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# Pain Medication Requirements After Sacropexy and Combination Interventions

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## ABSTRACT

**Background and Objectives:** Laparoscopic surgery is associated with reduced morbidity, and postoperative pain is reduced. The aim of this study was to assess postoperative pain intensity, analgesic requirements, and the influence of cofactors after laparoscopic sacral colpopexy.

**Methods:** The study assessed 287 patients treated with laparoscopic sacropexy for genital prolapse with a Pelvic Organ Prolapse Quantification grade >1. Patients were asked to evaluate their pain postoperatively using a 4-point verbal pain rating scale. In addition, medical records were analyzed regarding the requirement for analgesic medication.

**Results:** Patients distinguished between abdominal pain and shoulder pain after laparoscopy. Abdominal pain reached maximum severity on day 1 and showed a good response to nonsteroidal antiphlogistics, whereas shoulder pain was rarely found (6.27%). Of the patients, 38% required no pain treatment or required 1 dose at most. The need for pain medication reached its climax on day 1 and decreased during the 5 following days. Non-opioid analgesics provided a sufficient therapeutic effect.

**Conclusion:** Laparoscopic sacropexy is associated with a moderate degree of postoperative pain. Non-opioid analgesics should be preferred as first-line therapy. The typical shoulder-tip pain showed only a low prevalence in our study group. From our point of view, the low rate of shoulder-tip pain corresponded with the low intra-abdominal carbon dioxide pressure.

**Key Words:** Laparoscopic surgery, Postoperative pain, Prolapse surgery, Pain treatment, Shoulder-tip pain, Laparoscopic sacropexy, Pain medication, Vault prolapse.

## INTRODUCTION

Laparoscopic procedures in prolapse surgery have gained increasing importance within the past few years. Reduced morbidity, good cosmetic results, and a shorter stationary period are advantages generally offered by laparoscopy.[1] The concept of *minimally invasive* refers primarily to the manner of access. Although the intra-abdominal area of trauma is not necessarily smaller than when using open methods (eg, intra-abdominal access for sacropexy or retroperitoneal access for lateral repair), the abdominal wall injury is considerably more extensive during laparotomy compared with laparoscopy.

Problems with intestinal distention (ie, intestinal atony from carbon dioxide [$CO_2$] insufflation) and scapulodynia, triggered by the phrenic nerves, are frequent side effects of laparoscopy.[2] Because these are clinically the most striking side effects, we investigated the pain caused by these two problems.

When nociception occurs, it is important to distinguish between visceroception and surface perception. Visceroception is conducted over C fibers. The pain is therefore primarily transmitted via slow fibers that are passed on to the gyrus precentralis and lead to a rather muffled pain perception in the tractus spinothalamicus around the thalamus. Surface pain perception is passed on via fast A fibers, which efficiently conduct a localizable piercing or burning pain sensation.[3]

In the context of surgical operations, both pain qualities are triggered. The deep pain component predominates during laparoscopy as a result of visceral trauma, whereas a diaphragm irritation, provoked by augmented intra-ab-

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dominal pressure, can lead to known scapulodynia (nervus phrenicus).[4]

Prostaglandin metabolism plays an important role in pain treatment. When damage to tissue occurs, adenosine triphosphate, protons, oxygen radicals, potassium ions, and arachidonic acid are released and are transformed into prostaglandins, among other substances, with the enzymes cyclooxygenase 1 and 2. Further mediator substances, such as kinins and serotonin, cause a local inflammation response with vasodilatation and edema. Interleukin release and mast cell degranulation complete the reaction.[5] Non-opioid analgesics are preferentially used for the treatment of postoperative pain because of their influence on arachidonic acid metabolism and their antiphlogistic effect.[6,7]

