Hernias. In: Sabiston DC Jr, ed. *Textbook of Surgery: The Biological Basis of Modern Surgical Practice*. 1997.

Epidemiology:

- 25% of males

  2% of females

  Will have inguinal hernias in their lifetimes representing the most common hernia in males and females

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- Rutkow IM, Robbins AW. Demographic, classificatory, and socioeconomic aspects of hernia repair in the United States. *Surg Clin North Am*. Jun 1993;73(3):413-26. [Medline].
- Rutkow IM. Epidemiologic, economic, and sociologic aspects of hernia surgery in the United States in the 1990s. *Surg Clin North Am*. Dec 1998;78(6):941-51, v-vi. [Medline].

- *75% of all hernias occur in the groin; two thirds of these hernias are indirect and one third direct*

- Indirect inguinal hernias are the most common hernias in both men and women; a right-sided predominance exists.

- Incisional and ventral hernias account for 10% of all hernias

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Katz DA. Evaluation and management of inguinal and umbilical hernias. *Pediatr Ann*. Dec 2001;30(12):729-35. [Medline].

Matthews RD, Neumayer L. Inguinal hernia in the 21st century: an evidence-based review. *Curr Probl Surg*. Apr 2008;45(4):261-312. [Medline].

- Only 3% of hernias are femoral hernias.
- The incidence of inguinal hernias in children ranges up to 4.5%, while umbilical hernias occur in approximately 1 out of every 6 children.
- The incidence of incarcerated or strangulated hernias in pediatric patients is **10-20%;** 50% of these occur in infants younger than 6 months.

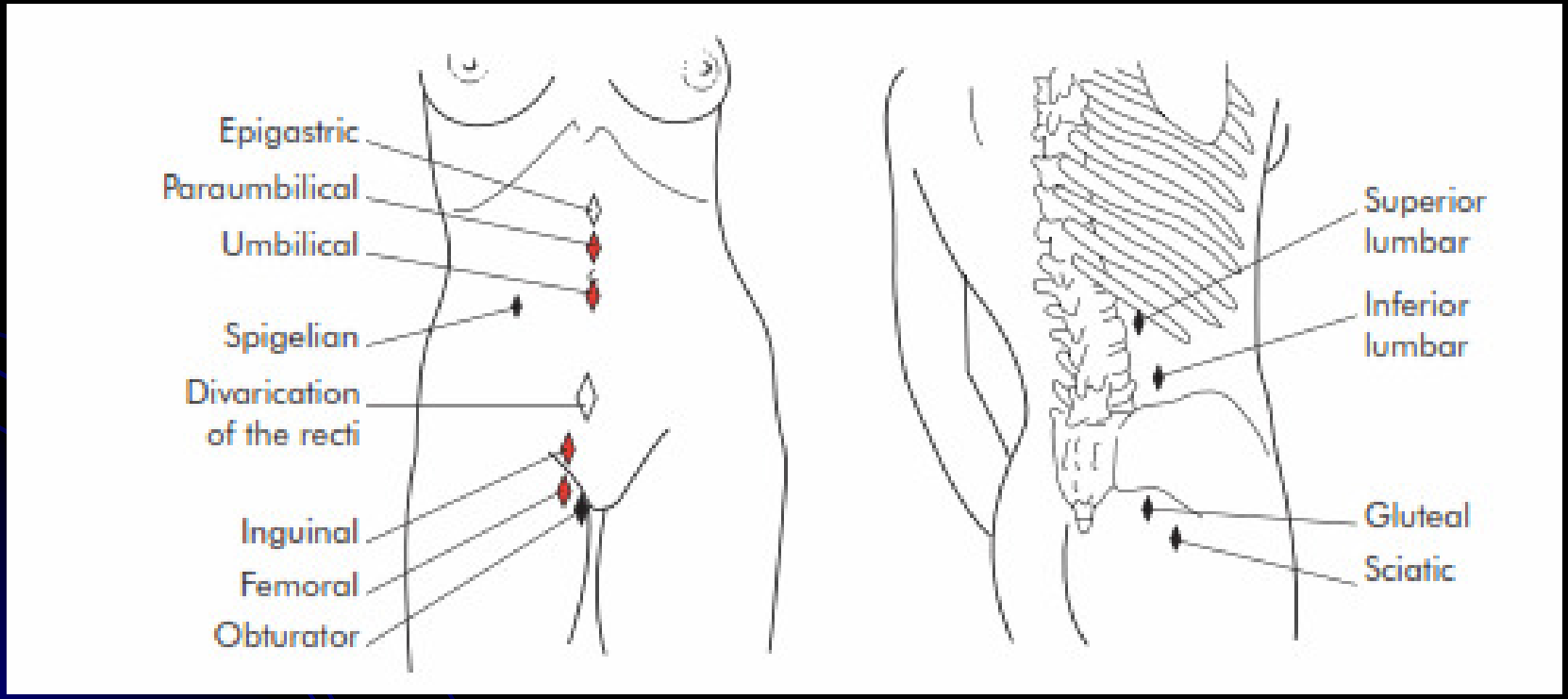
Brandt ML. Pediatric hernias. *Surg Clin North Am*. Feb 2008;88(1):27-43, vii-viii. [Medline].

Katz DA. Evaluation and management of inguinal and umbilical hernias. *Pediatr Ann*. Dec 2001;30(12):729-35. [Medline].

Brandt ML. Pediatric hernias. *Surg Clin North Am*. Feb 2008;88(1):27-43, vii-viii.

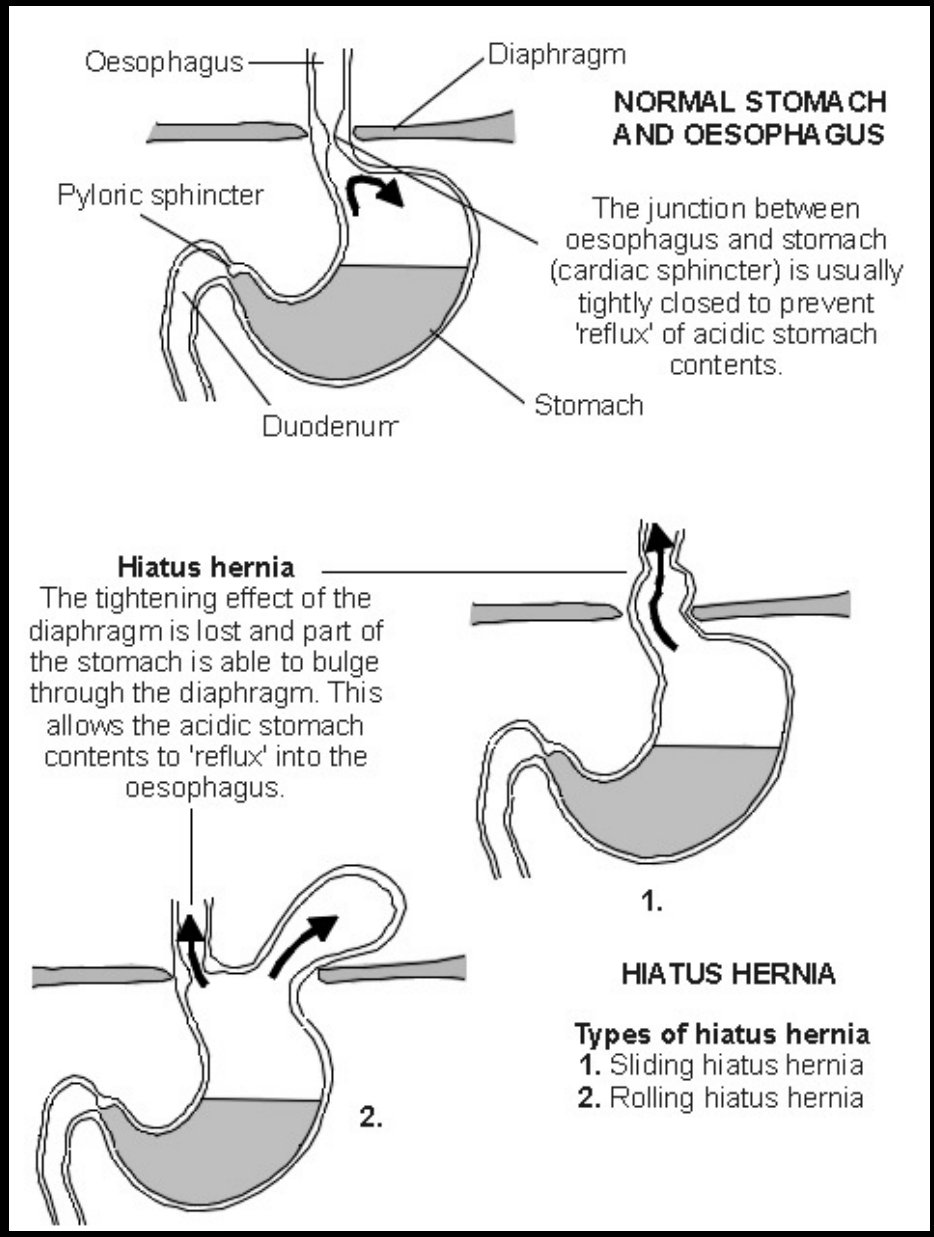
Types & Names of Hernias:

