

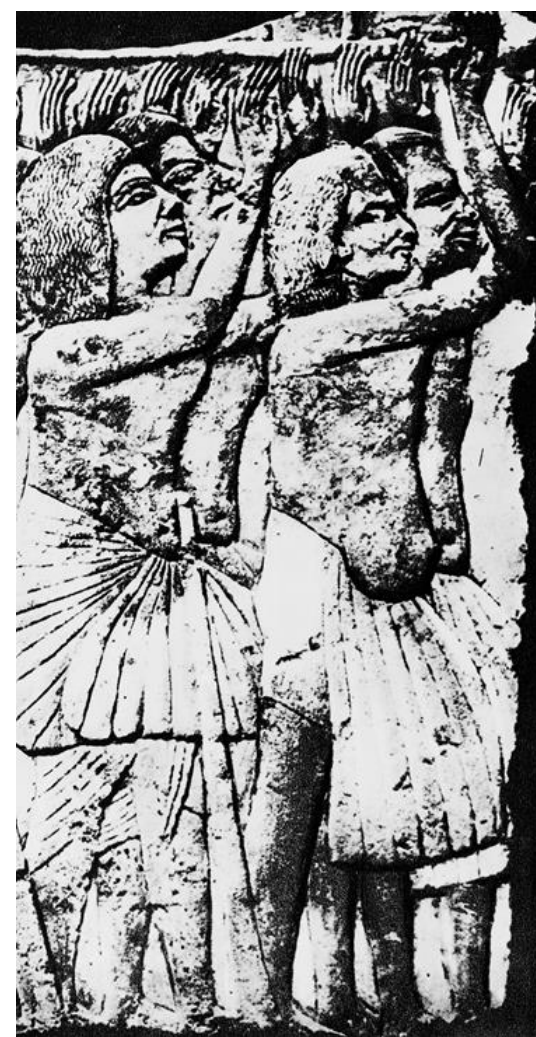


Principles of Complex Abdominal Wall Reconstruction

Prof. Dr. Samir Ammar

COMPLEX ABDOMINAL WALL HERNIA

- Defect size, features, and location
- Contamination and soft tissue condition
- Patient history and risk factors
- Clinical scenario



An elderly man suffering from umbilical hernia, Egypt- tomb of Horemheb- Saqqara

GRADING OF VENTRAL ABDOMINAL HERNIAS

<p>Grade 1 <i>Low Risk</i></p> <ul style="list-style-type: none"> • Low risk of complications • No history of wound infection 	<p>Grade 2 <i>Co-Morbid</i></p> <ul style="list-style-type: none"> • Smoker • Obese • Diabetic • Immunosuppressed • COPD 	<p>Grade 3 <i>Potentially Contaminated</i></p> <ul style="list-style-type: none"> • Previous wound infection • Stoma present • Violation of the gastrointestinal tract 	<p>Grade 4 <i>Infected</i></p> <ul style="list-style-type: none"> • Infected mesh • Septic dehiscence
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Grade 1 Low risk	Grade 2 Co-morbid	Grade 3 Contaminated
<ul style="list-style-type: none"> - Low risk of complications - No history of wound infection 	<ul style="list-style-type: none"> - Diabetes - COPD - Immunosuppression - Active smoker - Obese 	<ul style="list-style-type: none"> - Stoma present - Violation of gastrointestinal tract - Infected mesh - Septic dehiscence

Ventral Hernia Working Group; Breuing K, Butler CE, et al. Incisional ventral hernias: review of the literature and recommendations regarding the grading and technique of repair. *Surgery*. 2010 Sep;148(3):544-58.

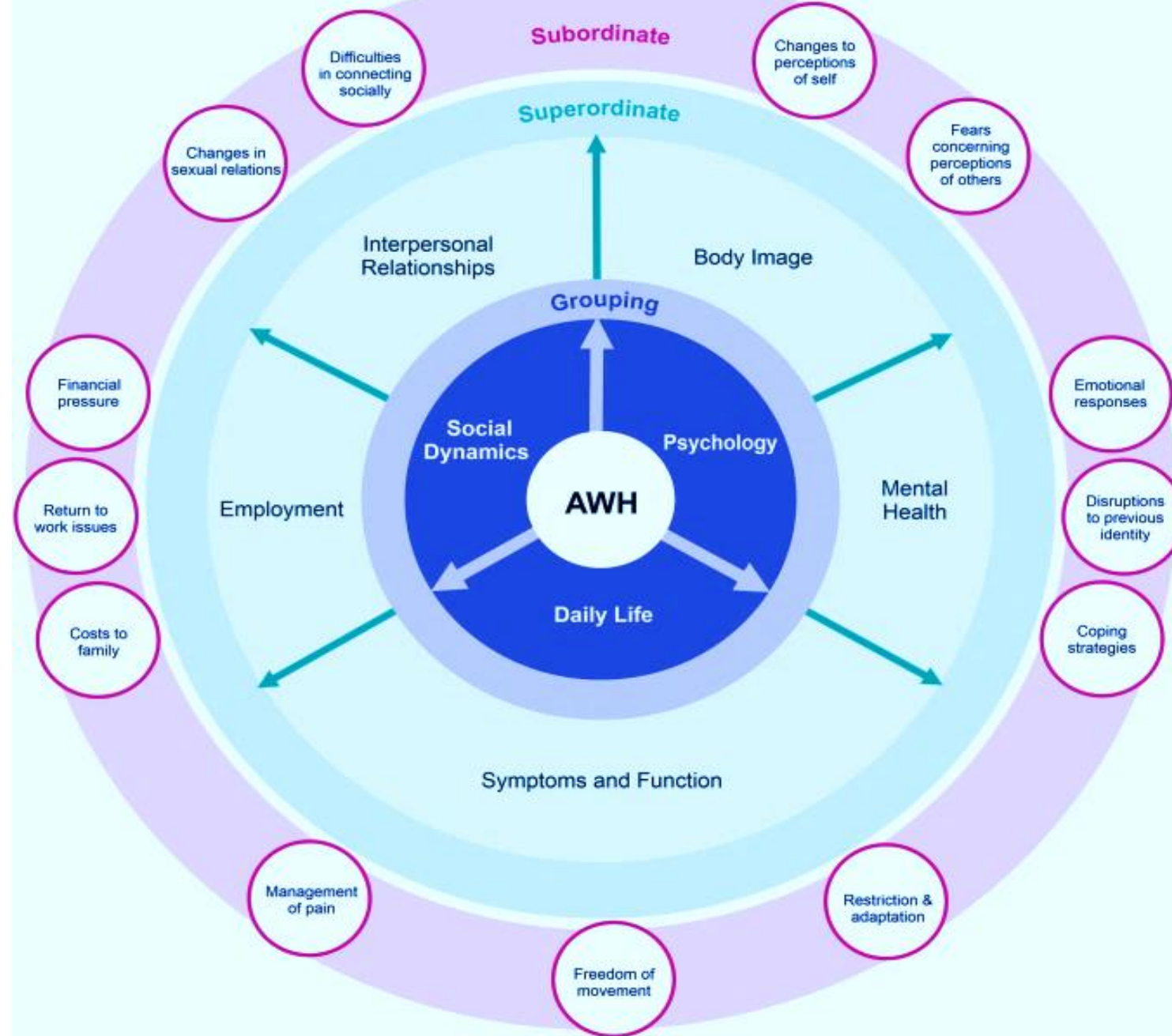
Kanters AE, Krpata DM, Blatnik JA, et al. Modified hernia grading scale to stratify surgical site occurrence after open ventral hernia repairs. *J Am Coll Surg*. 2012;215(6):787-793.

HERNIA PATIENT WOUND (HPW) CLASSIFICATION

- Hernia (H) width is graded 1 (< 10 cm), 2 (10-20 cm) or 3 (>20.0 cm).
- Patient (P) comorbidities are absent (0) or present (1)
- The wound (W) clean (0), or contaminated (1).

Stage 1	H1, P0,W0
Stage 2	H1, P1, W0 / H2, any P, W0
Stage 3	H1, any P, W1 / H2, any P W1 / H3, P0 W0
Stage 4	H3, P1, W0 / H3, any P, W1

Petro CC, Novitsky YW. Classification of Hernias. In: Novitsky YW, editor. Hernia Surgery: Current Principles. Cham: Springer International Publishing; 2016. p. 15-21.



Smith OA, Mierzwinski MF, Chitsabesan P, et al . Health-related quality of life in abdominal wall hernia: let's ask patients what matters to them? *Hernia*. 2022 ;26(3):795-808.

