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Combination of pre-emptive port-site and intraoperative intraperitoneal ropivacaine for reduction of postoperative pain: a prospective cohort study

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ABSTRACT

Objective: To evaluate the effectiveness of intraoperatively applied local ropivacaine added to standard analgesic therapy in reducing postoperative pain intensity and opioid requirement under routine hospital conditions.

Study design: In this prospective controlled cohort study, 303 consecutive patients receiving a gynaecological laparoscopic intervention at the Jena University Hospital were included. The study cohort ($n = 168$) received, in addition to standard pain management, a port-site (PS) infiltration with ropivacaine prior to incision and intraperitoneal (IP) instillation at the end of surgery. On the first postoperative day patients answered a validated questionnaire, and requirement of rescue analgesics was assessed.

Results: Pain intensity was assessed on an 11-point numeric rating scale (NRS) from 0 = no pain to 10 = most severe pain. Reported pain intensity for movement-related pain was significantly lower ($p = .001$) in the study group compared with the control group (4.4 (SD 2.4) vs. 5.3 (SD 2.2) respectively). Minimal pain intensity after operation was also significantly lower in the study cohort (2.6 (SD 1.7) vs. 2.1 (SD 1.8), ($p = .007$)). Significantly fewer patients required rescue opioids for analgesia in the ropivacaine cohort ($p = .001$). The requested dose of rescue opioid (piritramide) in this cohort was also lower ($p = .035$) with 6.5 mg (SD 4.9) vs. 8.7 mg (SD 6.6), and demanded later ($p = .001$) with 4.3 h after surgery vs. 3.1 h. Patients in the study cohort experienced less nausea ($p = .046$). Higher satisfaction scores with pain management were reported in the ropivacaine group 12.7 (SD 2.5) vs. 11.6 (SD 2.8) ($p < .001$) (16-point NRS with 0 = not at all, 15 = completely satisfied).

Conclusion: Addition of pre-emptive port-site plus intraperitoneal ropivacaine to standard postoperative analgesic therapy reduced postoperative pain intensity and opioid consumption in gynaecological laparoscopy.

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1. Introduction

Several benefits have been achieved with the implementation of laparoscopic techniques in gynaecological surgery, including reduction of postoperative pain and opioid requirement [1–8]. Nevertheless, early postoperative pain during the first 24 h remains a problem and needs to be addressed [9,10].

Different studies have been performed to reduce pain after laparoscopy by applying local anaesthetics (LA) in different ways: infiltration of the port-site (PS) [11,12], intraperitoneal (IP) instillation [13–15], IP nebulisation [16], paracervical block [17], tubal application [18] or a combination of these procedures [19,20]. Although many of these studies showed efficacy in pain reduction in experimental settings, there is still controversy about the effectiveness of LA application in routine clinical practice. Its clinical relevance within gynecological laparoscopy is therefore still unclear, and this technique is not considered standard of care.

The aim of this study was to investigate whether the use of ropivacaine at multiple locations and defined time points during

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Table 1
Overview of outcome measures on the questionnaire.

Outcome measure	Scale
Pain on ambulation/stress	NRS 0–10[a]
Maximum pain intensity since surgery	NRS 0–10[a]
Minimum pain intensity since surgery	NRS 0–10[a]
Is pain interfering with your mobility or movement?	Yes/No
Are you experiencing pain when you cough or breathe deeply?	Yes/No
Were you woken up by pain last night?	Yes/No
Is pain interfering with your mood?	Yes/No
Have you felt very tired since your surgery?	Yes/No
Have you felt nausea since your surgery?	Yes/No
Have you vomited since your surgery?	Yes/No
Would you have liked to have received more pain medication?	Yes/No
How satisfied are you with your pain treatment since surgery?	NRS 0–15[b]

[a] Numeric related scala (NRS) for pain: 0 = no pain, 10 = most intense pain imaginable.
[b] NRS for satisfaction: 0 = very unsatisfied, 15 = very satisfied.

laparoscopic surgery under routine conditions could reduce postoperative pain intensity and opioid requirement in gynaecologic patients. Patient satisfaction, cost-effectiveness and reduction of adverse effects of analgesic therapy were defined as secondary aims.

