Original Article | Symptom Management in Palliative Medicine and Palliative Care

The lesion site in malignant psoas syndrome influences the cancer pain intensity

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Background: Malignant psoas syndrome (MPS) is characterized by pain and hip flexion fixation due to tumor infiltration of the iliopsoas muscle. However, the dose of opioid required to control pain varies markedly among MPS patients. As the ability to predict whether an MPS patient will need a higher opioid dose in the early period of pain control is clinically meaningful, we retrospectively evaluated the relationship between lesion site in MPS and the opioid dose required for pain control.

Methods: Fourteen patients received opioid control of cancer pain due to MPS between January 2014 and December 2018. Two patients with paraplegia who died during pain control were excluded from this study. The remaining 12 patients were divided into group of muscle attachment (group MA) (n=6), with the lesion in the iliopsoas MA to the spine, and group of muscle belly (group MB) (n=6), with the lesion in the iliopsoas MB. We compared opioid doses for pain control between groups.

Results: No significant differences in background characteristics were seen between groups. Opioid dose (in oral morphine equivalents) was significantly higher in group MB (1,374.3±504.5 mg/day) than in group MA (92±67.9 mg/day; P=0.0007).

Conclusions: MPS patients with the lesion in the MB appear to need a higher opioid dose for pain control than patients with the lesion in the MA.

Keywords: Malignant psoas syndrome (MPS); cancer pain control; opioid

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Introduction

Malignant psoas syndrome (MPS) is an uncommon condition that was first described by Stevens *et al.* in 1990, and is characterized by proximal lumbosacral plexopathy due to tumor infiltration into the iliopsoas muscle, causing painful fixation of hip flexion due to muscle spasms (1). MPS often develops from invasion, or metastasis of gynecological, urological and gastrointestinal cancer and

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some of them were reported as the primary lesion (2-4). Most patients with MPS need opioids for pain control. However, the opioid dose required to control pain varies between MPS patients. Predicting whether an MPS patient will need high-dose opioids in the early period of pain control is clinically meaningful. We retrospectively evaluated the relationship between the lesion site of MPS and the opioid dose required for pain control. We present this article in accordance with the STROBE reporting checklist (available at https://apm.amegroups.com/article/view/10.21037/apm-23-383/rc).

Methods

The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the review board of Nagasaki University Hospital (No. 16052314-3) and individual consent for this retrospective analysis was waived. We enrolled all 14 patients who received pain control for MPS from the palliative care team at our institution between January 2014 and December 2018. Two patients with paraplegia due to defuse sacral invasion of colon cancer who died during pain control were excluded from analysis in this study. MPS was diagnosed by both symptoms and confirmation of the existence of metastatic or invasive lesions in the iliopsoas muscle radiologically. We used computed tomography (CT) scan for the diagnosis of MPS, because most of MPS patients couldn't keep supine for the long time. We started pain control of MPS patients with opioids due to consultation from oncologist. Complete pain control of MPS was defined as the dose of analgesic at which the patient did not need any increase in opioid dose. The opioid dose required for pain control, liver and renal functions, and other factors affecting opioid dose when complete pain control was obtained were determined retrospectively from medical charts. Our team contained psychooncologist, we could consult if the patients had psychophysiological problem. The remaining 12 patients were divided into two groups: group of muscle attachment (group MA), patients with the tumor lesion in the iliopsoas MA to the spine; and group of muscle belly (group MB), patients with the lesion in the iliopsoas MB. Based on National Comprehensive Cancer Network (NCCN) guidelines, we converted the opioid dose needed for pain control to oral morphine equivalents. Data are expressed as mean ± standard deviation (SD). Statistical analysis was performed using Fisher's exact test and Student's *t*-test. Values of $P<0.05$ were considered statistically significant.

Highlight box

Key findings

- The possibility of new classification of malignant psoas syndrome (MPS).

What is known and what is new?

- The lesion site of MPS affects pain intensity.
- This manuscript contributes the pain control of MPS patients.

What is the implication, and what should change now?

- To make rapidly pain control of MPS patients.

