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Taiwan Hernia Society Winter Workshop

Incisional hernia guidelines and video sharing

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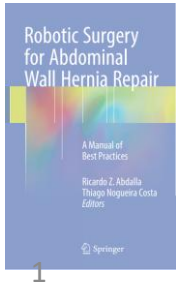

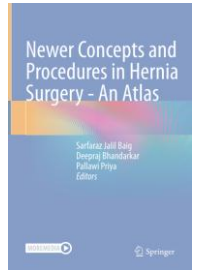

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GUIDELINES

Update of Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS))—Part A

- Builds on 2014 IEHS guidelines.
- Focus: evidence 2012–2017, new techniques included.
- Guidelines updated to reflect literature up to 2017.
- New topics: CST, TAR, Botox, robotics, imaging.
- Only new/changed recommendations are included.
- Read original + update for complete picture.

Rationale for update

- Hernia surgery literature expanded dramatically (≈10×).
- New minimally invasive and robotic techniques emerged.
- Need to inform surgical community and stimulate research.
- Guidelines are bridge between evidence and practice.

How the update was done

- Literature 2012–2017 evaluated using Oxford evidence ranking.
- Previous authors re-assessed their chapters.
- Two consensus conferences: Oct 2017 (Beijing), Mar 2018 (Cologne).
- Only novel/updated statements included.

Content map — Part A chapters (overview)

- 31 chapters covering imaging, classification, techniques, outcomes.
- Topics: CT/MRI/US, component separation, fixation, mesh, complications.

Epidemiology & trends

- Worldwide ~2 million hernia surgeries/year.
- Aging population and more laparotomies increase incidence.
- Surge in publications and innovation.
- Importance of standardized recommendations.

Content—Part A

Chapter 1 —

Comparability of incisional vs ventral hernias

- Question: Are operative techniques/outcomes comparable?
- Incisional hernias often more complex (adhesions, prior incision).
- Primary ventral hernias tend to be smaller/simple.
- Surgical approach should be tailored to hernia type.

Key outcome differences

- Differences in recurrence, complication profiles by hernia etiology.
- Patient comorbidities and prior operations heavily influence outcomes.
- Data heterogeneity limits definitive comparisons.
- Recommendation: individualize technique selection.

Practical implications

- Preoperative planning must consider hernia origin.
- Use imaging and measurement to guide approach.
- Consider open vs minimally invasive based on complexity.
- Document criteria for approach selection.

Chapter 2a —

Role of CT/MRI pre-op

- New studies: CT may predict wound complications and need for complex repair.
- CT useful for large/incarcerated hernias for planning.
- Pre-op defect ratios/area help predict feasibility of closure (CST).
- Grade D recommendation: consider CT in larger/incarcerated cases.

CT limitations & variability

- High interobserver variability in CT interpretation (radiographic recurrence).
- Need standardized radiographic definitions for recurrence.
- MRI-visible meshes studied for mesh behavior but limited data.
- CT planning should be combined with clinical judgement.

Practical CT guidance

- Consider CT when planning CST, TAR, or complex reconstruction.
- Use CT to measure defect area, loss of domain.
- Counsel patients about complexity based on imaging.
- Avoid over-reliance on imaging without clinical correlation.

Chapter 2b —

Role of ultrasound pre-op

- Ultrasound may detect ventral hernias and rectus diastasis preoperatively.
- Useful in clinic for dynamic assessment.
- Operator-dependent; requires trained sonographer.
- Consider as adjunct when CT not available/needed.

Ultrasound practicalities

- Good for superficial defects and diastasis.
- Combine with physical exam for best accuracy.
- May reduce need for CT in small straightforward hernias.
- Standardize reporting for reproducibility.

Chapter 3 —

Classification

- Review of available classification systems (EHS, others).
- Importance of consistent defect-size reporting (width, area).
- Classify by location, size, prior surgery.
- Standardized classification improves research and comparisons.

Measurement issues

- Intra-abdominal pressure (IAP) affects defect measurements (IAP 8 vs 15 mmHg alters dimensions).
- Recommend standardized measurement technique (insufflation level).
- Report width/height/area and method used.
- Highlight loss of domain when relevant.

Chapter 4 —

Indications for treatment

- Indications depend on defect size, symptoms, hernia type, age.
- Symptomatic hernias generally recommended for surgery (Grade B).
- Watchful waiting may be safe in selected patients but has high crossover rates.
- Emergency repair associated with higher morbidity/mortality.

Watchful waiting evidence

- Studies show WW can be safe but 11–33% crossover to surgery.
- Emergency operations after WW crossover have higher perforation, fistula, mortality rates.
- Grade B: suggest WW for medical optimization (modifiable risk factors).
- Use shared decision-making and clear follow-up plan.

Size thresholds & recommendations

- Laparoscopic technique preferably for defects <15 cm diameter.
- Defect size predicts emergency repair risk (umbilical 2–7 cm).
- Larger defects correlate with higher recurrence and complications.
- Pre-op optimization recommended for elective cases.

Chapter 5 —

Role of open suture repair

- Re-evaluate whether open suture repair still has place depending on defect size.
- Evidence favors mesh-based repairs for many defects.
- Primary suture repair may be considered for very small defects.
- Discuss trade-offs: recurrence vs mesh-related risks.

Practical guidance

- For defects > certain size, recommend mesh augmentation/repair.
- Consider patient factors (comorbidity, infection risk) in selecting technique.
- When choosing suture repair, counsel about recurrence risk.
- Document rationale for non-mesh repair.

Chapter 6 —

Obesity and incisional hernia

- Obesity increases risk of incisional hernia and postoperative complications.
- Pre-op weight optimization is beneficial if feasible.
- Consider multidisciplinary management for obese patients.
- Laparoscopic approach may reduce wound complications in some.

Surgical strategy in obese patients

- Tailor mesh choice and fixation to body habitus.
- Consider component separation or TAR for large defects with obesity.
- Optimize comorbidities (DM, smoking) pre-op.
- Use enhanced recovery pathways when possible.

Chapter 7 —

Recurrence after open surgery

- Question: Is re-do better laparoscopically?
- Laparoscopic re-do can reduce wound complications and infection.
- Adhesiolysis risk and bowel injury must be considered.
- Case selection important for laparoscopic re-do approach.

Evidence & recommendations

- Risk-adjusted tailoring leads to uniformly low complication rates.
- Consider laparoscopic re-do for appropriate patients; it’s not universally superior.
- Ensure surgeon experience in complex reoperations.
- Document rationale for chosen re-do strategy.

Chapter 8 —

Antibiotic & VTE prophylaxis

- Review of evidence for antibiotic prophylaxis in laparoscopic ventral hernia surgery.
- Perioperative antibiotics recommended for mesh procedures to reduce SSI.
- Thromboembolic prophylaxis should follow risk stratification.
- Balance bleeding risk vs thrombosis risk.

Practical prophylaxis guidance

- Use evidence-based dosing and timing for antibiotics.
- Apply VTE protocols adapted to patient risk and procedure length.
- For prolonged procedures, reassess antibiotic redosing.
- Document prophylaxis plan in operative note.