COMPLEX ABDOMINAL WALL RECONSTRUCTION

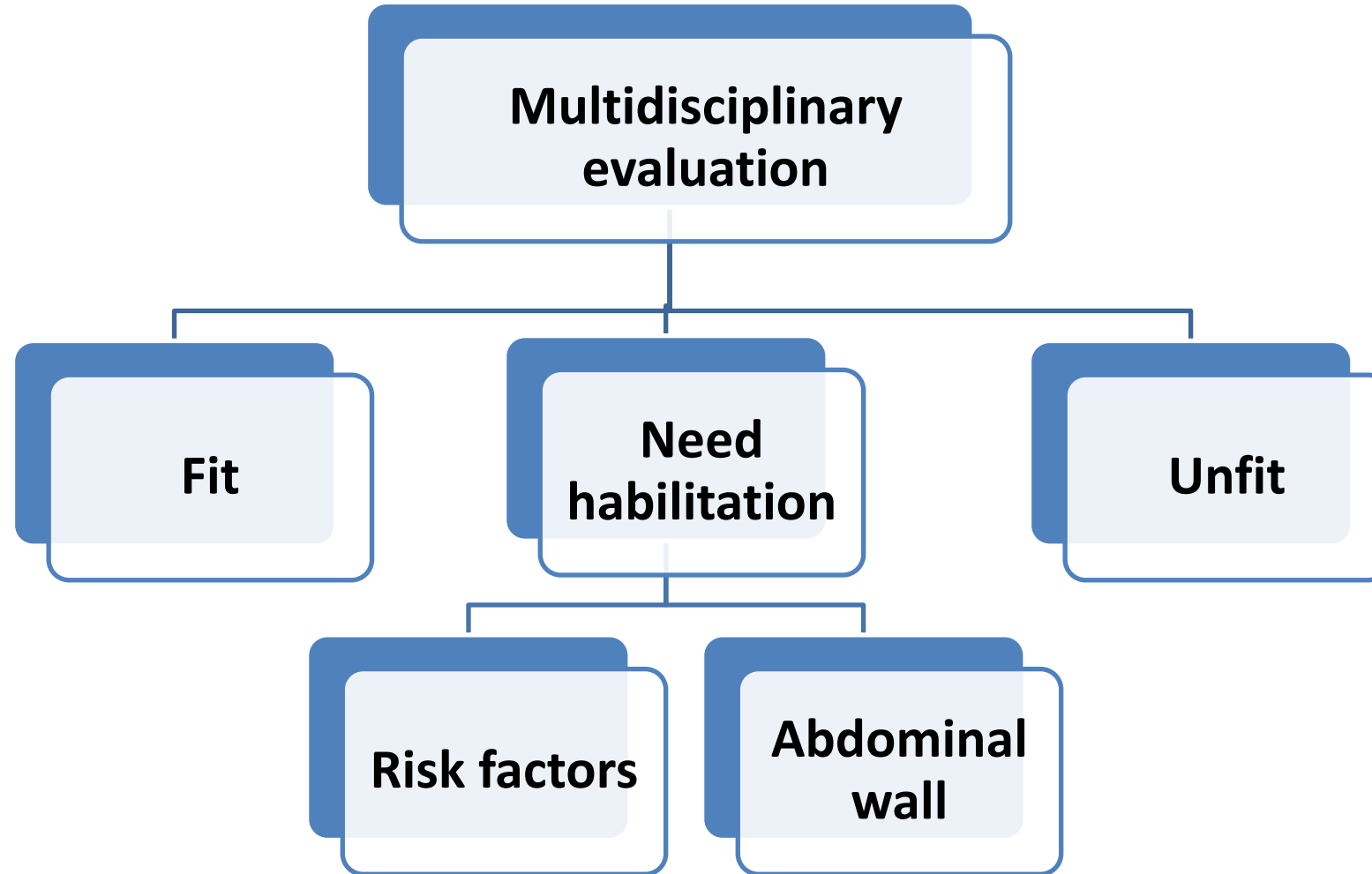
The principal goals of reconstruction:

- Preventing hernia complications
- Preventing recurrence
- Optimizing the aesthetic restoration of the abdomen
- Improvement of life quality



Khansa I, Janis JE. Management of skin and subcutaneous tissue in complex open abdominal wall reconstruction. *Hernia*. 2018 Apr;22(2):293-301

PREOPERATIVE EVALUATION



PRINCIPLE 1- OPTIMIZE MODIFIABLE RISK FACTORS

- Preoperative optimization (pre-habilitation)
 - All comorbidities optimized, and contamination minimized.
- Cessation of smoking
 - Glycemic control
 - Improve nutrition
 - Weight loss
 - Respiratory exercise
 - Pulmonary condition
 - Cardiac condition

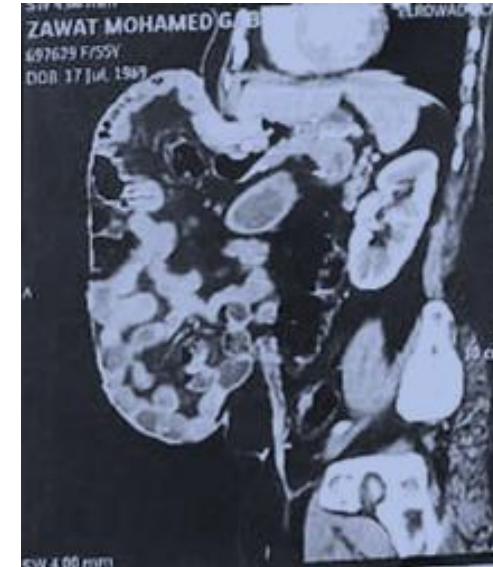
PRINCIPLE 2. PRE-HABILITATION OF THE ABDOMINAL WALL



Consultation report

- ❖ **Patient history:**
 - ✓ Female patient, 55 years old.
 - ✓ Abdominal wall hernia.
 - ✓ Requested for pre-operative evaluation.
- ❖ **Available sent tools:**
 - ✓ Contrast MSCT of the abdomen and pelvis.
- ❖ **Examination done after revision:**
 - ✓ Abdominal US
- ❖ **Opinion and recommendation:**
 - ✓ **After revision of the available images and doing abdominal US we can conclude that:**
 - ✎ There is midline epigastric and PUM hernia at the site of incision with the following criteria:
 - **Site:** epigastric and Supraumbilical.
 - **Size of the defect:** 16x19 cm
 - **Size of the hernial sac:** 10x20x26 cm
 - **Volume of the hernial sac:** 2600 cm³
 - **Size of the peritoneal sac:** 9x23x27 cm
 - **Volume of the peritoneal cavity:** 2795 cm³
 - **Ratio of hernia sac volume to peritoneal cavity volume:** 46/54 (%)
 - **Contents of the hernia sac:** All small bowel, part of greater curve of stomach and all transverse colon with segment III of the liver.
 - **Complications:** no
 - ✎ Abdominal organs: Bariatric gastric surgery.
 - ✎ Ascites: no
 - ✎ Lymphadenopathy: no

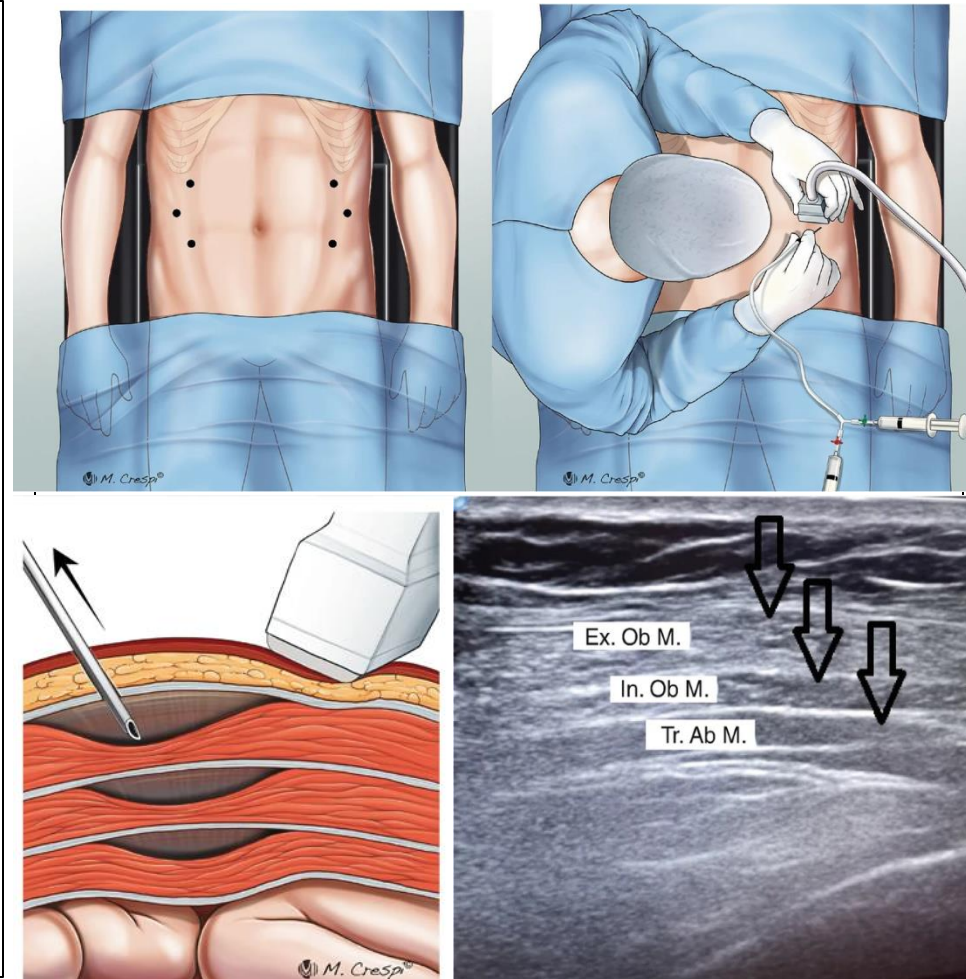
Best regards



PRINCIPLE 2. PRE-HABILITATION OF THE ABDOMINAL WALL

Botulinum toxin A injection (BTI)

