Original Article

Intrathecal Analgesia in Patients with Cancer Pain – An Audit in a Tertiary Institution

Koravee Pasutharnchat,[1] *MD*, Kian-Hian Tan,[2] *MBBS, FANZCA, FFPMANZCA*, Mohamed Abdul Hadi,[2] *MBBS, MMed (Anaes)*, Kok-Yuen Ho,[2] *MMed (Anaes), FIPP, DAAPM*

Abstract

Introduction: Cancer pain is one of the most frequently encountered pain syndromes. With the application of the World Health Organization analgesic ladder, adequate analgesia is achieved in 75% to 90% of patients. The remaining patients suffer from intractable pain requiring intrathecal analgesia. The aim of this study was to retrospectively analyse the pain intensity before and after intrathecal analgesia and review the complications associated with the implantation and the care of the intrathecal device. Materials and Methods: We reviewed medical records of all cancer patients whose pain were managed by intrathecal catheter implants in our centre from February 2005 to August 2008. The pain intensity, medication and complications related to intrathecal catheter insertion or drug delivery were reviewed at the time before starting the intrathecal analgesia (T0) and time of discharge from the hospital/time prior to death during their stay in the hospital (Tdsc). Results: Twenty-nine patients were included. Out of these 29 patients, 86.2% had metastatic cancer. The most common indication was poor pain control. Pain intensity was reduced significantly at the time of discharge from hospital (P <0.001). The number of patients with side effects from opioids decreased after intrathecal treatment. We found 4 patients with short-term catheter complications e.g. kinked or displaced catheter and catheter-related infection. Conclusion: Intractable cancer pain could be managed effectively by intrathecal analgesia with a significant decrease in pain intensity and reduced opioid-related side effects. The side effects due to intrathecal opioids and complications from intrathecal catheter were minimal.

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Key words: Intractable cancer pain, Intrathecal catheter

Introduction

Pain is prevalent in cancer patients. It is a major impediment to an adequate quality of life and may undermine efforts to assess and treat the underlying disease.[1] Approximately 75% to 90% of cancer-related pain syndromes can be controlled using the 3-step ladder approach guidelines established by the World Health Organization.[2] However, even when the basic principles for the use of analgesic drugs are adhered to, some patients will still experience considerable side effects from systemically administered opioids.[3] Consequently, these patients may require aggressive interventional pain management strategies. Intrathecal (IT) analgesia has emerged as a key therapeutic option for patients who have failed to obtain adequate pain relief or develop intolerable side effects to drug therapy.[4] IT therapy restricts drug effect to regions associated with the source of the noxious stimulus. Systemic side effects are largely reduced, and there is a higher concentration of analgesics at the site of action, even at significantly lower doses. In addition, new techniques for catheter insertion and new catheter designs have been introduced in the last decade and have made it possible to implement this treatment modality in home care situations.[5]

The aim of this study was to audit the use of IT analgesia for patients with intractable cancer pain in Singapore General Hospital. We retrospectively analysed the pain intensity before and after IT drug delivery and reviewed the complications associated with the implantation and the care of the IT device.

[1] Department of Anesthesiology, Faculty of Medicine, Ramathibodi Hospital, Mahidol University, Thailand
[2] Pain Management Centre, Singapore General Hospital, Singapore
Address for Correspondence: Dr Koravee Pasutharnchat, Department of Anesthesiology, Ramathibodi Hospital, Rama 6 Road, Bangkok 10400, Thailand.
Email: kpasuth@yahoo.com

Materials and Methods

With approval from the Institutional Review Board, we reviewed the medical records of all cancer patients whose pain were treated with IT analgesia at the Pain Management Centre between February 2005 and August 2008. Mean pain intensity using Numeric Rating Scale (NRS) ("0" being "no pain" and "10" being "the worst possible pain") of all patients was calculated before IT catheter insertion (T0) and at the time of discharge from the hospital /time prior to death during their stay in the hospital (Tdsc). The mean daily systemic opioid consumption at T0 and Tdsc, was converted to oral morphine equivalent and documented. The mean daily dose of IT local anaesthetic and opioids were also documented for T0 and Tdsc. Opioid doses were converted to equi-analgesic morphine equivalents.[6] The presence of opioid-related side effects of opioids before and after IT drug delivery were also compared.