Chapter 9 —

Trocar positioning & pneumoperitoneum

- Proper trocar placement and IAP creation are critical for exposure.
- Positioning depends on hernia location and size.
- Consider patient positioning to optimize working angles.
- Initial access method should minimize bowel injury risk.

Technical tips

- Use optical trocar or open Hasson for entry in prior surgery.
- Establish pneumoperitoneum at appropriate IAP for measurements.
- Place working ports to facilitate mesh deployment and fixation.
- Protect trocars and instruments to reduce hernia at port sites.

Chapter 10 —

Port type, number, and placement

- Port selection affects ergonomics and instrument handling.
- Minimize number of ports compatible with safe technique.
- Single-port techniques emerging but role is limited.
- Use port configuration suited to mesh insertion technique.

Emerging single-port considerations

- NOTES/single-port currently limited role for ventral hernia. (SP system impact)
- Consider only in selected cases with experienced teams.
- Evidence insufficient for routine adoption.
- Monitor outcomes and publish series to build evidence.

Chapter 11 —

Principles of adhesiolysis

- Safe adhesiolysis reduces bowel injury risk.
- Sharp dissection near adhesions, energy devices used cautiously.
- Identify anatomy carefully before transection.
- Use laparoscopic techniques when feasible.

Management of dense adhesions

- Consider staged approach or conversion if unsafe.
- Pre-op imaging (CT) may indicate adhesion burden.
- Protect and repair any bowel injuries promptly.
- Document adhesiolysis extent and findings.

Chapter 12 —

Defining defect margins & sizing

- Accurate defect measurement critical for mesh sizing and closure planning.
- Use IAP-standardized intraoperative measurement.
- Report width, height, and area.
- Consider loss of domain assessments.

Implications for mesh & closure

- Mesh area must account for overlap and possible shrinkage.
- Closure before IPOM may reduce postoperative bulging/seroma.
- Plan fixation and insertion technique based on measured size.
- Use imaging data where available to aid planning.

Chapter 13 —

Closure vs non-closure prior to IPOM

- Key Qs: does defect closure reduce complications & recurrence?
- Some studies favor closure for improved function/QoL.
- Closure may reduce seroma and bulging.
- Techniques vary (sutures, transfascial, barbed sutures).

Measures to facilitate closure in large defects

- Component separation (anterior/posterior) and TAR to allow midline closure.
- Pre-op Botox to relax abdominal wall considered in some centers.
- Progressive pneumoperitoneum or staged approaches possible.
- Techniques selection based on defect size and surgeon experience.

Recommendations & evidence

- Evidence heterogeneous; closure generally favored when feasible.
- For very large defects, bridging may be necessary but associates with more bulging.
- Document closure method and rationale.
- Encourage RCTs to compare closure strategies.

Chapter 14 —

How much overlap is necessary

- Accurate defect measurement critical for mesh sizing and closure planning.
- Use IAP-standardized intraoperative measurement.
- Report width, height, and area.
- Consider loss of domain assessments.

Practical guidance on overlap

- Measure defect and plan mesh with margin for fixation and shrinkage.
- Use imaging or intra-op measurement to confirm.
- Ensure adequate fixation to maintain overlap.
- Report overlap dimensions in operative notes

Chapter 15/16 —

Fixation principles

- Fixation affects pain, recurrence, and mesh stability.
- Options: tacks, transfascial sutures, adhesives.
- Number and type of fixation points matter.
- Balance between secure fixation and chronic pain risk.

Fixation evidence & pain risk

- Chronic pain may relate to fixation type/number.
- Some data suggest fewer tacks and selective suturing reduce pain.
- Consider absorbable fixation in select patients.
- More high-level evidence needed.

Practical fixation tips

- Use standardized fixation patterns for reproducibility.
- Place transfascial sutures at key anchor points for large meshes.
- Use care near nerves to decrease chronic pain risk.
- Document fixation method/locations.

Chapter 17 —

Mesh insertion techniques

- Mesh insertion approach influences operative time and contamination risk.
- Various methods: roll-and-insert, introducer devices, through ports.
- Protect mesh from contamination during insertion.
- Consider pre-shaped or customized meshes for large defects.

Minimizing contamination & handling

- Use specimen bag or wound protector for contaminated cases.
- Avoid touching mesh with instruments that contacted bowel.
- Maintain pneumoperitoneum during insertion where helpful.
- Ensure mesh orientation (coated side correctly placed).

Chapter 18 —

Management of bowel injury intra-op

- Bowel injury during adhesiolysis/repair is a serious complication.
- Immediate recognition and repair crucial.
- Consider conversion to open if contamination or complex repair needed.
- Mesh placement in contaminated field is controversial.

Decision-making after bowel injury

- Primary repair +/- diversion based on injury severity.
- Avoid prosthetic mesh in grossly contaminated fields; consider biological if necessary.
- Document injury, repair, and postoperative plan.
- Monitor closely for infection or fistula.

Chapter 19 —

Risk factors for infection

- Factors: obesity, smoking, immunosuppression, prolonged OR time.
- Contaminated wounds greatly increase infection risk.
- Mesh infection is a major concern needing possible explant.
- Perioperative antibiotics reduce SSI risk.

Strategies to reduce infection

- Optimize skin prep and sterile technique.
- Minimize OR time and tissue trauma.
- Consider prophylactic drains selectively.
- Early recognition and management of SSI essential.

Chapter 20 —

Mesh infection overview

- Mesh infection can require long-term antibiotics or removal.
- Synthetic vs biological meshes behave differently in infection.
- Prevention is preferable to treatment.
- Imaging and cultures guide management.

Management options for mesh infection

- Conservative therapy vs explant depending on organism/severity.
- For deep infection with sepsis, consider mesh removal.
- Biological meshes may be preferred in contaminated fields (evidence limited).
- Long-term follow-up required after management.

Chapter 21 —

Postoperative seroma: risks

- Seroma common after ventral hernia repair.
- Risk factors: large dead space, lack of defect closure, obesity.
- Seroma may contribute to infection or delay healing.
- Prevention strategies include closure and drains.

Seroma prevention & treatment

- Consider defect closure to reduce seroma.
- Use compression and aspiration for symptomatic seromas.
- Avoid routine prolonged drains unless indicated.
- Document seroma management in follow-up.

Chapter 22 —

Postoperative bulging

- Bulging may occur due to mesh bridging or inadequate mesh support.
- Distinguish true recurrence vs bulging/pseudorecurrence (clinical vs radiographic).
- Bulging affects cosmetic and functional outcomes.
- Prevent by closure and appropriate mesh selection.

Management of bulging

- Conservative management for mild cases; repair for symptomatic cases.
- Investigate with imaging to assess mesh integrity.
- Consider reoperation for persistent functional impairment.
- Emphasize prevention in initial repair.

Chapter 23 —

Chronic pain: key questions

- Is chronic pain related to fixation type/number/mesh/defect size?
- Chronic pain is multifactorial and challenging to treat.
- Identify neuropathic vs nociceptive components early.
- Prevention is primary strategy.