- Chemical component separation
- Chemical paralysis leads to elongation of the lateral muscles
- 4 weeks before surgery
- May allow fascial closure without the need for component separation



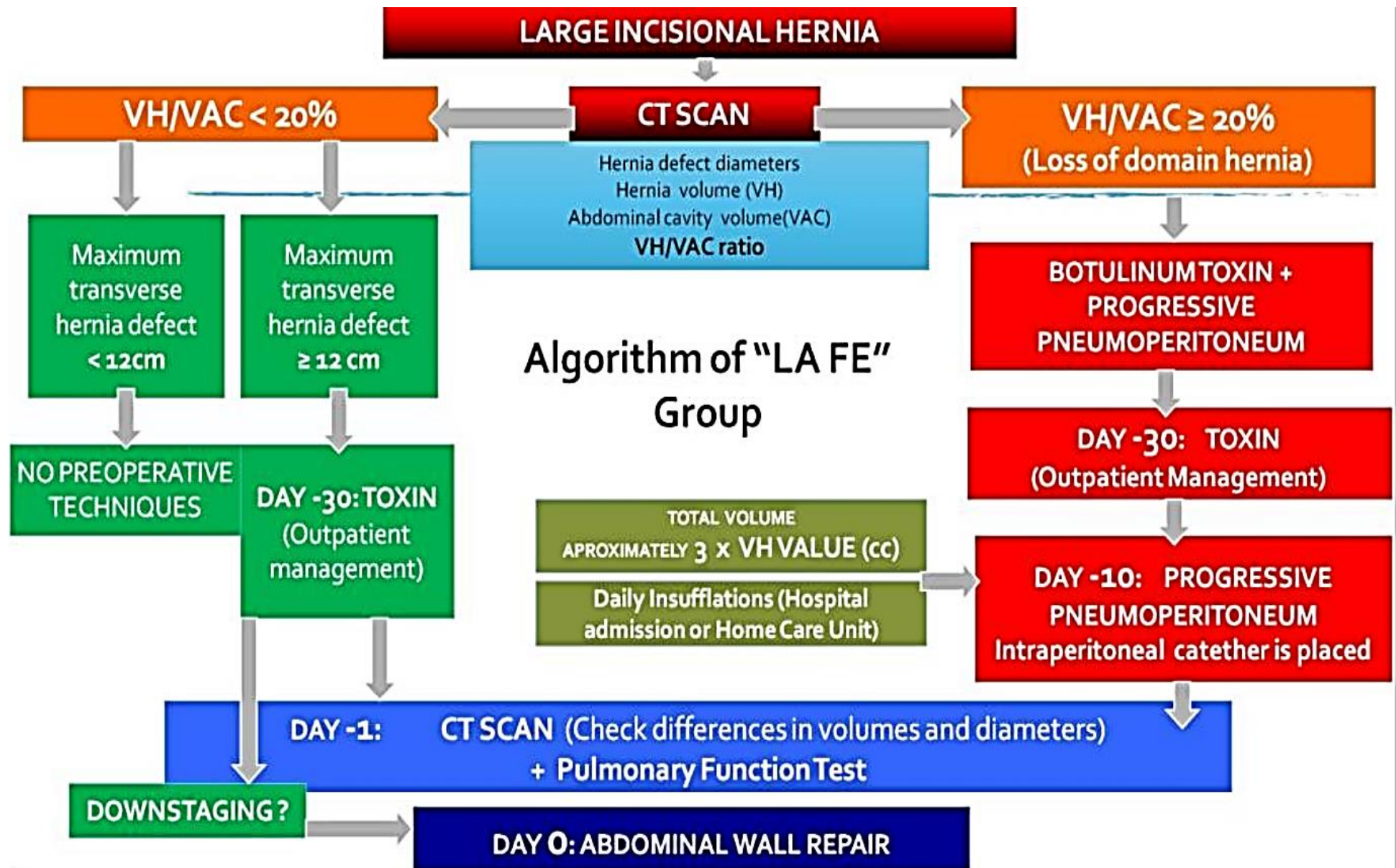
PRINCIPLE 2. PRE-HABILITATION OF THE ABDOMINAL WALL

Preoperative Progressive Pneumoperitoneum (PPP)

- Using peritoneal dialysis catheters, central venous catheters, or pigtail catheter
- 2-3 weeks before surgery
- Various schedules of injections
- Can be combined with BTI
- Abdominal belt is mandatory during the PPP



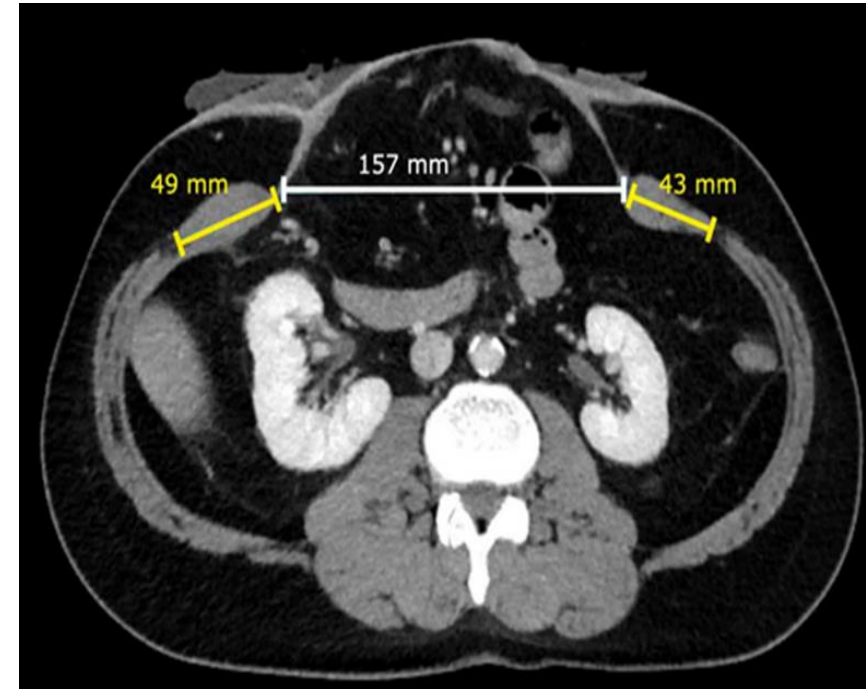
Ramaswamy A. Preoperative Optimization for Abdominal Wall Reconstruction. *Surg Clin North Am.* 2023;103(5):917-933.
Bueno-Lledó, J., Martínez-Hoed, J., Pous-Serrano, S. (2022). Progressive Pneumoperitoneum (PPP) in Hernia Repair. In: Baig, S.J., Bhandarkar, D., Priya, P. (eds) *Newer Concepts and Procedures in Hernia Surgery - An Atlas.* Springer, Singapore. pp 219–232. https://doi.org/10.1007/978-981-19-5248-7_23.



Bueno-Lledó J, Carreño-Saenz O, Torregrosa-Gallud A, Pous-Serrano S. Preoperative Botulinum Toxin and Progressive Pneumoperitoneum in Loss of Domain Hernias-Our First 100 Cases. *Front Surg.* 2020;28:7:3

PRINCIPLE 3. PERIOPERATIVE CARE

- Preoperative imaging
- Pulmonary function tests
- Bowel preparation
- Plan an ICU bed if needed
- DVT prophylaxis
- Multimodal analgesia
- WHO checklist for prevention of surgical site infection
- Early mobilization
- Abdominal binder



