

Need for improved treatment of postoperative pain

Ole Mathiesen¹, Berit Ahlmann Thomsen¹, Birgitte Kitter¹, Jørgen Berg Dahl² & Henrik Kehlet³

ABSTRACT

INTRODUCTION: A cross-sectional study was performed at Rigshospitalet, Copenhagen, a Danish tertiary university hospital, to describe current postoperative pain and nausea treatment with a view to identifying areas with improvement potential.

MATERIAL AND METHODS: Data on up to four of the major and most frequent types of surgery were collected from each department based on interviews with the staff, audits of patient courses and electronic patient medication records. Staff guidelines on procedure-specific pain treatment were also collected.

RESULTS: Data on 121 patients from 12 surgical departments and 44 procedures were included in the study. No reliable information about the quality of pain management was available as no data on pain scores were detectable for the first three postoperative days (POD) for 55% (day 1), 71% (day 2) and 84% (day 3) of the patients. Most patients (75%) were treated with opioids. Non-opioid analgesic treatment was insufficient as the majority of patients did not receive sufficient 24-hour treatment with paracetamol and non-steroidal anti-inflammatory drugs, and only a minority received combination therapy. Nausea was found in approx. 20% on POD 1-3. Staff pain treatment guidelines were present in 14% of the cases.

CONCLUSION: Our results confirm that challenges exist in postoperative pain management as previously observed in multinational surveys. The way forward is procedure-specific treatment plans based on interdisciplinary collaboration implemented in conjunction with organizational changes. This work represents a natural extension of the work of the traditional acute pain clinic.

FUNDING: not relevant.

TRIAL REGISTRATION: not relevant.

Postoperative pain treatment continues to represent a significant clinical challenge. Recent surveys demonstrate that 75% of patients experience pain after surgery and up to 30% experience moderate to severe postoperative pain [1-3].

One approach for improving postoperative pain treatment is the introduction of hospital-based acute pain services such as those initially introduced in the USA and Germany in 1985 [4]. With such services followed an increased use of advanced pain treatment modalities such as regional blockade, epidural analgesia and patient controlled analgesia. However, improved

pain relief per se could not be demonstrated to improve postoperative outcome, except that patient satisfaction rose and pulmonary complications became fewer [4]. Instead, it was suggested that improved patient outcomes could be obtained by integrating the work of acute pain services with multimodal rehabilitation programmes or fast-track surgery. It was subsequently demonstrated that a standardized pain treatment plan that was part of a fast-track set-up reduced the length of the stay and also the incidence of severe medical complications compared with a conventional postoperative rehabilitation programme [5, 6].

The Section of Acute Pain Management and Palliative Medicine (EASP) was established at Rigshospitalet, Copenhagen, a tertiary university hospital in Denmark. One of the Section's main objectives is to introduce and implement multimodal postoperative analgesic and anti-emetic regimens and to integrate these with fast-track surgery programmes. Consequently, we initially conducted a cross sectional study to describe the current postoperative pain and nausea treatment at Rigshospitalet with a view to identifying improvement areas.

MATERIAL AND METHODS

This was a cross-sectional, observational and non-interventional study. The local Regional Ethics Committee was asked, but since the study was a quality assurance study, no approval was needed.

Through interviews with doctors and nurses at surgical departments, up to four of the major and most frequently performed types of surgery at the departments were identified. Furthermore, the nature of the standard postoperative pain and nausea treatment for each of these procedures was registered from interviews and from the electronic patient medication (EPM) record. Procedure-related information on pain management

ORIGINAL ARTICLE

- 1) Section of Acute Pain Management and Palliative Care 4114, Rigshospitalet
- 2) Department of Anaesthesia 4231, Rigshospitalet
- 3) Section for Surgical Pathophysiology, Rigshospitalet

Dan Med J
2012;59(4):A4401



Section of Acute Pain Management and Palliative Medicine Rigshospitalet, Copenhagen.

 TABLE 1

Departments and types of surgery comprised by the study.