Evidence on pain & fixation

- Some evidence links fixation (sutures/tacks) to chronic pain risk.
- Fewer fixation points or absorbable devices may reduce pain.
- Mesh type/placement plane may also influence pain.
- More standardized outcome measures needed.

Treatment strategies for chronic pain

- Multimodal pain management: meds, nerve blocks, rehabilitation.
- Consider surgical intervention for refractory cases (neurectomy, mesh removal).
- Document pain scores and functional impact.
- Refer to pain specialists as needed.

Chapter 24 —

Recurrence after laparoscopic repair

- Recurrence mechanisms: inadequate overlap, fixation failure, infection.
- Risk factors include larger defects and technical errors.
- Reported recurrence rates vary; follow-up methods differ.
- Aim to standardize recurrence definitions and reporting.

Prevention of recurrence

- Ensure adequate overlap and secure fixation.
- Consider closure of defect when feasible.
- Address modifiable patient risk factors pre-op.
- Use standardized surgical technique and documentation.

Chapter 25 —

Open vs laparoscopic comparison

- Compare OR time, bowel lesion, seroma, wound infection.
- Laparoscopic repair often shorter hospital stay and fewer wound infections.
- Open approach may be preferred for complex, contaminated fields.
- Selection depends on patient & hernia factors.

Evidence highlights

- Some comparative studies show advantages for laparoscopy in selected outcomes.
- Heterogeneity in studies limits universal conclusions.
- Choose approach based on evidence and surgeon expertise.
- Encourage rigorous comparative trials.

Chapter 26 —

QoL, cost, recovery comparisons

- Assess hospital stay, return to activity, cost, QoL, pain, recurrence.
- Laparoscopy may offer faster recovery and shorter stay.
- Cost-effectiveness depends on local resources and complication profiles.
- Patient-reported outcomes increasingly important.

Practical conclusions

- Consider overall value: recovery, QoL, recurrence, and costs.
- Shared decision-making with patients regarding approach.
- Standardize outcome measures in trials for better comparisons.
- Report comprehensive endpoints (clinical + PROMs).

Chapter 27 —

Ideal mesh for adhesion prevention

- Do coated meshes prevent adhesions? Are manufacturer claims supported?
- Evidence mixed; no universally “ideal” mesh established.
- Permanent vs absorbable barriers debated.
- Choice influenced by defect, contamination risk, and surgeon preference.

Coated vs non-coated meshes

- Coated meshes reduce visceral adhesions in some studies.
- Long-term outcomes and comparative effectiveness require more data.
- Consider cost and specific clinical scenario.
- Watch for mesh shrinkage and behavior on imaging.

Practical mesh selection

- Use coated mesh for intraperitoneal placement when indicated.
- For contaminated fields, consider biological or biosynthetic alternatives.
- Balance adhesion prevention vs handling and fixation needs.
- Document mesh type and rationale.

Chapter 28 —

Role of biological/biosynthetic meshes

- Considered for infected or contaminated abdominal walls.
- Evidence limited; benefits in contaminated fields not definitive.
- Cost and durability are considerations.
- Use case-by-case with multidisciplinary input.

Evidence & recommendations

- Some series show acceptable outcomes but heterogeneity persists.
- Biologicals may decrease infection consequences but recurrence risk varies.
- Reserve for contaminated/complex cases where synthetic mesh contraindicated.
- Encourage better comparative studies.

Chapter 29 —

What happens to synthetic mesh in vivo

- Mesh integration, shrinkage, and remodeling occur post-implantation.
- MRI-visible meshes show measurable shrinkage within months.
- Host response varies by material and patient factors.
- Long-term mesh fate impacts functional outcomes.

Clinical implications

- Plan overlap accounting for mesh shrinkage.
- Monitor mesh position/behavior in follow-up imaging when indicated.
- Choose mesh with known properties for intended placement plane.
- Report mesh-related outcomes in registries.

Chapter 30 —

Prophylactic mesh in laparotomy/stoma surgery

- Indications for prophylactic mesh to reduce incisional hernia risk.
- Evidence supports certain prophylactic uses, but patient selection critical.
- Risk reduction strategies include reinforcement at stoma creation.
- Balance potential mesh complications vs prevention benefits.

Practical prophylactic recommendations

- Consider prophylactic mesh in high-risk patients (obesity, COPD, steroid use).
- Use appropriate mesh type and placement technique.
- Monitor outcomes and complications prospectively.
- More RCT data needed to refine indications.

Chapter 31 —

NOTES & single-port surgery role

- Investigate whether NOTES or single-port have role in ventral hernia repair.
- Current evidence limited; role experimental/selective.
- Technical challenges and learning curve present.
- Safety and reproducibility not yet established.

Recommendations on single-port/NOTES

- Not recommended for routine use; consider in select centers.
- Publish outcomes to contribute to evidence base.
- Prioritize patient safety and proven techniques.
- Continue evaluation via trials/registries.


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GUIDELINES

Update of Guidelines for laparoscopic treatment of ventral and incisional abdominal wall hernias (International Endohernia Society (IEHS)): Part B

Chapter 1	How can the new techniques for minimal invasive extraperitoneal mesh repair of abdominal wall hernias and rectus diastasis be defined?
Chapter 2	Is there an indication for operative treatment of diastasis recti without hernia formation?
Chapter 3	Component separation techniques.
Chapter 4	In which patient group is a transversus abdominis release (TAR) indicated?
Chapter 5	The role of preoperative adjunct interventions in ventral hernia repair
Chapter 6	Robotic ventral/incisional hernia repair
Chapter 7	Treatment of lateral primary or incisional hernias: Which technique should be preferred?
Chapter 8	Education and Training in Laparoscopic Ventral Hernia Repair.

Core Goals of Part B

- Clarify indications for new techniques
- Summarize evidence for novel repairs
- Provide recommendations based on levels
- Identify knowledge gaps for future research

Clinical Relevance

- Hernias with diastasis increasing
- Need for durable, low-complication repairs
- Minimally invasive sublay repairs preferred
- Robotics enabling complex reconstruction

Chapter 1 — Key question: how can the new techniques for minimal invasive extraperitoneal mesh repair of abdominal wall hernias and rectus diastasis be defined?