- Spontaneous Hernias:



Special Types & Names of Hernias

“Hiatus Hernia”



Meckel's Diverticulum “Littre's Hernia”

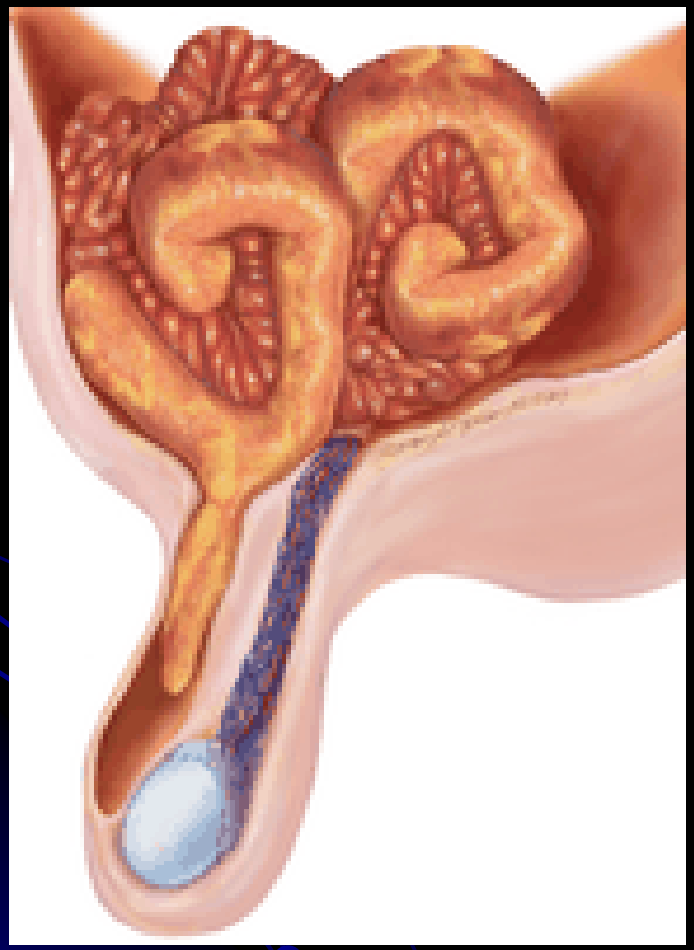
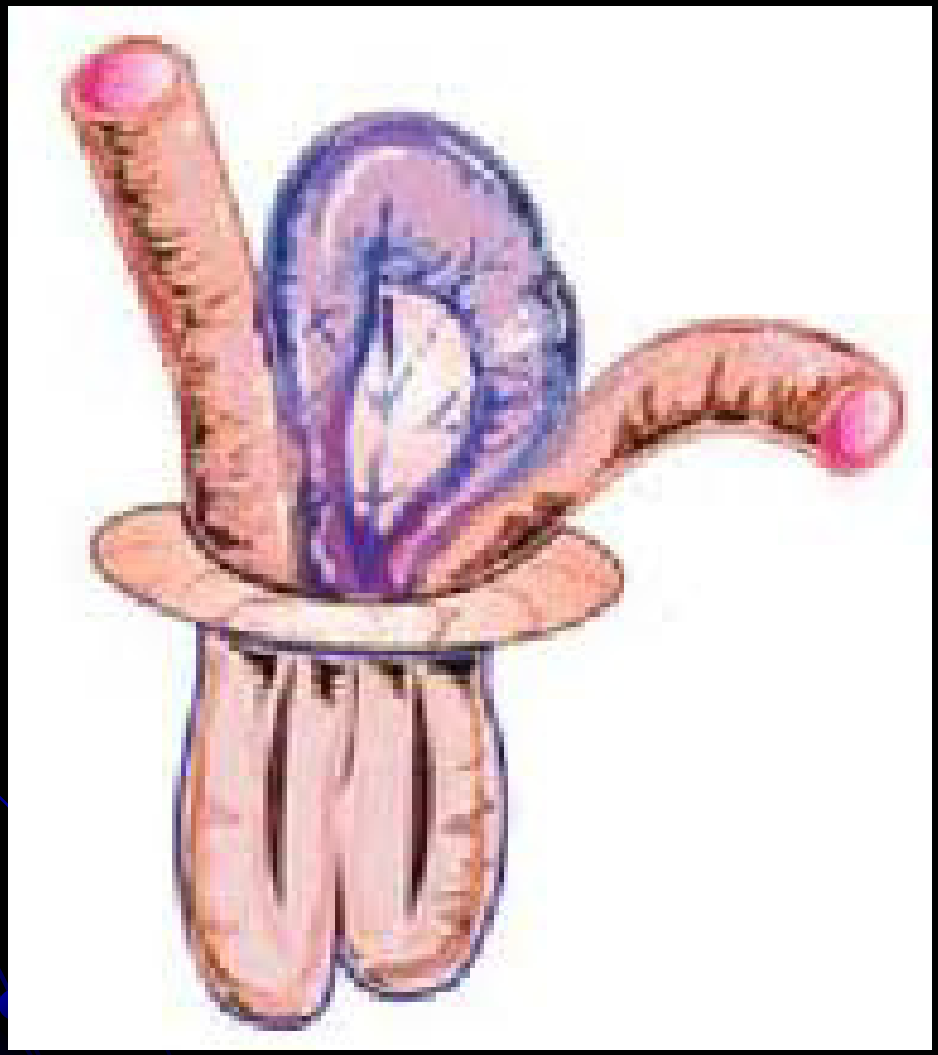
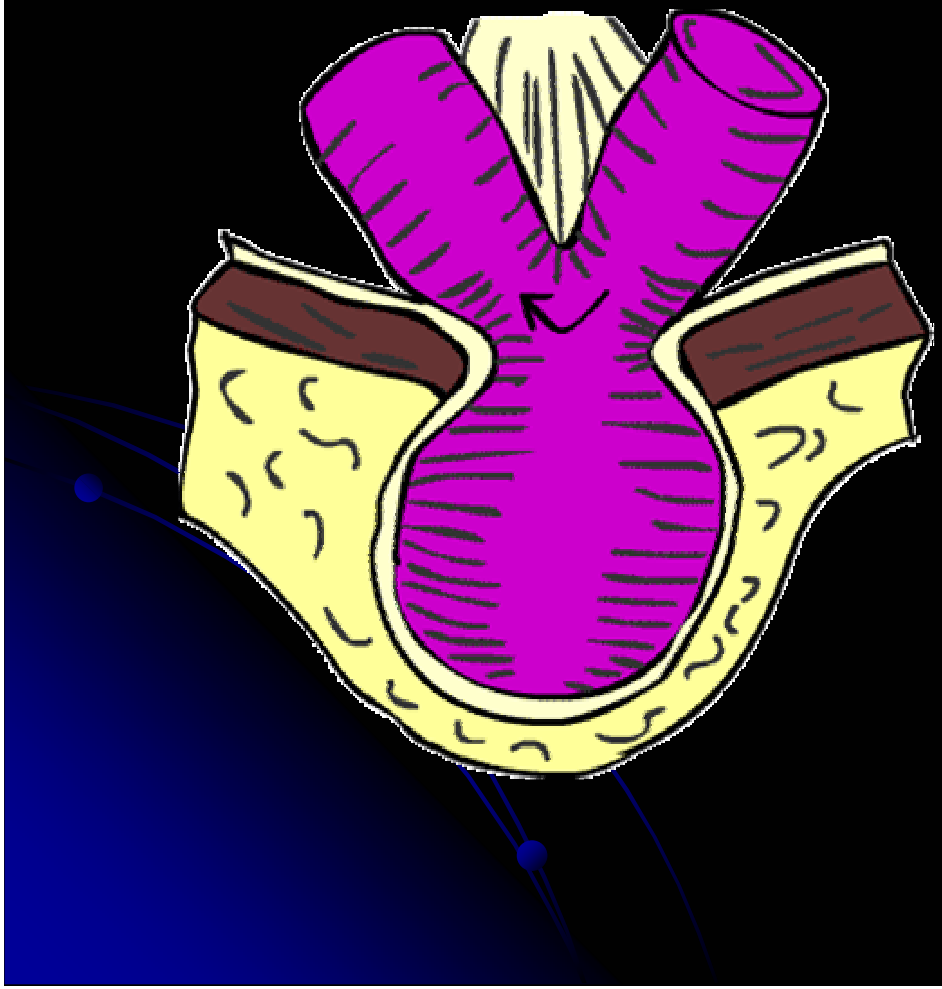


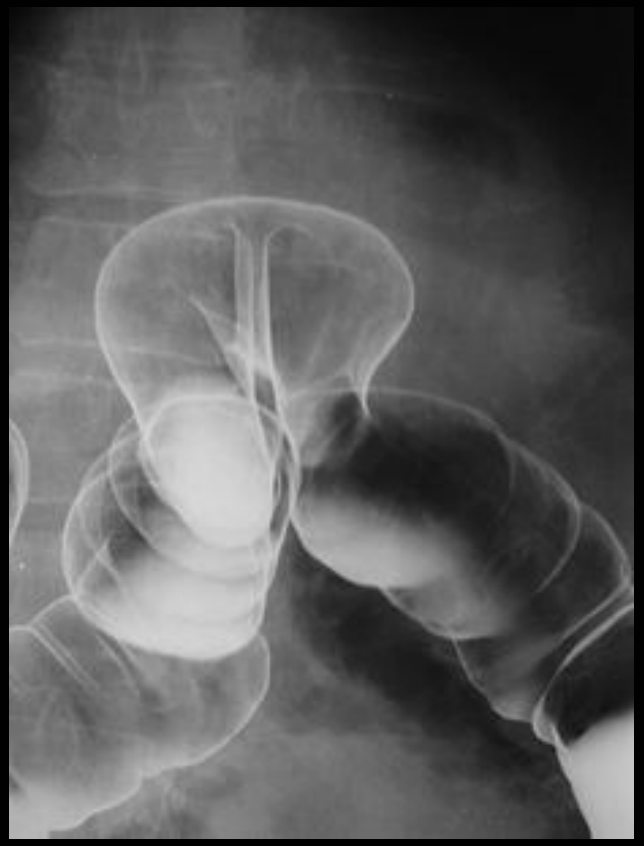
Fig. 1. Hernia sac content: a large amount of small bowel with Meckel's diverticulum.

