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PŮVODNÍ PRÁCE

Prepacked Take-Home Analgesia in Outpatient Hand Surgery Reduces Opioid Dispensation

Předbalená „s sebou domů„ analgezie při ambulantní chirurgii rukou snižuje výdej opioidů

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ABSTRACT

BACKGROUND

Adequate postoperative pain treatment is important for quality of life, patient satisfaction, rehabilitation, function, and total opioid consumption, and might lower both the risk of chronic postoperative pain and the costs for society. Prolonged opioid consumption is a well-known risk factor for addiction.

Previous studies in upper extremity surgery have shown that total opioid consumption is a third of the amount prescribed, which can be explained by package size. The aim of this study was to examine whether implementation of prepacked take-home analgesia bags reduced the quantity of prescribed and dispensed opioids.

MATERIAL AND METHODS

We introduced prepacked take-home analgesia bags for postoperative pain treatment in outpatient surgery. The bags came in two sizes, each containing paracetamol, etoricoxib, and oxycodone. The first 147 patients who received the prepacked analgesia bags were included in the study, and received a questionnaire one month after surgery covering self-assessed pain (visual analog scale of 0–10) and satisfaction (0–5), as well as opioid consumption. Prescription data after introducing the analgesia bags were compared with data before the bags were introduced.

RESULTS

Of the 147 patients included in the study, 58 responded. Compared to standard prescription (small bag group: 14 oxycodone immediate release capsules (5 mg), large bag group: additional 28 oxycodone extended release tablets (5 mg), based on the smallest available package), the patients in the small analgesia bag group received 50% less oxycodone and 67% less for the large bag group. Patients with small bags consumed a median of 0.0 mg oxycodone and those with large bags consumed a median of 25.0 mg oxycodone. The median satisfaction was 5.0 (range: 2–5) and the median pain score was acceptable at the first postoperative day. Prescription data showed a significant reduction of 60.0% in the total amount of prescribed opioids after the introduction of prepacked analgesia bags.

CONCLUSIONS

The introduction of prepacked analgesia bags dramatically reduced the quantity of opioids prescribed after outpatient hand surgery. Patient satisfaction was high and the postoperative pain level was acceptable.

Key words: analgesia, hand surgery, opioids, outpatint surgery, wrist surgery.

INTRODUCTION

Outpatient surgery is a common type of surgery where patients are operated under general or local anesthesia and then discharged the same day. Good pain management is essential to maintain a good quality of recovery, and patient satisfaction after surgery. Conversely, poor pain management can significantly reduce the patient's quality of recovery. The visual analogue scale (VAS) is an effective tool for assessing pain. Current Swedish guidelines for pain management aim to achieve a score of less than 4 on a VAS running from 0 to 10 (1, 19, 23).

The first-line analgesics in Sweden are paracetamol and cyclooxygenase (COX) inhibitors. Opioids are mainly used as supplementary short-term treatment. Type of surgery is usually the main determinant for post-operative pain regime; for example, after carpal tunnel surgery, paracetamol and ibuprofen are usually enough to achieve adequate pain relief (4, 11, 16, 8). In cases where opioid analgesics are necessary, the smallest available package for a prescription often contains an unnecessarily large quantity, leading to unused drugs (19, 5, 13, 20). In Sweden, where Sweden prescription of individual tablets is not possible, the smallest package of slow release oxycodone 5 mg contains 28 tablets, and the smallest package of immediate release 5 mg contains 14. This increases the risk of adverse effects, misuse, addiction, and in severe cases death (7, 13, 14, 17).

Statistics show that four out of five people with opioid addiction have previously used prescription painkillers (7, 14). Of the approximately 185 million drug users worldwide, it is estimated that 26–36 million use opioids as their main drug (13, 17). Opioids are considered to be the drugs with the strongest addictive effect of all pharmaceutical substances. Among those receiving drug addiction treatment worldwide, opioid addiction is the most common cause (50–85% of patients). Moreover, opioids were involved in close to 50,000 cases of drug-related deaths in 2019 in the US, about 70 % of all drug-related deaths (24).