Access:

- Laparoscopic transabdominal preperitoneal (ventral TAPP)
- Laparoscopic transabdominal retromuscular (ventral TARM)/ Laparoscopic retromuscular ventral hernia repair (RMVH)
- Total extraperitoneal preperitoneal / retromuscular (ventral TEP)
- Enhanced view total extraperitoneal preperitoneal / retromuscular (ventral eTEP)
- Robotic Enhanced view total extraperitoneal preperitoneal / retromuscular (ventral reTEP)
- Robotic Transabdominal preperitoneal (ventral rTAPP)
- Robotic Transabdominal retromuscular (ventral rTARM)/ Robotic retromuscular ventral hernia repair (rRMVH)
- Transhernial total extraperitoneal/ preperitoneal / retromuscular Mini or Less-Open Sublay repair (MILOS) or endoscopic variant (EMILOS)

Location of mesh:

- preperitoneal
- retrorectus (between rectus abdominis muscle and posterior rectus sheath)
- retromuscular (posterior to rectus abdominis or oblique muscles and peritoneum
- onlay

Modality of defect closure:

- Suture
- Tack
- Linear stapler
- None

Reconstruction of the abdominal wall: closure of hernia defect, posterior rectus sheath, and rectus diastasis

- No closure
- Only closure of hernia defect
- Only closure of posterior rectus sheath
- Closure of hernia defect and posterior rectus sheath
- Closure of hernia defect and rectus diastasis
- Closure of hernia defect, posterior rectus sheath and rectus diastasis

Simultaneous Minimally invasive posterior component separation (TAR) possible:

- Laparoscopic ventral TAPP, TARM, RMVH, TEP, eTEP: yes
- Robotic TAPP, robotic eTEP: yes
- MILOS, EMILOS: yes
- ELAR, Onlay: no

Recommendation (Grade C)

Several minimally invasive laparoendoscopic and robotic options for extraperitoneal mesh repair of ventral hernia with favorable short term outcomes can be offered. Ongoing evaluation regarding long term outcomes, operative me, cost, and clinical benefit are needed. The new techniques should only be adopted afer adequate training.

Chapter 1 — Extraperitoneal minimally invasive extraperitoneal mesh repair

Key question

In patients presenting with a ventral hernia in combination with a rectus diastasis, which is the best treatment option- IPOM plus, ELAR, MILOS, EMILOS, LIRA, eTEP, Stapler Abdominoplasty?

Concept & Rationale

- Defined as mesh placement without entering peritoneal cavity
- Avoids intraperitoneal adhesions and bowel contact
- Includes eTEP, TEP, retromuscular approaches
- Expands MIS access to complex ventral defects

Techniques Overview

- eTEP allows wide retromuscular dissection
- Midline reconstruction without intraperitoneal entry
- Supports TAR in selected cases
- Flexibility for bilateral/large defects

Chapter 1 — Extraperitoneal minimally invasive extraperitoneal mesh repair

Indications

- Primary midline hernias
- Patients at risk of adhesions
- When non-intraperitoneal mesh preferred
- Prior intraperitoneal surgeries

Advantages

- No bowel contact with mesh
- Low chronic fixation-related pain
- Allows large retromuscular mesh placement
- Lower SSO rates

Limitations & Challenges

- High technical demand
- Peritoneal breach risk early in learning curve
- Limited application to large/lateral hernias
- Risk of seroma

Chapter 1 — Extraperitoneal minimally invasive extraperitoneal mesh repair

Evidence Summary

- Excellent long-term outcomes
- Less chronic pain vs IPOM
- Comparable recurrence to open repair
- Recommendations based on observational evidence

Key Recommendations

- Safe and effective in selected patients
- Performed by advanced MIS surgeons
- Retromuscular mesh preferred when feasible
- Consider anatomy, defect complexity, experience

Chapter 2 —Diastasis recti without hernia

Definition & Anatomy

- Separation of rectus muscles without fascial defect
- Occurs at linea alba
- Associated with pregnancy/obesity
- Distinct from ventral hernia

Clinical Presentation

- Midline bulge
- Core instability
- Back pain
- Cosmetic concerns

Diagnostic Evaluation

- Physical exam with strain
- Ultrasound measurement
- CT/MRI for classification
- Differentiate from occult hernia

Chapter 2 — Diastasis recti without hernia

Indications for Treatment

- Functional impairment
- Refractory instability
- Concomitant hernia repair
- Cosmetic impact

Treatment Options

- Physiotherapy first line
- Linea alba plication (open/MIS)
- Retromuscular mesh for large diastasis
- MIS growing in use

Chapter 2 — Diastasis recti without hernia

Evidence Summary

- Limited high-quality data
- Improved function/cosmesis with surgery
- Mesh reduces recurrence
- Consensus-based recommendations

Key Recommendations

- Repair for symptomatic cases
- Consider mesh for large diastasis
- Physiotherapy remains first-line
- Individualized decision making

Chapter 3 — Component separation techniques

Purpose & Concept

- Restores midline closure
- Provides fascial advancement
- Reduces closure tension
- Used with mesh reinforcement

Types of CST

- Anterior CST
- Posterior CST
- TAR as advanced posterior technique
- MIS CST variants

Indications

- Large defects
- Loss of domain
- Complex or recurrent hernias
- Need for tension-free closure

Chapter 3 — Component separation techniques

Advantages

- Large medial advancement
- Restores abdominal physiology
- Allows large retromuscular mesh
- Improves long-term outcomes

Limitations

- High wound morbidity in anterior CST
- Risk of skin ischemia
- Seroma formation
- Requires expert anatomy knowledge

Chapter 3 — Component separation techniques

MIS Evolution

- Endoscopic anterior CST reduces wound issues
- Robotic/eTEP posterior CST
- Preserves perforators
- Better recovery

Key Recommendations

- Posterior CST preferred
- Use MIS CST when possible
- Always pair with mesh
- Performed by experienced surgeons

Chapter 4 — Transversus Abdominis Release (TAR)

Concept & Anatomy

- Posterior CST technique
- Opens transversus abdominis layer
- Creates wide retromuscular space
- Allows large sublay mesh

Indications

- Large midline hernias
- Recurrent ventral hernias
- Complex defects
- Need for extensive posterior release

Advantages

- Tension-free midline closure
- Preserves neurovascular bundles
- Optimal sublay mesh positioning
- Strong long-term outcomes

Chapter 4 — Transversus Abdominis Release (TAR)

Technical Considerations

- Detailed posterior anatomy understanding
- Accurate layer identification
- Avoid neurovascular injury
- Prevent peritoneal tears

MIS/Robotic TAR

- Superior visualization
- Precision dissection
- Lower wound complications
- Expanded applicability

Chapter 4 — Transversus Abdominis Release (TAR)

Evidence Summary

- Low recurrence (<5–10%)
- Less morbidity vs anterior CST
- Strong evidence for complex hernias
- Functional recovery benefits

Key Recommendations

- Preferred for large/complex defects
- Use MIS/robotic TAR when available
- Combine with sublay mesh
- Best in experienced centers

Chapter 5 — Preoperative adjunct interventions in VHR

Purpose

- Reduce postoperative complications
- Improve midline closure feasibility
- Prepare for complex repair
- Improve functional outcomes

Botulinum Toxin

- Relaxes lateral muscles
- Increases abdominal domain
- Useful in large defects
- Best 4–6 weeks pre-op

Progressive Pneumoperitoneum

- Expands abdominal cavity
- Reduces closure tension
- Synergistic with BTX
- Daily insufflation regimen

Chapter 5 — Preoperative adjunct interventions in VHR

Lifestyle Optimization

- Smoking cessation
- Weight reduction
- Glycemic control
- Core strengthening

Imaging & Planning

- CT essential for planning
- 3D reconstruction useful
- Identify prior mesh/adhesions
- Guide anterior vs posterior strategy