Surgical clinic/department	Major types of surgery
Neurosurgery	Craniotomy, cervical disc prolapse, lumbar disc prolapse, lumbar fusion
Vascular surgery	Abdominal aortic aneurysm, aortic-intestinal bypass, carotid artery disease, lower extremity vascular bypass, endovascular surgery
Abdominal surgery	Major abdominal tumour surgery, bowel resection, whipple procedure, oesophageal resection, hepatic resection
Urology	Retroperitoneal tumour resection, radical cystectomy, nephrectomy, radical prostatectomy
Orthopaedic surgery	Knee alloplasty, hip alloplasty, tumour resection, major spinal surgery (scoliosis), minor spinal surgery
Plastic surgery and burns	Breast reconstruction, free flaps, burns, melanoma resection
Gynaecology	Endometriosis, cancer ovarii surgery, abdominal hysterectomy
Mamma surgery	Mastectomy with axillary dissection, mastectomy without axillary dissection
Ear, nose and throat surgery	Tonsillectomy, head and neck tumour, thyroidectomy
Cardiac and thoracic surgery	Video-assisted thoracoscopic surgery, thoracotomy, heart surgery
Oral surgery	Osteotomy, osteoradionecrosis, mandibular fractures
Spine section (children)	Adolescent idiopathic scoliosis

handed out to patients was collected as were staff guidelines on pain and nausea treatment.

Audits of three individual patient courses from each type of surgery were performed. Demographic data (gender, age and usual opioid consumption) were collected. Furthermore, data on any visual analogue scale (VAS) pain scores (at rest and during mobilization); analgesic treatment (opioids, paracetamol, nonsteroidal anti-inflammatory drugs (NSAIDs) and gabapentin) and nausea (incidence and anti-emetic treatment) were tracked and collected for the first three postoperative days (POD). This was based on patient and nurse records, pain score forms and EPM registration. Only written data material and data from the EPM were used; no patients were interviewed for the audit.

Trial registration: not relevant.

RESULTS

The study was carried out at Rigshospitalet – a tertiary 1,100 bed hospital – from November 2009 to February 2010. Data from 121 patients, 60 female and 61 male, with a mean age of 56 (range 15–93) years, were included in the study. Patients represented 12 surgical departments and 44 surgical procedures (Table 1). Eighteen of the patients received opioid treatment prior to their hospital admission.

Pain

Few data on pain score were available at the surgical departments. For the first three PODs, no VAS-pain scores at rest were available for 55%, 71% and 84% of patients, respectively. Furthermore, no VAS-pain scores during

mobilization were available for 80%, 87% and 89% of patients on POD 1-3, respectively (Figure 1 A). Consequently, it was not possible to collect reliable information on the quality of pain management.

Opioid treatment

Most patients (> 75%) patients received an opioid in the first three postoperative days. Seven different opioids were used at the surgical departments (Figure 1 B). Oxycodone (40%) was the most frequently used drug followed by morphine (39%).

Non-opioid analgesic treatment

The overwhelming majority of patients (97%) received paracetamol. However, according to the EPM, sufficient 24-hour treatment of 1 g every six hours was only given to 47%, 59% and 63% of the patients on POD 1-3, respectively.

A total of 53 patients (44%) received NSAID treatment during POD 1-3. Ibuprofen (51 patients) was the most frequently administered drug. However, according to the EPM, sufficient 24-hour treatment (defined as a minimum of 1,200 mg ibuprofen/24h), was only given to 57%, 85% and 65% of patients on POD 1-3, respectively.

Multimodal pain treatment with paracetamol ibuprofen and gabapentin.

Whereas most patients received analgesic treatment with paracetamol, relatively few patients were treated with a combination of non-opioid analgesics (Table 2).

Nausea

Approximately one out of five patients suffered from nausea during POD 1-3 (Table 3). However, only three departments (7%) presented a written guideline for nausea treatment. For the majority of the procedures (93%), an anti-emetic drug was prescribed as a part of the postoperative pain treatment plan in the EPM with ondansetron (88%) and metoclopramide (31%) as the most frequently administered drugs.

Pain treatment guideline

A standard, procedure-specific pain treatment plan was present in the EPM for 40 of 44 procedures.

However, a written, procedure-specific pain treatment guideline was available to staff in only 14% of the cases.

Patient information

In the handout and other written information aimed at patients about the postoperative period, only 16 of 44 procedures presented a specific goal for the pain treatment, e.g. that the patient should have low pain levels at rest and be able to move freely and/or cough.

