Randomized study of robot-assisted vs IPOM laparoscopic ventral hernia repair

1.Introduction

This is a multicenter, blinded randomized controlled study comparing standard IPOM laparoscopic ventral hernia repair vs robot-assisted laparoscopic hernia repair.

1.1 Protocol committee

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1.2 Writing committee

The results of the study are planned to be published in an international medical journal and be part of a doctoral thesis. The members of the protocol committee are responsible for the writing. The final decision on participating in the writing process will be left to the protocol committee based on the researchers contributing to the study.

1.3 Principal investigator

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2. Background

The most commonly used technique used in laparoscopic ventral hernia repair is Intraperitoneal Onlay Mesh (IPOM) [Rogmark]. In an IPOM repair the contents of the hernia sac are reduced into the abdominal cavity and a mesh is placed on the inside of the abdominal wall. Sometimes the defect is also closed from the inside. However, as the mesh has direct contact with the intestines in an IPOM repair, there is an increased risk of adhesions and fistulas. IPOM repair is also associated with pain in the postoperative period.

The problems related to an intraperitoneal mesh may be avoided if the mesh is positioned ventral of the peritoneum, i.e. in the retromuscular space between the posterior rectus sheath and the rectus muscles. This requires quite a meticulous dissection, which may be more easily accomplished with robot-assisted hernia repair than with conventional laparoscopic repair [Gonzalez]. Robot-assisted surgery gives greater degrees of freedom than conventional laparoscopic repair, which facilitates identification of anatomical spaces. It is also easier to fixate the mesh in robot-assisted hernia repair since it facilitates intracorporeal suturing.

Robot-assisted surgery has become widely accepted as a technique that enables more elaborate dissections, which would imply a better surgical outcome. The use of the robot in hernia repair is gradually becoming an accepted technique, despite the absence of randomized studies. Considering the high costs for the robot, more evidence is needed to confirm the intuitively perceived benefits, as well as analyses of cost-effectiveness.

3. Objectives and purpose

This is a clinical trial with the purpose of safety and reducing postoperative pain and discomfort for patients that undergo laparoscopic ventral hernia repair.

3:1 Primary aim

To investigate if a robot assisted ventral hernia repair results in less pain than IPOM laparoscopic ventral hernia repair.

3:2 Secondary aim

To compare operation time, length of stay, postoperative complications, recurrence, and costs in robot assisted laparoscopic ventral hernia repair vs laparoscopic IPOM-repair.

4. Hypotheses

- Robot assisted ventral hernia repair is associated with less tissue trauma and better opportunities for achieving a preperitoneal mesh repair. This should lead to less risk for postoperative pain.
- Robot assisted ventral hernia repair is associated with higher costs.
- Robot assisted ventral hernia repair is not associated with more risks for the patient than regular IPOM repair.

5. Study design

The study will be conducted as a prospective, open label randomized study. Patients planned for laparoscopic ventral hernia repair will be randomized between robot assisted laparoscopic and standard laparoscopic IPOM ventral hernia repair. Data on operating time, complications, LOS, SSO, pain, cost, and recurrence will be collected. The patients will be identified and asked about participation when they are planned for laparoscopic ventral hernia repair. They will be given oral and written information and signed informed consent is required from all patients.

At operation the CRF should be filled in. At discharge, the patient is prescribed 100 tablets Alvedon® and 20 tablets Oxynorm®. The patient is instructed to record the intake of all analgesics after discharge.

At discharge from the surgical ward the patient should be planned for a follow up at the surgical clinic at 30 days postoperatively. The doctor at the follow up visit should be another than the operating surgeon. The patients should then fill in VHPQ and a questionnaire and the surgeon should note the postoperative complications in the 30-days follow up form.

At one year follow up patients will also get the same questionnaire and the VHPQ.

At the follow-up visits 30 days and one year after surgery, a clinical examination is done. In case recurrent hernia is suspected, a computer tomography is done. At follow-up the patient is also examined for other surgical complications, including wound complications and seromas.

5.1 CRF

- Written consent and patient information will be given at surgical outpatient clinic
- Operation-protocol will be filled out in connection to the operation and the operating notes blinded
- 30-days the VHPQ will be filled out at 30 days follow up. 30-days follow up form will be filled up by the doctor which should be another than the operating surgeon.
- 1- year the VHPQ will be filled out at the 1 year follow up. The 1 year follow up form will be filled up by the doctor which should be another than the operating surgeon.

5.2 Exposure

The patient will be randomized to either conventional laparoscopic repair or robot assisted ventral hernia repair. The surgeon should have performed at least 20 repairs with the allocated technique.

In both groups, the repair is undertaken with the aim of minimizing the tissue trauma and striving to apply the mesh in a position that reduces the risk for complications and postoperative pain. The hernia defect is closed if possible with moderate tension. If possible, the mesh is applied preperitoneally. If it is not possible to achieve a preperitoneal repair, an IPOM repair is done.

The robot-assisted surgery will take place at Södersjukhuset and is performed with Da Vinci Si Surgical System (Intuitive Surgical, Sunnyvale, CA, USA). One 15 mm trochar for the camera and two 8 mm trochars are used. The defect is closed with intracorporal Stratafix® sutures or v-loc® sutures and a Medtronic progrip® mesh will be used. The mesh will be placed preperitional or retromuscular.