Table 1. Patient Demographics

No. of patients	29	
Age (y)	51.7 ± 14.4	
Sex: M/F	17/12	
Primary tumour		
Intra-abdominal	14	48.3%
Gynaecological	1	3.4%
Bone/muscle/breast	7	24.1%
Thyroid	1	3.4%
Lung	4	13.8%
Unknown	2	6.9%
Metastasis		
Yes	25	86.2%
No	4	13.8%
Indications for intrathecal analgesia		
Intolerable side effects from opioids	2	6.9%
Uncontrolled pain	20	69.0%
Both	7	24.1%
Catheter entry site		
Lumbar	26	89.7%
Thoracic	3	10.3%
Length of stay in hospital after IT catheter insertion (days)		10.4 ± 9.6
<1 week	13	44.8%
1-2 weeks	11	37.9%
2-3 weeks	2	6.9%
3-4 weeks	1	3.4%
>4 weeks	2	6.9%

Age and length of stay in hospital are shown as Mean ± SD. Other data are presented as number of patient and percentages.

Statistical Analysis

Data were expressed as mean with standard deviation (SD). The paired Wilcoxon signed rank test was used to compare pain intensity scores at T0 and Tdsc. The paired-sample Student's *t*-test was used to compare the mean IT opioid and local anaesthetic doses. The McNemar Test was used to compare the incidence of opioid-related side effects. All *P* values were two-sided, and *P* values <0.05 were considered statistically significant. Data were analysed by SPSS version 16.0 (SPSS Inc, Chicago, IL).

Results

Twenty-nine patients with intractable cancer pain managed by drugs administered via an IT catheter were included in the study. Patient demographics are presented in Table 1.

The IT catheter (PORT-A-CATH® IT implantable system, Deltec Inc, USA) was inserted at the lumbar vertebral level in 89.7% of patients. Among the patients, 86.2% received a combination of IT morphine and bupivacaine. Clonidine was added to the IT infusion in 3 patients to improve the quality of pain control. There was 1 patient whose IT local anaesthetic was switched from bupivacaine to lignocaine to obtain better pain control. Three patients were given an IT infusion of fentanyl and bupivacaine. Patient Controlled Intrathecal Analgesia (PCIA) was used in 11 patients, with an ambulatory patient-controlled analgesia infusion pump (CADD-Legacy® Model 6300, Smiths Medical, UK). Breakthrough pain in these patients was expeditiously treated by self-administration of predetermined IT bolus dose as and when necessary.

After initiation of IT analgesia, average pain score was significantly reduced by 70% with the appropriate IT drugs (7.1 ± 2.1 to 2.2 ± 1.6, *P* <0.001). The use of systemically administered opioids was also significantly reduced from 517.9 ± 156.0 mg at T0 to 40.4 ± 18.5 mg at Tdsc (*P* = 0.005) (Table 2).

Fewer patients reported opioid-related side effects with IT analgesia although there was no statistical significant difference between T0 and Tdsc (*P* = 0.688) (Table 3). Of these patients, 20.7% continued to be drowsy even after commencement of IT analgesia and with a reduction in the dosage of systemically administered opioids. All of them were patients with end-stage cancer who died during their hospital stay. One patient experienced urinary retention and 1 patient developed lower extremity weakness. In addition, 1 patient developed intestinal obstruction, resulting in nausea and vomiting at the time of hospital discharge. These adverse effects resolved before discharge from hospital. Catheter

Table 2. Difference in Pain Intensity and Drug Dosages Administered Before and After Intrathecal Analgesia

	T0	Tdsc	*P*
NRS pain intensity	7.1 ± 2.1	2.2 ± 1.6	<0.001
IT bupivacaine dose (mg/day)	8.8 ± 4.5	20.5 ± 16.0	<0.001
IT morphine dose (mg/day)	4.4 ± 4.7	9.5 ± 15.4	0.08
Systemically administered opioids in oral morphine equivalents (mg/day)	517.9 ± 156.0	40.4 ± 18.5	0.005

