



# Overview of Post-Operative Pain Management in Obese Patients Undergoing Elective Abdominal Gynecological Surgery

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## ABSTRACT

Postoperative pain is regarded as a type of acute pain resulting from surgical trauma with an inflammatory reaction and initiation of an afferent neuronal firing. Patients undergoing major surgical procedures continue to experience pain, despite better understanding of pathophysiology of post-operative pain and introduction of newer analgesics and delivery techniques, approximately 80% of patients have acute post-operative pain and among them 75% have moderate to severe pain. Persistent pain can cause shallow breathing, which encourages secretion retention, pneumonia, which can cause organ dysfunction and prolong recovery. As a result, ineffective postoperative pain management has physiological, psychological, ethical, and financial consequences. Assessment of pain immediately after surgery can be more difficult and lead to greater inter patient variability in pain scores. Major abdominal surgical procedures should ideally use the Acute Pain Management Service (APMS) for routine pain evaluation and prompt treatment of problems and breakthrough pains during the healing process. Acute pain services are struggling to survive, and doctors agreed that better organisational approaches are needed rather than new treatment and delivery techniques as patients continue to experience pain postoperatively due to wide variability in the efficiency of acute pain services. APMS has improved morbidity and decreased the length of hospital stay, but this service has limitations. The aim of the present study to review the post-operative pain management in obese patients undergoing elective abdominal gynecological surgeries.

**Keywords:** Pain; Analgesia; Obese Patients; Abdominal Gynecological Surgery

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## INTRODUCTION

Pain is defined according to The Taxonomy Committee of International Association for the study of Pain (IASP) as "An unpleasant sensory and emotional experience associated with, or resembling that associated with, actual or potential damage. Postoperative pain is considered a form of acute pain due to surgical trauma with an inflammatory reaction and initiation of an afferent neuronal firing(1).

Postoperative pain can be divided into acute pain and chronic pain. Acute pain is experienced immediately after

surgery (up to 7 days), and pain which lasts more than 3 months after the injury is considered to be chronic pain. Acute and chronic pain can arise from cutaneous, deep somatic or visceral structures(2). Pain may be classified according to its presumed etiology; nociceptive pain is due to the stimulation of nociceptors by noxious stimuli and neuropathic pain is the result of dysfunction of the nervous system(3).

- **Superficial & Deep**

**Somatic Pain:**

Somatic pain is the pain you feel when you have an injury, which typically improves with healing. Superficial somatic



pain includes cuts, bruises, burns, and the skin wound aspect of surgical incisions (4). Deep somatic pain comes from tissues deeper within the body, such as ligaments, bones, muscle, and tendons. Deep somatic pain is what is felt after an ankle sprain or a broken bone(4).

- **Visceral Pain**

Visceral pain originates from internal organs. It is the type of pain that is present when a person has appendicitis or gas pain that is stretching the digestive system. Visceral pain does not always reflect the exact location of the problem, it may present away from the actual area and can be caused by surgery or other damage to organs, including cancer or infection(4).

- **Neuropathic pain:**

It results from disorders of the peripheral nervous system or the central nervous system (brain and spinal cord). Thus, neuropathic pain may be divided into peripheral neuropathic pain, central neuropathic pain, or mixed (peripheral and central) neuropathic pain. Neuropathic pain may occur in isolation or in combination with other forms of pain. Neuropathic pain may be associated with abnormal sensations called dysesthesia or pain from normally non-painful stimuli (allodynia). It may have continuous and/or paroxysmal components, resembling stabbings or electric shocks(3).

**Adverse effects of unrelieved pain:**

(a) Cardiovascular system: The stress of unrelieved pain cause increasing sympathetic nervous system activity resulting in tachycardia, hypertension and increases in peripheral vascular resistance. This in turn increases load of the heart, resulting in increasing myocardial oxygen consumption The myocardial oxygen supply may be further compromised by the presence of any pre-existing cardiac or respiratory disease or

by impaired respiratory function, this may precipitate myocardial ischemia (5).

(b) Respiratory system: Unrelieved pain can result in decrease functional residual capacity (FRC) due to impaired movement of chest. This may cause respiratory dysfunction with retention of secretion. Atelectasis and pneumonia may follow (6).

(c) Gastrointestinal system: Increased sympathetic nervous system activity can lead to delay in gastric emptying and reduced bowel motility with the potential for the development of paralytic ileus (5).

(d) Immune system: unrelieved pain causes depression of the immune system. This may predispose the patient to wound infection, chest infection, pneumonia and sepsis (7).

(e) Genitourinary system: Unrelieved pain can increase the release of hormones and enzymes, such as catecholamine, aldosterone, ADH, cortisol, angiotensin-II and prostaglandins, which help to regulate urinary output, fluid and electrolyte balance as well as blood volume and pressure resulting in increased blood pressure, salt water retention, tachycardia and hyperglycemia (6).

