

Regularly Scheduled Oral Morphine for Post Surgical Orthopedic Pain

James P. McCormack, C. Brian Warriner, Marc Levine, John Forster-Coull

ABSTRACT

Post-surgical pain (PSP) is often poorly controlled despite the availability of many effective narcotic analgesics. Poor analgesia may be due to the use of inappropriate doses and dosing intervals rather than the type of analgesic agent used. Oral morphine administered on a regular schedule is a very effective therapy in patients with chronic pain but has not been actively investigated in the treatment of acute post-surgical pain in adults.

We studied the use of regularly scheduled oral morphine given every four hours in 13 patients undergoing total hip arthroplasty. This was an open pilot study to determine if regularly dosed oral morphine was effective and safe in this patient population. All patients initially received 20 mg PO q4h regularly dosed oral morphine with an option to receive 10 mg PO morphine PRN for pain. Eleven of 13 patients completed the study and received oral morphine for an average of 48 hours. Of the two patients who did not complete the study, one withdrew due to inadequate pain control and one withdrew due to upper gastrointestinal discomfort. None of the 11 patients completing the study required any parenteral morphine for breakthrough pain, and only three patients requested additional doses of oral morphine. Vomiting occurred in six of the study patients. It appears that regularly dosed oral morphine may be an effective means of administering narcotics to postsurgical orthopedic patients and should be compared in clinical trials to other methods of narcotic delivery.

Key Words: analgesia, morphine, orthopedics, post-operative

RÉSUMÉ

Les douleurs post-chirurgicales (DPS) sont souvent mal contrôlées, malgré la disponibilité d'un grand nombre d'analgésiques narcotiques efficaces. Il est possible que les problèmes d'analgésie résultent plus d'une posologie et/ou d'intervalles entre les doses inadéquates que du choix de l'analgésique. L'administration de morphine par voie orale à intervalles réguliers donne de bons résultats chez les patients qui éprouvent des douleurs chroniques, mais cette possibilité n'a pas été examinée pour les douleurs post-chirurgicales aiguës chez l'adulte.

Les auteurs se sont penchés sur l'administration de morphine par voie orale à intervalles réguliers, soit aux quatre heures, chez 13 patients ayant subi une arthroplastie complète de la hanche. L'étude pilote libre devait déterminer l'efficacité et l'innocuité de l'administration régulière d'une dose de morphine par voie orale à cette population. Chaque patient a reçu au départ 20 mg po q4h de morphine par voie orale sur une base régulière. Les patients pouvaient en outre obtenir 10 mg po de morphine prn pour combattre la douleur. Onze des treize sujets ont complétés l'étude et reçu de la morphine par voie orale pendant 48 heures en moyenne. Un des deux patients qui ont abandonné le projet a donné comme raison un mauvais contrôle de la douleur tandis que le second a mentionné des malaises dans la partie supérieure du système gastro-intestinal. Aucun des onze patients qui ont complété l'étude n'a eu besoin de morphine parentérale pour combattre la douleur et seuls trois d'entre eux ont réclamés des comprimés supplémentaires. Six ont souffert de vomissements. Il semble que l'administration de morphine en doses régulières par voie orale s'avère efficace chez les patients qui subissent une intervention chirurgicale orthopédique et cette méthode devrait être comparée à d'autres techniques d'administration des narcotiques dans le cadre d'essais cliniques.

Mots clés: analgésie, morphine, orthopédie, post-opératoire

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James P. McCormack, Pharm.D. from the Faculty of Pharmaceutical Sciences, University of British Columbia/Clinical Pharmacology, St. Paul's Hospital.

C. Brian Warriner, M.D. from the Department of Anesthesia, St. Paul's Hospital.

Marc Levine, Ph.D. Faculty of Pharmaceutical Sciences, University of British Columbia.

John Forster-Coull, B.Sc.(Pharm) at the time of the study was a hospital pharmacy resident at St. Paul's Hospital.

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Address correspondence to: Dr. James McCormack, Department of Pharmacy, St. Paul's Hospital, Vancouver, British Columbia, Canada, V6Z 1Y6.

INTRODUCTION

Post surgical pain (PSP) is a common complaint of patients following surgery. Despite the fact that effective treatment of PSP is con-

sidered to be important for recovery from surgical procedures,¹ many studies have shown that treatment is inadequate despite the availability of effective narcotic

analgesic agents.²⁻⁸ One of the major reasons for inadequate pain control appears to be the continued use of intermittent or on demand dosing of intramuscular (IM) nar-

cotics.² The degree and extent of PSP varies significantly among patients and among the specific procedures performed. The dose of analgesic and duration of pain relief are often impossible to predict in individual patients. Intermittent or on-demand dosing requires the patient to experience pain before an analgesic is given and this sets up a pain cycle resulting in poor pain control.