W-Shaped loop of small bowel: Maydl's Hernia



Strangulated anti-mesenteric border of hernia “ Rickter's Hernia





Greater Sciatic Notch “Gluteal Hernia”

Figure 1 - An enlarging herniation in the right buttock area, partially reducible.

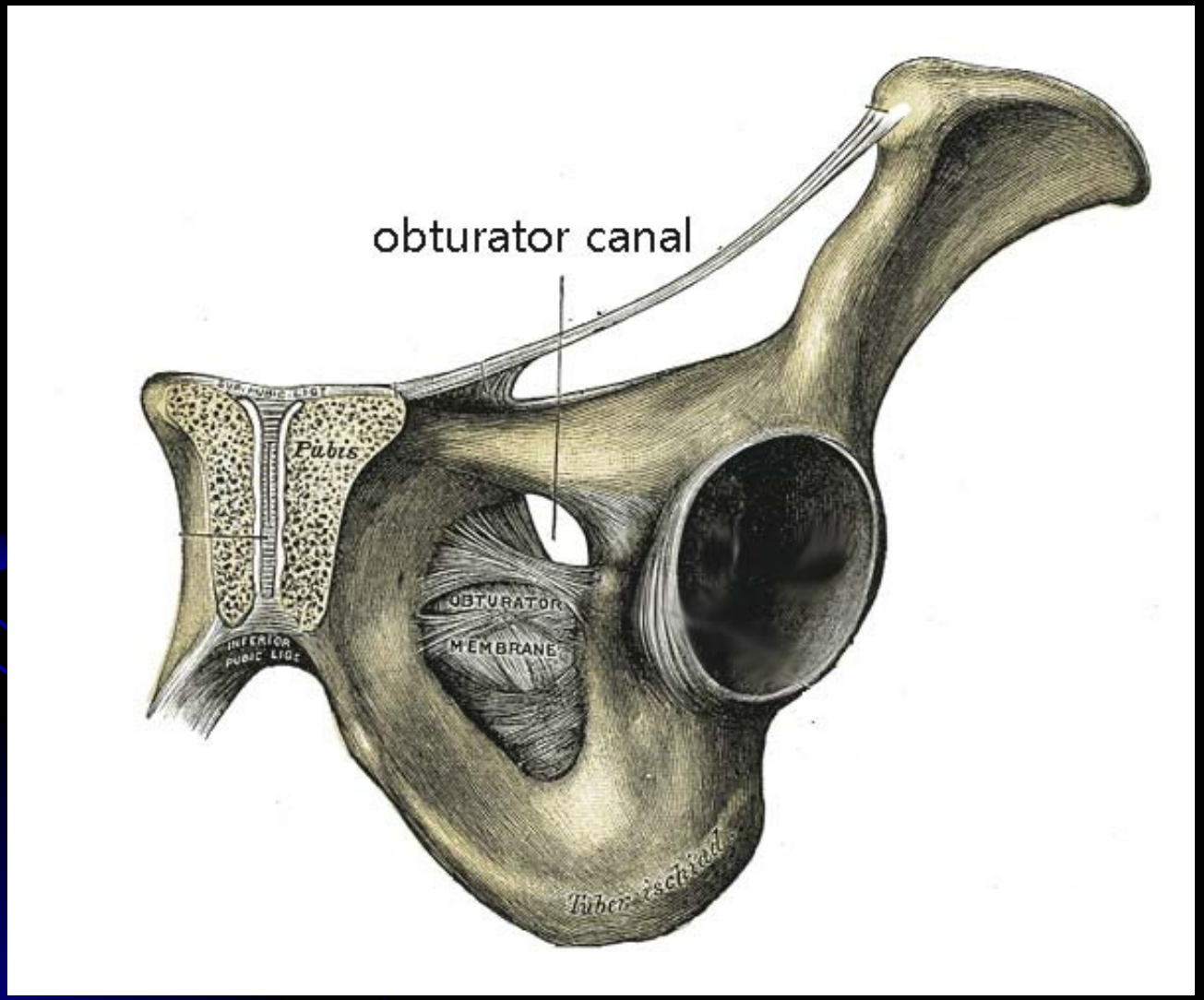
Superior Lumbar Triangle “Grynfelt's Hernia”

Inferior Lumbar Triangle: Petite Hernia

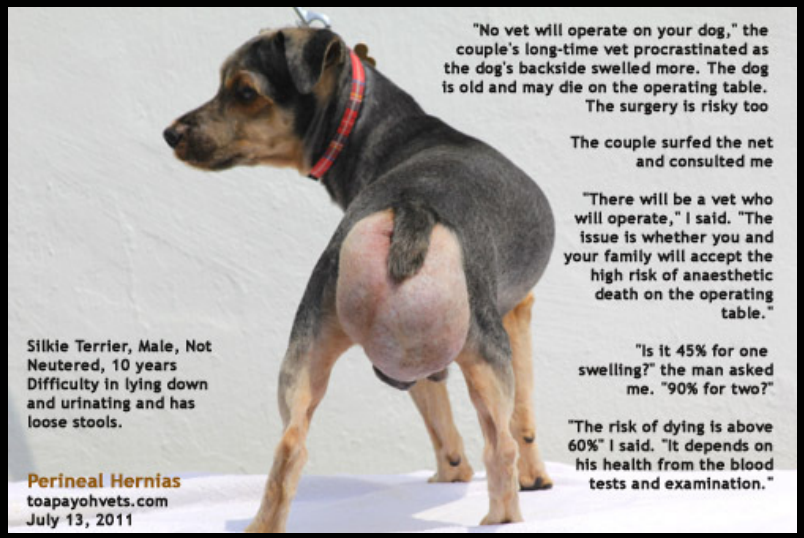
Figura 1: Hérnia de Petit: tumor localizado na região lombar inferior direita.

Figure 1: Petit's hernia: tumor located in the right inferior lumbar triangle.

Intra Operative finding: "Obturator Hernia"



Not only in Human but….



Prolapse [Rectal] :

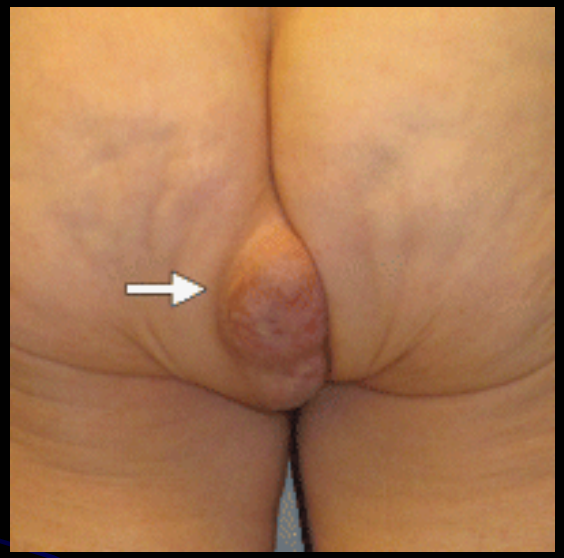
Inflammation and tissue damage causes painful straining to pass stools, which can lead to rectal prolapse.