DISCUSSION

This cross-sectional quality assurance study performed at a tertiary university hospital revealed several postoperative pain treatment issues with a potential for improvement. Data on the quality of postoperative pain management were scarce, written procedure-specific guidelines for pain management were few and the use of multimodal opioid-sparing pain treatment was suboptimal. This situation was mirrored in the consumption of opioids by the majority of the patients who had a high incidence of nausea, an opioid-related side-effect. Although disappointing, especially at a university hospital, these issues are most likely of a more general nature not only limited to Rigshospitalet, and they have, indeed, been observed in multi-national surveys [1, 3].

We were unable to collect pain scores for the majority of the patients. An estimation of the effectiveness of the actual pain treatment was therefore impossible. Regular pain scoring of patients is a basic tool in postoperative pain care and is essential in order to improve and adjust treatment. Data on pain scores during mobilization are especially valuable, as high pain scores may keep patients from early mobilization and ambulation and thereby prolong convalescence [7, 8].

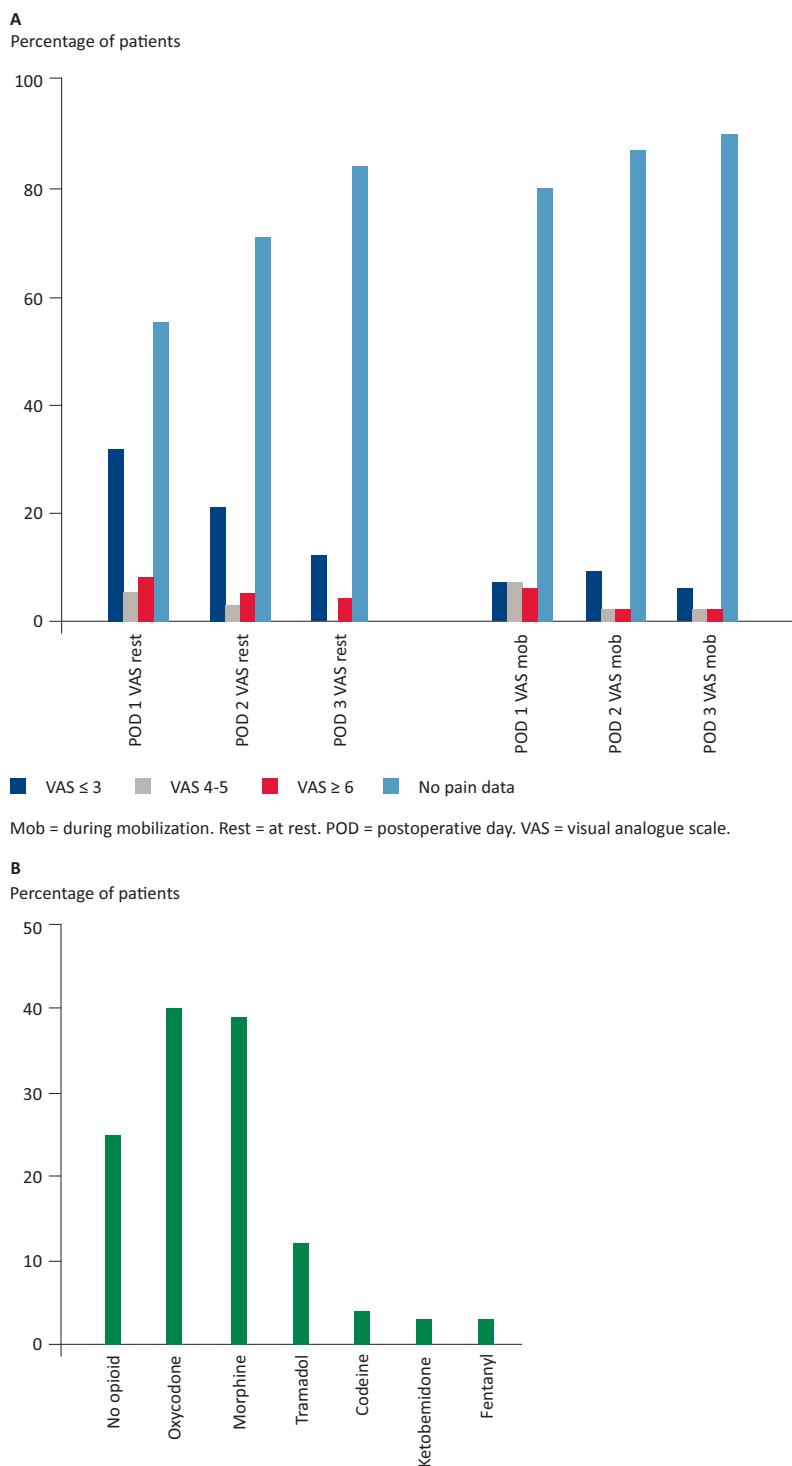
In contemporary evidence-based postoperative pain treatment, attenuation of pain is achieved by a combination of different analgesics affecting different pain mechanisms, e.g. nociceptive, neuropathic and inflammatory pain mechanisms [7]. Thus, an additive or even synergistic effect on pain can be achieved and pain during mobilization reduced. Another achievement from multimodal treatment is a reduction of opioid consumption and thereby also of its well-known side-effects [9]. This is well documented for drugs like NSAIDs [10, 11] and gabapentin [12, 13]. The present study showed that most patients were treated with paracetamol, but combinations of non-opioid analgesics were used in only 7% (paracetamol + NSAID + gabapentin) and 44% (paracetamol + NSAID) of the patients. We believe that this area holds an important potential for improvement.

