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Review

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Pain Management Following Abdominal Hysterectomy: Novel Approaches and Review of the Literature

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Abstract

Abdominal hysterectomy (AH) is one of the most common surgeries performed for malignant as well as benign indications. Effective pain management depends on the cooperation between the surgeons, anesthetists and the hospital's pain management service, and is a combination of preemptive analgesia, general and regional anesthesia, peripheral blocks and multimodal postoperative pain treatment. The objective of this work is to present the currently available therapeutic strategies for the treatment of posthysterectomy pain in the light of our experience and the literature review.

Keywords: Hysterectomy; Pain; Anesthesia; Policy; Postoperative period

Introduction

Abdominal hysterectomy (AH) is one of the most common surgeries performed in gynecology. AH is performed for malignant as well as benign indications such as uterine leiomyma, persistent vaginal bleeding, or pelvic organ prolapse. Hysterectomy can be performed in several different approaches: vaginal, laparoscopic and open abdominal. The choice of surgical approach depends on the indication for surgery, the presence of previous abdominal or pelvic surgery, the patient's medical history and background illnesses, Body Mass Index, and the surgeon's expertise. The level of pain associated with hysterectomy as well as the length of the period of convalescence depends on the surgical approach. The open abdominal hysterectomy is considered a major surgery and is associated with a medium to high pain level [1].

Innervation of the urogenital tract is complex and made up of somatic, sympathetic and parasympathetic components, found along the lateral walls of the pelvis. The nerves and nerve plexuses in the pelvis innervate the organs of the pelvis through the ligaments that anchor the various organs to the pelvis. Innervation to the uterus, ovaries, and vagina is derived from the superior hypogastric, pelvic, and uterovaginal plexus. Still, most of the pain associated with open abdominal hysterectomy is generated from the breach of the abdominal wall. Innervation to the lower and middle abdominal wall (up to the umbilicus) is derived from the ventral primary rami of spinal nerves T10-T12 and from the (iliohypogastric and ilioinguinal) lumbar plexus.

Patients' satisfaction and subjective success of the operation are crucially influenced by the efficacy of analgesia both in the immediate as well as long term period following the operation. Inadequate attention to acute post-operative pain has short term consequences such as recovery rate, length of hospitalization as well as immediate complications: infectious, neurological, cardiovascular, and thromboembolic sequelae caused by immobility. It also carries long term consequences in the form of chronic pain syndromes e.g. post-hysterectomy or hysterectomy chronic pelvic pain syndrome [2].

Treatment of pain after AH begins with preplanned anesthesia, starting with preparation and premedication for anesthesia, through anesthesia during the operation, and of course continued analgesia during the entire recovery period [3].

Preemptive Analgesia

Preemptive analgesia (PA) consists of administration of local anesthesia, various opioids, NSAIDs or paracetamol prior to surgery. The mode of action of PA is through reducing nociceptive input, rising of the nociception threshold, and less-

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ened activation of nociceptive receptors prior to making the surgical incision [4].

Administration of paracetamol prior to the operation was associated with reduced pain after surgery, and reduced the use of morphine patient controlled analgesia (PCA) in women undergoing abdominal hysterectomy [5].

Tramadol is considered a synthetic analgesic opioid, acting via the central nervous system, whose metabolites are powerful opioids. In addition, it is known that Tramadol also acts via the serotonergic pathway by inhibiting serotonin hydroxitryptamine type 2C receptors (5HT2CR receptors). Tramadol provides its analgesic effect while causing less respiratory suppression than other opioids. Administration of tramadol orally or parenterally was found to be effective for treatment of acute medium to high levels of post-surgical pain in adults. Tramadol in combination with morphine PCA pumps was found to be more effective that morphine alone following abdominal hysterectomy.

The administration of a Tramadol bolus prior to abdominal hysterectomy followed by use of a combination tramadol/morphine PCA pump following the surgery was compared to administration of a placebo in women undergoing the surgery under standard fentanyl based general anesthesia. Those women receiving placebo showed a shorter period of time until they required morphine after the surgery as well as requiring twice the dose of morphine compared to the Tramadol arm of the experiment. The placebo arm also suffered more side effects [6, 7].