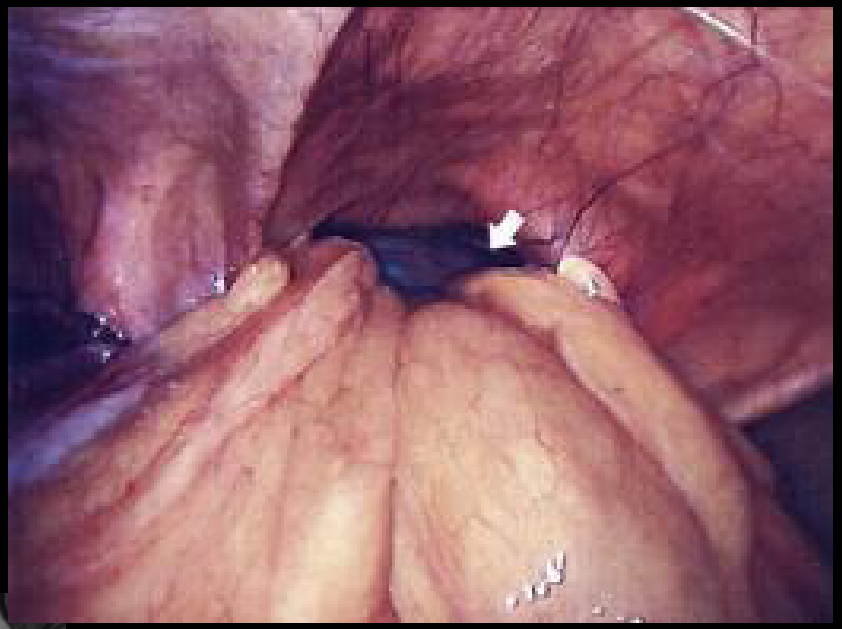
Prolapse is also common in animals

B] Iatrogenic Hernia:

- Parastomal Hernia:

- Perineal Hernia:





Hernia Repair:

- Until 1958, abdominal wall hernias were closed with primary suture repair
- In 1958, Usher published his technique using a polypropylene mesh
- This led to the Lichtenstein repair some 30 years later which popularised mesh for hernia repair
- Currently, about one million meshes are used per year world-wide.

Klinge U, Klosterhalfen B, Birkenhauer V, Junge K, Conze J, Schumpelick V. Impact of polymer pore size on the interface scar formation in a rat model. *J Surg Res* 2002; **103**: 208–14.

- The benefits of meshes were accepted for many years but the need for evidence-based medicine led to several trials designed to quantify their advantages

- In 2002, the EU trialist collaboration analysed 58 randomised controlled trials and found that the use of mesh was superior to other techniques. In particular, they noted fewer recurrences and less postoperative pain with mesh repair

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- The EU Hernia Trialists Collaboration. Repair of groin hernia with synthetic mesh: meta-analysis of RCT. *Ann Surg* 2002; **235**: 322–32.

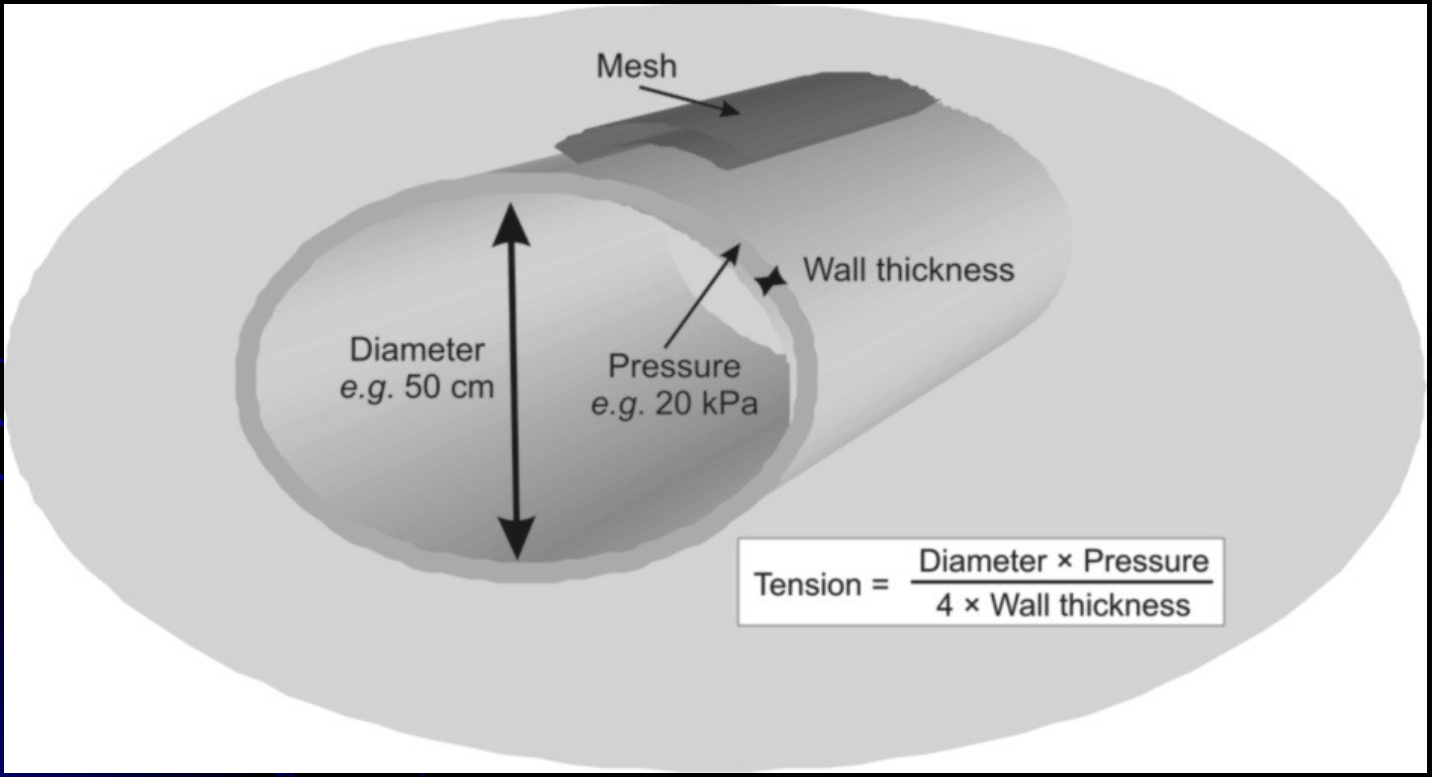
- Although these results are not accepted by all surgeons, meshes have now virtually replaced suture repair in the developed world.

Nixon SJ, Jawaid H. Recurrence after inguinal hernia repair at ten years by open darn, open mesh and TEP – no advantage with mesh. *Surgeon* 2009; **7**: 71–4.

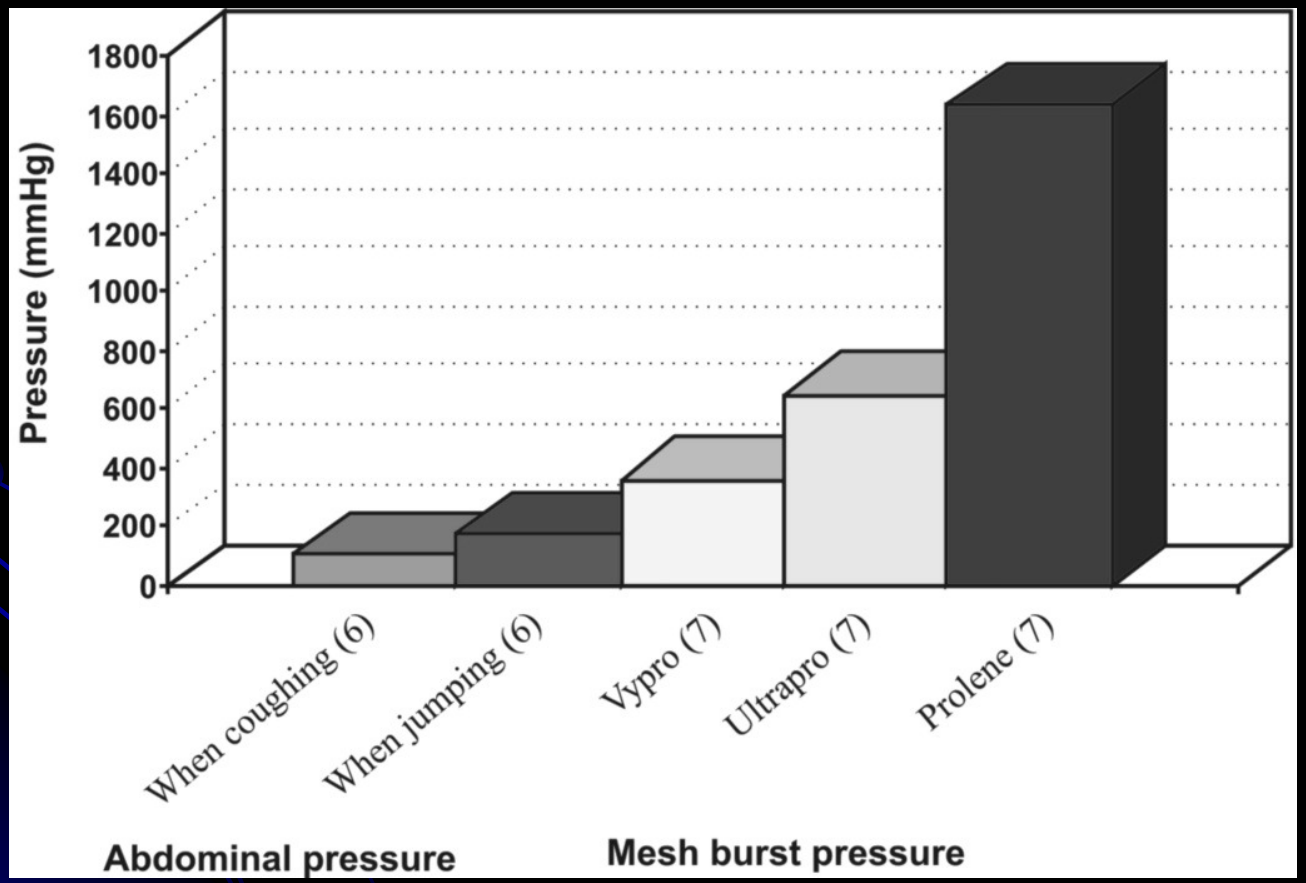
- The original **logic** behind using a mesh was very simple: the mesh was a material which could be used to **reinforce** the abdominal wall with the formation of scar tissue. It was expected that the best meshes would be those made of very strong material and able to induce the most fibrosis.