Evidence Summary

- BTX+PPP effective in loss-of-domain
- Lifestyle optimization lowers SSO
- Imaging strongly recommended
- Individualized preparation

Chapter 6 — Robotic ventral/incisional hernia repair

Robotic Platform Advantages

- 3D visualization
- Superior suturing/dexterity
- Ideal for posterior repairs
- Reduced surgeon fatigue

Indications

- Retromuscular mesh (r-eTEP/r-TAR)
- Complex/recurrent hernias
- Precise posterior dissection
- MIS candidates

Robotic vs Laparoscopic

- Lower conversion rates
- Easier intracorporeal suturing
- Allows advanced reconstructions
- Similar recurrence, lower wound issues

Chapter 6 — Robotic ventral/incisional hernia repair

Limitations

- Longer operative time during learning phase
- Higher hospital resource use and costs
- Requires specialized training and equipment
- Lateral defects remain challenging

Safety & Complications

- Low complication rates
- SSO reduction vs open repair
- Adhesiolysis risk persists
- MIS benefits retained

Chapter 6 — Robotic ventral/incisional hernia repair

Evidence Summary

- Strong support for robotic posterior repair
- Effective for retromuscular mesh
- Comparable recurrence to open TAR
- More data emerging

Key Recommendations

- Safe and effective in complex hernias
- Requires robotic competency
- Consider robotic TAR/eTEP
- Match patient to institutional capability

Chapter 7 — Lateral primary or incisional hernias

Definition & Challenges

- Hernias lateral to semilunar line
- Flank/lumbar etiology
- Complex anatomy
- Limited fixation zones

Anatomy Considerations

- Borders: costal margin–iliac crest
- Limited retromuscular plane
- Nerve-rich area
- Requires precise mesh positioning

Surgical Approaches

- Open sublay repair
- Laparoscopic/robotic options
- Preperitoneal/retromuscular mesh
- Avoid nerve injury

Chapter 7 — Lateral primary or incisional hernias

Mesh Strategies

- Large contoured mesh
- Minimal fixation near nerves
- Hybrid fixation options
- Lightweight meshes considered

Evidence Summary

- Limited high-quality studies
- Higher recurrence vs midline
- MIS reduces wound morbidity
- Individualized approach needed

Key Recommendations

- Understand anatomy thoroughly
- Prefer sublay mesh
- MIS/robotic in selected patients
- Anticipate complexity

Chapter 8 — Education & Training in LVHR

Importance

- Abdominal wall surgery increasingly complex
- Advanced techniques require training
- Standardization improves outcomes
- Essential for CST/TAR/MIS

Curriculum Components

- Detailed anatomy
- Open/MIS/robotic techniques
- Workshops, simulation, cadaver labs
- Complication management

Competency Acquisition

- Stepwise progression
- Validated assessment tools
- Focus on suturing & dissection
- Mentorship required

Chapter 8 — Education & Training in LVHR

Simulation

- VR simulators
- Box trainers
- Skill repetition benefits
- Reduces learning curve risks

Institutional Requirements

- Proctorship/mentorship
- Robotic system access
- Team-based environment
- Quality monitoring

Key Recommendations

- Structured pathways needed
- Prioritize MIS/robotic education
- Encourage workshops & certification
- Maintain continuous skill development


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REVIEW ARTICLE

Robotic surgery for inguinal and ventral hernia repair: a systematic review and meta-analysis

BACKGROUND

Evaluated robotic vs. laparoscopic/open surgery for IHR and VHR.

METHODS

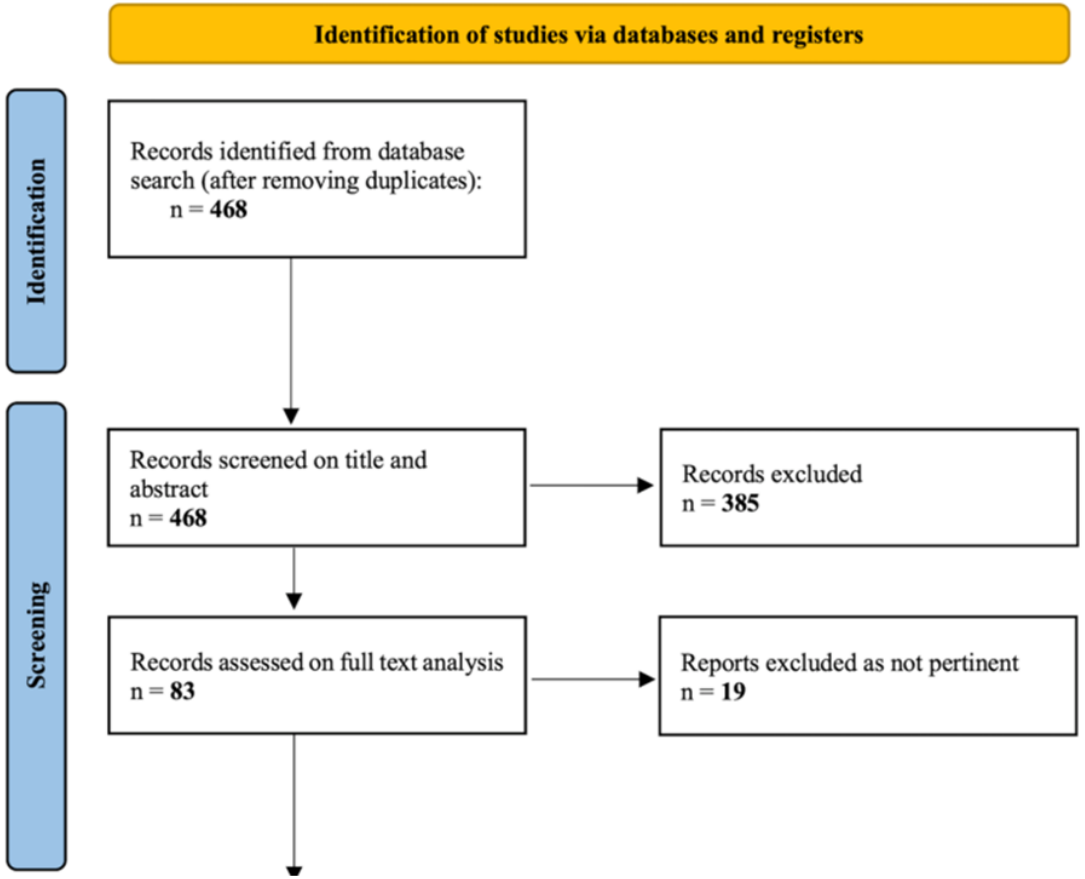
- Systematic review of PubMed/EMBASE up to July 2022.
- Analyzed complications, SSI, recurrence, operative time, blood loss, LOS, reoperation/readmission, opioid use, and recovery.