<https://radiologyassistant.nl/abdomen/abdomen-1/abdominal-wall-hernias>

FISCHER SCORE

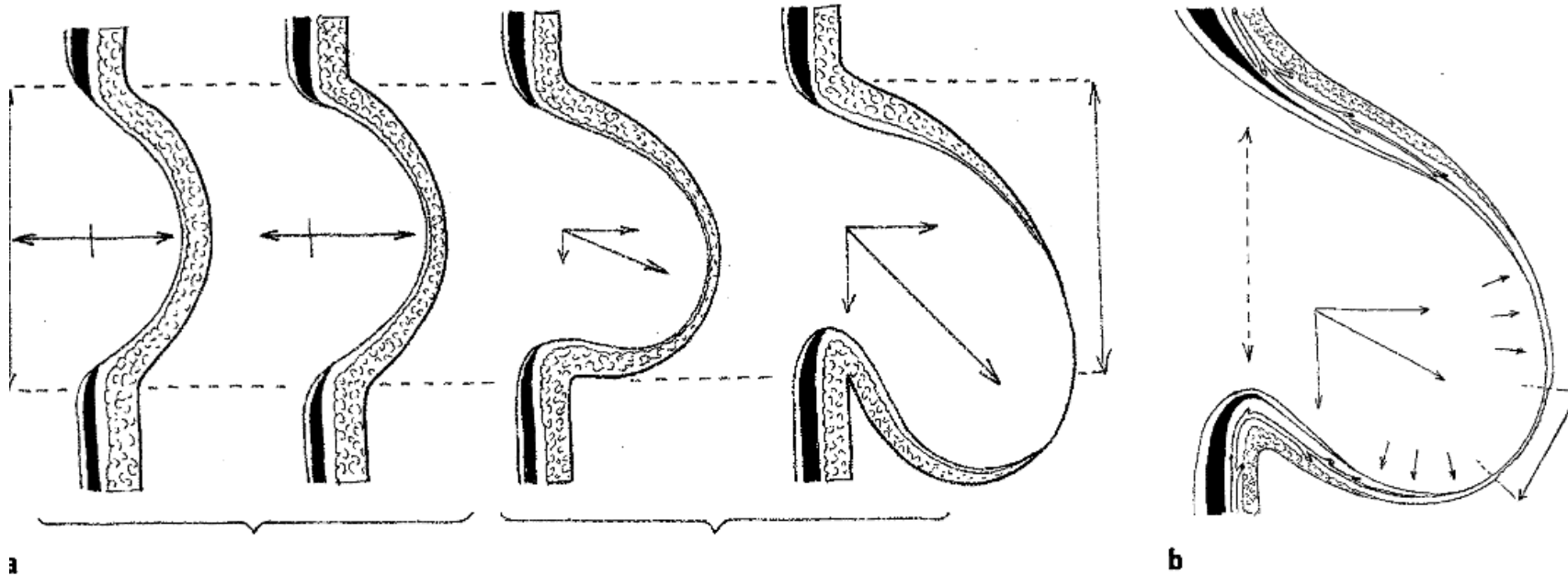
PREDICT POSTOPERATIVE RESPIRATORY FAILURE

Preoperative factors	points
COPD	2
Pre-existing dyspnea at rest	2
Dependent functional status	1
ASA score 4	1
Hypoalbuminemia	1
Recurrent incarcerated hernia	1
Postoperative factors	
Concurrent intra-abdominal procedure	1
Operative time > 240 min	1

Fischer JP, Shang EK, Butler CE, et al. Validated model for predicting postoperative respiratory failure: analysis of 1706 abdominal wall reconstructions. *Plast Reconstr Surg* 2013;132(5):826e-835e.

PRINCIPLE 4. WOUND PREPARATION

PATHOGENESIS OF ULCER IN GIANT INCISIONAL HERNIA



Flament, J.B., Avisse, C., Palot, J.P. *et al.* Trophic ulcers in giant incisional hernias-pathogenesis and treatment. *Hernia* 1, 71-76 (1997)

PRINCIPLE 4. WOUND PREPARATION

The first stage:

- Debridement or percutaneous drainage
- Local care, bed rest, antibiotics for eradication of chronic ulcer

The second stage: hernia surgery



PRINCIPLE 4. WOUND PREPARATION

One stage treatment of the hernia and ulcer

- Control infection: healing phase of the ulcer
- Wide resection of skin cover about the hernia thereby eliminating trophic ulcer



PRINCIPLE 5. SELECT THE CORRECT PROCEDURE

- To minimize the risk of hernia recurrence and bulge
- Good tension free fascia to fascia repair reinforced with mesh
- Achieving a robust, innervated, and mesh-reinforced musculofascial coaptation is vital for dynamic and functional abdominal wall.

PRINCIPLE 5. SELECT THE CORRECT PROCEDURE

- ✓ Bridged repair (mesh spanning the hernia defect).
- ✓ Simple release incisions
- ✓ Peritoneal flap hernioplasty
- ✓ Anterior component separation (ACS)
- ✓ Mesh-reinforced ACS
- ✓ Perforator sparing ACS
- ✓ Endoscopic ACS
- ✓ Posterior component separation (PCS)
- ✓ PCS/transversus abdominis release (PCS/TAR)
- ✓ Laparoscopic (PCS/TAR)
- ✓ Endoscopic TAR (eTEP TAR)
- ✓ Robot-assisted TAR (rTAR)

Holihan JL, Askenasy EP, Greenberg JA, et al. Component Separation vs. Bridged Repair for Large Ventral Hernias: A Multi-Institutional Risk-Adjusted Comparison, Systematic Review, and Meta-Analysis. *Surg Infect* . 2016 ;17(1):17-26.

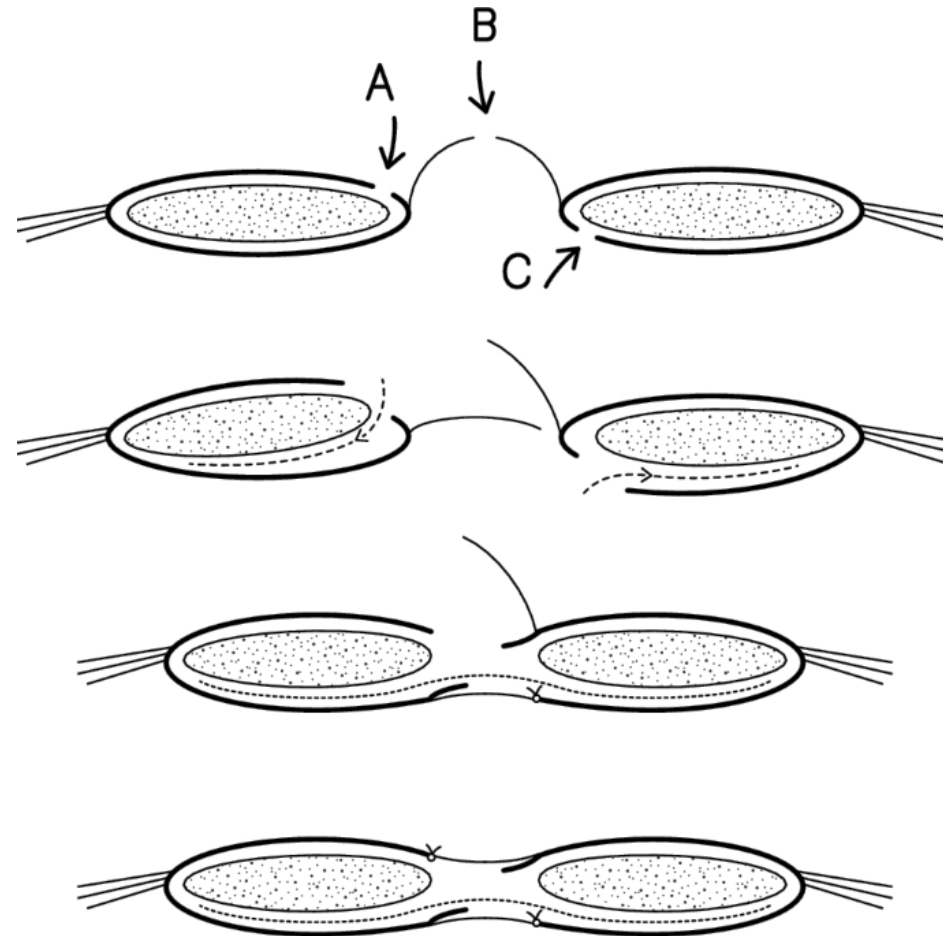
Sözen S, editor. *Hernia Updates and Approaches* [Internet]. IntechOpen; 2023. Available from: <http://dx.doi.org/10.5772/intechopen.1000397>

PRINCIPLE 5. SELECT THE CORRECT PROCEDURE

- In late 1980s, sublay retromuscular mesh placement (Rives & Stoppa)
- In 1990, open anterior component separation technique (Ramirez)
- In 2000, the 'endoscopic CST (Lowe& Maas)
- In 2008, Posterior CST (Carbonell)
- In 2012, PCS/transversus abdominis release (TAR) (Novitsky)

PERITONEAL FLAP HERNIOPLASTY

Use of the hernia sac to bridge the fascial gap and isolate the mesh from both the intraperitoneal contents and the subcutaneous space.