- **Unfortunately,** this fibrotic reaction led to pain and movement restriction and it soon became clear that this needed to be minimised. In order to do this, the surface area, and therefore strength, of the mesh had to be reduced.

- Calculations of intra-abdominal pressures by the **law of Laplace**. proved that this would be possible without compromising mesh function.



- In fact, the tensile strength of a mesh required to withstand the maximum abdominal pressure is only a tenth of that of most meshes.



- This realization led to the concept of **light-weight meshes** which were first introduced in **1998** (Vypro)

- These meshes have **large pores** (normally 3–5 mm) and a **small surface area**. They stimulate a reduced inflammatory reaction and, therefore, have **greater elasticity and flexibility**

Klinge U. Mesh for hernia repair. *Br J Surg* 2008; **95**: 539–40.

- Unfortunately, despite these improvements, they continue to have complications such as recurrence, infection and adhesion formation.
- Thus, the search for an **ideal mesh** continues.
- The difficulty of finding a single, ‘ideal’ mesh was acknowledged by the development of **composite meshes.**
- These combine more than one material and are the basis of most new mesh designs.
- The main advantage of the composite meshes is that they can be used in the intraperitoneal space with minimal adhesion formation

- Despite the vast selection of brands available, nearly all these meshes continue to use one or other of three basic materials:
  - Polypropylene,
  - Polyester and
  - ePTFE.

- These are used in combination with each other or with a range of additional materials such as:
  - Titanium,
  - Omega 3,
  - Monocryl,
  - PVDF and
  - Hyaluronate.

- Contrary to the manufacturers' literature, it appears that none of these synthetic materials is without disadvantages

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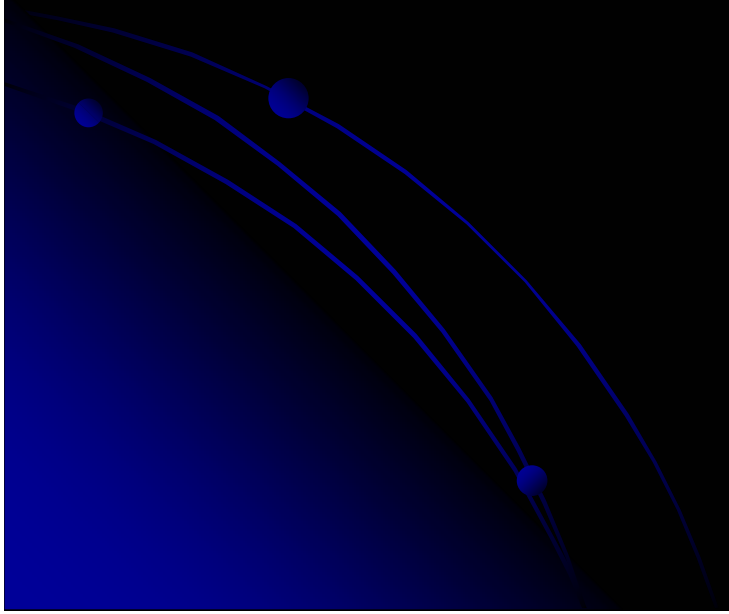
- O'Dwyer, Kingsworth AN, Molloy RG, Small PK, Lammers B, Horeyseck G. Randomized clinical trial assessing impact of a lightweight or heavyweight mesh on chronic pain after inguinal hernia repair. *Br J Surg* 2005; **92**: 166–70.

- The problems encountered with synthetic materials led to the development of biomaterials and it is appropriate that the history of meshes should conclude with the most physiologically based implants

- These consist of an acellular collagen matrix derived from human dermis (Aderm) or porcine small intestine submucosa (Surgisis).

- The matrix allows soft tissue to infiltrate the mesh which eventually becomes integrated into the body by a process of remodeling

- It is clear that the evolution of meshes is NOT YET COMPLETE and the ideal mesh has yet to be found



Mesh properties:

- **TENSILE STRENGTH:**
  - The maximum intra-abdominal pressures generated in healthy adults occur whilst coughing and jumping are estimated to be about 170 mmHg
  - This is easily achieved as even the lightest meshes will withstand twice this pressure without bursting

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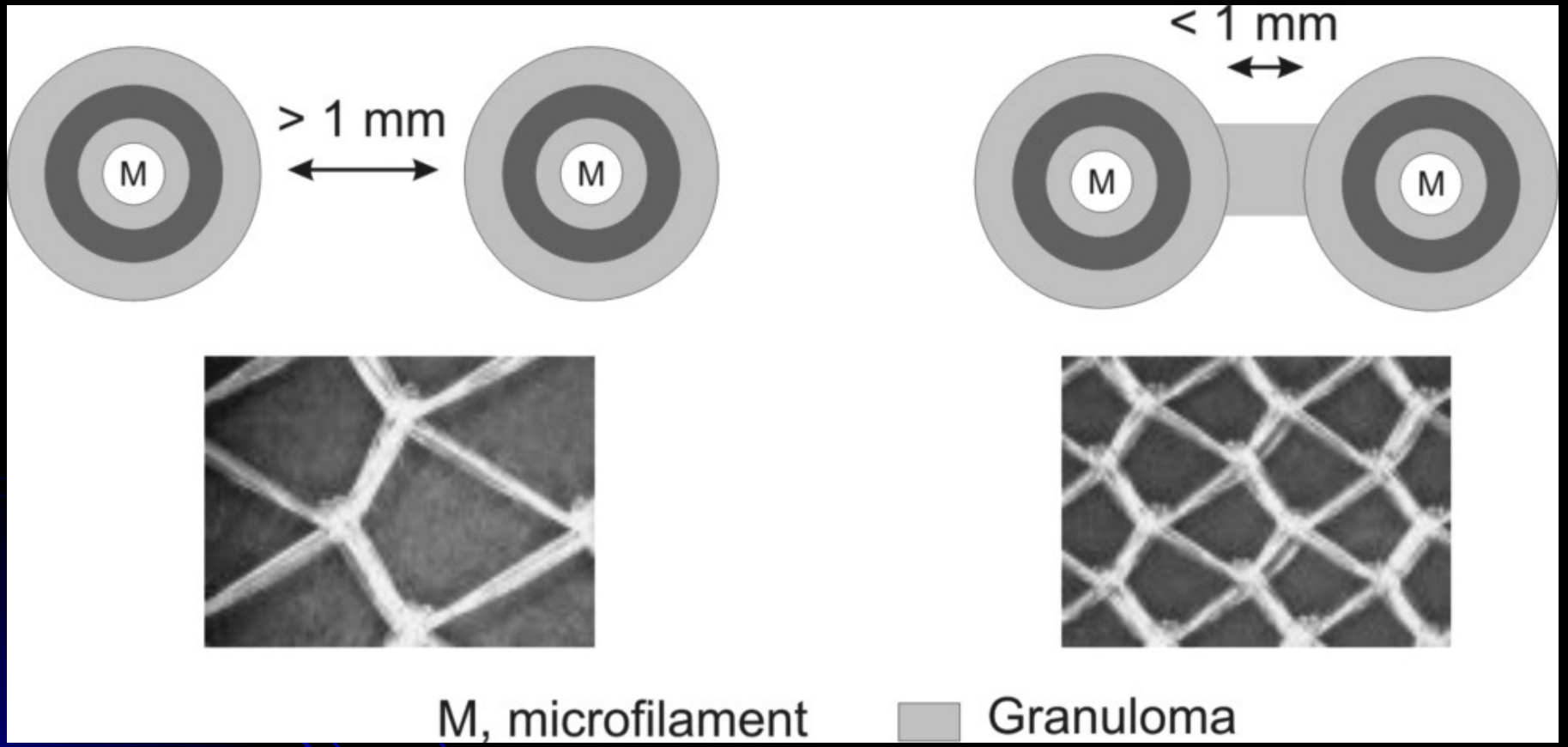
- Cobb WS, Burns JM, Kercher KW, Matthews BD, James Norton H, Todd Heniford B. Normal intraabdominal pressure in healthy adults. *J Surg Res* 2005; **129**: 231–5.
- Klosterhalfen B, Junge K, Klinge U. The lightweight and large porous mesh concept for hernia repair. *Expert Rev Med Devices* 2005; **2**: 103–17.

- **PORE SIZE**
  - Porosity is the main determinant of tissue reaction.
  - Pores must be more than 75 ìm in order to allow infiltration by macrophages, fibroblasts, blood vessels and collagen.
  - Meshes with larger pores allow increased soft tissue in-growth and are more flexible because of the avoidance of granuloma bridging.
  - Granulomas become confluent with each other and encapsulate the entire mesh (Fig. 3). This leads to a stiff scar plate and reduced flexibility


> 1 mm
M
M
< 1 mm
M
M
M, microfilament
Granuloma

- **WEIGHT**
  - The weight of the mesh depends on both the weight of the polymer and the amount of material used (pore size).

