



## Original Research

# The TREPP as alternative technique for recurrent inguinal hernia after Lichtenstein's repair: A consecutive case series



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## HIGHLIGHTS

- Recurrent inguinal hernias are preferably treated via an alternative route, e.g. posterior after anterior.
- Endoscopic preperitoneal repair techniques are common for groin hernias after Lichtenstein's plasty.
- The TREPP technique is a minimal access, open variant of these preperitoneal techniques.
- The TREPP technique may yield extra advantages such as spinal anesthesia and lower costs.

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## ABSTRACT

**Background:** Recurrent inguinal hernias after initial repair with mesh are preferably treated via an alternative route (e.g. posterior after anterior). For recurrent inguinal hernias after an anterior repair such as Lichtenstein's, an endoscopic approach such as the total extraperitoneal or transabdominal preperitoneal technique (TEP or TAPP) is recommended if expertise is present. The TransREctus sheath Pre-Peritoneal (TREPP) technique is a promising open posterior technique and could be an alternative to endoscopic methods. This study aims to evaluate the results of the TREPP technique for recurrent inguinal hernia.

**Materials and methods:** Consecutive patients who underwent a TREPP repair for recurrent hernia after initial operation according to Lichtenstein were included in a retrospective manner. A minimum of one year follow-up after the TREPP repair was maintained. Data retrieved from the patient files were combined with the findings at an outpatient department visit.

**Results:** Between January 2006 and December 2013 fifty-two patients were eligible for inclusion of which 38 patients were clinically evaluated. The mean follow-up of these thirty-eight patients was 65 months (range 17–108 months) in which 2 patients had developed a re-recurrence. One patient reported chronic postoperative inguinal pain (CPIP) since the TREPP and four patients experienced CPIP since the primary inguinal hernia repair. Peri-operative and <30 day complications were rare and no severe adverse events occurred.

**Conclusion:** TREPP seems to be a feasible alternative for recurrent inguinal hernia repair after an initial operation according to Lichtenstein. It may yield extra advantages compared to endoscopic repairs, such as a short learning curve, spinal anesthesia and lower costs.

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## 1. Background

Inguinal hernia repair is one of the most frequently performed surgical operations. Since the use of mesh the overall recurrence rates dropped drastically. In guidelines, the Lichtenstein's technique is widely known as the reference technique [1]. Reported recurrence rates vary between 0 and 7.7% after at least 2 years

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follow-up [1,2]. These recurrent inguinal hernias remain a challenge for surgeons because of (mesh related) scar tissue and distorted anatomy. These factors may play a role in the occurrence of damage to the nerves, the blood vessels and/or spermatic cord. This may lead to a higher incidence of patients with chronic post-operative inguinal pain (CPIP) and other complications after an operation for a recurrence. When confronted with a recurrent hernia after Lichtenstein's, a posterior approach with the mesh placed in the preperitoneal space (PPS) may prevent such complications because the previous surgery site is not re-entered. Current guidelines suggest the endoscopic totally extraperitoneal (TEP) and laparoscopic transabdominal preperitoneal (TAPP) techniques as proven methods for this purpose, especially when the surgeon is experienced [1,3]. Although the clinical results are excellent, there are other disadvantages of the TEP and TAPP such as a long learning curve and a considerable proportion of serious adverse events [4]. Furthermore, the non-reducible, incarcerated or large scrotal hernias are challenges for an endoscopic repair [4]. Recent studies show promising results for the TransRECTus sheath PrePeritoneal procedure (TREPP) as an open preperitoneal posterior approach in primary hernia repair [5,6]. However, the basic principles of this technique are not new: open preperitoneal repairs have been performed for decades [7], in particular in patients with bilateral or recurrent inguinal hernias. After a renewed interest in these techniques, and merging several beneficial aspects from them, the TREPP technique was developed and introduced, characterized by a small incision and an easy access to the preperitoneal plane just lateral to the rectus muscle [7,8]. The feasibility of TREPP for primary inguinal hernia repair (PIHR) has been described previously [5,9] and is currently subject of a randomized clinical trial (RCT) [10]. No TREPP results for secondary inguinal hernia repair (SIHR) have been reported yet. The aim of this study was to evaluate the outcomes of the TREPP technique as a secondary inguinal hernia repair (SIHR) for recurrent inguinal hernia after Lichtenstein's. Its safety (adverse events), feasibility (operation data) and durability (re-recurrence rate and CPIP) were evaluated. These outcomes may aid as a first step towards a prospective, comparative trial between TREPP and the current standard techniques (TEP or TAPP).