RESULTS

- IHR: Robotic → lower recurrence vs. laparoscopy, less opioid use vs. open.
- VHR: Robotic → fewer bowel injuries & conversions vs. laparoscopy; fewer complications, SSI, blood loss, shorter LOS, fewer readmissions vs. open.
- Longer operative times for robotic in both IHR and VHR.

CONCLUSION

Robotic surgery is a safe, effective alternative with intra- and postoperative advantages.


Identification of studies via databases and registers
Identification
Records identified from database search (after removing duplicates): n = 468
Screening
Records screened on title and abstract n = 468
Records excluded n = 385
Records assessed on full text analysis n = 83
Reports excluded as not pertinent n = 19

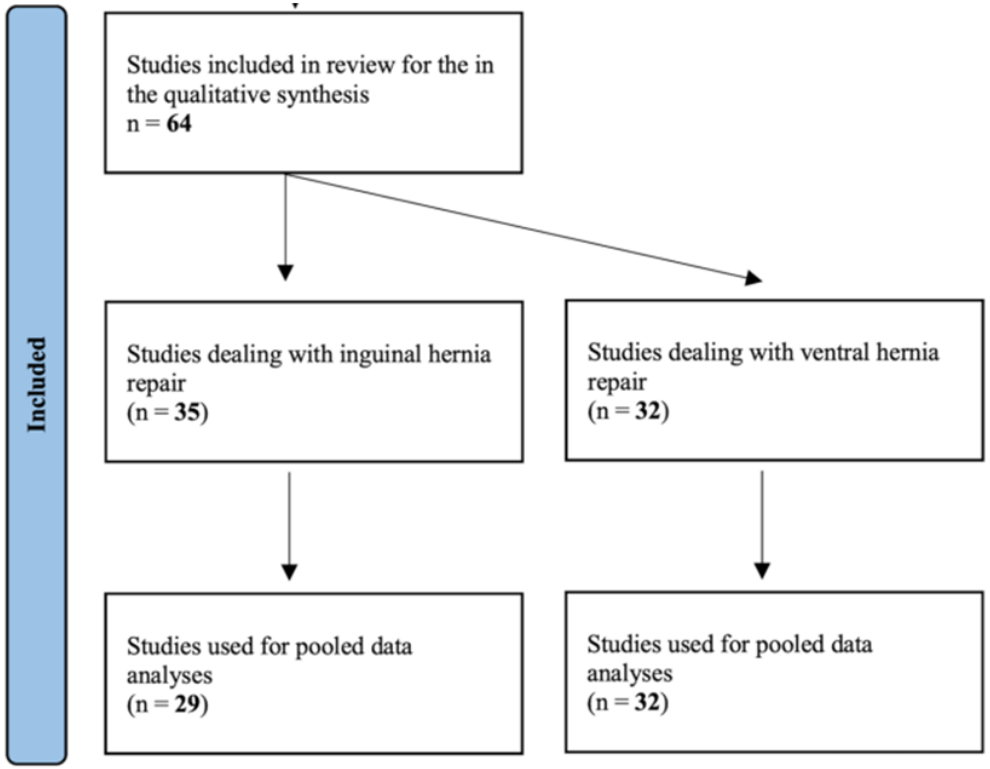

Included
Studies included in review for the in the qualitative synthesis n = 64
Studies dealing with inguinal hernia repair (n = 35)
Studies dealing with ventral hernia repair (n = 32)
Studies used for pooled data analyses (n = 29)
Studies used for pooled data analyses (n = 32)

Table 3 Results of the meta-analyses comparing robotic vs. laparoscopic and robotic vs. open inguinal hernia repair (IHR)

Outcome variables	Robot vs. laparoscopic IHR					Robot vs. open IHR				
	Nb of studies	OR or WMD	95% CI	P value	I^2	Nb of studies	OR or WMD	95% CI	P value	I^2
Overall complications	14	1.24	0.69, 2.22	0.479	87.5%	9	1.14	0.52, 2.49	0.751	94.7%
SSI	11	1.22	0.46, 3.27	0.690	70.9%	8	0.67	0.15, 3.01	0.602	92.7%
Seroma/hematoma	11	1.15	0.87, 1.52	0.333	0%	4	0.90	0.34, 2.37	0.837	27.8%
Hernia recurrence	9	**0.54**	**0.29, 0.99**	**0.047**	0%	4	1.07	0.33, 3.48	0.913	59.9%
Operative time (min)	10	**33.1**	**2.6, 63.6**	**0.033**	99.4%	7	**41.3**	**8.0, 74.7**	**0.015**	99.8%
Intraoperative bowel injuries	3	0.003[a]	− 0.002, 0.009	0.258	0%	3	0[a]	− 0.004, 0.004	1.000	0%
Conversion to open surgery	6	0.49	0.22, 1.08	0.077	68.7%	–	–	–	–	–
LOS (days)	5	0.1	− 1.0, 1.1	0.867	98.9%	6	− 0.3	− 0.9, 0.2	0.248	99.1%
30-day mortality	6	0.001[a]	0, 0.002	0.295	0%	2	1.03	0.51, 2.07	0.931	0%
30-day reoperation rate	2	**4.85**	**1.22, 19.20**	**0.025**	33.3%	3	0.71	0.10, 5.28	0.738	82.2%
30-day readmission rate	6	1.02	0.39, 2.66	0.965	46.5%	6	0.44	0.20, 1.01	0.052	29.9%
Opioid use (yes)	3	0.74	0.33, 1.69	0.479	66.3%	3	**0.46**	**0.25, 0.84**	**0.012**	55.8%

Statistically significant results are shown in bold characters

CI confidence interval, *LOS* length of stay, *OR* odds ratio, *SSI* surgical site infections, *WMD* weighted mean difference

[a]Risk difference (RD)

Table 4 Results of the meta-analyses comparing robotic vs. laparoscopic and robotic vs. open ventral hernia repair (VHR)

Outcome variables	Robot vs. laparoscopic VHR					Robot vs. open VHR				
	Nb of studies	OR or WMD	95% CI	P value	I^2	Nb of studies	OR or WMD	95% CI	P value	I^2
Overall complications	11	1.05	0.41, 2.68	0.925	96.5%	9	**0.61**	**0.39, 0.96**	**0.033**	68%
SSI	11	1.28	0.74, 2.22	0.369	9.1%	14	**0.47**	**0.31, 0.72**	**< 0.001**	0%
Seroma/hematoma	9	0.88	0.41, 1.85	0.728	72.8%	10	1.52	0.77, 2.99	0.226	73.6%
Hernia recurrence	7	0.69	0.27, 1.76	0.436	31.5%	8	0.94	0.56, 1.60	0.832	0%
Operative time (min)	6	**67.3**	**42.2, 92.5**	**< 0.001**	90%	7	**55.5**	**35.8, 75.3**	**< 0.001**	73%
Intraoperative bowel injuries	6	**0.59**	**0.42, 0.85**	**< 0.001**	0%	3	0.70	0.19, 2.51	0.581	0%
Intraoperative blood loss (mL)	0	–	–	–	–	2	**− 95.3**	**− 125.6, − 65.0**	**< 0.001**	0%
Conversion to open surgery	7	**0.51**	**0.43, 0.60**	**< 0.001**	0%	–	–	–	–	–
LOS (days)	7	− 0.2	− 0.6, 0.3	0.423	81.5%	6	**− 3.4**	**− 5.1, − 1.7**	**< 0.001**	96.9%
30-day mortality	2	4.69	0.49, 45.17	0.181	0%	3	0.59	0.21, 1.62	0.306	0%
30-day reoperation rate	4	0.34	0.10, 1.16	0.086	0%	5	0.48	0.18, 1.22	0.123	0%
30-day readmission rate	7	1.10	0.52, 2.34	0.802	85.2%	9	**0.66**	**0.44, 0.99**	**0.046**	24.7%
Opioid use (yes)	2	0.72	0.48, 1.08	0.113	16.1%	2	0.76	0.46, 1.26	0.287	54.5%
Time to return to normal activities (days)	2	− 1.5	− 7.0, 4.0	0.592	94.5%	2	− 1.6	− 7.1, 3.9	0.571	95.1%
Time to return to work (days)	2	− 0.8	− 2.3, 0.7	0.303	13.7%	2	− 1.7	− 10.6, 7.2	0.712	95.9%