- Koch A, Bringman S, Myrelid P, Kald A. Randomised clinical trial of groin hernia repair with titanium-coated lightweight mesh compared with standard polypropylene mesh. *Br J Surg* 2008; **95**: 1226–31.

- Heavy-weight meshes use thick polymers, have small pore sizes and high tensile strength, typically weigh 100 g/m2

- Light-weightmeshes are composed of thinner filaments and have larger pores (> 1 mm), typically 33 g/m2

- A new generation of even lighter meshes include the titanium/ propylene composite meshes, These have been shown to be associated with a more rapid recovery in a recent randomised controlled trial (RCT).

- Koch A, Bringman S, Myrelid P, Kald A. Randomised clinical trial of groin hernia repair with titanium-coated lightweight mesh compared with standard polypropylene mesh. *Br J Surg* 2008; **95**: 1226–31.

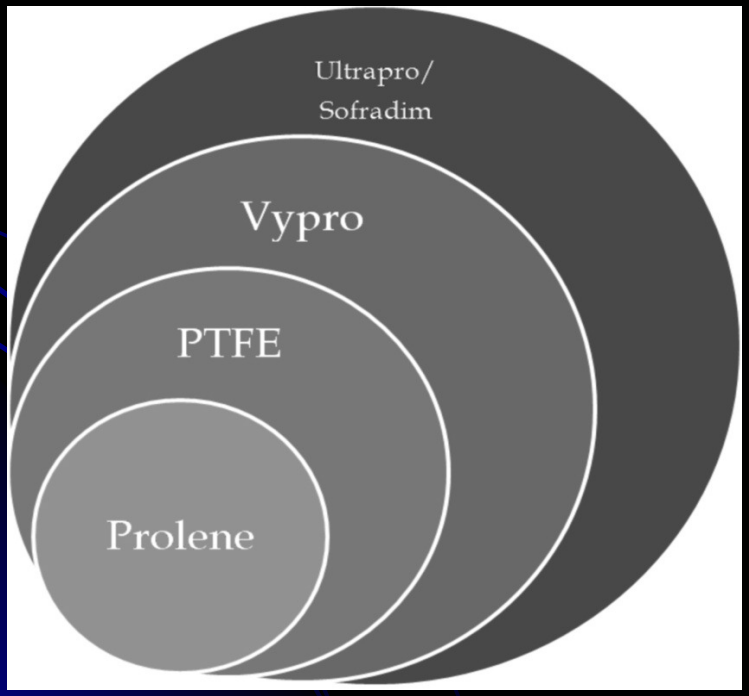
- **REACTIVITY/BIOCOMPATIBILITY**
  - Modern biomaterials are physically and chemically inert. They are generally stable, non-immunogenic and non-toxic.
  - Despite this, they are not biologically inert: This involves inflammation, fibrosis,calcification, thrombosis and formation of granulomas, this will result in development of stiff scar plates and alteration of collagen composition
  - During normal scar healing, the initial, immature, type III collagen is rapidly replaced by stronger, type I collagen.
  - This process is delayed in the presence of a foreign body such as a mesh. The result is a much lower ratio of type I/III collagen, leading to reduced mechanical stability. [Regardless of the mesh type]

- Klosterhalfen B, Hermanns B, Rosch R. Biological response to mesh. *Eur Surg* 2003; **35**: 16–20.
- Junge K, Klinge U, Rosch R, Mertens PR, Kirch J, Klosterhalfen B *et al*. Decreased collagen type I/III ration in patients with recurring hernia after implantation of alloplastic prosthesis. *Langenbecks Arch Surg* 2004; **389**: 17–22.

- **ELASTICITY**
  - The natural elasticity of abdominal wall at 32 N/cm is about 38%. Light-weight meshes have an elasticity of about 20–35% elasticity at 16 N/cm.
  - Heavy-weight meshes have only half this elasticity (4–16% at 16 N/cm) and can restrict abdominal distension.

- **CONSTITUTION**
  - Mesh fibres can be:
    - Monofilament,
    - Multifilament (braided): higher risk of infection or
    - Patches (for example, ePTFE).Multifilament fibres.

- **SHRINKAGE**
  - Shrinkage occurs due to contraction of the scar tissue formed around the mesh.
  - Scar tissue shrinks to about 60% of the former surface area of the wound.
  - The smaller pores of heavy weight meshes lead to more shrinkage due to the formation of a scar plate



Ultrapro < 5%,
Sofradim < 5%.
Vypro II 29%,
PTFE 40–50%,
Prolene 75–94%,

Complications of Meshes:

- Most complications are merely a reflection of the properties already described
  - For example, materials such as ePTFE have a good profile for adhesion risk but a high risk of infection
  - In contrast, Polypropylene meshes are durable and have a low infection risk but they have little flexibility and a high adhesion risk.

- **INFECTION RISK:**
  - Mesh infection remains about 0.1–3%
  - there is no evidence that routine prophylaxis with antibiotics confers any protection against infection
  - In contrast there is some evidence that the infection risk can be lowered by impregnating meshes with antiseptics.

Kumar S. Chronic groin sepsis following tension-free inguinal hernioplasty. *Br J Surg* 1999; **86**: 1482.

Avtan L, Avci C, Bulut T, Fourtanier G. Mesh infections after laparoscopic inguinal hernia repair. *Surg Laparosc Endosc* 1997; **7**: 192–5.

Carbonell AM, Mathews BD, Dreau D, Foster M, Austin CE, Kercher KW *et al*. The susceptibility of prosthetic materials to infection, *Surg Endosc* 2005; **19**: 430–5.

- Risk of Infection:
  - Type of filaments (Multifilament)
  - Pore size (<10 micron)
    - Best mesh to use are those Monofilaments of Pore size >75 m
      - Antibiotics can be effective in eradicating infection without removal.

- **ADHESION RISK**:
  - All meshes produce adhesions when placed adjacent to bowel, but their extent is determined by pore size, filament structure and surface area.
    - Heavy-weight meshes induce an intense fibrotic reaction which ensures strong adherence to the abdominal wall but also causes dense adhesions
  - In contrast,
    - Microporous ePTFE does not allow tissue in-growth. It has a very low risk of adhesion formation, but is unable to adhere strongly to the abdominal wall.

- Composite meshes aim to do this by providing an additional surface which can be safely placed in contact with bowel whilst peritoneal mesothelial cells grow over the mesh.

- It takes up to 7 days to regenerate peritoneum; however, once formed, it should prevent adhesion formation to the mesh.

- Unfortunately, there is evidence to suggest that most of these only prevent adhesion formation in the short term and the effect is diminished after 30 days.
- In some types, it is also possible for the layers to separate and become adherent to bowel.

Schreinemacher MHF, Emans PJ, Gijbels MJ, Greve JW, Beets GL, Bouvy ND. Degradation of mesh coatings and intraperitoneal adhesion formation in an experimental model. *Br J Surg* 2009; **96**: 305–313.

Bohmer RD, Byrne PD, Maddern GJ. A peeling mesh. *Hernia* 2002; **6**: 86–7.

- **RECURRENCE**:
  - Quoted rates vary greatly between studies, but most describe a reduction in the rate of recurrence by at least half when using a mesh
    - for example, for incisional hernias this is reduced from17–67%to 1–32%).
  - In nearly all cases of early recurrent (1/3 of cases) herniation occurs at the edges of meshes. This is commonly due to inadequate fixation, or underestimation of shrinkage of the mesh,

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Finan KR, Kilgore ML, Hawn MT. Open suture versus mesh repair of primary incisional hernias a cost-utility analysis. *Hernia* 2009; **13**: 173–82.

Mahmoud Uslu HY, Erkek AB, Cakmak A, Sozener U, Soylu L, Turkcapar AG *et al*. Incisional hernia treatment with polypropylene graft: results of 10 years. *Hernia* 2006; **10**: 380–4.

- There is little evidence that recurrence is related to the type of mesh used
  - Although it has been proposed that light-weight meshes have a higher risk due to their increased flexibility and movement

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O'Dwyer, Kingsworth AN, Molloy RG, Small PK, Lammers B, Horeyseck G. Randomized clinical trial assessing impact of a lightweight or heavyweight mesh on chronic pain after inguinal hernia repair. *Br J Surg* 2005; **92**: 166–70.

Klosterhalfen B, Junge K, Klinge U. The lightweight and large porous mesh concept for hernia repair. *Expert Rev Med Devices* 2005; **2**: 103–17.

- Late Recurrence:
  - Two-thirds of recurrences occur after 3 years (median, 26 months).
  - This suggests that a technical error is unlikely to be the only cause of recurrence and defective collagen synthesis may be equally important

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Schumpelick V, Nylus L. *Meshes: benefits and risks*. Berlin: Springer, 2003.

Sauerland S, Schmedt CG, Lein S, Leibl BJ, Bittner R. Primary incisional hernia repair with or without polypropylene mesh: a report on 384 patients with 5-year follow-up. *Langenbecks Arch Surg* 2005; **390**: 408–12.