Intestinal atony can be considered an aftereffect of acidosis of the intestine walls that is caused by $CO_2$ gas.[8] A higher tissue plasminogen activator activity, which is caused by this gas, can also play a role at the terminal ileum and the colon.[9] At graded abdominal $CO_2$ pressures (8–12 mm Hg), different values for either plasminogen activator inhibitor 1 (PAI-1) or tissue plasminogen activator yield are not seen.[10]

Laparoscopic interventions have a lower pain load than open operations; however, they are frequently underestimated as a result of the good reputation of laparoscopic procedures. This can lead to an insufficient therapeutic effect.[11] Because flatulence and scapulodynia are frequently listed as the main complaints during patients' daily routine, we investigated the intensity of shoulder and abdominal pain, as well as analgesic drug consumption, after laparoscopic sacropexy and combination operations.

## MATERIALS AND METHODS

All patients (N = 287) who underwent a laparoscopic sacropexy at our hospital between March 2005 and January 2009 were included in the study (**Table 1**). Quantification of prolapse according to the Pelvic Organ Prolapse Quantification system[12] was performed. All patients with a Pelvic Organ Prolapse Quantification grade >1 in the apical segment and descensus problems were included in the study. Laparoscopic supracervical hysterectomy was carried out in 171 cases by cervical sacropexy. (We favor net fixation at the cervical stump.) Anterior and posterior colpoplasties, lateral repair, and anti-incontinence operations (for cystocele, rectocele, pre-existing incontinence, and lateral defects), if required, were carried out simultaneously with the sacropexy (**Table 2**).

**Table 1.**
Basic Study Data for Laparoscopic Sacropexy Patients (N = 287)

| Characteristic | Mean | Range |
|---|---|---|
| Age (y) | 62.4 | 31–91 |
| Operative time (min) | 111.5 | 32–270 |
| No. of accompanying procedures | 2.10 | 0–4 |
| Hospital stay (d) | 6.6 | 4–22 |
| Weight (kg) | 71.08 | 40–118 |
| Height (cm) | 163.99 | 145–180 |
| BMI[a] ($kg/m^2$) | 26.44 | 17.8–45.5 |

[a]BMI = body mass index.

**Table 2.**
Accompanying Procedures Carried Out Simultaneously With Laparoscopic Sacropexy (N = 287)

| Accompanying Operation | % | n |
|---|---|---|
| Laparoscopic supracervical hysterectomy | 59.6 | 171 |
| Incontinence surgery | 19.1 | 55 |
| Transobturator tape | 9.7 | 28 |
| Endoscopic Burch Procedure | 8.7 | 25 |
| Tension-free vaginal tape | 0.7 | 2 |
| Anterior vaginal plastics | 47.7 | 137 |
| Posterior vaginal plastics | 34.1 | 98 |
| Lateral repair | 12.9 | 37 |

A pressure-controlled pneumoperitoneum with a maximum pressure of 12 mm Hg was established. (A warming device was not available at the time.) The patients were operated on while under general anesthesia in a moderate head-down position (15° Trendelenburg position). In total, 4 trocars were inserted: one 12-mm trocar for the laparoscope; two 5-mm trocars, one on each side, 2 cm medio-caudal to the anterior superior iliac spine; and one 5-mm trocar 2 cm above the symphysis in the midline.

All patients received premedication with 7.5 mg of midazolam approximately 1 hour before the operation. Anesthesia was induced with fentanyl (0.1–0.2 mg) and propofol (2 mg/kg) and was maintained by inhalation of volatile anesthetics according to patients' requirements. Thirty minutes before termination of general anesthesia, patients were given piritramide (3.75–7.5 mg) intravenously, as well as acetaminophen (1000 mg) or dipyrone (1–2.5 g).