Statistically significant results are shown in bold characters

CI confidence interval, *LOS* length of stay, *OR* odds ratio, *SSI* surgical site infections, *WMD* weighted mean difference

What is the effectiveness of robotic surgery compared to conventional laparoscopy or open surgery for inguinal and ventral hernia repair in terms of postoperative complications and hernia recurrence rate?

	Inguinal hernia repair	Ventral hernia repair
	35 studies; 227 242 patients	32 studies; 158 384 patients
Robotic surgery		
VS Laparoscopy	= overall complications (OR: 1.24; p=0.47) ↓ hernia recurrence (OR: 0.54; p=0.047) ↑ operative time (WMD: 33.1 min; p=0.033) ↑ 30-day reoperation rate (OR: 4.85; p=0.025)	= overall complications (OR: 1.05; p=0.92) ↓ intraoperative bowel injuries (OR: 0.59; p<0.001) ↓ conversion to open surgery (OR: 0.51; p<0.001) ↑ operative time (WMD: 67.3 min; p<0.001)
VS Open surgery	= overall complications (OR: 1.14; p=0.75) ↓ hernia recurrence (OR: 0.54; p=0.047) ↓ opioid use (OR: 0.46; p=0.012) ↑ operative time (WMD: 41.4 min; p=0.015)	↓ overall complications (OR: 0.61; p=0.033) ↓ surgical site infections (OR: 0.47; p<0.001) ↓ intraoperative blood loss (WMD: -95.3 ml; p<0.001) ↓ length of hospital stay (WMD: -3.4 days; p<0.001) ↓ 30-day readmission rate (OR: 0.66; p=0.046) ↑ operative time (WMD: 55.5 min; p<0.001)

de'Angelis et al. *Surg End*. October 2023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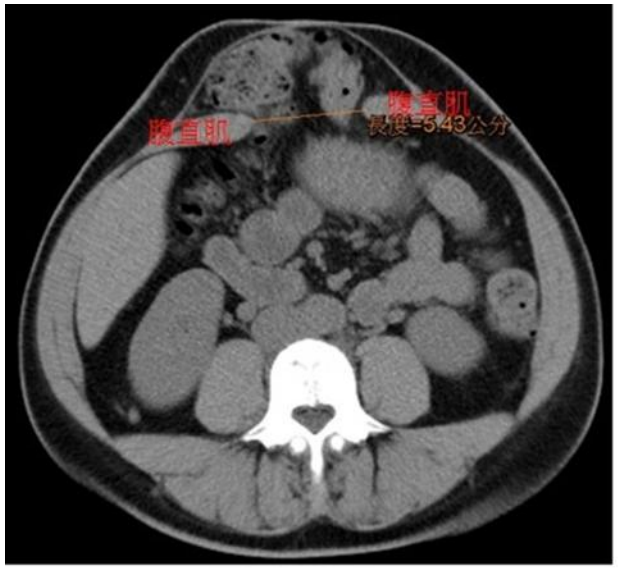
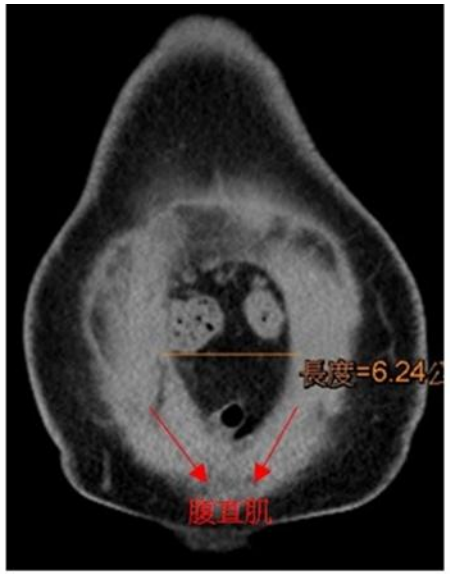
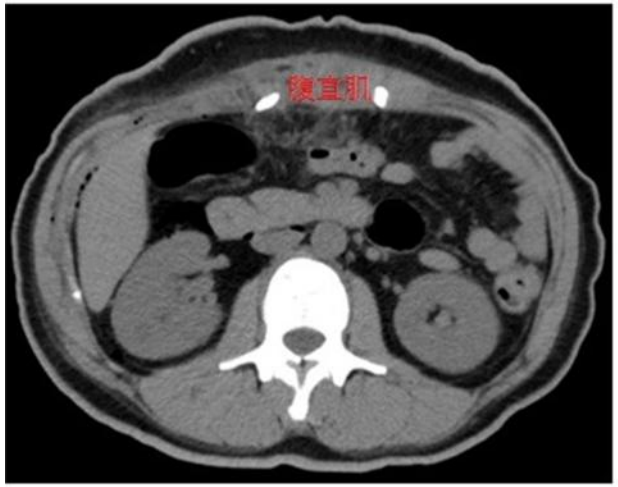




手術前電腦斷層呈現腹壁缺陷(6x5 cm)與腹直肌分離

病患站立時腹部膨出 (臍疝氣與腹直肌分離)