The conventional laparoscopic repairs will take place at Ersta or Södertälje hospitals. The local routines regarding troachar placement will be followed. The defect is closed with intracorporal Stratafix® sutures or v-loc® sutures and a Medtronic symbotex® mesh. The mesh will be placed on the peritoneum and fixated

The diameter of the defect will be measured intraoperatively. If it turns out to be greater than 8 cm, the procedure will be completed as planned and the patient will be included in the study on an intention to treat base, but not in to the protocol analysis.

6. Patient selection

All patients from the including centers, who fulfil the inclusion criteria shall be evaluated for participation in the study. Patients are given written and oral information before signed written consent. When they have given their consent, they will be given a code with the

hospital name first, for example Sös-001. Patient will be given a note in the file system about participating in the trial.

6.1 Inclusion criteria

- Patients planned for laparoscopic ventral hernia repair.
- Hernias in the midline with transverse diameter 2-8cm
- Distance to xiphoid process >5cm
- Closure of the fascia defect perceived as possible preoperatively
- ASA I-III
- BMI <35
- Age 18-80 years

6.2 Exclusion criteria

- Hernia defects with diameter >8 cm
- Ventral hernias outside the midline
- Fascia closure perceived as impossible
- Extensive abdominal adhesions foreseen
- ASA >III
- BMI >35
- Age >80 years or <18 years

7.Randomization

The randomization will be done at the outpatient department after the decision has been made to include the patient. A computer-based generator system is used for the random allocation. In case the patient is randomized to surgery with conventional laparoscopic technique, a referral is sent to Ersta or Södertälje. A notification is also made through the electronic patient record system (Take Care).
In case there is a disagreement between the surgeon responsible for the decision and the unit where the patient is allocated to, the patient is invited for a visit for second opinion at the allocated unit. Whatever final decision is taken, the patient stays within the study and will be included in an intention to treat analysis.

8.Blinding

No blinding will be done

9.Data to be collected

The following data will be collected and evaluated:

- Age operation protocol, surgeon
- Gender operation protocol, surgeon
- Length operation protocol, surgeon or anesthetist nurse
- Weight operation protocol, surgeon or anesthetist nurse
- ASA class operation protocol, surgeon or anesthetist nurse

- Smoking operation protocol, surgeon
- Immunosuppression operation protocol, surgeon
- Diabetes operation protocol, surgeon
- Collagenous disease operation protocol, surgeon
- Operating time operation protocol, surgeon
- Bleeding operation protocol, surgeon or anesthetist nurse
- Peroperative complication operation protocol, surgeon
- Complication Clavien classified 30-days follow up, doctor
- SSO 30-days follow up, doctor
- Seroma 30-days follow up, doctor
- Postop recurrent hernia 30-days follow up, doctor, 1 year, 3 years
- Pain and inconvenience patient, nurse, doctor on follow up, questionnaires
- Analgesics taken before and after discharge

10.Statistics

Primary outcome: postoperative pain after 30 days

Secondary outcome: Costs, Operation time, length of stay, postoperative pain, 30-day clavien classified complications, including SSO and seromas. Hernia recurrence.

Sample size estimation

The sample size estimation is based on the assumption that a preperitoneal repair causes less postoperative pain. If the procedures may be completed with a retromuscual technique in 10% of the cases in conventional laparoscopic hernia repair and that this proportion may be increased to 40% with robot-assisted technique, a total of 31 procedures would be needed in each group to reach a chance of 80% to show a statistically significant difference at the $p<0.05$ level. In order to compensate for drop-outs, we aim on including 70 patients.

11.Ethical considerations

The pilot study is approved by the ethical committee in Stockholm (2017/1696-31). An application will also be sent for the present randomized controlled trial.

The operations will take place under general anesthesia with careful, standardized routines for sterilization. The per-and postoperative period for the two methods are expected to be equivalent. The operation, regardless of method, carry risks of complications, mainly seromas, infections, bleedings and bowel injury. Participation in the study is not expected to increase these risks

The patients are cared for of according to clinical routines meaning postoperative monitoring until patient is adequately pain relieved. The patients are followed up regarding possible complications. The patients in the study will be followed even more actively than the standard treatment for these patients today.

12.Time schedule

The trial starts 1 September 2019. Inclusion is planned for at least two years.

13. Administration

The Surgical clinic and department for clinical research at

For every participating hospital a principal physician and nurse will be responsible for the study. The protocol committee is responsible for problems that may arise during the time of the study.

14. Appendices (Swedish)

1) Patient information and consent

2) Questionnaire 30 d, 1 year

3) VHPQ 30d, 1year

3) Operation protocol

4) Operation description and blinding

5) 30-day protocol

6) Flow chart

7) Reminder in short

8) Screening log

9) Subject enrolment

10) Examples on file notes for Take care

15. References

References

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Rogmark P, Petersson U, Bringman S, Ezra E, Österberg J, Montgomery A. Quality of Life and Surgical Outcome 1 Year After Open and Laparoscopic Incisional Hernia Repair: PROLOVE: A Randomized Controlled Trial. Ann Surg. 2016 Feb;263(2):244-50.

Gonzalez A, Escobar E, Romero R, Walker G, Mejias J, Gallas M, Dickens E, Johnson CJ, Rabaza J, Kudsi OY. Robotic-assisted ventral hernia repair: a multicenter evaluation of clinical outcomes. Surg Endosc. 2016 Aug 5. [Epub ahead of print]