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# Inguinal Hernia

## Open Preperitoneal Techniques - Standardisation and Comparison

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## Comparison and Standardisation of various Open Preperitoneal Techniques in Inguinal Hernia Surgery -Results of a Review and Consensus

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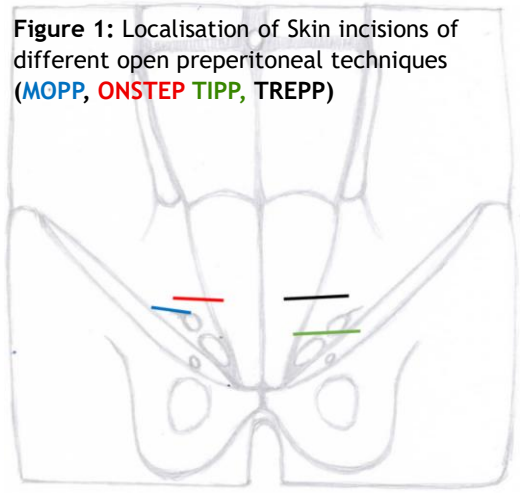
**Introduction:** Both open and laparoendoscopic preperitoneal mesh techniques are good options for the treatment of inguinal hernias. The 2023 updated HerniaSurge Guidelines recommend open preperitoneal mesh techniques as an acceptable alternative to Lichtenstein repair if expertise and competence are available. However, although numerous surgical open preperitoneal techniques have been developed, only a few comparative studies comparing the different open preperitoneal techniques are available. Because of the lack of scientific evidence and standarization the aim of this article is to define comparable standards and compare four frequently used open preperitoneal techniques.

**Figure 1:** Localisation of Skin incisions of different open preperitoneal techniques (**MOPP**, **ONSTEP TIPP**, **TREPP**)



**Methods:** Using a Delphi-consensus process among both the authors and experts in the field various key steps for each procedure, indications, as well as outcome parameters were set to allow adequate comparison of different open preperitoneal techniques.

**TABLE 1** | Comparison of four different open preperitoneal techniques.

| | Question | MOPP | TIPP | TREPP | ONSTEP |
|---|---|---|---|---|---|
| 1 | Best or even ideal indication? | Primary groin hernias | Large direct or indirect and combined direct, indirect, and femoral hernias | Primary groin hernias | Non-obese men with small- and medium-size hernias (EHS Classification) |
| 2 | Skin incision location and length (**Figure 1**) | Groin transverse incision in front of the internal ring 3-4 cm | Groin transverse incision 4-5 cm along the inguinal canal, 1.5 cm above the pubic bone and, 1.5 cm lateral to the midline | Lower abdomen 5 cm transverse incision almost 2-3 cm above the inguinal canal | Lower abdomen 4 cm transverse incision almost 2-3 cm above the inguinal canal |
| 3 | Important preparation steps | Always exact parietalisation to avoid overseen occult indirect hernias and to unroll the prosthesis | | | |
| | Use of specific instruments? | Different long Retractors (**Figure 2**) | Two Langenbeck or Kocher Retractor medial and lateral | Two Langenbeck or Kocher Retractor | One Langenbeck, Kocher, or Farabeuf Retractor (**Figure 3**) |
| 4 | Handling of the hernia sac or lipomas | Reducing hernia sac<br>Resection of Lipomas | Resection of indirect hernia sac<br>Reducing direct hernia sac<br>Resection of lipomas | Reposition of indirect and direct hernia sac<br>Resection of lipomas | Reposition of indirect and direct hernia sac<br>Resection of lipomas |
| 4 | How to create preperitoneal space? | Blunt dissection with counted gauzes (one or two 10 × 10 cm gauzes) | | | |
| 5 | Mesh position | Complete preperitoneal mesh placement in Retzius space medially and Bogros space laterally | | | Medial: preperitoneal in the Retzius space<br>Lateral: interparietal on top of the internal muscle (**Figure 4**) |
| 6 | How is access provided for mesh insertion in the groin? | (**Figure 5**)<br>Always *via* internal ring<br>First medial placement than lateral placement of the mesh | (**Figure 6**)<br>Depending on type of hernia, indirect *via* internal ring or direct *via* posterior wall<br>First medial placement than lateral placement of the mesh | (**Figure 7**)<br>Via opened rectus sheath<br>First lateral placement then medial placement of the mesh | The medial part of the mesh is inserted in the preperitoneal space through an opening in the peri-tuberculum transversalis fascia after creating space with a gauze<br>First medial placement than lateral placement of the mesh |
| 7 | Mesh size and type<br>Preformed or flat? | Any type of preformed or flat lightweight mesh with large pores is recommended, with a minimum size of 8 × 14 cm. Meshes with a commercially resorbable recoil ring facilitate easier implantation. There appears to be no significant differences between various brands [21]<br>Non-split mesh | | | Split mesh: lateral to the internal ring surrounding spermatic cord or round ligament (**Figure 8**) |
| 8 | Is mesh fixation needed and, if so, how? | No fixation | Mostly no fixation, optional one or two non-resorbable single stitches as fixation on Cooper's ligament to avoid mesh roll-up in case of large direct hernias | No fixation | No fixation is needed in ideal cases. A single Vicryl stitch to the pubic bone might provide benefits in women |
| 9 | Closure of the posterior wall – Augmentation or Bridging? | Normally no, optional augmentation with closure of the posterior wall | Normally no, optional augmentation with closure of the posterior wall | No | No |
| 10 | What are the limitations of the techniques? | Unsuitable for morbidly obese patients | Unsuitable for morbidly obese patients | Unsuitable for morbidly obese patients | Scrotal and femoral hernias |
| | | For all techniques, hernia recurrences—especially after mesh repair or hernia repair following oncologic prostate resection with lymphadenectomy or vascular procedures—can present significant challenges | | | |
| 11 | Possible specific complications | For all techniques utilizing the preperitoneal space, complications in this area are possible, including injuries to the vessels (such as the inferior epigastric, iliac, or Corona mortis) or the bladder<br>Recognition of perioperative vascular injury may not be straightforward postoperatively | | | |
| 12 | Average operating time (+ short <20', ++ midterm 21' to 40', +++ longer >41') | ++ | ++ | ++ | + |
| 13 | Learning curve of the technique (+short, ++ midterm, +++ longer) | ++ | ++ | +++ [22] | + |

**Results:** We present four different and frequently used open preperitoneal techniques:

- Minimal Open PrePeritoneal repair (MOPP),
- TransInguinal PrePeritoneal repair (TIPP),
- TransREctus sheat PrePeritoneal repair (TREPP), and
- Open New Simplifyed Total Extraperitoneal repair (ONSTEP).

We provide a clear and comparable standard regarding the best indication, different procedural steps, the use of meshes and fixation, the learning curve involved, and possible complications and limitations. We also identify some similarities for the techniques but also specific differences on different topics.

**Conclusion:** Both development, validation and implementation of these standards for the various open preperitoneal techniques are essential both for education and training as well as for future comparative studies