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### APPROXIMATION OF THE DEEP INGUINAL RING AND MANUAL MESH FIXATION IN TAPP HERNIOPLASTY AS A STRATEGY FOR PREVENTING "PSEUDO-RECURRENCE" AND CHRONIC INGUINAL PAIN

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**ANNOTATION:** *Prolapse of the mesh prosthesis through a residual, uncorrected deep inguinal ring — clinically indistinguishable from true hernia recurrence and termed "pseudo-recurrence" — is a specific complication of TAPP hernioplasty. Concurrently, mechanical staple fixation carries a recognised risk of neuropathic injury contributing to chronic inguinal pain. This comparative study (n = 176) evaluated the efficacy of deep inguinal ring approximation (continuous Vicryl 2/0 suture to physiological diameter 1.0–1.5 cm) combined with manual absorbable-suture mesh fixation. In the control group (n = 94, standard TAPP with stapler), clinically significant pseudo-recurrence occurred in 3 patients, all with ring diameter > 2.5 cm. In the study group (n = 82), no prolapse was recorded. VAS pain scores were significantly lower at all time points ( $p < 0.05$ ). Overall complication rate decreased from 18.1% to 12.2%. The combined technique is a safe, cost-effective, and reproducible modification of TAPP.*

**Keywords:** *deep inguinal ring approximation; mesh prolapse; pseudo-recurrence; absorbable suture fixation; TAPP; laparoscopic hernioplasty; chronic inguinal pain; neuropathic pain.*

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Prolapse of the mesh prosthesis through a dilated deep inguinal ring is a specific TAPP complication that patients and even clinicians may misinterpret as hernia recurrence. Its morphological basis is a mismatch between the widened transverse fascial ring and the rigidity of surrounding tissues — allowing the mesh to bulge under intraabdominal pressure before fibroblastic incorporation is complete. Simultaneously, staple-based fixation risks injury to the genitofemoral, ilioinguinal, and iliohypogastric nerves, leading to chronic neuropathic pain — a leading cause of patient dissatisfaction after laparoscopic hernioplasty. This study aimed to evaluate the efficacy of ring approximation combined with manual fixation in preventing prosthesis prolapse and chronic inguinal pain.

The study enrolled 176 patients with inguinal hernias: control group ( $n = 94$ , standard TAPP with staple fixation) and study group ( $n = 82$ , TAPP with ring approximation and manual fixation). Approximation was performed when the intraoperatively measured ring diameter exceeded 2 cm, using a continuous Vicryl 2/0 suture reducing it to a physiological 1.0–1.5 cm. Manual fixation comprised 2–3 interrupted sutures to Cooper's ligament, the transverse fascia, and the rectus sheath. Follow-up clinical examination and ultrasound were performed at 1, 3, and 6 months. Pain intensity was assessed by VAS. Complications were graded per Clavien–Dindo; statistical methods included Student's t-test, Pearson's chi-squared, and Mann–Whitney U test ( $p < 0.05$ ).

Three patients in the control group (all with ring diameter  $> 2.5$  cm and staple fixation) developed clinically significant mesh prolapse consistent with pseudo-recurrence; two required CT for differential diagnosis with true recurrence, and one underwent revisional surgery. No prolapse occurred in the study group; ultrasound at one month confirmed correct mesh position in all cases. VAS pain scores were significantly lower in the study group at all time points from postoperative day 1 through month 3 (all  $p < 0.05$ ). Overall

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complication rates fell from 18.1% to 12.2%, with grade IIIa–IIIb events completely eliminated.

| Time Point | Control (n=94) | Study (n=82) | p      |
|------------|----------------|--------------|--------|
| Day 1      | 4.7 ± 1.2      | 3.2 ± 1.0    | < 0.05 |
| Day 3      | 3.8 ± 1.1      | 2.4 ± 0.9    | < 0.05 |
| Day 5      | 3.2 ± 1.0      | 1.9 ± 0.7    | < 0.05 |
| Day 30     | 2.1 ± 0.9      | 1.1 ± 0.6    | < 0.05 |
| Month 3    | 1.4 ± 0.6      | 0.6 ± 0.4    | < 0.05 |

Table 2. VAS pain scores over time — mean ± SD

| Clavien–Dindo Grade           | Control (n=94) | Study (n=82) | Reduction |
|-------------------------------|----------------|--------------|-----------|
| Grade I (seromas, haematomas) | 10 (10.6%)     | 4 (4.9%)     | ↓ 53.8%   |
| Grade II (pharmacological)    | 6 (6.4%)       | 5 (6.1%)     | ↓ 4.7%    |
| Grade IIIa–IIIb (invasive)    | 1 (1.1%)       | 0 (0%)       | ↓ 100%    |
| Total                         | 17 (18.1%)     | 10 (12.2%)   | ↓ 32.6%   |

Table 3. Postoperative complications by Clavien–Dindo classification

## CONCLUSION

Approximation of the dilated deep inguinal ring with an absorbable continuous suture and manual mesh fixation are pathogenetically sound and

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clinically effective components of a modified TAPP technique. Their combined application completely prevented prosthesis prolapse and pseudo-recurrence, significantly reduced postoperative pain from day 1 through the late follow-up period, and lowered the overall complication rate — without increasing operative cost or requiring additional instrumentation. Ring approximation adds no more than 8–10 minutes of operating time and is readily reproducible, supporting incorporation into routine TAPP surgical protocols.

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