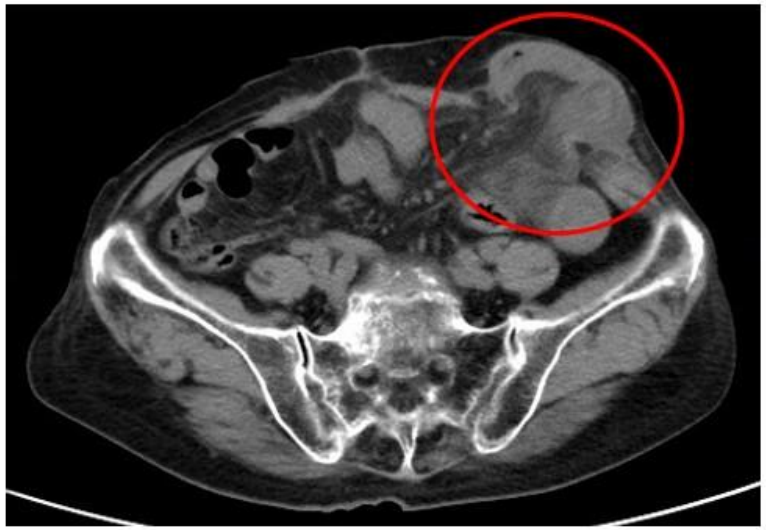
手術後電腦斷層呈現腹壁無缺陷與腹直肌無分離

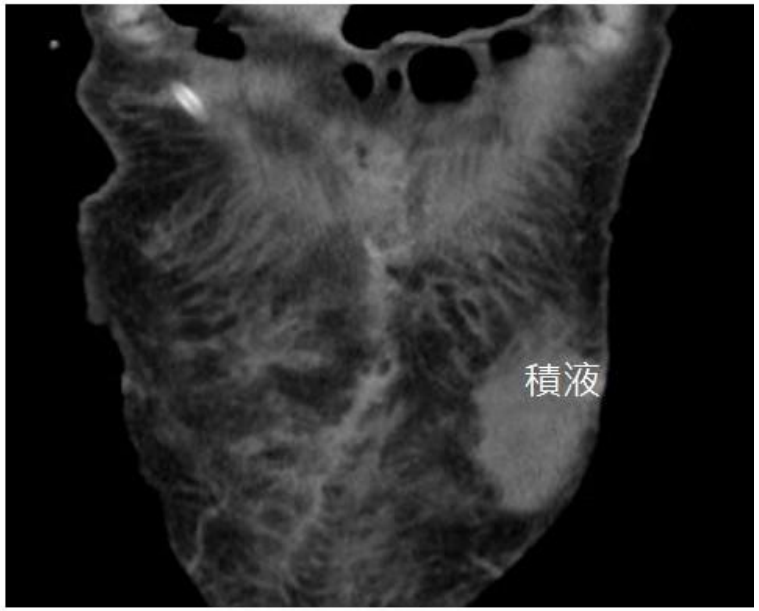
R- eTEP with TAR

R- eTEP

術前

術後



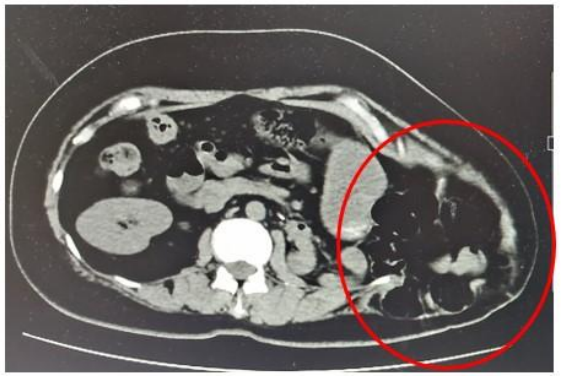


術前電腦斷層呈現 7x6 cm 腹壁缺陷
且疝氣膨出物-小腸腫脹

術後電腦斷層呈現無腹壁缺陷
(疝氣成功修補)但有皮下積液
(後經抽吸處理)

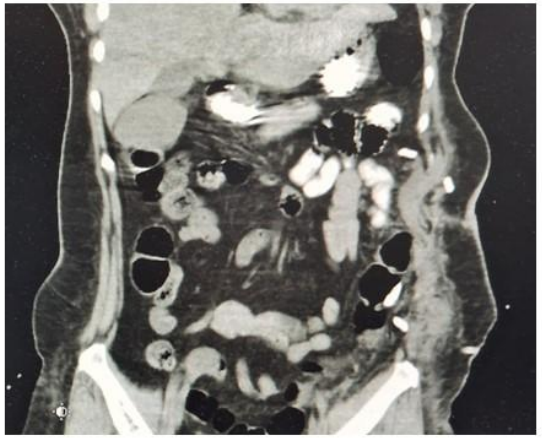
R- TARM with TAR

術前



術前電腦斷層呈現16x9
公分側腹壁缺陷

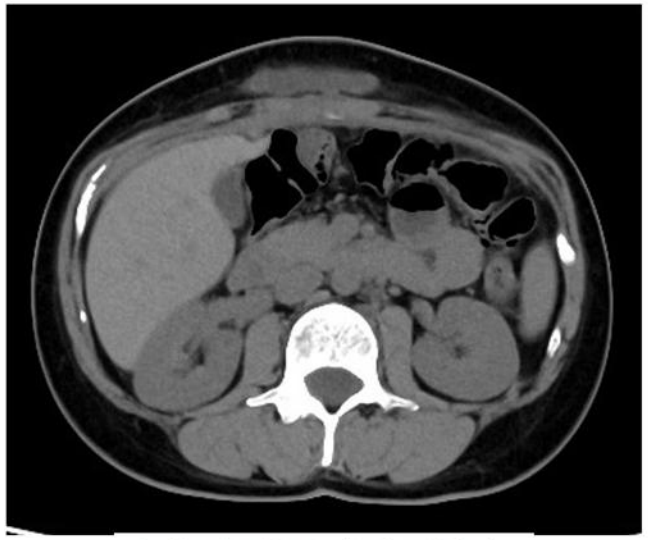
術後



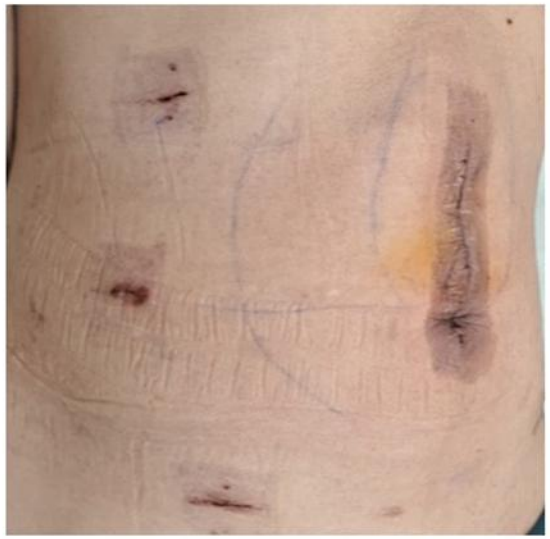
術後電腦斷層呈現側腹
壁缺陷成功修復

術前電腦斷層: 腹壁缺陷

術前照: 巨大且復發之複雜型切口性疝氣



術後電腦斷層: 無腹壁缺陷



術後照: 用力時腹部無隆起
(疝氣修補- 25x20 cm 人工網膜置放)

R- TARM with TAR

F/47, BW: 60 kg; BH:1.61 m; BMI:23.15

Incisional hernia, EHS M3-4 W2 R1 (defect: 8.8 × 15 cm)

RDR (rectus-to-Defect Ratio) : (3.05+2.99)/8.8= 0.69

Thanks for your attention

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微創手術中心