Patient-controlled analgesia, continuous narcotic infusions, and epidural administration of narcotics are some of the methods of narcotic administration that are presently being investigated or used clinically. While these methods have been shown to be effective, they are expensive, require specially trained clinical staff and also have specific adverse effects associated with their use.⁹⁻¹³

The oral route for administration of narcotic analgesics has not been actively investigated for the treatment of PSP. Oral administration of morphine has gained acceptance as the treatment of choice in chronic cancer pain, yet is almost never used to treat acute PSP. This is despite the fact that oral morphine is inexpensive, easy to titrate, and has high patient acceptance compared to IM injections. Only one study has evaluated oral liquid morphine given on a regularly scheduled basis for the treatment of PSP. O'Hara et al,¹⁴ found that more pediatric orthopedic patients were pain free with regularly scheduled oral morphine than with intermittent IM meperidine. Unfortunately, this study was not double-blind and investigator bias is a significant possibility.

A number of other studies have assessed the use of regularly scheduled sustained release (SR) oral morphine tablets in patients with PSP.¹⁵⁻²⁰ Most of these studies

found regularly dosed SR morphine effective for the treatment of PSP. Unfortunately, some of these studies failed to give the oral preparation and/or measure pain relief early in the postsurgical period. This time period is when possible concern about efficacy and absorption of oral narcotics, especially SR formulations, exists. In addition, SR preparations may not be appropriate for the treatment of acute PSP because they lack a rapid onset and ease of titration which are key features required in a preparation being used for the treatment of acute pain lasting 24-72 hours.

Post surgical nausea and vomiting are concerns when using oral medication immediately after surgery. Nausea and vomiting occur in up to 40% of postsurgical patients but these symptoms tend to be of short duration²¹ and are usually associated with either eating/drinking or mobilization of the patient immediately after surgery. Most patients do not have intractable vomiting or persistent nausea and, with the exception of patients having upper gastrointestinal surgery, take oral medication after awakening from anaesthesia.

Given its proven role in the treatment of chronic pain, regularly dosed oral morphine has the potential to be an effective and well tolerated method of PSP treatment for some surgical procedures but it has not been evaluated. The present study was designed as an open trial to evaluate the effectiveness and safety of regularly dosed oral morphine in patients undergoing total hip arthroplasty.

METHODS

This study was approved by the ethics review boards at St. Paul's Hospital and the University of British Columbia and all patients gave

written, informed consent. All patients who were scheduled to undergo total hip arthroplasty were approached and asked to participate in the study. Patients were excluded if any of the following were present:

- a) COPD and/or asthma that could not be improved by medical therapy preoperatively, congestive heart failure or unstable angina,
- b) a history of allergy to morphine or related narcotics,
- c) an incomplete gastrointestinal tract or gastrointestinal motility disorders.

All patients had their pain initially controlled with 1-4 mg of morphine IV as needed every 10-15 minutes while in the post anaesthetic room (PAR) according to normal hospital procedure. Upon arrival on the surgical ward, all patients received 20 mg of a commercially available liquid oral morphine preparation if their respiratory rate was greater than nine breaths per minute (BPM) and they did not have a sedation score of three or four (1 - for awake, 2 - easily arousable, 3 - difficult to arouse, 4 - unarousable). A 20 mg starting dose was chosen because this is an approximate equivalent to 5-10 mg of intramuscular morphine, a common parenteral dose, and provided a similar 24 hour morphine dose to that given in the SR morphine studies. Oral morphine was administered q4h at regularly scheduled times (0200, 0600, 1000, 1400, 1800, 2200). If breakthrough pain occurred at any time during the study, the patients could request additional medication and they would receive a 10 mg dose of oral morphine. When this additional morphine was requested, the subsequent regularly scheduled oral morphine dose was

to be increased by 10 mg. The regularly scheduled oral dose of morphine could be increased up to a maximum of 40 mg orally every four hours. If pain control was still unsatisfactory at this time, the investigators were to be contacted and further dosage adjustments would be done as deemed necessary. This protocol allowed the titration of regularly scheduled oral morphine to be driven by the on demand analgesic request of the patient. This protocol should produce an oral equivalent of "patient controlled analgesia".

All patients were ordered a stool softener (docusate 100 mg PO bid) and a stimulant laxative (bisacodyl 10 mg PO daily) during the study to help prevent any constipation that might occur from regularly dosed narcotics and inactivity during the postsurgical period. Anti-nauseants were used at the discretion of the investigators if patients complained of nausea and vomiting.