(Piritramide is a synthetic opioid structurally related to meperidine, possessing a relative analgesic potency of 0.7 compared with morphine.) In the recovery room, piritramide was titrated intravenously according to individual needs. Any patients requiring pain medication postoperatively were prescribed diclofenac (100 mg as a suppository), ibuprofen (600 mg orally), acetaminophen (1000 mg orally), dipyrone (1000 mg intravenously), or etoricoxib (90 mg orally). This was recorded in the anesthesia record. The prescribed medication was administered primarily according to need over the following days. In the case of insufficient pain reduction after administration of the prescribed medication, piritramide (3.75–7.5 mg) was also injected intravenously until the pain intensity of the patient was classified as low (score of 0 or 1). For the recording of pain intensity, patient files were evaluated on a daily basis. A differentiation was made between scapulodynia and abdominal ache.

Pain intensity was documented by means of a verbal rating scale (none, 0; some, 1; middle, 2; or much, 3) according to Societá Italiana di Anestesia Analgesia Rianimazone e Terapia Intensiva (SIAARTI) recommendations for the treatment of postoperative pain.[7] The actual analgesic drug consumption was also investigated using patient files. Because 94.1% of the patients underwent combination operations (1–4 additional interventions), the pain query concentrated on the typical complaints mentioned after laparoscopy (abdominal pain and scapulodynia).

Pain intensity and analgesic requirements were recorded in relation to each other. Body mass index, blood loss, and operative duration were also investigated.

The Ethics Committee of the University of Witten Herdecke approved this study (No. 46109) on August 24, 2009.

## RESULTS

### General Data

All patients were treated by sacropexy, 23% of whom underwent a purely laparoscopic operation. The remaining patients also underwent further interventions (anterior and posterior colpoplasty, lateral repair, and laparoscopic supracervical hysterectomy). The median age at the time of the operation was 62.4 years (range, 31–91 years), and the median operative time was 111.5 minutes (range, 32–270 minutes). The median blood loss was 28 mL (range, 0–350 mL), and the median postoperative hemoglobin reduction was 0.7 mg/dL (preoperative, 13.6 mg/dL; postoperative, 12.9 mg/dL). The length of hospital stay was 6.6 days on average (according to the requirements of the German health care system; this has since changed to 4 days). Because of internal difficulties, 1 patient remained in the hospital for 22 days (**Table 1**).

Overall, the pain scores after laparoscopic sacropexy were low. The patients could clearly differentiate between scapulodynia (somatic pain) and visceral pain; however, differences between the combination operations could not be determined.

### Combination Operations and Pain

Sacropexy was carried out as the sole operation in 5.9% of cases (17 of 287 patients). These patients indicated only slight postoperative pain (score of 0 or 1). We found intermediate and strong postoperative pain in a very small group (4.18% [12 of 287 patients] and 0.69% [2 of 287 patients], respectively). All patients with intermediate or strong postoperative pain underwent 2 or 3 additional operations. However, 93% of patients with additional operations (251 of 270 patients) indicated only slight postoperative pain.

### Pain Medication

In the recovery room 211 patients required treatment with an opioid (piritramide). After the transfer from the recovery room (30–60 minutes after surgery), 95% of patients reported no or little pain.

Until patients' discharge from the hospital, 15.0% (n = 43) required no analgesics and 37.6% (n = 108) required only a single dose. The other patients were given individualized treatment according to their pain profile or focus. The mean pain medication requirement amounted to 1.01 doses per day on the first day and dropped to 0.38 doses per day by day 5 (**Figure 1**). Only 4.87% of all patients indicated severe pain. In the general ward, piritramide (7.2 ± 4.9 mg) had to be given to 87 patients (30.3%) complaining of persistent abdominal pain after administration of non-opioid analgesics.

### Pain and Side Effects

Neither an increased body mass index nor an extended operative duration was accompanied by an increase in the median analgesic dose. Increased blood loss did not result in a significant increase in the pain medication requirement.