IT: intrathecal; NRS: Numeric Rating Scale
Values are expressed as mean ± SD

Table 3. Opioid-related Side Effects

Side effects	T0	Tdsc
Somnolence	6 (21%)	6 (21%)
Nausea and vomiting	1 (3%)	1 (3%)
Both	2 (7%)	0 (0%)
Total	9 (31%)	7 (24%)

Data are presented as number of patients with percentages in parentheses

Table 4. Complications from Intrathecal Drug Delivery System Implantation

	n	%
Short-term complication		
Yes	4	13.8%
High pressure	3	10.3%
Catheter displacement	1	3.4%
No	25	86.2%
Long-term complication		
Yes	1	3.4%
Infection	1	3.4%
No	28	96.6%

Data are presented as number of patient and percentage.

kinking triggering the high-pressure alarm occurred in 3 patients after IT catheter insertion. Each and every incident was resolved with adjustment of the catheter. Catheter displacement was discovered in 1 patient who reported unimproved pain. The pain was better after the position of the IT catheter was adjusted. One patient developed catheter-related infection 6 months after IT catheter implantation, and the catheter had to be removed (Table 4).

Discussion

We found a significant reduction in pain score (67%) in our patients following the administration of IT analgesia. Our results are consistent with other studies that demonstrated IT drug delivery system improve clinical success, reduce pain scores, and has been associated with increased survival at 6 months from the time of device implantation.[7] The development of various implantable drug delivery systems (IDDSs) has complemented and facilitated the growth of this treatment modality. Patients with a limited life expectancy would benefit from a less invasive technique consisting of a percutaneous port connected to an IT catheter.[3] In our study, 93.1% of patients were implanted with this system.

Morphine remains the current gold standard for spinally administered analgesic agents and is the only opioid approved by the Food and Drug Administration (FDA) for IT delivery to treat chronic pain.[8] The benefit of administering IT morphine is the reduction of side effects associated with systemic morphine. Because of its relatively hydrophilic profile compared to other opioids, morphine is capable of spreading distal to the site of injection, and thus exerts effect at multiple spinal levels.[9] Rauck et al[10] evaluated a patient-activated IT morphine delivery system in 119 cancer patients who had either refractory pain or uncontrolled side effects. Pain decreased from a mean score of 6.1 to 4.2 at 1 month and remained decreased through 13 months (P <0.05). There was also a statistically significant reduction in drug toxicity and oral opioid requirements.[10] When compared with comprehensive medical management, significant improvement in pain can be achieved in cancer patients treated with IT morphine infusion systems.[7]

In addition to IT morphine, 86.2% of our patients also received infusions containing bupivacaine 0.1%. The opioid and local anaesthetic mixture has been shown to improve the quality of analgesia and reduce morphine usage. Clinical significant hypotension and muscle weakness associated with the use of low-dose bupivacaine were rarely observed.[11] Van Dongen et al[12] found that the addition of IT bupivacaine to opioids resulted in adequate analgesia in 10 of 17 cancer patients who failed IT opioid therapy alone. In a later, double-blind, randomised trial comparing IT morphine alone to IT morphine and bupivacaine in 20 cancer patients, the combination group developed less opioid tolerance than the morphine-only group.[13] The authors concluded that the combination of IT bupivacaine and morphine provided synergistic analgesic effects.

We also described the technique of PCIA in our audit

– one that has not been described before in IT analgesia for cancer pain. This method allows patient control over incidental and breakthrough pain, which may require higher doses of IT medications intermittently. This function also translates into better patient satisfaction due to the ability of the patient to exert control over their pain management.

After initiation of IT analgesia, the number of patients who reported opioid-related side effects decreased. However, the number of patients with drowsiness (20.7%) did not change. Deterioration of the patient's clinical condition may be responsible for this drowsiness. One patient developed catheter-related infection 6 months after IT catheter implantation. The rate of infection after implant ranges from 0.8% to 9%.[14,15]

In conclusion, we described 29 cancer patients whose intractable pain was managed by drugs administered intrathecally via an IT catheter. This treatment provided a significant decrease in pain intensity and decreased side effects compared to systematically administered opioids. The incidence of IT catheter-related complications was low.

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