Opioid use has increased dramatically worldwide, as have deaths from opioid analgesics. In the United States, which has been hit the hardest, the prescription of opioids increased between 2000 and 2010, but has since the slowly decreased in number of prescriptions but the share of prescriptions with a duration more then 30 days has increased (22). An estimated 2.4 million Americans are currently addicted to opioids (7, 14, 17).

Surgeons in general and orthopedic surgeons in particular are among the most common prescribers of opioids, and the use of opioids for postsurgical pain continues to increase (7, 14, 17).

The number of deaths due to oxycodone has increased tenfold in the last 10 years according to the register of the Swedish Society of Toxicology, indicating that this is a global problem (21).

Overprescribing of opioids is well documented within surgery. Previous studies in upper extremity surgery have shown that total opioid consumption is only a third of of the amount prescribed. Moreover, larger and longer duration of initial opioid prescriptions are known to predispose patients to continued postoperative opioid use (3, 10).

There are some guidelines aimed at reducing the overprescription of opioids, but as mentioned earlier, the smallest available package for a prescription often contains a larger amount of tablets than needed (2, 6, 15, 18). The aim of this study was therefore to investigate whether implementation of prepacked take-home analgesia bags reduced the amount of opioids prescribed and dispensed.

MATERIAL AND METHODS

In 2022, we introduced prepacked analgesic bags for postoperative pain treatment in outpatient surgery at the Department of Hand Surgery at *Örebro* University Hospital. To account for differences between patients and surgery type, "small" and "large" bags were prepared. The prepacked bags contained 24 tablets of paracetamol (500 mg), 3 tablets of etoricoxib (60 mg), and 7 immediate release oxycodone (IR) capsules (5 mg). The large bags included an additional 7 extended-release oxycodone (ER) tablets (5 mg). The content of the bags was determined by a group consisting of hand surgeons, pharmacists, anesthesiologists, and anesthetic nurses, on the basis of local hospital guidelines, Swedish national recommendations, and existing studies (6, 11). Following the surgical procedure, patients who would otherwise have received an opioid prescription instead received a prepacked analgesia bag free of charge. The bag size was determined by the operating hand surgeon based on the surgical procedure and expected need for ER opioids. Previously used standard prescription was 14 oxycodone IR capsules (5 mg) for the small bag group and an additional 28 oxycodone ER tablets (5 mg) for the large bag group, based on the smallest available prescription package. The primary outcome was the amount of opioids dispensed. Secondary outcomes were patient satisfaction with prepacked take-home analgesia bags, VAS pain scores first and second postoperative day and total opioid consumption.

Inclusion criteria: patients undergoing outpatient hand surgery, with following postoperatively opioid requiring procedures, ligament repair, arthrodesis, fracture fixation, or hardware removal. Exclusion criteria: being under the age of 18 years, having difficulty understanding Swedish, dementia, mental illness, and alcohol/substance abuse. The inclusion period was 1st of February to 31st of Marsh 2022. During the inclusion period 147 patients received the prepacked analgesia and met inclusion but not exclusion criteria. These patients received a questionnaire one month after surgery covering self-assessed pain (visual analog scale of 0–10) and satisfaction (0–5), as well as opioid consumption.

In addition to the cohort of 147 patients we analyzed the total opioid prescriptions at our department. All prescriptions are registered centrally in Sweden, and we extracted our prescription data locally in Region Örebro County. The data were used to compare the total amount of opioid prescription during a six-month period after the introduction of the prepacked analgesia bags to the same six-month period in 2019, before the prepacked bags were introduced. We chose 2019 as the comparison year because of the Covid-19 pandemic in 2020 and 2021. The study was approved by the Swedish Ethical Review Authority (no.2023-01360-01).