Pain intensity was evaluated by the patient prior to each dose using a vertical 10 cm visual analog scale (VAS) with the top of the line labelled "unbearable pain" and the bottom labelled "no pain". The level of sedation and respiratory rate were recorded before each dose. If the patient scored either a three or four on the sedation scale, or the respiratory rate was less than 10 BPM, the dose was omitted and the investigators were called. The presence of nausea or vomiting was determined by questioning the patient every four hours and was recorded for the duration of the study period. Patients were considered to have completed the study when, in the opinion of the investigators, subsequent pain could be controlled effectively by dosing on demand with acetaminophen with codeine (i-ii tabs q3-4h

PRN). In general, this occurred 48-72 hours after surgery.

RESULTS

Thirteen patients (eight females, five males) ranging in age from 31 to 83 (mean 62 years) were enrolled in the study and started on oral morphine. Twelve of the 13 patients received a general anaesthetic. Eleven of 13 patients completed the study and all patient's individual pain scores are shown in Table I.

Only three of the 11 patients (#8, 12 and 13) required an additional 10 mg dose of oral morphine and a subsequent increase in the maintenance dose of oral morphine to 30 mg q4h as per study protocol. This occurred at 17, 36 and two hours post surgery respectively. No further supplemental doses of oral

morphine were requested by these patients for the duration of the study. The average duration of regularly scheduled oral morphine in all the patients completing the study was 48 hours (range 40-52 hours). From the time the patients were moved to the surgery ward from the PAR, no patients completing the study needed had any parenteral narcotics.

Patient #5 was withdrawn from the study after only two doses of oral morphine due to inadequate pain relief which was based on the patient continually requesting frequent doses of intramuscular morphine. After withdrawal from the study, she received 10 mg of IM morphine every two hours, and required a psychiatric consult for pain control. This patient had a history of extreme pain following

Table I
Visual Analog Pain Scores (on a 10 cm scale) prior to each oral dose

Patient	Arrival on Ward	Doses of Regularly Scheduled Oral Morphine												
		1	2	3	4	5	6	7	8	9	10	11	12	13
		Hours from Arrival on Ward												
		4	8	12	16	20	24	28	32	36	40	44	48	52
1	6.6	7.0	5.0	3.3	2.8	3.0	3.1	2.2	2.0	2.2	2.1	2.6	3.2	3.4
2	4.5	2.2	3.3	0.0	0.0	0.0	1.3	0.3	0.0	0.0	0.0	0.0	0.0	0.0
3	6.1	2.8	3.2	3.5	1.2	2.4	5.8	2.0	3.7	1.6	1.8	1.8	4.6	2.8
4	1.3	0.2	1.0	0.5	0.5	0.2	0.2	0.2	0.2	0.0	0.0	X	X	X
5	8.2	6.3	6.4	R	R	R	R	R	R	R	R	R	R	R
6	5.1	4.3	5.5	2.2	3.1	2.8	R	R	R	R	R	R	R	R
7	4.5	3.1	2.2	2.3	2.0	2.1	1.2	2.3	2.1	2.0	3.0	X	X	X
8	6.9	7.4	3.8	4.1	6.8	9.2	6.8	6.2	7.9	3.8	0.0	0.8	X	X
9	7.2	4.5	4.0	2.5	3.7	3.5	4.5	2.0	2.7	3.0	1.6	X	X	X
10	6.6	?	3.4	3.4	2.2	0.0	1.8	1.3	2.8	2.9	0.0	X	X	X
11	10.0	5.0	0.3	0.2	0.4	0.1	0.4	0.2	0.2	0.7	0.2	0.2	0.1	0.1
12	5.6	5.6	4.7	?	0.4	1.8	1.3	3.1	7.7	4.3	0.0	1.9	0.0	X
13	8.0	9.0	3.0	5.7	5.8	5.7	3.9	2.0	3.0	0.9	1.7	2.0	3.1	X

X = patient completed study and treated with PRN acetaminophen with codeine

R = patient removed from study due to poor pain control or adverse effect

? = score not taken

previous hip replacement surgery, requiring high and regular doses of IM morphine and a psychiatric consult. Patient #6 was withdrawn after 24 hours, despite good PSP control, due to epigastric pain unrelieved by antacids. It was difficult to determine whether oral morphine was the cause of the epigastric discomfort, however, it did decrease once the patient was withdrawn from the study.