- **PAIN**:
  - Acute postoperative pain, there is little difference in the type of mesh used.
  - Chronic pain following hernia repair has gained increased recognition, with a quoted risk of over 50%. When:
    - it starts in the immediate postoperative period, it is usually due to nerve damage at the time of operation
    - In contrast, pain due to foreign body reaction (FBR) typically presents after 1 year.
  - Some authors have also suggested that absorbable meshes may have a role in reducing chronic pain.

Poobalan AS, Bruce J, Smith WC, King PM, Krukowski ZH, Chambers WA. A review of chronic pain after inguinal herniorrhaphy. *Clin J Pain* 2003; **19**: 48–54.

Courtney CA, Duffy K, Serpell MG, O'Dwyer PJ. Outcome of patients with severe chronic pain following repair of groin hernia. *Br J Surg* 2002; **89**: 1310–4.

- **SEROMA**
  - Seromas develop with any mesh type but those with larger pores may be less likely to do so

- **Degradation & Calcification**

- Schumpelick V, Klosterhalfen B, Müller M. Minimized polypropylene mesh for preperitoneal net plasty (PNP) of incisional hernias. *Chirurg* 1999; **70**: 422–30.

Which mesh should surgeons use?

- light-weight mesh, with large pores and minimal surface area. Ideally, it should consist of a monofilament , A polypropylene or polyester mesh is, therefore, usually suitable
- If the mesh is to be placed inside the peritoneal cavity, an attempt should be made to minimise adhesions by choosing a hybrid mesh with an absorbable surface
- In infected wounds, an absorbable / Biological mesh is preferred

Mesh in Prolapse Surgery

- Full Thickness Rectal Prolapse can be repaired through:
  - Perineal Approach:
    - Delorme's procedure
    - Altemeier's procedure
  - Abdominal Approach: Open Or Laparoscopic
    - Resection or No Resection (Pexy)
    - Posterior or Anterior

- Posterior Rectopexy:
  - Ivalon Sponge "Well's Procedure"
  - Fascia Lata "Orr-Loygue Operation"
  - Non Absorbable Mesh
  - Suture Rectopexy

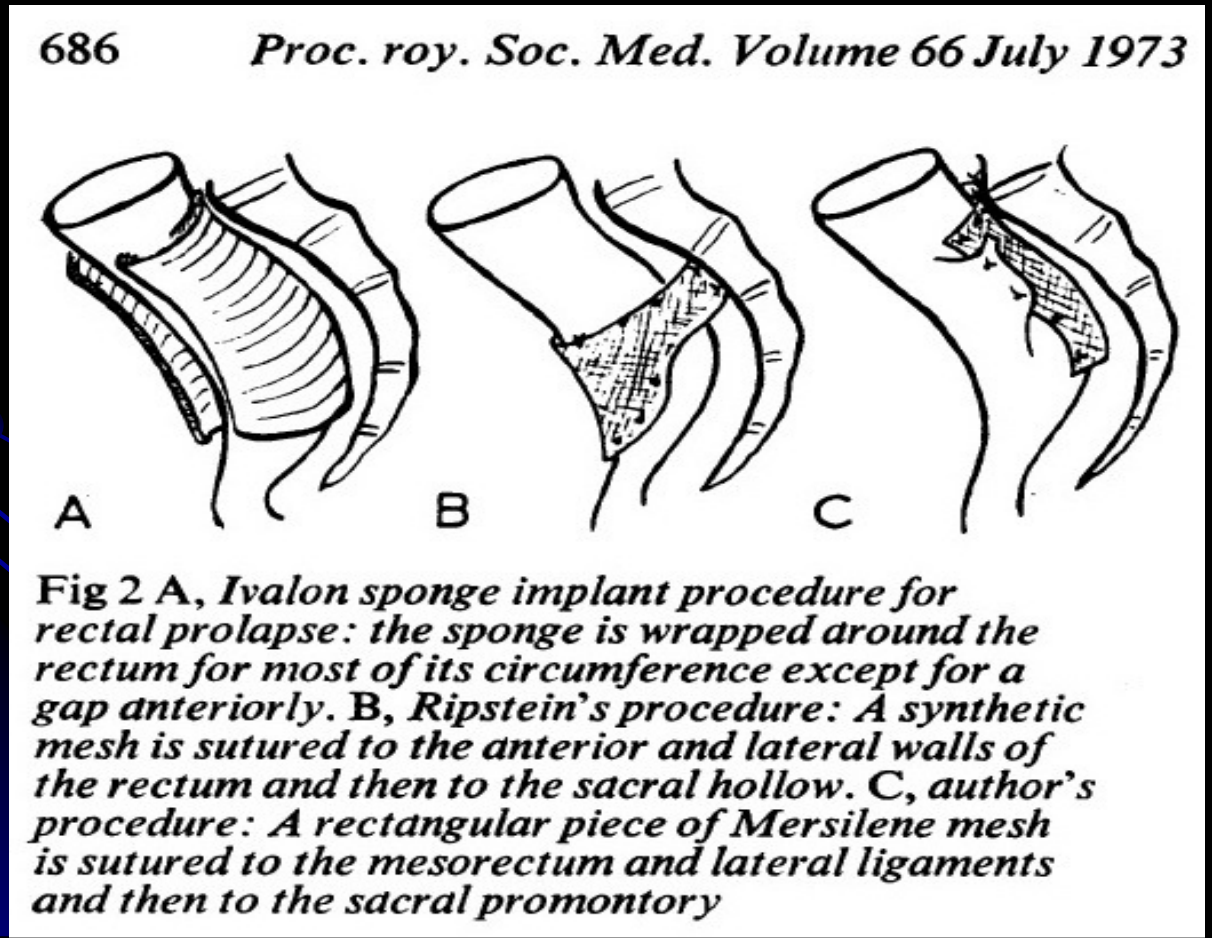
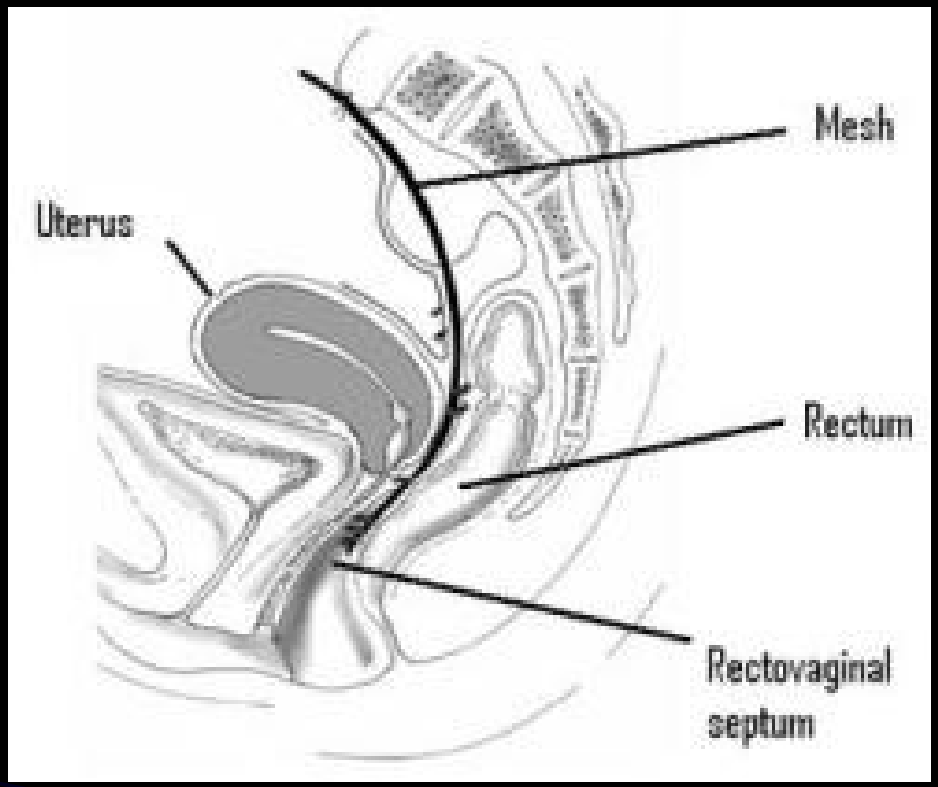