Results

Six patients each were included in group MA and group MB. Representative CT images for each group are shown in *Figure 1*. Patient characteristics and organs of the primary cancer are described in *Table 1*. Renal function was calculated using the Cockcroft-Gault equation. No significant differences in age, sex, body weight, and liver or renal functions were seen between the two groups. No patients had severe psychophysiological problem.

Four patients in group MA, and all patients in group MB had taken opioids before consultation. Patients of each group were given opioids via intravenous from consultation. The mean period from consultation to pain control was higher in group MB (6.67±3.0 days) than in group MA (18±7.3 days; P=0.012). The opioid dose in oral morphine equivalents was higher in group MB (1,374.3±504.5 mg/day) than in group MA (92±67.9 mg/day; P=0.0007) (*Figure 2*).

Discussion

MPS is an uncommon and distressing pain syndrome that involves multiple mechanisms of pain, including nociceptive pain, muscle spasm with inflammation, tissue destruction and lactate acceleration due to tumor infiltration and neuropathic pain with involvement of the lumbar nerve plexus by the cancer lesion. To relieve, or at least control, the pain in MPS, multimodal analgesia such as a combination of analgesics based on the three-step ladder of the World Health Organization, adjuvant analgesics, muscle relaxants, radiotherapy, chemotherapy, surgery, and invasive intervention are needed (5-7). Relieving the pain of MPS as early as possible is important, because the pain from MPS decreases the performance status (PS) of patients, keeping

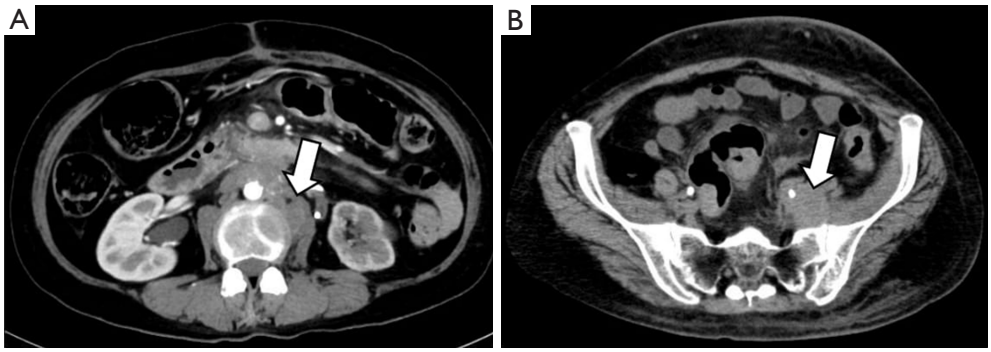

Figure 1 CT images for group MA and group MB. The arrow presents the lesion of MPS. (A) A 60-year-old woman. Paraaortic lymph node metastasis from colorectal cancer infiltration causing a lesion in the iliopsoas MA to the spine. (B) A 40-year-old woman. Cervical cancer metastasis causing a lesion in the iliopsoas MB. CT, computed tomography; MA, muscle attachment; MB, muscle belly; MPS, malignant psoas syndrome.

Table 1 Patient characteristics

Characteristics and primary organ	Group MA	Group MB	P
Age (years)	57.5±14.1 [42–82]	52.2±13.2 [37–70]	0.26
Sex (male)	1	3	0.1
Body weight (kg)	55.2±5.3	53.9±12.2	0.75
Renal function (eCcr)	59.5±18.0	71.3±30.0	0.28
Liver function			
AST (U/L)	16.8±6.8	30±33.1	0.33
ALT (U/L)	13.7±8.7	15.8±8.1	0.64
Primary organ			–
Kidney	1	0	
Prostate	1	1	
Ovary	1	0	
Uterus	2	2	
Gastrointestinal	1	3	

Values are expressed mean ± SD [range] or number. eCcr was calculated using the Cockcroft-Gault formula. MA, muscle attachment; MB, muscle belly; eCcr, estimated creatinine clearance; AST, aspartate transaminase; ALT, alanine aminotransferase; SD, standard deviation.

them in the hospital bed almost all day and disturbing daily activities and cancer therapy due to their low PS. Prediction of whether the MPS patient will need a high dose of opioid in the early period of pain relief and cancer therapy is thus meaningful. Unless MPS patients are controlled pain, they can't undergo cancer examination and therapy such as magnetic resonance imaging and radiotherapy, because most of MPS patients couldn't keep supine for the long time (8). This study indicated the MPS, especially the patients seen with MB lesions need a large amount of analgesics and long period for pain control. We should consider the interventional pain management and rapid opioid titration as Scarborough *et al.* reported (9).