Statistics

Demographic data are presented as number of cases, median, and interquartile range (IQR). The Shapiro-Wilks test was used to assess the normality of the distribution (data not shown). Due to non-normal distribution of data, the data are presented as median and IQR, but the mean is presented when suitable. The Mann-Whitney test and chi (19) test were used for comparison between groups. P-values less than 0.05 were considered to be statistically significant.

RESULTS

Of the 147 patients who received the prepacked analgesia bags, 58 responded to the questionnaire (39.5%). Median age was 62 (IQR: 54–67) years. Fifteen of the respondents were male and 43 were female. Among the

Table 1. Numbers and sizes of prepackaged analgesia bags dispensed after various surgical procedures

	Small	Large	Total
Ligament repair with suture, hand	1	4	5
Arthrodesis	1	0	1
Kirschner wire fixation of fracture, hand	2	6	8
Internal plate fixation of fracture, wrist and hand	5	33	38
Hardware removal	5	1	6
TOTAL	**14**	**44**	**58**

58 respondents, 14 (24%) received the small bag and 44 (76%) received the large bag. Surgical procedures are presented in Table 1. There was no statistically significant difference in bag size between genders.

The groups receiving large versus small bags did not show any difference in satisfaction and pain on the first postoperative day. On the second day, pain was significantly higher in the group receiving the large bag (p=0.047). The total consumption and outcomes are presented in Figure 1 and Table 2.

On the second postoperative day, 1 patient in the small bag group (7%) and 16 patients (36%) in the large bag group reported moderate or severe pain (VAS>4) in the large bag group (p=0.036).

Patients who reported moderate to severe pain on the second postoperative day consumed 10 (IQR: 5–30) mg immediate release oxycodone, compared to 0 (IQR: 0–10) mg among patients reporting no or low pain (p=<0.001).

Compared to standard prescription based on type of surgery, the patients in the small bag group received 50% less oxycodone, respectively 67% less for the large bag group. The small prepacked bag contained 35mg oxycodone and the large prepacked bag contained 70mg oxycodone. The small bag group consumed a median of 0 mg (IQR: 0–8.8 mg) oxycodone (0% of the amount dispensed), while the large bag group consumed a median of 25.0 mg (IQR: 15.0–45.0 mg) oxycodone (35.7% of the amount dispensed). Five patients, one in the small bag group and four in the large bag group, needed additional prescription of pain medication.

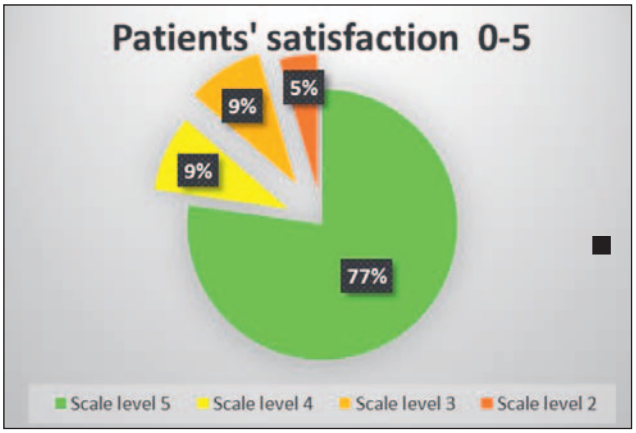

Fig. 1. Patient satisfaction. Note: 5 indicates most satisfaction, and 0 indicates least satisfaction.

Of the tablets distributed to the study population in the prepacked analgesic bags, 76% of the paracetamol, 52% of the etoricoxib, 28% of the immediate-release oxycodone capsules, and 60% of the prolonged-release oxycodone tablets were consumed by the patients (Fig. 2a+b). None of the patients reported use of any other pain medication aside from the medication in the analgesic bag.

The cost of the small bag was 1.53 USD and the cost of the large bag was 2.05 USD.