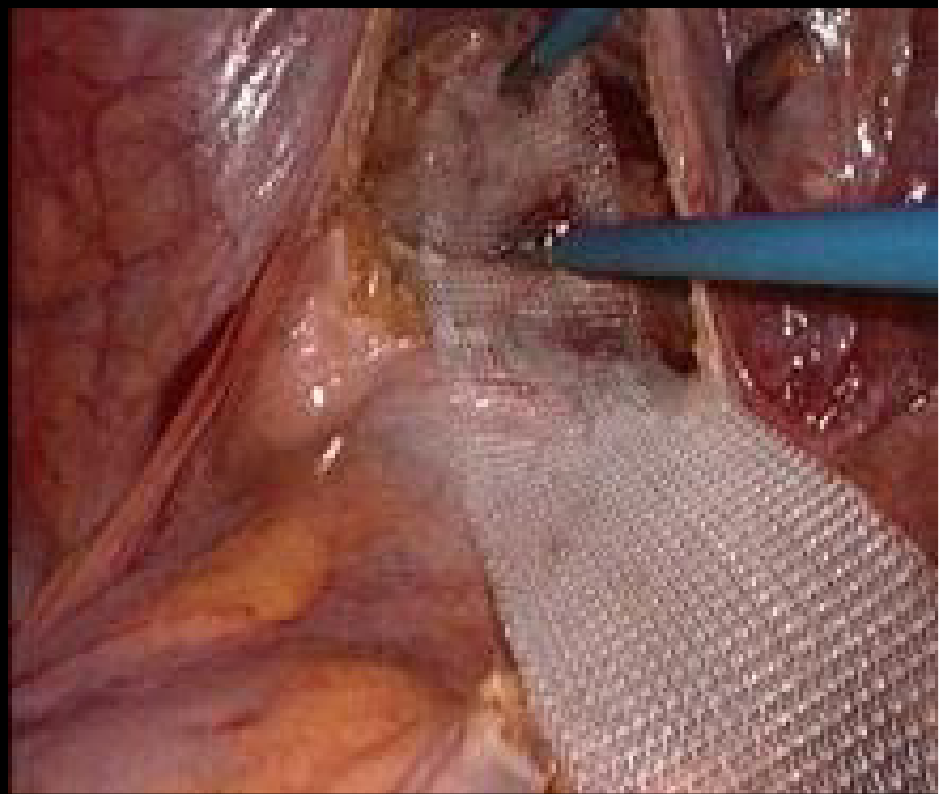
Fig 2 A, *Ivalon sponge implant procedure for rectal prolapse: the sponge is wrapped around the rectum for most of its circumference except for a gap anteriorly.* B, *Ripstein's procedure: A synthetic mesh is sutured to the anterior and lateral walls of the rectum and then to the sacral hollow.* C, *author's procedure: A rectangular piece of Mersilene mesh is sutured to the mesorectum and lateral ligaments and then to the sacral promontory*

- Anterior "Ventral" Rectopexy:
  - Mesh Sling "Ripstein"
  - Laparoscopic Ventral Rectopexy:
    - First described by D'Hoore et al.;
    - Low morbidity of 7%,
    - Low Recurrence of 4%

Br J Surg; 2004 Nov;91(11):1500-5.

- Laparoscopic Ventral Rectopexy is becoming popular:
  - Rectal mobilization is kept strictly anterior with complete mobilization down to anal sphincter thereby avoiding Autonomic Nerve damage.
  - A narrow strip of mesh is used to fashion the Ventral Rectopexy, Posterior colporrhaphy and vaginal sacropexy


Mesh
Uterus
Rectum
Rectovaginal
septum



- **Systematic review on ventral rectopexy for rectal prolapse and intussusception.**

Samaranayake CB, Luo C, Plank AW, Merrie AE, Plank LD, Bissett IP.

Department of Surgery, Faculty of Medical and Health Sciences, The University of Auckland, Auckland, New Zealand.

- Twelve nonrandomized case series studies
- 728 patients
- Seven studies used the Orr-Loygue procedure (VR with posterior rectal mobilization to the pelvic floor)
- Five studies used VR without posterior rectal mobilization

- Conclusions:
  - VR has low recurrence and improves FI
  - There is a greater reduction in postoperative constipation if VR is used without posterior rectal mobilization

805

Hornung B[1], Smith A[2], Telford K[1]
1. South Manchester University Hospital, UK, 2. St. Mary's Hospital, Manchester, UK

LONG TERM OUTCOME OF LAPAROSCOPIC VENTRAL MESH RECTOPEXY AND SACROCOLPOPEXY

Results

Patient Demographics: 18 female patients were identified.

Demographic		Median	(range)
Age	(yrs)	65	(21-88)
Follow up	(months)	48	(12-106)
Operating time	(mins)	110	(80-180)
Length of stay	(days)	3	(2-15)

Morbidity and Mortality

Complication	Frequency
Mesh erosion	1
Port-site hernia	1
Recurrent rectal prolapse	2
Mortality	1

There was one case of mesh erosion into the posterior vaginal wall. Since then the mesh has been changed to a softer composite mesh. There were 2 post-operative recurrences of full thickness rectal prolapse. Both occurred in young patients (21yrs and 29yrs) who have since been diagnosed with connective tissue disease. The post-operative death occurred on the 15th post-operative day in an elderly patient with multiple medical co-morbidities. She developed small bowel obstruction secondary to a port site hernia, which required surgical exploration. As a result of the insult she developed severe chest sepsis and multi-organ failure.

Functional Outcome

	Pre - op	Post-op (at long term follow-up)	p value
Incontinence Score (Vaizey)	10 (3-16)	3 (0-15)	0.031*
Constipation Score (Wexner)	14.5 (3-21)	9 (3-15)	0.25
Quality of life (MHQ)	432 (165-628)	227 (0-497)	0.016*

*Values are medians with range in brackets. *=significant at 0.05 level.*

NICE National Institute for Health and Care Excellence

- The evidence suggests that surgical repair of prolapse using mesh may be more efficacious than traditional surgical repair
- This is a technically challenging procedure
- Further publication of safety and efficacy outcomes will be useful

U.S. Food and Drug Administration

Protecting and Promoting *Your* Health

- After reviewing the literature published and the complaints filed during the past several years, the FDA **has acknowledged its mistake** in issuing a public notice that called mesh problems "rare."

- Today, the FDA estimates the problems most commonly arise in **10 percent** of women within a year of surgery, and these patients often undergo multiple surgeries to remove the mesh. Unfortunately, even after these surgeries, the problem is sometimes impossible to fix.

- The FDA is convening an advisory committee of experts in the fall to determine whether to ban the use of surgical mesh products, which are often used to treat pelvic organ prolapse (POP) and stress urinary incontinence (SUI)

- **Size of the Problem:**
  - October 20, 2008, FDA Public Health Notification, more than 1,000 adverse events
  - January 1, 2008, through December 31, 2010, the FDA received 2,874 additional reports

These reports included:

- Erosion of the mesh and/or protrusion of the mesh from the soft tissues
- Pelvic pain, including pain with intercourse
- Infections
- Urinary tract problems and urinary issues
- Bleeding
- Spasms
- Damage to nearby organ

Outcome after Prolapse Surgery:

Authors (reference)	Year	n	Length of follow-up	Trial procedures	Outcomes
Speakman et al.[37]	1991	26	Median 12 months	Open polypropylene mesh rectopexy with division vs. preservation of lateral ligaments	Lateral ligament preservation was associated with less postoperative constipation but an increased rate of recurrent prolapse
Luukkonen et al.[46]	1992	30	6 months	Open resection suture rectopexy vs. open polyglycolic acid mesh rectopexy	Resection rectopexy resulted in less postoperative constipation
McKee et al.[47]	1992	18	Mean 20 months	Open resection rectopexy vs. open suture rectopexy (with division of the lateral ligaments)	Resection rectopexy resulted in less postoperative constipation but less improvement in faecal incontinence
Selvaggi et al.[38]	1993	20	Mean 14 (range 6–24) months	Open Marlex®/Mersilene® rectopexy with division vs. preservation of lateral ligaments	Lateral ligament preservation was associated with less postoperative constipation
Winde et al.[43]	1993	49	Mean 50.5 months	Open abdominal rectopexy (with anterior mesh sling) comparing polyglycolic acid vs. polyglactin mesh	No significant differences in postoperative complications or recurrence
Novell et al.[42]	1994	63	Median 47 (range 44–50) months	Open abdominal Ivalon® sponge rectopexy vs. suture rectopexy	No significant difference in recurrence rates but a significantly higher incidence of postoperative constipation in the Ivalon® sponge group
Deen et al.[31]	1994	20	Median 17 (8–22) months	Altemeier's procedure with pelvic floor repair vs. abdominal resection rectopexy with pelvic floor repair	Similar recurrent full thickness and mucosal prolapse rates. Significant postoperative morbidity in both groups. Incontinence significantly improved in resection rectopexy group only
Galili et al.[44]	1997	37	Mean 3.7 years	Open abdominal mesh rectopexy (with anterolateral rectal mesh fixation) comparing polyglycolic acid vs. polypropylene mesh	No significant differences in postoperative complications or recurrence rates
Boccasanta et al.[50]	1998	21	Mean 29.5 (range 8–45) months	Laparoscopic vs. open Marlex®/ Mersilene® mesh rectopexy versus open suture mesh (with anterolateral rectal mesh fixation)	No significant difference in recurrence rates
Mollen et al.[39]	2000	18	Mean 3.5 years	Posterior mesh rectopexy with division vs. preservation of lateral ligaments	No statistical difference in functional outcome

The PROSPER Trial

PROSPER (Prolapse Surgery: Perineal or Rectopexy) trial, www.prosper.bham.ac.uk	292	90% of patients recruited by January 2007	First randomisation or surgeon preference to select abdominal vs. perineal approach. Second randomisation in abdominal approach of suture vs. resection rectopexy and in perineal approach of Delorme's vs. Altemeier's operations (see Fig. 12.1)	48 patients randomised to approach, 78 to abdominal methods and 212 to perineal methods. Primary end-point of recurrent prolapse abandoned in favour of secondary end-points of bowel function and quality of life when recruitment one-third of anticipated

- Perineal Hernia ttt.
- Parastomal Hernia ttt.

Any **Questions** !!!

Thank You …