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Original Contribution

Optimal epidural analgesia for patients diagnosed as having gynecologic cancer undergoing interstitial brachytherapy☆

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Abstract

Study objective: To determine the optimal epidural analgesia for patients receiving interstitial brachytherapy (ISBT) for gynecologic cancers.

Design: Retrospective analysis.

Setting: Operating room and hospital ward.

Patients: Seventy-three patients diagnosed as having gynecologic cancer and undergoing ISBT.

Interventions: Twelve patients received ropivacaine alone, 14 patients received ropivacaine with fentanyl, and 45 patients received ropivacaine with hydromorphone by epidural infusion.

Measurements: Numeric Rating Scale pain scores, amounts of nonnarcotic and narcotic pain medications used in intravenous morphine equivalents (IVMEs), and amount of antiemetic or antipruritic medications used.

Main results: Patients receiving ropivacaine alone had higher pain scores the morning of day 2 (4.2 vs 1.71 vs 0.6, $P = .001$), the afternoon of day 2 (4.9 vs 2.5 vs 1.7, $P = .005$), and the night of day 2 (2.4 vs 2.0 vs 0.6, $P < .001$). Patients receiving opioids in their epidural had lower pain scores on the night of placement ($P = .050$), the morning of day 2 ($P < .001$), the afternoon of day 2 ($P = .002$), and the night of day 2 ($P < .001$). Patients receiving ropivacaine alone used more oral narcotics than did those receiving ropivacaine with fentanyl or ropivacaine with hydromorphone on day 3 (5.9 vs 3.8 vs 2.8 mg IVME) and received more intravenous opioids day 1 (5.8 vs 0.0 vs 0.7 mg IVME, $P = .004$) and day 2 (20.6 vs 4.8 vs 1.0 mg IVME, $P = .042$). There were no differences in antiemetic or diphenhydramine usage at any time point. No epidural complications occurred.

Conclusions: For patients receiving ISBT for gynecologic cancer, epidural analgesia provides safe and effective pain control. Combined modality epidural analgesia improves pain control and lessens oral and intravenous opioid requirements without increased risk of adverse effects compared with epidural analgesia with local anesthetic alone.

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1. Introduction

Patients receiving interstitial brachytherapy (ISBT) for gynecologic cancer present a management challenge for anesthesiologists [1]. ISBT is an integral part of curative and palliative treatment of gynecologic cancers. Radiation oncologists and gynecologic oncologists place straight, hollow interstitial needles through the perineum into the tissues surrounding the tumor in the operating room. The needles remain in place for up to 3 days, whereas radiation therapy is given intermittently before the system is removed.

ISBT for gynecologic malignancy is painful during device placement, vaginal packing, and while the device is in place [2]. There are several different mechanisms of pain associated with brachytherapy: the uterus is distended by applicator rods stimulating the sympathetic autonomic afferents from T10 to L1 and may cause nausea and vomiting; manipulation of the cervix stimulates parasympathetic autonomic afferents at S2-4 which may contribute to low back pain; and the vaginal packing stimulates the somatic afferents of S2-4 [3,4].

Continuous analgesia is absolutely essential to successful ISBT. A patient must remain supine and immobilized during brachytherapy treatment. Should the patient have severe discomfort and move during vaginal packing or any other time, the device may not be in the correct place for treatment delivery and require needle repositioning. Therefore, optimal pain control is not only important for patient comfort, but also for adequate treatment delivery. Serious complications may occur if the patient moves secondary to suboptimal analgesia, including underdosing of the tumor or perforation by the treatment device secondary to malpositioning [5].

To date, there are limited data regarding anesthesia and analgesia for ISBT. Analgesia methods vary from institution to institution because there is no established standard of care [2]. General anesthesia is an appropriate way to provide patient analgesia during device placement and packing [3]; however, it is unrealistic and potentially harmful to keep a patient deeply sedated for the entire treatment course of brachytherapy. The preferred method for gynecologic ISBT is therefore epidural analgesia complimented by monitored anesthesia during device placement with general anesthesia reserved for patients unable to have an epidural catheter placed [2,5]. An epidural catheter provides continuous analgesia with titration ability for each patient individually [6,7]. Although studies examining ISBT specifically are rare, data in other postprocedural populations show superiority of epidural patient controlled analgesia (PCA) to intravenous (IV) PCA [8-10].

Several local anesthetics are available for epidural infusion. Epidural bupivacaine has been traditionally used as the primary local anesthetic medication either alone or in combination with opioids. Ropivacaine, an S(−)enatomer, has been increasing in clinical use given its effective analgesia and approval for epidural infusion in many concentrations [11,12] and potential for reduced systemic toxicity [13-16]. Various opioid medications have been used in conjunction with local anesthetic medications for epidural analgesia. Although there are potential advantages using a combined modality approach in patients with severe pain [17], limited data addressing the unique challenges of pain control in patients undergoing ISBT are available. We sought to examine patients undergoing ISBT for gynecologic cancer at our institution to determine the optimal method of epidural analgesia.

Table 1 Patient characteristics

Characteristics	No. (%)
Age (y)	
<45	15 (21.1)
45-59	30 (42.3)
60-70	14 (19.7)
>70	16 (22.5)
ASA classification	
2	21 (29.6)
3	49 (69.0)
4	1 (1.4)
Primary site	
Cervix	35 (49.3)
Vaginal	16 (22.5)
Uterine	13 (18.3)
Vulva	7 (9.9)
Epidural level (placement)	
Thoracic	3 (4.2)
Lumbar 1/2	8 (11.3)
Lumbar 2/3	8 (11.3)
Lumbar 3/4	40 (56.3)
Lumbar 5/sacral 1	1 (1.4)
Epidural medication group	
Ropivacaine + hydromorphone	45 (63.3)
Ropivacaine + fentanyl	12 (16.9)
Ropivacaine only	14 (19.7)

ASA = American Society of Anesthesiologists.

2. Methods

Records were reviewed as part of this institutional review board–approved study. A waiver of consent was granted given the retrospective nature of the study. Between 2009 and 2014, 73 patients with gynecologic cancer underwent pelvic ISBT. Of these, 71 patients successfully had an epidural placed by the acute pain service before ISBT placement in the operating room, whereas *2* patients failed epidural placement and were excluded from analysis. Our institutional ISBT technique has been previously described [18,19] and included placement of a Foley catheter while the ISBT system was in place. Clinical characteristics are shown in Table 1.

2.1. Anesthetic technique

Each patient was consented for epidural placement by the acute pain service; all risks and benefits were fully explained. Patients were positioned sitting upright and nasal