Prescription data from the Department of Hand Surgery

Prescription data showed a significant reduction of 71.0% in the total amount of opioids prescribed by our department, from 19 915 tablets during January–June 2019 to 5 770 tablets during January–June 2022 (Fig. 3a). The distribution of emergency and elective surgery was the same in both periods. In January–June 2019 we performed 1 282 surgeries and prescribed 19 915 opioid tablets, while in January–June 2022 we performed 928 surgeries and prescribed 5 770 opioid tablets. We therefore reduced the number of tablets per surgery from 15.5 to 6.2, corresponding to a 60.0% reduction in prescribed opioids (Fig. 3b).

Table 2. Outcomes by size of prepacked analgesia bags

Median (range) [IQR]	**Small bag**	**Large bag**	**p-value**
VAS pain score day 1	2.00 (0–5) [0.0–4.0]	3.00 (0–10) [0.3–5.0]	NS
VAS pain score day 2	2.00 (0–7) [0.5–3.8]	3.50 (0–8) [2.0–5.8]	0.047
Satisfaction (0–5)	5.0 (2–5) [3.3–5.0]	5.0 (2–5) [4.0–5.0]	NS
Consumed paracetamol (24 tablets in bag)	17.0 (0–24) [4.0–24.0]	24.0 (4–24) [24.0–24.0]	0.028
Consumed etoricoxib (3 tablets in bag)	1.0 (0–3) [0.0–2.8]	2.0 (0–3) [0.0–3.0]	NS
Consumed IR oxycodone (7 tablets in bag)	0.0 (0–7) [0.0–1.8]	0.5 (0–7) [0.0–3.8]	NS
Consumed ER oxycodone (0 or 7 tablets in bag)	–	4.0 (0–7) [2.0–7.0]	–
Total consumption oxycodone (mg)	0.0 (0–35) [0.0–8.8]	25.0 (0–70) [15.0–45.0]	<0.001

Note: p-values were calculated using the Mann-Whitney test. IR = immediate release; ER = extended release

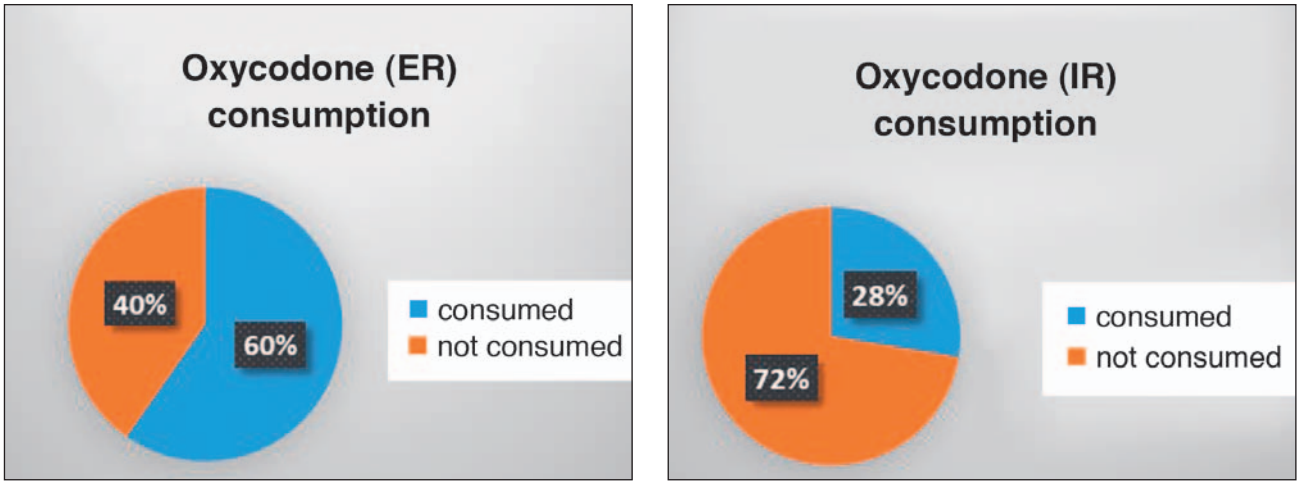

Fig. 2. Oxycodone consumption as percentage of amount dispensed.