Most patients needed treatment with opioids, and oxycodone was used as frequently as morphine. However, morphine is generally recommended as first-choice drug when opioid treatment is warranted [14], and there is no evidence that oxycodone is a superior drug compared with morphine. On the contrary, the prescription of morphine rather than e.g. oxycodone or fentanyl may be cost-saving, not only for the hospital, but also for society [14].

Our study was not designed to indicate which patient should have been treated with an opioid or not, but it does serve to demonstrate the frequent use of opioids; a use which may well be reflected in the relatively high incidence of nausea on POD 1-3. This, in turn,

FIGURE 1

A. Maximum 24-hour visual acuity scale pain scores at rest and during mobilization on the first three postoperative days. No data on pain scores were available for the majority of patients. **B.** Type of opioid consumption on postoperative days 1-3 at surgical departments. More than 75% of patients received an opioid in the postoperative period. Oxycodone and morphine were administered equally frequently.



emphasizes the importance of an opioid-sparing pain treatment [13, 15]. It is also of concern that evidence-

TABLE 2

Percentage of patients who received basic non-opioid analgesic treatment.

Treatment	
Paracetamol	97
Paracetamol + NSAID	44
Paracetamol + gabapentin	12
Paracetamol + NSAID + gabapentin	7

NSAID = non-steroidal anti-inflammatory drug.

TABLE 3

Percentage of patients with nausea on the first three postoperative days.

Nausea	POD 1	POD 2	POD 3
Yes	23	18	20
No	75	58	52
No data	2	24	28

POD = postoperative day.

based guidelines for treatment of postoperative nausea and vomiting (PONV) were present for only a small minority of the procedures. In the majority of cases, PONV treatment was limited to one drug, e.g. ondansetron or metoclopramide, and administered at the discretion of the attending nurse on the ward. If evidence-based anti-emetic prophylaxis and therapy [16] were combined with guidelines to support clinical staff, important improvements would be achievable in this area. Furthermore, such changes would limit the use of metoclopramide, which has no evidence-based anti-emetic effect in the doses typically used (10 mg), and which has unwanted side-effects at higher doses [17].

In fast-track surgery, it is highly important that patients are well informed and cooperative. Information about the planned pain treatment and any related goals may help patients to cooperate with the staff and thereby improve their pain management and outcome [18].

The results of this cross-sectional quality assurance study identify challenges that need to be met in daily clinical praxis at our hospitals. To handle these challenges, interdisciplinary collaboration is required between all involved staff in the course of the patients from admission to discharge. Furthermore, updated knowledge and education on pain treatment is needed. And, finally, the handling of these challenges requires the introduction of procedure-specific pain and nausea treatment plans that are based on best knowledge and incorporated into daily practice and which include concomitant monitoring of implementation and results [19]. Consequently, a coordinating project- and research unit working cross-sectionally and facilitating and promoting collaboration between a wide range of clinical staff is warranted.