Antiemetics

Surgical manipulation of the urogenital region in young non-smoking women carries a high potential for eliciting nausea and vomiting during and following surgery [8]. In addition, the standard protocol drugs used for analgesia following surgery carry the potential for nausea and vomiting. Nearly every analgesia protocol that involves use of opioids either parenterally, orally or neuroaxially raises the risk of nausea and vomiting following surgery [9]. Prophylactic anti-emetic treatment prior to surgery significantly reduces the frequency and severity of perioperative nausea and vomiting [10].

General Anesthesia

In women undergoing hysterectomy with general anesthesia alone, the options for pain relief post surgery are more limited and include repeat doses of opiates, or their administration using a PCA pump. In recent years, there has been a marked rise in the use of Tramadex for pain relief following surgery either as monotherapy or in combination with a PCA pump. In addition, it is possible to combine NSAIDs as part of a multimodal approach [11].

Repeat doses of Ketamine and long acting opioids such as morphine or Meperidine during the surgery allows a smoother adjustment period for patients using PCA pump opioids in the immediate post operative period [12].

Despite the requirement for dedicated instruments and the increased risk of nausea and vomiting in patients using PCA pump following abdominal hysterectomy, its advantages far outweigh these drawbacks. The use of PCA affords the patient a sense of autonomy and an ability to control pain. In addition, PCA use is less time consuming for the treating staff and reduces the total amount of opioids consumed following surgery [13].

Regional Anesthesia

The original use of regional anesthesia for open abdominal hysterectomies was mainly auxiliary-epidural anesthesia and was administered as an adjunct to general anesthesia during the surgery. It was used post-operatively for administration of sodium channel blockers with or without opioids either continuously or intermittently [14].

In current practice most authors recommend using Bupivacaine 0.1% - 0.125% with Fentanyl 2 μg/mL during surgery and afterwards with or without additional drugs such as Butorphanol [15].

Recently there have been a number of publications addressing the use of slow release morphine following abdominal surgery [16]. This modality was found to be efficient; however, precise dosages have yet to be determined so as to prevent the common side effects of pruritus, drowsiness, and depressed respiratory rate associated with this treatment.

There is also the possibility of using an Epidural PCA for the post-operative period with advantages similar to those achieved by IV PCA [17]. Single as well as repeated doses of morphine administered through the epidural catheter have been proven as an efficient form of post-operative analgesia.

In approximately a fifth of cases epidural anesthesia is not sufficient for analgesia during or following surgery [18], as opposed to nearly 100% efficiency observed with spinal anesthesia. On the other hand, spinal anesthesia is quite limited in its time duration, usually up to 2 hours, imposing a relative limitation.

Regional anesthesia as a sole mode of analgesia is inappropriate for laparoscopic surgery. However, in abdominal hysterectomies regional anesthesia – notably spinal anesthesia- is gaining popularity. This popularity is related to the growing preference for lower transverse abdominal incisions-Pfannenstiel incisions-in these operations, as opposed to the classic median incision. The high level of anesthesia induced by spinal anesthesia affords the surgeon a comfortable operating field while avoiding general anesthesia and its associated complications. Use of spinal anesthesia also reduces the need for opioids after the surgery and allows a

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faster return to normal bowel function [19]. Among young patients morphine can be added to the epidural [20] or to the spinal anesthesia for a more effective analgesic effect that can last as long as 24 - 27 hours post-operatively [21].

The side effects of morphine in neuroaxial anesthesia include primarily pruritus, nausea, vomiting and urinary retention in up to 30% of cases. It is important to note that patients undergoing hysterectomy usually have a urinary catheter placed until the first post-operative day, thus reducing the significance of the aforementioned urinary retention in patients undergoing open abdominal hysterectomy. Respiratory depression is a serious albeit rare side effect of morphine use in neuroaxial anesthesia. Among young patients, the incidence of respiratory depression following neuroaxial morphine administration is very low, and is far less than the incidence of respiratory depression following morphine administration via repeated injections or PCA pump [22].