In this study, group MB needed a significantly larger dose of opioid than group MA. MPS has been regarded as a single pathology, and to our best knowledge there have been no reports describing the relationship between lesion site in MPS and pain intensity. We suggest two potential causes for

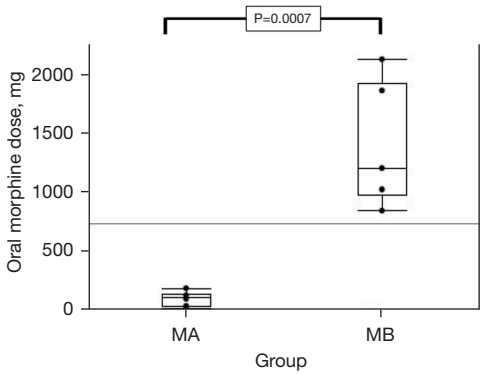

Figure 2 Mean opioid dose needed for relief of pain from MPS in group MA and group MB. Dose is significantly higher in group MB than in group MA. MA, muscle attachment; MB, muscle belly; MPS, malignant psoas syndrome.

the differing opioid doses needed between the two groups.

The first is the difference in muscle volume at the sites of iliopsoas muscle. Koopman *et al.* reported a relationship between cross-sectional area and strength of muscle contraction (10). Several researchers have thus suggested a relationship between muscle pain and state and dynamic fusimotor drive of the muscle in cat models of muscle pain (11,12). They found that intramuscular injection of hypertonic saline triggered a marked increase in muscle contraction via increased firing of muscle spindles. Stronger muscle spasm may thus be seen in group MB due to an increased firing rate for the muscle spindle due to nociceptive stimuli following tumor infiltration into the MB. Moreover, Swett *et al.* reported that muscle spindles existed predominantly in the MB (13). The second potential cause is the difference in mobility at sites of the iliopsoas muscle. When flexing the hip joint, the distal side of the iliopsoas muscle approaches the proximal side. Mobility of the lesion may have been greater in group MB than in group MA.

In this study, patients in group MB needed longer period for pain control and higher dose of opioids for pain control due to MPS. While we cannot definitively discuss the reasons for differences between groups, muscle spasm is considered to be involved in the intensity of MPS pain.

Our study has some limitations. First, the results in this study are based on the retrospective study in a single institution. Therefore, they are subject to biases that may have influenced the strategies of pain control for MPS, such as pharmacological, radiotherapeutic or/and interventional management. Although patients with MPS pain require multimodal analgesia, there is no consensus of standard therapy for pain control. Second, the number of patients included is small, which may have influenced the statistical analysis. Patients with MPS are rare and the incidence of MPS is not well understood. In our institution, 14 of approximately 1,500 patients who were introduced to our team for cancer pain control, developed MPS.

To address the two limitations, multicenter collaboration using the same strategy for MPS pain control will be needed in the future.

Conclusions

Our results indicate that MPS patients with lesions in the MB need longer period and higher opioid doses for pain control than MPS patients with lesions involving the MA and contribute to rapid titration of opioid dose, offer interventional pain management. Predicting whether an MPS patient will need high-dose opioids in the early period of pain control is meaningful for optimizing patient comfort and restoring the patients to cancer treatment via their PS recovering.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://apm.amegroups.com/article/view/10.21037/apm-23-383/rc

Data Sharing Statement: Available at https://apm.amegroups.com/article/view/10.21037/apm-23-383/dss

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://apm.amegroups.com/article/view/10.21037/apm-23-383/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was

conducted in accordance with the Declaration of Helsinki (as revised in 2013). The study was approved by the review board of Nagasaki University Hospital (No. 16052314-3) and individual consent for this retrospective analysis was waived.

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