Scapulodynia occurred in only 6.27% of cases: 66.67% of these patients described little pain, 27.78% indicated me-

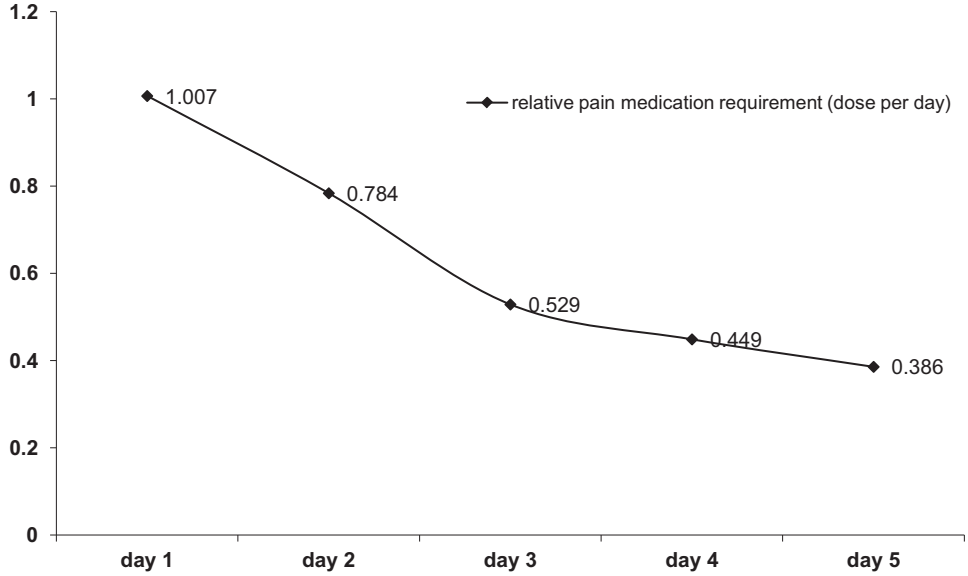


**Figure 1.** Course of relative pain medication requirement (dose per day) over first 5 postoperative days after laparoscopic sacropexy (recovery room excluded) for all patients (N = 287).

dium to severe pain, and 1 patient had severe scapulodynia (**Figure 2**).

## DISCUSSION

This study showed relatively low postoperative pain intensity corresponding with little overall requirement for analgesic medication in women undergoing elective laparoscopic sacropexy. The frequency of moderate or severe pain was low (14 of 287 patients), and except for a short period in the postanesthesia recovery unit, most patients could be treated sufficiently without the use of opioids. The mean length of hospital stay of 6.6 days appears to be quite long when compared with international standards. However, with regard to the special conditions of the German health care system, this was the regular time interval. As mentioned earlier, the length of stay has since decreased to 4 days.

Postoperative pain is considered unpleasant by patients and should be treated as early as possible.[7] Insufficient therapy for pain favors subsequent illnesses, such as delayed mobilization, pneumonia, thrombosis, and chronic pain syndromes.[13] According to the grade scheme of the World Health Organization, non-opioid analgesics should be used primarily but can be combined with opiates if necessary.[14,15]

A high body mass index, younger age, female gender, longer duration of surgery, and intra-abdominal interventions are all regarded as risk factors for increased pain medication requirement after open operations.[16] Laparoscopic procedures are accompanied by considerably lower morbidity and a shorter hospital stay. Jaturasrivilai[17] found that after laparoscopic hysterectomy, compared with the open approach, both pain medication consumption and hospital stay were significantly reduced (135.0 ± 67.5 mg vs 300.0 ± 75 mg of diclofenac and 2.6 days vs 4.5 days, respectively).

Because abdominal pain and scapulodynia are the most common postoperative complaints after laparoscopic operations, our discussion focuses on these issues. Laparoscopic and vaginal combination operations were not included, although in the subsequent analysis, this would have contributed to the rounding off of the overall picture.