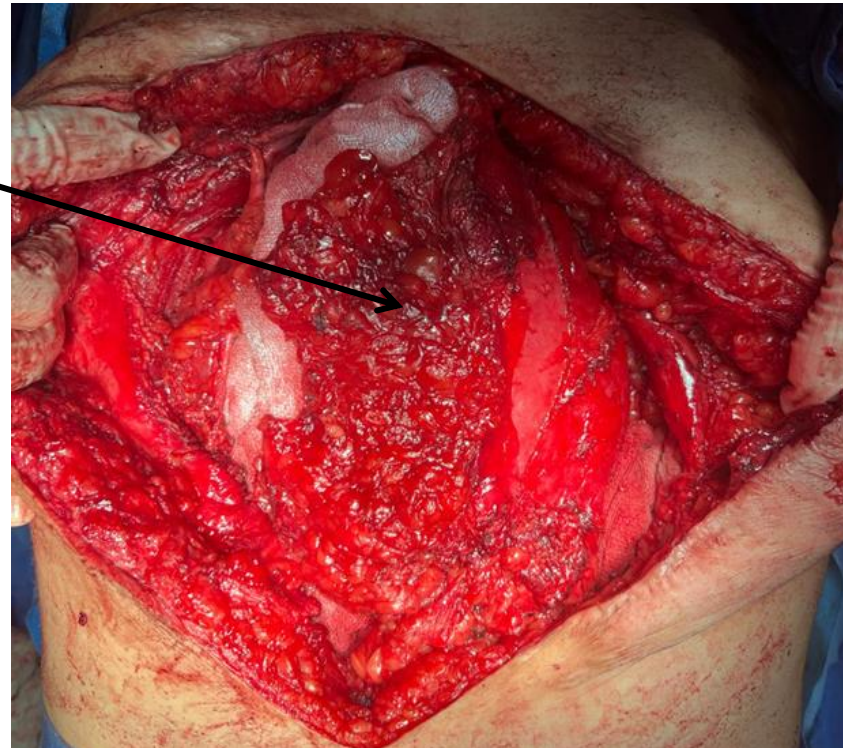


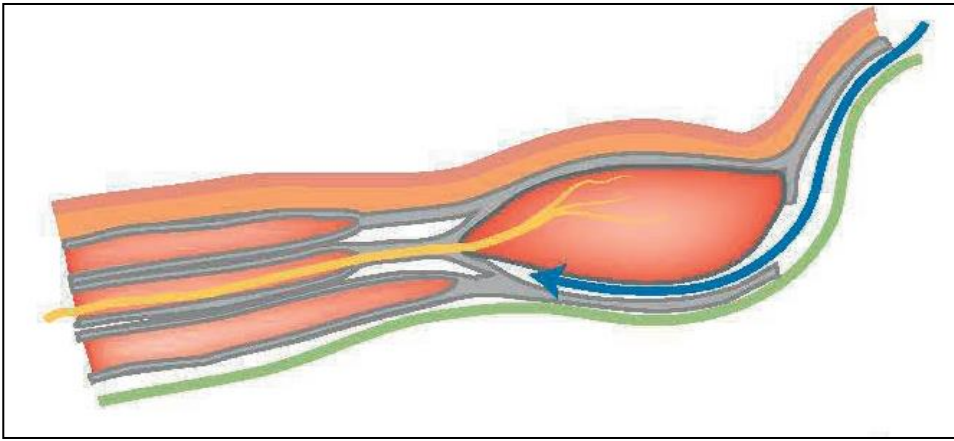
Baig SJ, Singhal V, Afaque MY, et al. Peritoneal flap technique for abdominal wall expansion in the management of complex ventral hernias: a multicentre study from India. *Hernia*. 2024;28(3):863-869.

PERITONEAL FLAP HERNIOPLASTY

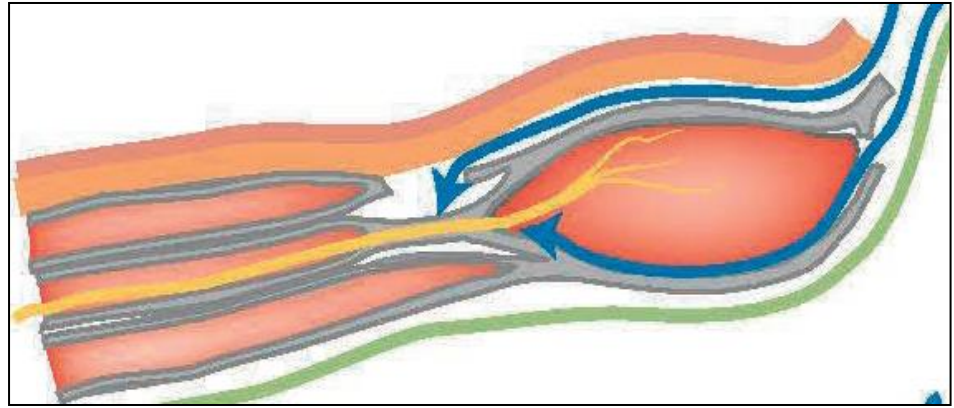
- Component separation can be combined with bridging using peritoneal flap of hernia sac