In summary, the way forward includes organizational adaptation and represents a natural extension of

the work of the traditional acute pain service. The objective of such work is to facilitate, develop, teach and implement updated, procedure-specific postoperative pain treatment plans at the hospital [19]. Such plans should be based on collection of data both before and after implementation in order to document results and make adjustments as required. Finally, plans should be incorporated with fast-track treatment programmes to achieve the full advantages of improved pain treatment.

CORRESPONDENCE: Ole Mathiesen, Enhed for Akut Smertebehandling og Palliation 4114 Rigshospitalet, 2100 Copenhagen, Denmark.
E-mail: olemat@dadlnet.dk

ACCEPTED: 9 January 2012

CONFLICTS OF INTEREST: none

LITERATURE

- Fletcher D, Fermanian C, Marday A et al. A patient-based national survey on postoperative pain management in France reveals significant achievements and persistent challenges. *Pain* 2008;137:441-51.
- Apfelbaum JL, Chen C, Mehta SS et al. Postoperative pain experience: results from a national survey suggest postoperative pain continues to be undermanaged. *Anesth Analg* 2003;97:534-40.
- Benhamou D, Berti M, Brodner G et al. Postoperative Analgesic Therapy Observational Survey (PATHOS): a practice pattern study in 7 central/southern European countries. *Pain* 2008;136:134-41.
- Werner MU, Soholm L, Rotboll-Nielsen P et al. Does an acute pain service improve postoperative outcome? *Anesth Analg* 2002;95:1361-72.
- Kehlet H, Wilmore DW. Evidence-based surgical care and the evolution of fast-track surgery. *Ann Surg* 2008;248:189-98.
- White PF, Kehlet H, Liu S. Perioperative analgesia: what do we still know? *Anesth Analg* 2009;108:1364-7.
- Kehlet H, Dahl JB. Anaesthesia, surgery, and challenges in postoperative recovery. *Lancet* 2003;362:1921-8.
- White PF, Kehlet H, Neal JM et al. The role of the anesthesiologist in fast-track surgery: from multimodal analgesia to perioperative medical care. *Anesth Analg* 2007;104:1380-96.
- Zhao SZ, Chung F, Hanna DB et al. Dose-response relationship between opioid use and adverse effects after ambulatory surgery. *J Pain Symptom Manage* 2004;28:35-46.
- Maud E, McDaid C, Rice S et al. Paracetamol and selective and non-selective non-steroidal anti-inflammatory drugs for the reduction in morphine-related side-effects after major surgery: a systematic review. *Br J Anaesth* 2011;106:292-7.
- Marret E, Kurdi O, Zufferey P et al. Effects of nonsteroidal antiinflammatory drugs on patient-controlled analgesia morphine side effects: meta-analysis of randomized controlled trials. *Anesthesiology* 2005;102:1249-60.
- Kong VK, Irwin MG. Gabapentin: a multimodal perioperative drug? *Br J Anaesth* 2007;99:775-86.
- Dahl JB, Mathiesen O, Kehlet H. An expert opinion on postoperative pain management, with special reference to new developments. *Expert Opin Pharmacother* 2010;11:2459-70.
- Jarlbæk L, Kehlet H, Sjogren P. The licit opioid consumption in Denmark. *Ugeskr Læger* 2010;172:3173-8.
- Kehlet H. Postoperative opioid sparing to hasten recovery: what are the issues? *Anesthesiology* 2005;102:1083-5.
- Gan TJ, Meyer T, Apfel CC et al. Consensus guidelines for managing postoperative nausea and vomiting. *Anesth Analg* 2003;97:62-71.
- Tramer MR. A rational approach to the control of postoperative nausea and vomiting: evidence from systematic reviews. Part II. Recommendations for prevention and treatment, and research agenda. *Acta Anaesthesiol Scand* 2001;45:14-9.
- Kehlet H. Fast-track surgery—an update on physiological care principles to enhance recovery. *Langenbecks Arch Surg* 2011;396:585-90.
- White PF, Kehlet H. Improving postoperative pain management: what are the unresolved issues? *Anesthesiology* 2010;112:220-5.