Scapulodynia belongs to the group of somatic pains that are probably triggered by a phrenic irritation due to intraoperative gas pressure. To this effect, numerous studies have used different methods. Some studies used local anesthetics (bupivacaine/ropivacaine) in the diaphragm region,[18,19] whereas others used reduced gas pressure to lower the stimulus, causing the scapulodynia rate to decrease.[20–22] However, the study statements are heterogeneous and partly contradictory. Local anesthetics appear to have an influence only on general pain and not on scapulodynia. However, these studies appear to be unan-

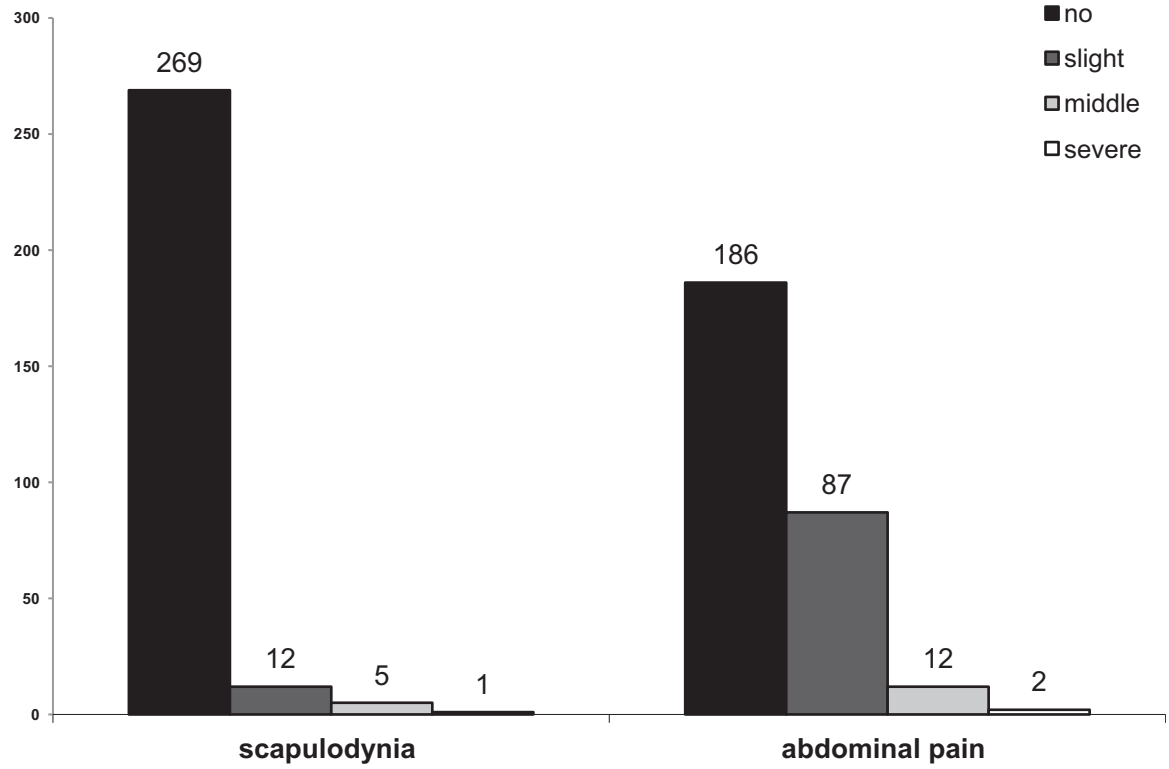


**Figure 2.** Verbal rating scores for postoperative scapulodynia and abdominal pain after laparoscopic prolapse surgery (N = 287).

imous with respect to the effects of a reduction of the intra-abdominal pressure.

Yasir et al[22] reported a reduction of postoperative shoulder-tip pain from 28% to 10% by reducing pressure from 14 to 8 mm Hg in 104 cholecystectomies. Sandhu et al[20] found a decrease from 44% to 28% at a pressure comparison of 14 and 7 mm Hg. Kandil and El Hefnawy[2] compared 4 groups with pneumoperitoneum pressures of 14, 12, 10, and 8 mm Hg and described a continuous decline in scapulodynia from 20% to 11% in accordance with the lower pressure.