2. Material and methods

2.1. Sample and settings

The local Ethics Committee of the University of Jena approved this study. Data sampling was performed between January 2011 and February 2012. The intraoperative LA application was implemented in standard operating procedures (SOPs) in April 2011 after recruitment of the control arm had been completed. Thus, patients who received port site and intraperitoneal ropivacaine (PSIR) were considered as the study group, and patients having no intervention were considered the control group. Patients were included consecutively. All patients above 18 years of age, undergoing a laparoscopic surgical procedure after providing informed consent in the Jena University Hospital, Department of Gynaecology and Obstetrics, were eligible for inclusion. Exclusion criteria were: contraindication for ropivacaine or any other local anaesthetics, known allergy, refusal of treatment, refusal of participation in the data assessment, day care operations or patient participating in another clinical study. Since intervention was integrated as SOP into our quality assurance (DIN EN ISO 9001) patients were not informed about the comparative study being performed. From October until January 2011 a prophylactic-oxycodone based pain management was tested for some patients in our department. Since this medication could affect the postoperative pain experience data regarding these patients was not considered for this study ($n = 98$).

An external research assistant, not involved in patient care, and blinded for the intervention visited all patient 24 h after surgery to collect demographical, clinical and outcome data. Patients were instructed and asked to anonymously fill in a pain questionnaire. This questionnaire was developed and validated [21,22] by the pain-unit of the Jena University Hospital as a part of a national, multicenter interdisciplinary project for improvement of postoperative pain management (QUIPS, quality improvement in postoperative pain management [23], www.quips-projekt.de, last visited 28th August 2013). This questionnaire was divided into different sections dealing with pain intensity, functional impairment, side effects of pain treatment, and global assessment of postoperative pain management by the patient (Table 1). Patients were instructed to use a numeric rating scale (NRS) from 0 to 10 for assessing pain intensity.

No member of the surgical or ward team was involved in data collection or patient questioning. To ensure standardised data collection, written guidelines and training were provided to study personnel. All data were collected and sent to a central internet database of the QUIPS project [23].

2.2. Application of ropivacaine and surgical technique

The entire surgical team was instructed and trained in the application technique to guarantee uniformity of the procedure. In the PSIR group, the periumbilical area was infiltrated with 4 ml of a 0.75% ropivacaine solution (Ropivacaine© Fresenius Kabi GmbH, Bad Homburg, Germany) after induction of anaesthesia and prior to skin incision. Following this step, a Veress needle was introduced and pneumoperitoneum was induced with CO_2 gas. After a 10 mm trocar for the endoscope was inserted, each of the

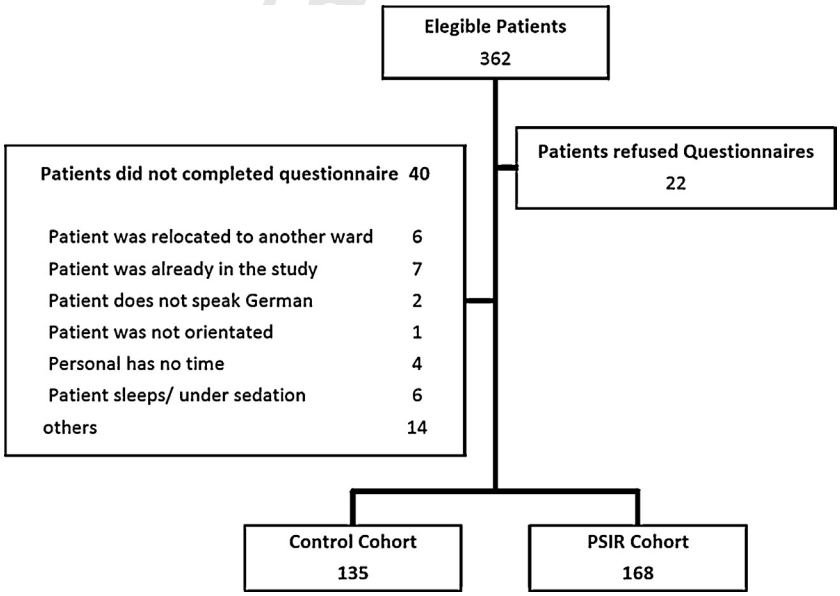

Fig. 1. Patient inclusion process.

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