DISCUSSION

The increasing abuse of opioids is a problem that poses great challenges to society. the crime that accompanies the abuse devours huge amounts of social resources. Many cases of opioid abuse have been related to a prescription being the starting point (18). In four out of five people with opioid addiction, a prescription was the dominant factor. Of the 185 million drug users worldwide, an estimated 26 to 36 million use opioids as their main drug (7, 9, 14, 17).

Opioids are considered the most addictive of all drugs. It is well known that addiction to opioids occurs after a short period of time (10), making it all the more important to reduce the number of opioids prescribed and to adapt them to the real needs of our patients. In our opinion, one of the main problems is the package size. Many orthopedic and hand surgery procedures require significantly fewer opioids than the smallest package contains (12, 17). In this study, we were able to demonstrate a dramatic reduction in the amount of opioids dispensed, and the patients were satisfied with the concept. We also found a low consumption of the opioids, indicating that the bags contained too many opioids or that they were not used optimally. It is important to mention that not all patients who underwent surgery received a pre-packed analgesia bag.

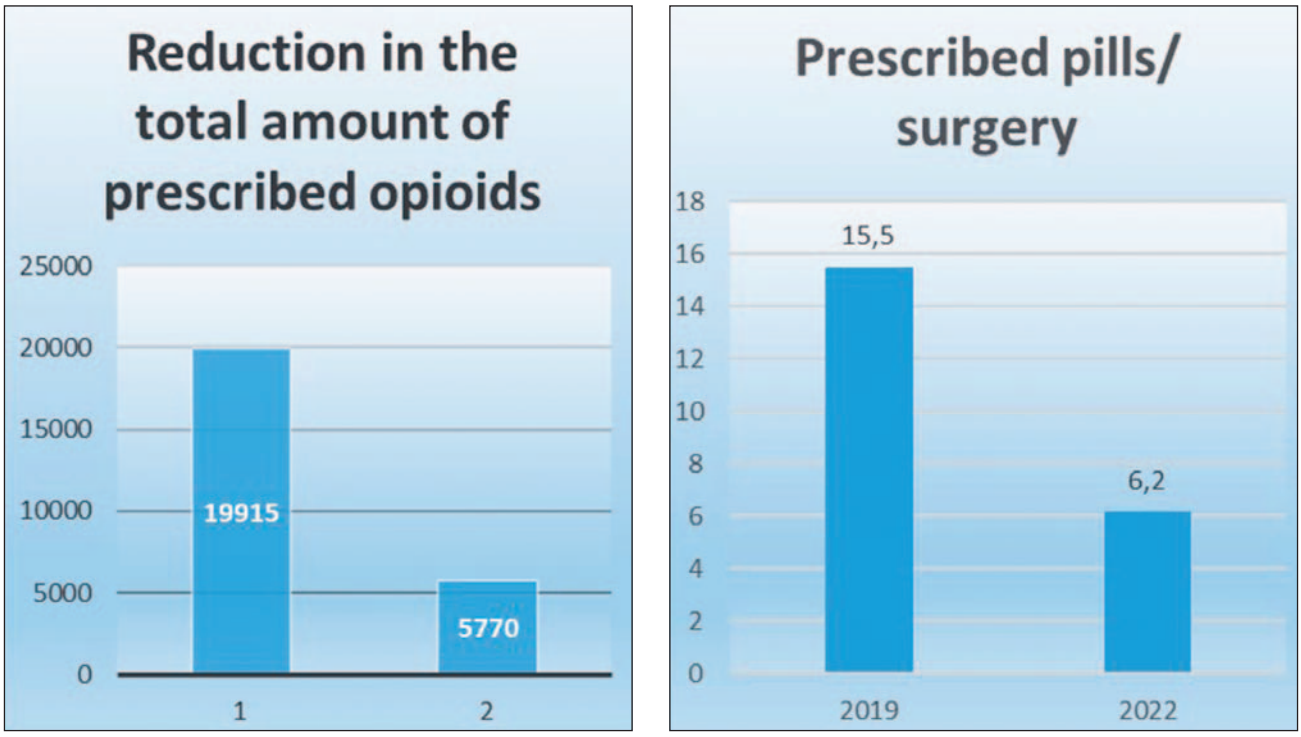

Fig. 3. Total opioid prescription and prescribed pills/surgery in 2019 and 2022 from the Department of Hand Surgery, Örebro University Hospital, Örebro, Sweden.

Total prescription data from the Department of Hand Surgery were compared before and after the introduction of pre-packed analgesia bags. The significantly lower number of pills cannot only be explained by the introduction of the pre-packed bags alone. We can trace back about 5,000 tablets to the pre-packed bags, and roughly the same number can be explained by the lower number of interventions performed. However, given that there was a total reduction of 14,000 in the number of pills prescribed, the question remains of why we prescribed 4,000 fewer pills than can be explained by the pre-packed bags and the number of surgeries. One explanation could be that the project raised awareness among our colleagues about the prescription of opioids. At the same time, the problems of overprescription and consumption of opioids were discussed intensively in the media, which could have promoted different prescriptions and consumer behavior.