Other groups dealt with the amplified removal of gas at the end of the operation, to remove $CO_2$ as completely as possible. This was achieved by siphoning, special drainage, or manual positive pressure ventilation during removal of the trocars. Sharami et al[23] performed 146 gynecologic operations and found significantly less scapulodynia with the pulmonary recruitment maneuver. In general, however, these authors reported higher pain rates than those working with low pressure. The highest pain reduction was described in the work of Uen et al,[21] with a reduction from 20% to 5%. They found that the group of patients with low-pressure $CO_2$ pneumoperitoneum (8 mm Hg) had less postoperative shoulder pain than the group that underwent a gasless technique using a subcutaneous abdominal wall–lifting device.

In laparoscopic procedures, superficial soreness, which usually plays a large role in abdominal incision pain during open methods, is frequently reduced. The effectiveness of infiltration of the trocar puncture sites with local anesthetics is open to question. Savaris et al[24] could prove no benefit of bupivacaine infiltration after laparoscopic surgery of the fallopian tubes. In contrast, other studies reported a reduction in postoperative abdominal pain.[18] In this study no special measurements were taken intraoperatively regarding superficial pain. In general, deep pain usually outweighs superficial pain. Deep soreness is viscerosensory pain that also occurs after open surgery in addition to the superficial incision pain. Studies in other disciplines have shown the effectiveness of non-opioid analgesics after laparoscopic organ removal.[6]

Diclofenac is the best-investigated non-opioid analgesic, and its effectiveness has been compared with that of acetaminophen and low-potency opiates. After both open operations and laparoscopies, diclofenac was found to have a good pain-relieving effect.[25] The most commonly

described standard dose is 75 mg orally or 100 mg as a suppository.

Because of the absence of a $CO_2$ warming device, we could not measure the influence of using $CO_2$ at room temperature. This might, according to the positive effects of warm $CO_2$,[26] be a weak point in our study that makes it less comparable.

The data in this study confirm that pain treatment consisting of only an on-demand medication was able to treat postoperative pain sufficiently in our collective of patients undergoing laparoscopic gynecologic operations. The use of a prophylactic time-scheduled administration of analgesics does not seem to be necessary in most cases. The incidence as well as the severity of pain was rather low, and many patients never requested analgesics at all.

Generally, laparoscopic sacropexy, as a central component of a composite prolapse surgery, is accompanied by little pain so that no long-term treatment appears to be necessary. Pain at the trocar puncture sites is rare and only requires treatment, from our point of view, in individual cases. It is still to be investigated whether larger incisions, caused by specimen rescue, are positively influenced by infiltration of local anesthetics. We were not able to assess the extent to which the different combinations of operative procedures had an effect on pain perception because we only focused on the consequences of laparoscopic interventions. Given that scapulodynia occurred in only 6.27% of patients, low pressure seems to be decisive for good outcomes, as indicated by a comparison of the literature and our own management (pressure of 12 mm Hg). Because scapulodynia is difficult to treat,[18] a pressure $<$12 mm Hg can be chosen, if necessary, for individuals with a history of scapulodynia. It is advisable to evaluate this in further studies. Problems caused by decreased intestinal peristalsis should also be the target of further efforts to optimize the postoperative situation. Further studies will have to be carried out to determine whether the influence of intestinal flora and gas removal techniques or, alternatively, gasless laparoscopy will provide the optimal result.

## CONCLUSION

The aim of this study was to assess the analgesic requirements after laparoscopic sacropexy and combination interventions for the treatment of pelvic floor disorders. Patients showed a low requirement for pain medication, and pain was rapidly and well controlled with non-opioid analgesics in most cases. The rate of scapulodynia was unexpectedly low, which could be the result of the low intraoperative $CO_2$ pressure, as indicated by a study of the literature.

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