peritoneal flaps

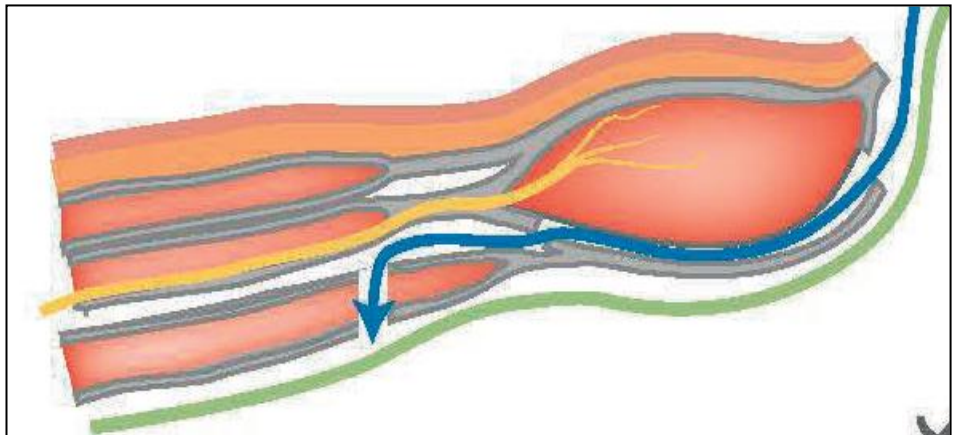




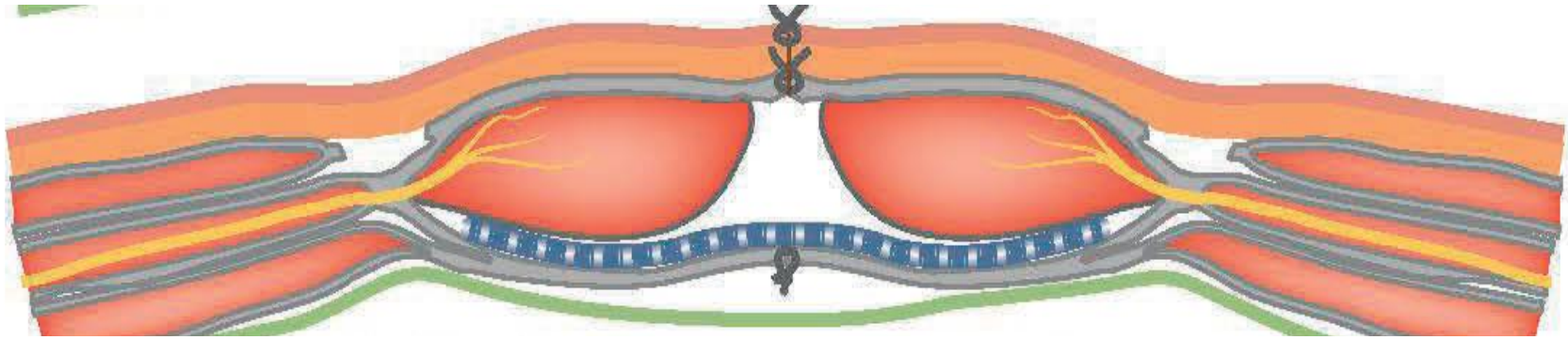
Retorectus: Rives- Stoppa



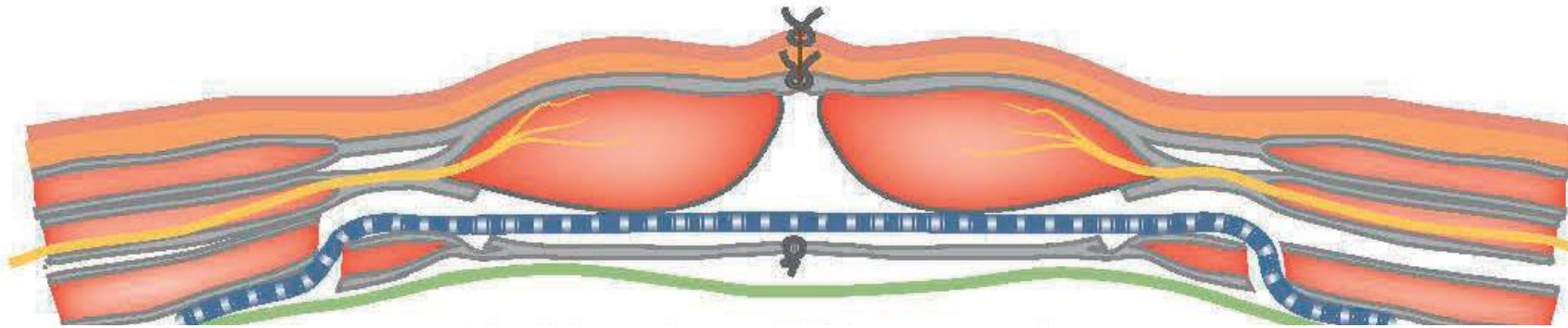
Anterior component separation



Transversus abdominis release

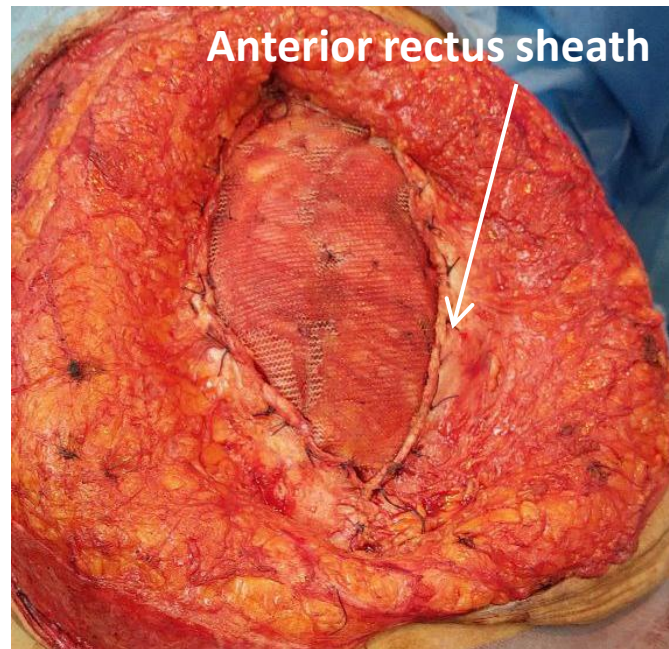
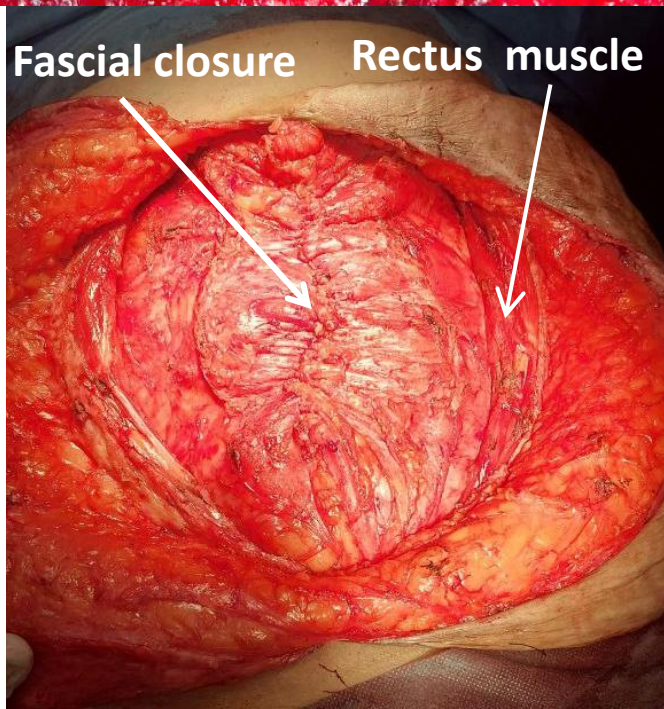
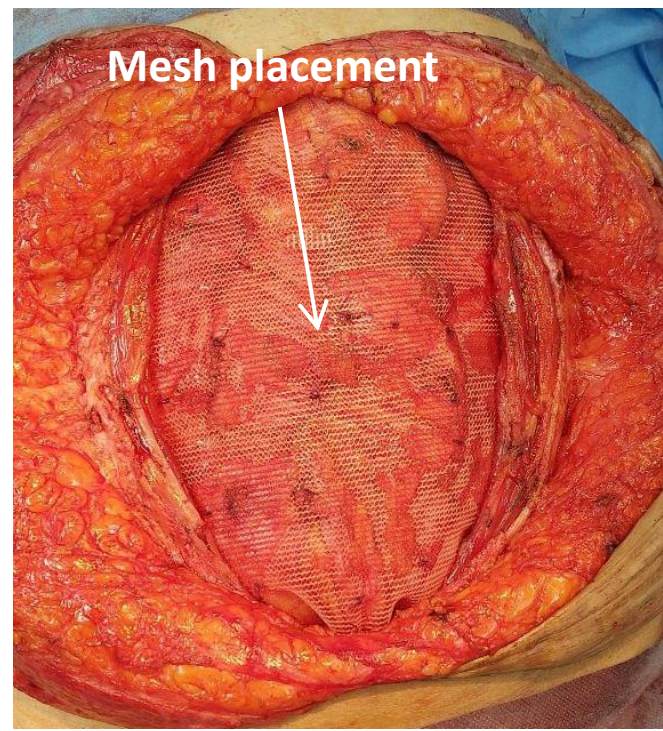
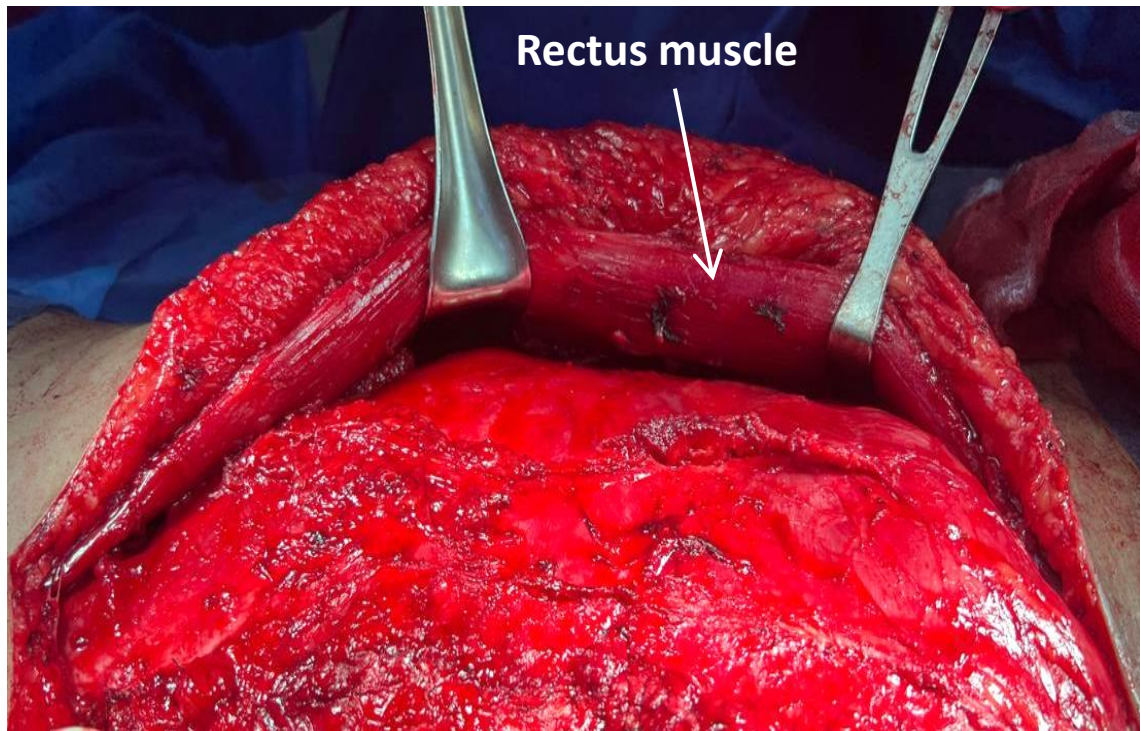


Anterior component separation with retrorectus mesh



Posterior component separation with mesh in retromuscular pre peritoneal plane

Illustration: Ron Slagter. Wegdam J, van der Velde S. Zwelling van de buik. In: van der Velde S, Houwert M, Schepers A, Smit F(red.). Probleemgeoriënteerd denken in de chirurgie. Utrecht: Boom|De Tijdstroom; 2022. p. 568.