Cost is one important factor in this study. Since purchasing of medicines is regulated centrally in Sweden, the costs for us as a university hospital are lower than for the end consumers who pay for their medicines in the pharmacy. We are aware that drug prices can vary greatly from country to country. The price of €1.48, depending on the exchange rate, is calculated for our university hospital and is certainly not generally valid for the rest of the world outside Sweden. However, when comparing these costs to the costs caused by opioid abuse, the cost of the prescription must be regarded as negligible. Approximately 47,000 persons died in the United States from an opioid-involved overdose in 2018, and 2.0 million individuals met the diagnostic criteria for an opioid use disorder in 2017. The economic cost of the U.S. opioid epidemic in 2017 was estimated at 1.021 billion USD, including the cost of opioid use disorder, estimated at 471 billion USD, and the cost of fatal opioid overdose, estimated at 550 billion USD (17).

The correct number of analgetics to include in the bags is a matter for debate. It is not possible to have one bag for all surgical procedures. Although our large bag contains only enough oxycodone for the first 3 postoperative days, it still appears to be oversized for a number of procedures that we have considered an indication for prescribing that bag. For other procedures, the bags could be undersized. In the future, we will have to optimize the content with the help of further research.

There are limitations to this study. A standard protocol for bag size selection was not used, but was determined by the operating hand surgeon based on the surgical procedure and expected need for ER opioids. The response rate was 39.5%, indicating a bias and uncertain results. The questionnaire was sent a month after surgery. This could potentially introduce recall bias and other confounders. The periods over which the prescription data were compared were not totally equal regarding procedures and number of patients. Further, the questionnaires only asked for pain scores during the first two postoperative days.

CONCLUSIONS

In conclusion, the findings in this study suggest that prepacked take-home analgesia in outpatient hand surgery reduces opioid prescription in our department. A small number of patients needed additional prescription of pain medication. Additional prescription also occurs in standard care. Despite the five additional prescriptions, total amount of dispensed opioids is still reduced. Further studies are warranted to determine the optimal contents in the analgesia bags, and to examine pain over a longer follow-up period. Further studies, preferably randomized controlled trials, are also warranted to determine the outcome regarding pain, satisfaction, and total dispensing/consumption of opioids for patients with traditional prescriptions versus prepacked take-home analgesia bags.

Ethical approval: *The study was approved by the Swedish Ethical Review Authority, ref No 2023-01360-01.*

Level of evidence: *Level 3b.*

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