

Standardization and Learning Curve in Laparoscopic Hernia Repair: Experience of a High-Volume Center

Francesco BRUCCHI, Federica Ferraina, Emilia Masci, Davide Ferrara, Luca Bottero, Giuseppe G. Faillace

Sesto San Giovanni Hospital; Edoardo Bassini Hospital, Milan, Italy

Introduction

Groin hernias are a prevalent condition, and laparoscopic repair, particularly the Transabdominal Preperitoneal (TAPP) approach, offers multiple advantages over open surgery, including reduced postoperative pain, faster recovery, and lower infection rates. Despite its benefits, the adoption of TAPP is limited due to the technical complexity and the steep learning curve. This study describes a standardized surgical approach developed over 30 years, aimed at improving training and reducing complications during the learning curve.

Materials and Methods

Between March 2015 and October 2022, 362 patients underwent TAPP hernia repair, with 487 hernia defects treated. A total of 319 procedures performed by experienced surgeons, and 168 by surgical trainees. Data collected retrospectively and follow-up was conducted via phone interviews and outpatient visits.

Surgical Technique

A stepwise, standardized approach to TAPP developed and taught.

The technique included:

- Defined anatomical zones and landmarks (e.g., Cooper's ligament, vas deferens, spermatic vessels)
- Use of 3D mesh (10.3 × 15.7 cm or 12.2 × 17.0 cm)
- Selective direct defect closure using barbed sutures
- Systematic dissection and peritoneal closure

Training program involved progressive skill acquisition, from peritoneal closure, then prosthesis placement, and ultimately full procedure execution.

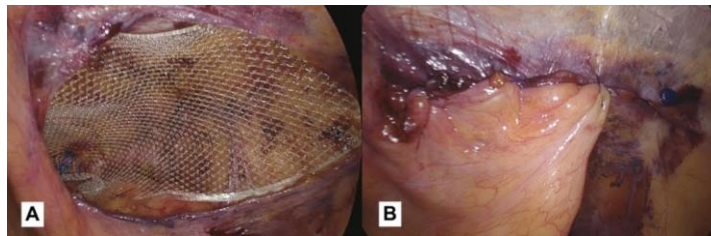
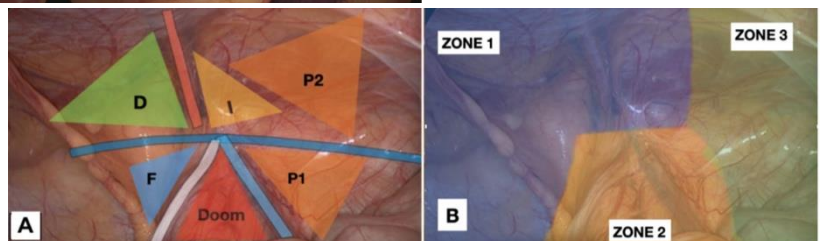


Fig. 1 (a): Polypropylene 3D mesh placed: a curved, three-dimensional, pre-shaped prosthesis. **(b):** The image shows the closed peritoneum. We suggest using the redundant direct hernia sac, when present, to reinforce the suture

Fig. 2 (a): Revised anatomical landmarks: P2 stands for the second triangle of pain. It covers the varying anatomy of nerve branches and the transversus abdominis muscle area. **(b):** Revised division and numbering of the posteroinguinal



Results

- Total patients: 362 (91.7% male, median age: 62)
- Hernia types repaired: 277 indirect, 175 direct, 34 femoral, 1 obturator
- Median operation time: 55 min (93 min for trainees)
- Complication rate: 0.41%
- Recurrence rate: 0.41%
- Direct defect closure: performed in 4.1% of cases

No increase in recurrence during the trainees' learning phase. Operative time the only parameter showing a learning curve.

Conclusion

TAPP repair, when performed through a standardized and structured approach, is effective, safe, and reproducible—even for trainees.