CHOICE OF REPAIR TECHNIQUE

- Enthusiastic surgeons, applying new techniques
- Industry-driven, tsunami of expensive meshes
- Industry- driven tsunami of sophisticated laparoscopic & robotic instruments

- No one size fit for all
- Patient and hernia characteristics
- Local experience and training
- Availability of equipment and meshes
- Resources

PRINCIPLE 6: MANAGEMENT OF SKIN AND SUBCUTANEOUS TISSUE

- The reconstruction can be lost due to skin necrosis/dehiscence, or infection around the mesh
- Good reconstruction improve quality of life and self-esteem

PRINCIPLE 6: MANAGEMENT OF THE SKIN AND SUBCUTANEOUS TISSUE



MINIMIZE DEAD SPACE

Risk of dead space

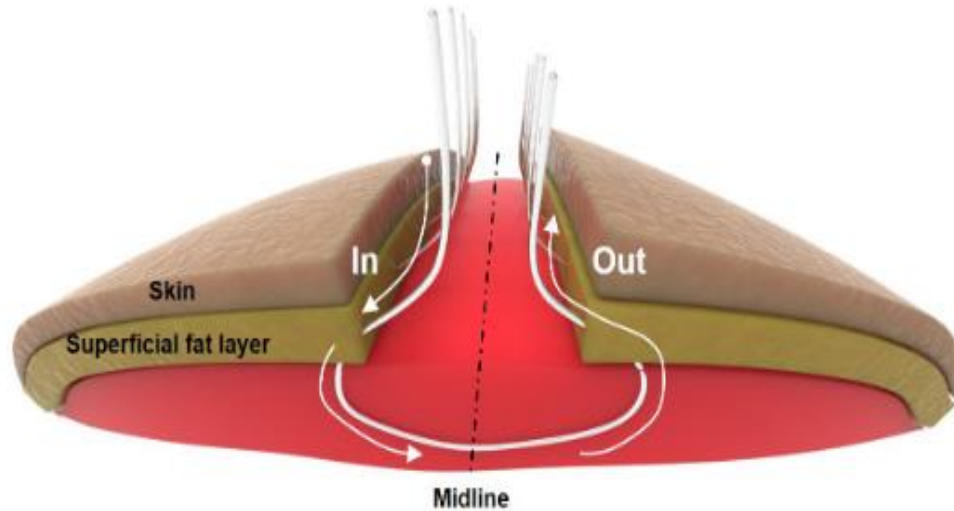
- Fluid accumulation may prevent revascularization or incorporation of mesh
- Infection of fluids

How to avoid

- ✓ Avoid excess skin
- ✓ 3-point tension sutures
- ✓ Quilting sutures
- ✓ Closed Suction drains
- ✓ Abdominal binder

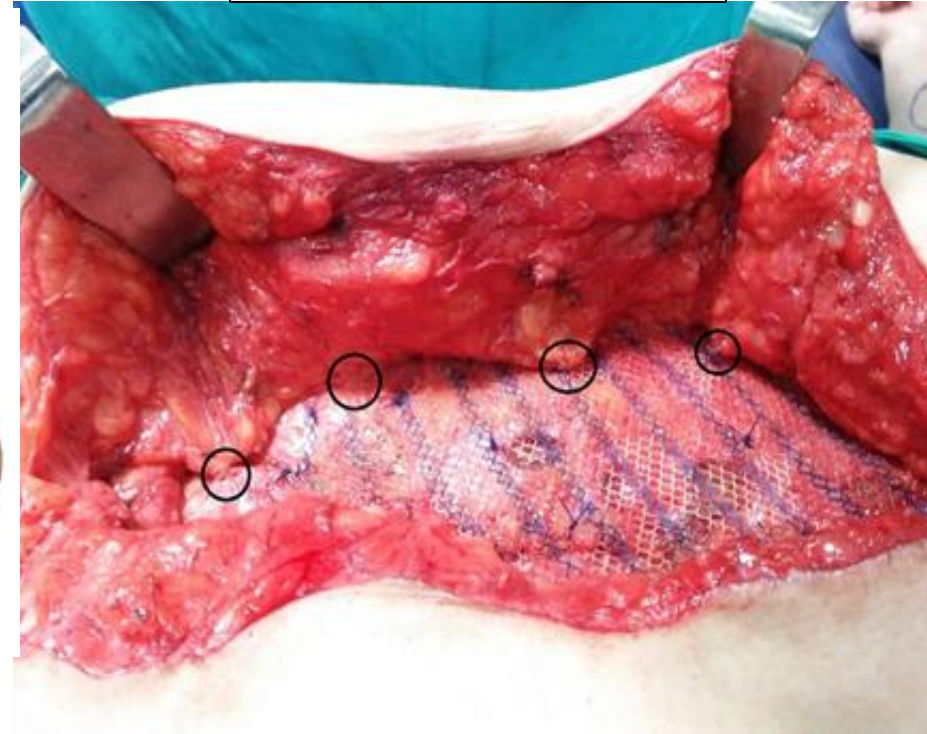
MINIMIZE DEAD SPACE

3- point tension sutures



Comparative study of the prevention of seroma formation in immediate breast reconstruction with latissimus dorsi myocutaneous flap. Arch Aesthetic Plast Surg. 2020;26(3):92-9

Quilting sutures



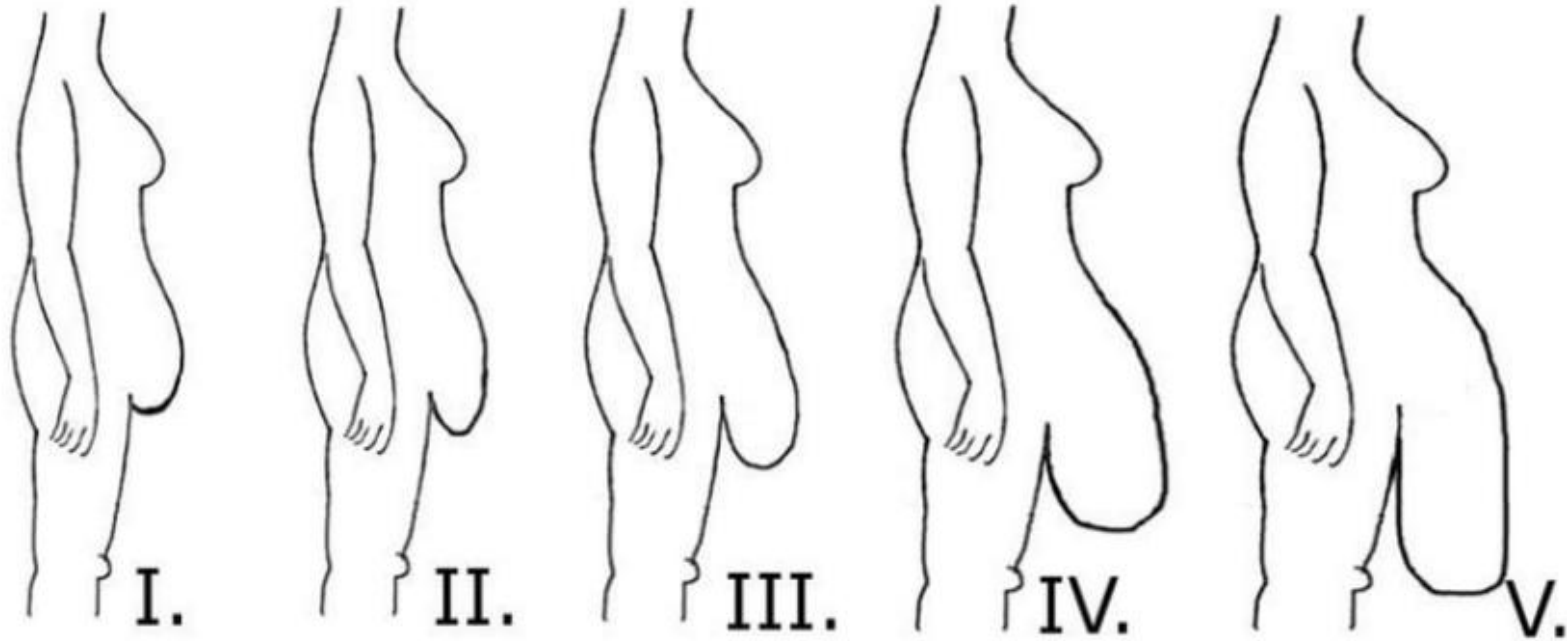
Alhussini MA, Awad AT, Kholosy HM. Using quilting sutures in decreasing seroma formation after managing large ventral hernias: a comparative study. Hernia. 2019;23(4):717-722.

HOW TO AVOID SKIN TENSION

- Design of skin incision
- Obtaining primary musculofascial reapproximation
- Layered incisional closure (Scarpa's fascia, followed by deep dermal sutures)
- Deep dermal sutures should evert the skin edges, to accelerate healing and improve scar quality

PRINCIPLE 6: MANAGEMENT OF THE SKIN AND SUBCUTANEOUS TISSUE

Skin pannus



Panniculus classification according to Igwe Jr et al.



