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**PERIOPERATIVE MANAGEMENT OF  
ABDOMINAL HYSTERECTOMY: NOVEL  
APPROACHES AND REVIEW OF THE LITERATURE**

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**ПЕРИОПЕРАЦИОННЫЙ МЕНЕДЖМЕНТ АБДОМИНАЛЬНОЙ ГИ-  
СТЕРЭКТОМИИ: НОВЫЕ ПОДХОДЫ И ОБЗОР ЛИТЕРАТУРЫ**

**Актуальность.** Абдоминальная гистерэктомия (АГ) является одной из наиболее распространенных операций, выполняемых при злокачественных, а также доброкачественных опухолях органов женской репродуктивной системы. Эффективный периоперационный менеджмент зависит от сотрудничества между хирургами, анестезиологами, гемостазиологами и службами управления болью лечебного учреждения и представляет собой сочетание упреждающей анальгезии, общей и региональной анестезии, изучения и регулирования функционального состояния системы гемостаза.

**Цель работы.** Представление имеющихся в настоящее время терапевтических стратегий для лечения постгистерэктомической боли и тромботических осложнений в свете нашего опыта и обзора литературы.

**Ключевые слова:** гистерэктомия, управление болью, тромботические осложнения.

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**PERIOPERATIVE MANAGEMENT OF ABDOMINAL HYSTERECTOMY:  
NOVEL APPROACHES AND REVIEW OF THE LITERATURE**

Abdominal hysterectomy (AH) is one of the most common surgeries performed for malignant as well as benign indications. Effective perioperative management

depends on the cooperation between the surgeons, anesthetists, hemostasiologists and the hospital's pain management service, and is a combination of preemptive analgesia, general and regional anesthesia, studying and regulation of the functional state of the hemostasis system. The objective of this work is to present the currently available therapeutic strategies for the treatment of posthysterectomy pain and trombotic complications in the light of our experience and the literature review.

**Key words:** hysterectomy, pain management, trombotic complications.

### **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 leiomyoma, 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.

Patient satisfaction and subjective success of the operation is 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.

### **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, raising of the nociception threshold, and lessened 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 PCA [patient controlled analgesia) 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 5HT<sub>2</sub>CR receptors [hydroxytryptamine type 2C 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 than 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.

### **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 Tramadol 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 [14].

### **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 or administration of sodium channel blockers with or without opioids either continuously or intermittently [15].

In current practice most authors recommend using Bupivacaine 0.1–0.125 with Fentanyl 2 microg/mL during surgery and afterwards with or without additional drugs such as Butorphanol [16].

There is also the possibility of using an Epidural PCA for the post-operative period with advantages similar to those achieved by IV PCA [19]. Single as well as repeated doses of morphine administered through the epidural catheter have been proven as an efficient form of post-operative analgesia.

Recently there have been a number of publications addressing the use of slow release morphine following abdominal surgery [17]. 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.

In approximately a fifth of cases epidural anesthesia is not sufficient for analgesia during or following surgery [20], 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 faster return to normal bowel function [21]. Among young patients morphine can be added to the epidural [18] or to the spinal anesthesia for a more effective analgesic effect that can last as long as 24–27 hours post-operatively [22; 13].

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 [13].

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 check ups 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 [24]. 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 TAP — Transverse Abdominal Plane or ilioinguinal block [25]. The ilio-

inguinal 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 or 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 [26]. This block offers a safe, effective and relatively easy mode of analgesia and is effective as part of a Multimodal Pain Management plan [21].

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 [23; 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.

Using of low-frequency piezoelectric tromboelastography method in patients with abdominal hysterectomy

To determine the amplitude and chronometric constants hemocoagulation we used the method of low-frequency piezoelectric tromboelastography (LPTEG). The analyzer is designed to aggregate clinical studies of blood, analysis and evaluation of integrative hemocoagulation and fibrinolysis. The methodology — to check the most minor changes in the aggregate state of blood, reflecting the internal processes that occur in the blood coagulation and clot lysis. Throughout the study the curve show us process which calculating amplitude and chronometric constants that characterize the main stages of hemocoagulation and fibrinolysis.

Available literature suggests that the use of epidural anesthesia in surgical treatment of patients reduces the risk of postoperative thrombotic complications. Important factors that support the biochemical balance in the coagulation system and clotting of blood is vascular tone and biochemically active substances released as a result of the constant movement of vessels. When the tone of the sympathetic nervous system increases significantly it provokes hypercoagulation state that can lead to thrombotic complications. When epidural anesthesia is blocking adrenergic receptors, and therefore braking the cycle of hyper coagulation. Such information has practical importance, as is the development trom-

botic complications can be predicted and therefore, start the appropriate means of prevention and treatment. Dependence of blood coagulation system of the tone of the vascular wall is the basis of the use of regional anesthesia as a way of correcting thrombotic complications. However, despite the variety of studies on the impact of epidurals on the system of hemostasis consensus on this issue did not happen. By this time it is unclear whether sufficient use of intraoperative epidural anesthesia to prevent thrombosis. Despite the variety of pharmacological agents, unsolved remain a number of fundamental issues such as the duration of prophylaxis thrombotic complications, an optimal combination of drugs clarify their dosage in cases where due to various circumstances (high risk of intraoperative bleeding, emergency surgery) preventive measures were initiated in the postoperative period, the need for prescribing drugs at a low rate of thrombotic complications. Low-frequency piezoelectric tromboelastography as express-method of assessing the hemostatic system allows timely and accurately in real-time diagnosis of functional disorders of aggregation, and fibrinolytic activity of blood in patients with hysterectomy and correct them effectively.

### 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 is a contraindication 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. Also we found that method of low-frequency piezoelectric tromboelastography can help to prevent thrombotic complications and optimize perioperative therapy for this type of patients.

Effective pain management depends upon cooperation between the surgeons, anesthesiologists 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 researching these fields and we are waiting for the results in the near future.

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## **PRES В РАННЕМ ПОСЛЕОПЕРАЦИОННОМ ПЕРИОДЕ У НЕЙРОХИРУРГИЧЕСКИХ ПАЦИЕНТОВ**

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## **PRES В РАННЕМ ПОСЛЕОПЕРАЦИОННОМ ПЕРИОДЕ У НЕЙРОХИРУРГИЧЕСКИХ ПАЦИЕНТОВ**

В статье представлен обзор литературы, посвященный описанным случаям PRES (posterior reversible encephalopathy syndrome, или синдром задней обратимой энцефалопатии) у пациентов с первичными опухолями ЦНС после нейрохирургических операций. Критериями диагноза PRES является соче-