In the past year, recommendations were published regarding the optimal follow-up care and surveillance of women whom have undergone neuroaxial opioid anesthesia. Surveillance includes hourly check-ups following morphine and bihourly checkups following fentanyl epidural PCA. The check up consists of alertness level, respiratory rate and peripheral oxygen saturation rate, all measured for the initial 24 hours after surgery [23]. The need for intensive follow-up requires additional nursing staff, which is juxtaposed with the obvious analgesic advantages of this method of anesthesia. Well designed research is still lacking as to the cost-effectiveness and necessity of this close monitoring.

Peripheral Blocks

As a helpful adjunct to general or regional anesthesia, peripheral blocks can be considered such as Transverse Abdominal Plane (TAP)or ilioinguinal block [24]. The ilioinguinal block is ineffective for these types of surgery. On the other hand, TAP is gaining popularity following published reports of its effectiveness both after bilateral one time injection and with continuous infusion to the imaginary plane between the internal oblique and transversus abdominis muscles through the Triangle of Petit. This peripheral block does not reduce the incidence or severity of nausea and vomiting but does reduce the requirement for opioids and other analgesics [25]. This block offers a safe, effective and relatively easy mode of analgesia and is effective as part of a Multimodal Pain Management plan [19].

In addition, there are a few anecdotal reports on further methods of analgesia, such as single or continuous injection of local anesthetic agents into the peritoneal space. This method was tried with limited success [26, 27] as well as together with Gabapentin and Ketamine [28]. Another multimodal approach requiring close cooperation between the anesthesiologist and the surgeon is the Fast Track Hysterectomy method, which in essence is an anesthesia protocol that reduces anxiety and pain and allows for faster mobilization as well as faster return to normal diet and shorter hospital stay [29-31].

Following the literature search presented above we decided to summarize our own clinical experience. We retrospectively collected all the cases of abdominal hysterectomy in the past year for which we could obtain all relevant information including type of anesthesia used, and analgesia used post-operatively until discharge. We found 110 cases meeting our requirements. It is of note that a substantial proportion of the patients (8 - 19%) underwent extensive surgery, i.e. total AH + staging due to malignancies. From our data, 45% of patients underwent surgery under general anesthesia, 21% under combined general and regional anesthesia, 26% under spinal anesthesia alone, and 8% under combined spinal and epidural anesthesia. Morphine was administered with neuroaxial anesthesia in 45% of cases, with no adverse effects in the population described. Pain estimate as recorded by nursing staff in the department on the ward 24 hours post-operatively was 0 - 3 in cases when morphine was used neuroaxially, with no need for further parenteral morphine administration. In cases where patients received parenteral opioids as repeat injections or as continuous administration via PCA pump, the pain ranking was higher, level of consciousness lower, and mobilization was slower.

Conclusion and Recommendations

From this literature review and our experience, we have found that effective pain management during and after abdominal hysterectomies are predicted upon prior planning of anesthesia. Use of general anesthesia alone does not allow flexibility in pain management; therefore, there is a preference for combining regional anesthesia or peripheral blocks with general anesthesia. In cases where there are a contraindications preventing combined anesthesia, administration of opioids by PCA pump can improve analgesia with the disadvantage of added side effects. In most cases, regional anesthesia alone is sufficient and affords the benefit of neuroaxial opioids administration either as a single bolus or continuously.

Effective pain management depends upon cooperation between the surgeons, anesthetists and the hospital's pain management service. It allows the implementation of the Fast Track Hysterectomy approach. Moreover, it is desired that each medical center periodically review its activity and results so that efficacy of treatment can be assessed and novel therapy approached can be incorporated. It seems that other lower abdominal and pelvic surgeries not involving skeletal structures can benefit from the anesthetic approach described above, including vaginal hysterectomies, rectal surgery, and lower urinary tract surgery. Our department is currently re-

searching these fields and we are waiting for the results in the near future.

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