SKIN APRON OR PANNUS

- Hanging pannus often become edematous ulcerated or infected
- Medically disabling
- Diminish patient ability to walk, work, and perform daily activity (e.g. hygiene)



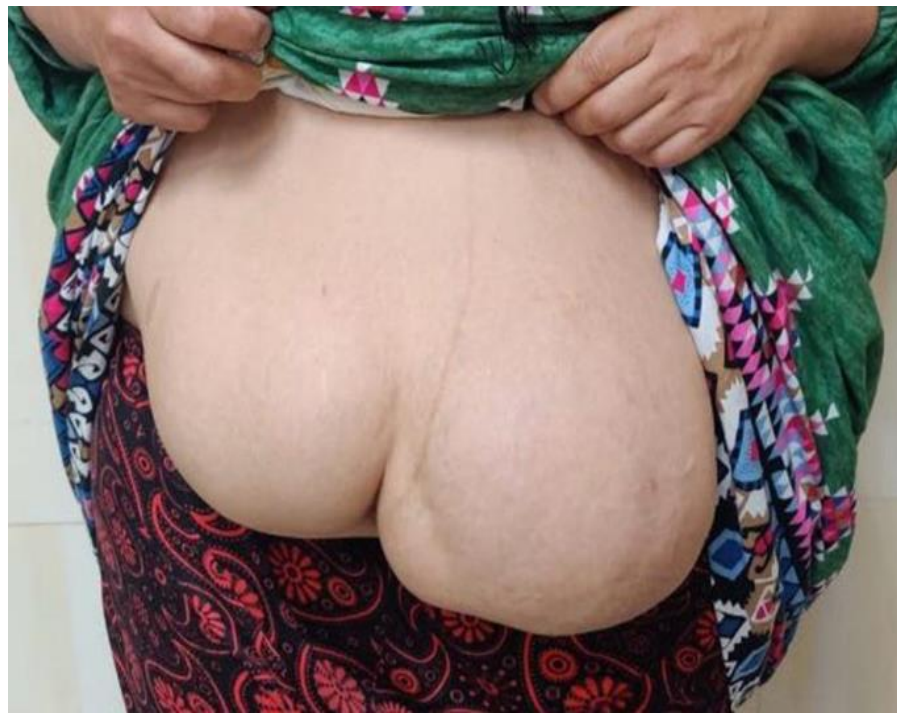
CONCOMITANT PANNICULECTOMY

- Excision of unhealthy skin back to healthy tissue
- Elliptical panniculectomy
- Enhances surgical exposure
- Minimize dead space
- Improve function
- Increasing patient satisfaction

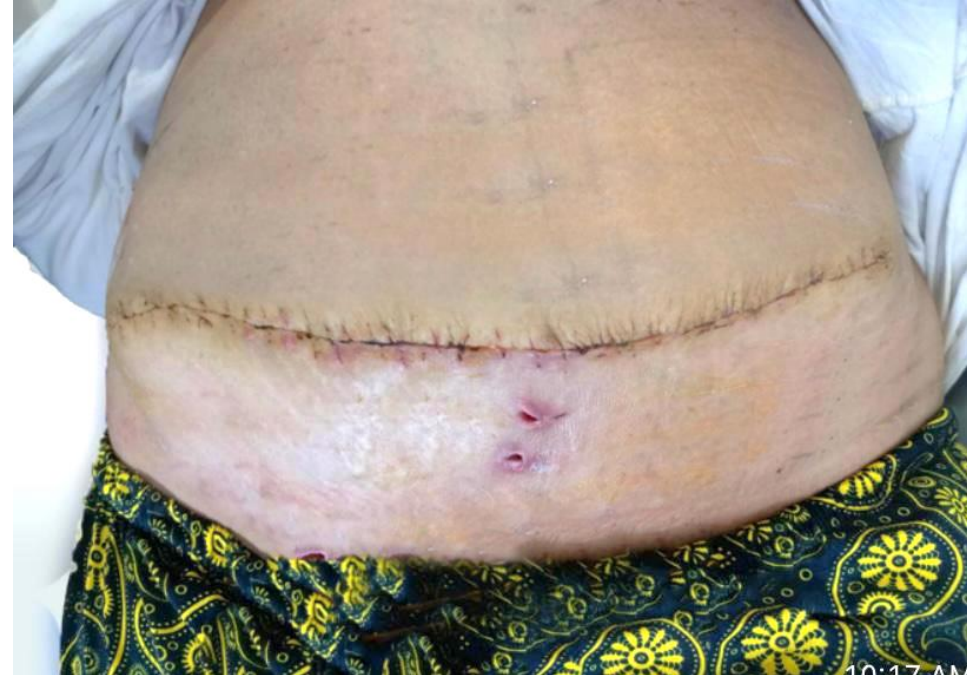


POSTOPERATIVE OUTCOME





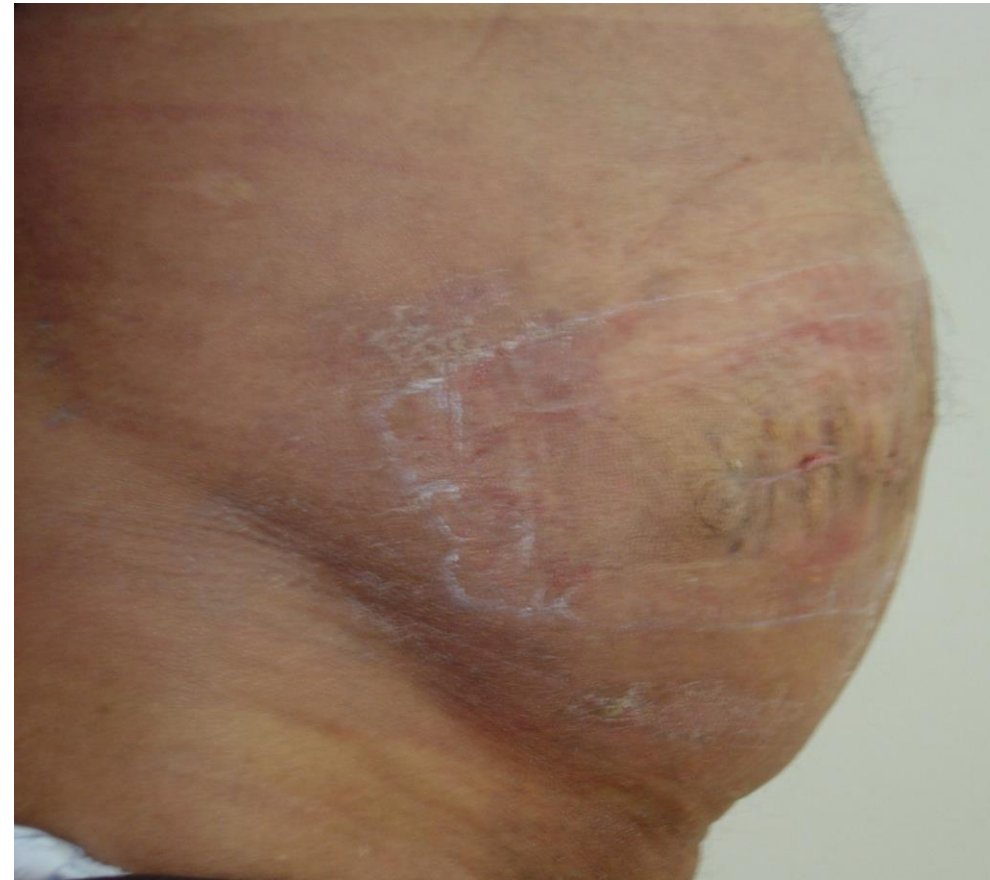
POSTOPERATIVE OUTCOME



POSTOPERATIVE OUTCOME



POSTOPERATIVE OUTCOME

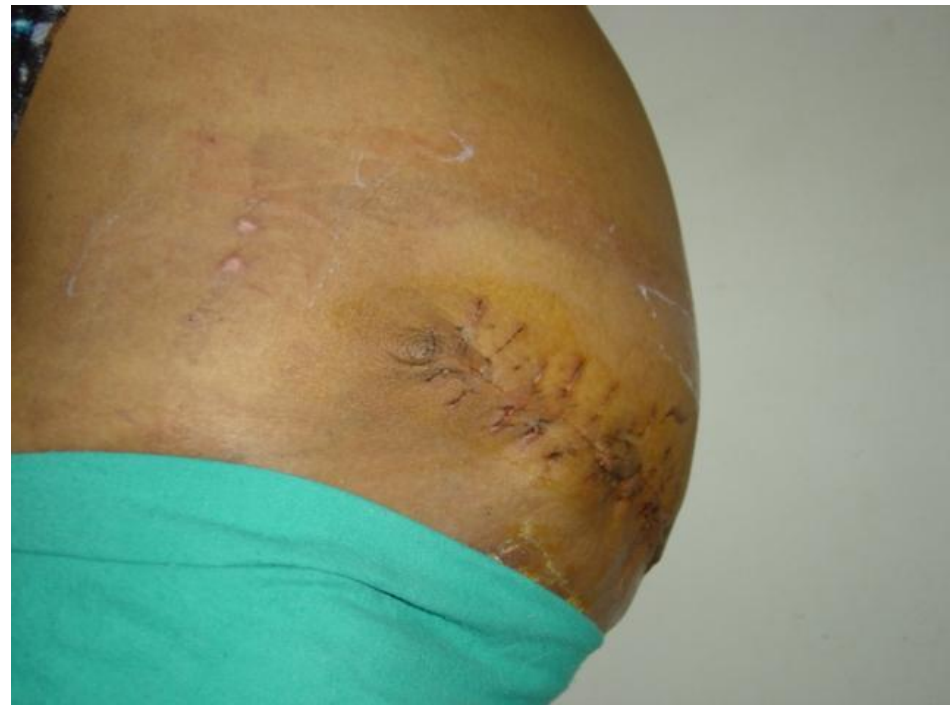


POSTOPERATIVE OUTCOME





POSTOPERATIVE OUTCOME



POSTOPERATIVE OUTCOME







QUALITY OF LIFE AFTER ABDOMINAL WALL RECONSTRUCTION

Improved:

- ✓ Abdominal wall function
- ✓ Mobility
- ✓ independence
- ✓ Work and employment
- ✓ self-esteem
- ✓ Social & interpersonal relations

Thank
you