## 2. Methods and materials

### 2.1. Patients

At the St. Jansdal Hospital, the TREPP technique is the standard operation for all patients with a groin hernia for either primary or secondary inguinal hernia repair (PIHR or SIHR). With over 2000 performed TREPP operations since 2006, the St. Jansdal Hospital is the expertise center in which national and international surgeons are trained in this technique. For this study, all consecutive patients who underwent TREPP for SIHR were identified using a list based on operation codes. Patients who were operated on between January 2006 and December 2013 were enclosed to warrant a minimal follow-up period of one year. To minimize heterogeneity in this retrospective study the PIHR technique of the eligible patients was retrieved from the operative reports and inclusion in the study was further restricted to the Lichtenstein's technique. Exclusion criteria were PIHR without a mesh, PIHR with preperitoneal approach or when the PIHR technique was inadequately described in the operation report. All patients underwent physical examination, either at the outpatient department or by a home visit by the investigator. Written informed consent was obtained after providing patients a complete insight of the aim of the study according to its protocol. Recurrent inguinal hernia was defined as a reappearance of the inguinal hernia, diagnosed by physical examination (a reducible bulge with positive Valsalva).

### 2.2. Surgical technique

The TREPP operations were performed by one of three dedicated hernia surgeons and the technique has been described earlier for PIHR [9]. In short: a 4–5 centimeters (cm) transverse incision is made about 1 cm above the localization of the deep inguinal ring. The anterior rectus sheath is opened. After retracting the rectus muscle medially, the preperitoneal space (PPS) is bluntly dissected and a complete overview can be achieved. All possible (recurrent and/or persistent) hernia orifices can be visualized such as: a direct, indirect, pantaloon, and/or femoral hernia. A self-expandable mesh is then positioned in the PPS (PolySoft® hernia patch 'Large', Bard, IJsselstein, the Netherlands). Due to the "upstream principle" no mesh fixation is necessary [5].

### 2.3. Data collection

Outcomes regarding benefits and harms of the PIHR and SIHR(s) were retrieved from the digital patient records and checked for accuracy during the patient interview at the outpatient department or during home visit. Demographic data regarding age at time of operation, gender and body mass index (BMI) were extracted from the files. Further data collection involved peri-operative outcomes of the secondary hernia repair (uni- or bilateral, American Society for Anesthesiologist (ASA) classification, duration of surgery, European Hernia Society (EHS) classification, type of anesthesia and any reported damage to vessels, nerves or spermatic cord) and postoperative adverse events such as wound infection, hematoma, seroma, mesh infection, urinary retention, length of hospital stay, re-recurrence, chronic postoperative inguinal pain (CPIP), re-operation, persisting numbness and procedure related mortality. These complications were graded according to the patient's perspective [11]. Patients were asked to categorize any complaints in either 'discomfort' or 'pain'. Discomfort was defined as any unpleasant but non-painful feeling that "irritated" or "annoyed" the patient. In compliance with the international guidelines, CPIP was defined as any form of pain present after three months post-operatively [12]. Patients were asked to fill out the Visual Analogue Score (VAS) for pain at rest and during physical activity. With the pin-prick test sensory disturbances were measured and drawn on a dermatome map [13]. The study design (case series, retrospective) precluded a relevant measurement of health-related quality of life. Data were analyzed using SPSS version 12.0 for Windows. Results are reported in line with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement [14].

## 3. Results

Between January 2006 and December 2013 fifty-two patients underwent a TREPP procedure as SIHR after Lichtenstein's technique. However, only 38 could be included in this study. The reasons for exclusion were: unrelated death ( $n = 6$ ) and inability ( $n = 5$ ) or unwillingness to participate ( $n = 3$ ). None of the excluded patients lost to follow-up had chronic complaints reported in their digital patient files. The eight patients who were unable or unwilling to participate for physical examination (at home or at outpatient department) were asked for chronic pain by phone; none of them reported any pain or discomfort. Data of the 38 included patients were analyzed. Prior to the Lichtenstein's procedure (referred to as PIHR), ten patients had already undergone an ipsilateral inguinal hernia repair; 6 of these patients were operated using a non-mesh technique, 2 had a previous mesh-repair and 1 patient had multiple unilateral corrections for inguinal and femoral hernias, with unknown techniques. Analysis of the reports of the Lichtenstein's repair (PIHR in this study) revealed that fifteen

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