Five patients (#1, 4, 8, 9 and 11) had one episode of vomiting, while one patient (#2) had two episodes of emesis. Vomiting usually occurred secondary to ambulation and fluid intake and was not associated with ingestion of the oral morphine. Sedation scores were one or two in all study patients for the duration of the study with the exception of patient #12 who experienced a single sedation score of three. This occurred following a dosage increase (20 to 30 mg) 36 hours after surgery. As per study protocol. The subsequent dose was held, after which the patient received two more regularly scheduled doses of oral morphine and exhibited no further problems. With the exception of patient #12, all patients had respiratory rates of greater than 9 BPM for the entire study. Patient #12, upon arrival to the orthopedics ward and prior to any oral morphine being administered, had a respiratory rate of 6 BPM, but was awake and talking. The initial dose of oral morphine was held until the patient's respiratory rate was greater than nine, which occurred one hour and 15 minutes after arrival on the ward.

DISCUSSION

Pain control with the use of regularly scheduled oral morphine appeared to be satisfactory for all patients completing the study. Mean VAS pain scores declined

rapidly over the first 12 hours and were then less than three for the duration of the study (Figure 1). The large standard deviations at each time point indicates that there was a great deal of variability in pain scores among patients. Most patients did not request any breakthrough doses of oral morphine despite the fact that they were told to ask for additional doses of morphine if they felt their pain was not adequately controlled. Only three patients (#8, 12, 13) requested morphine for breakthrough pain on one occasion each and subsequently had their maintenance dose increased to 30 mg. By comparison, a retrospective review of 20 patients who underwent total hip arthroplasty showed that patients requested on average, six IM narcotic injections for pain relief per postsurgical course. The reason patient #13 required an alteration in the oral morphine dose may have been related to the fact that the patient received a spinal anaesthetic and therefore no intravenous morphine was given in the PAR. In patients that do not receive any intravenous morphine in the PAR,

a higher initial dose of morphine may be required. Four patients who were in for revision or a second hip arthroplasty indicated that pain control on this occasion was far superior to what they recollected from previous surgery.

A single episode of vomiting was reported in five of the study patients, and one patient reported two episodes of vomiting. Vomiting followed either recent fluid ingestion or ambulation of the patient which suggests a vestibular component. None of the episodes of vomiting occurred within 30 minutes of any of the oral morphine doses and absorption of morphine was likely not affected. All the nausea reported appeared to be mild and of short duration and is consistent with that seen following orthopedic surgery.

In conclusion, 20 mg of oral morphine every four hours, with a titration schedule, for the treatment of PSP secondary to total hip arthroplasty appeared to be effective and well tolerated by the patients in this study. A 10 mg starting dose with titration to the patient's needs may be more appropriate in pa-

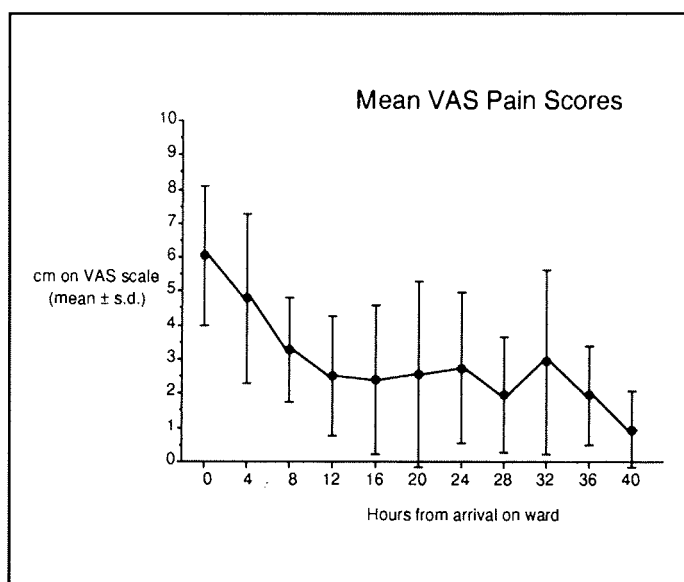


Figure 1

tients who are at greater risk for sedation or respiratory depression such as the elderly, patients with preexisting hypercapnic pulmonary disease, and patients overly sensitive to narcotics (determined from previous use). This method of PSP treatment is inexpensive and has many potential advantages over the use of intermittent intramuscular morphine injections. It is easier to administer, to titrate, and has high patient acceptance. To ensure the safety of regularly scheduled oral morphine for patients undergoing total hip arthroplasty, we recommend that respiratory rate and level of sedation be monitored in patients before each regularly scheduled oral morphine dose. As with any narcotic, if excess sedation or a low respiratory rate is observed, the regularly scheduled dose should be held. The use of regularly scheduled oral morphine in the treatment of PSP can not yet be extrapolated to patients undergoing surgery involving manipulation of the gastrointestinal tract as this may lead to reduced or delayed morphine absorption. In view of its potential advantages, regularly dosed oral morphine should now be compared to other forms of narcotic administration in patients with PSP secondary to orthopedic procedures. A double-blind comparison of regularly scheduled oral morphine to intermittent IM morphine is presently underway. ☒

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