**Assessment and Measurement of Acute Pain:**

Psychological and environmental factors affect the overall pain experience. The assessment of acute pain should include general medical history and physical examination, sometimes associated factors such as hyperalgesia, the stress response (e.g. plasma cortisol concentrations, behavioural responses (e.g. facial expression), functional impairment (e.g. coughing, ambulation) or physiological responses (e.g. changes in heart rate) may provide additional information(8).



In acute pain management, assessment must be undertaken at appropriately frequent intervals, at these times, evaluation of pain intensity, functional impact, and side effects of treatment must be undertaken and recorded using tools and scales that are consistent, valid and reliable (9).

The well-known visual analogue scale (VAS) faces" pain rating scale, numeric Pain Rating Scale and verbal Pain Intensity Scale can provide some degree of guidance about a patient's experience of pain, but all of these are completely subjective and have wide variation between subjects and within subjects at different times (10). But, visual analogue scale (VAS) and numeric rating scale (NRS) for assessment of pain intensity agree well and are equally sensitive in assessing acute pain after surgery, and they are both superior to a four-point verbal categorical rating scale (VRS). They may be used for worst, least, or average pain over the last 24 h, or during the last week (11). VAS typically consist of a 100 mm horizontal line with "no pain" at the left endpoint and "worst pain possible" at the right endpoint. The patient makes a vertical mark on the line to indicate how much pain he/she feels. Pain intensity scores are calculated by measuring the distance from the left end point of the scale to the patient's mark (9).

Assessment of pain immediately after surgery can be more difficult and lead to greater inter patient variability in pain scores because of transient anesthetic-related cognitive impairment and decreases in visual acuity (8).

- **Management of postoperative pain in gynecological surgeries:**

Multimodal analgesia, the administration of two or more analgesic agents or procedures (e.g. regional nerve

blocks) that exert their effects along different analgesic pathways, contributes to optimization of acute postoperative pain. Multi-modal analgesia within established ERAS (enhanced recovery after surgery) guidelines for gynecological surgery have demonstrated a reduction in opioid consumption, less postoperative nausea and vomiting (PONV), and decrease in hospital stay, reducing healthcare costs (13).

Common pharmacologic agents of multimodal analgesia include nonsteroidal anti-inflammatory drugs (NSAIDs), acetaminophen, anticonvulsant agents, lidocaine, and ketamine. Acetaminophen is a non-opioid analgesic inhibitor of N-methyl-D-aspartate (NMDA) receptors and cyclooxygenase, scheduled acetaminophen regimens reduce opioid consumption compared with as needed dosing (14).

The recommended schedule is 12–15mg/kg, four times daily to a maximum of 3250 mg per day; acetaminophen is well tolerated, with minimal side effects (15).

NSAIDs suppress inflammation and inhibition of the cyclooxygenase enzyme. NSAIDs are key components of multimodal analgesia with 30–50% opioid-sparing effect. NSAIDs have significant side effects, like gastrointestinal and post-operative bleeding. However, short-term use as part of a postoperative multimodal analgesic regimen reduces the incidence. Nonselective opioids like ketorolac, decreased opioid usage on the first postoperative day and reduced need for antiemetics (16).

Gabapentin and Pregabalin are a 2-subunit calcium-channel ligands that reduce pain by decreasing the reuptake of glutamate, norepinephrine, and substance P. Preoperative gabapentin for abdominal hysterectomies can be



effective in reducing postoperative pain ,opioid consumption and opioid-related side effects. Gabapentin may decrease opioid-associated vomiting and pruritus **(17)**.

Ketamine is a NMDA-receptor antagonist. It disrupts nociception by binding and inhibiting NMDA channel's excitatory glutamate receptor site. Low-dose ketamine (10–15mg) has analgesic and opioid-sparing effects in the first 24h after surgery Evidence for the role of ketamine in gynecology surgery is limited**(1)**. Grady et al. suggest that ketamine does not improve functional analgesia or opioid related sideeffects after abdominal hysterectomy **(18)**.

Opioid analgesics are the predominate postoperative pain management tool. Oral analgesia is the preferred route postoperatively, as soon as the patient is tolerating oral intake as it is convenient,non-invasive, and cost-effective. It is best to avoid intramuscular administration as this route is painful and has large variations in pharmacokinetics. Intravenous opioids, often administered with patient-controlled analgesia (PCA) pumps can restrict mobility and functional recovery **(15)**.PCA infusions predominantly use morphine, hydromorphone, and fentanyl. Oral morphine ,hydromorphone ,and oxycodone are the most common opioids in the postoperative period. Opioids lead or contribute to pruritus,nausea, constipation, urinary retention, respiratory depression, and delirium. The choice of opioid should be made according to pharmacological profile, that is, speed of onset, duration of action, efficacy, and side effects **(19)**.

- **Regional Anesthetic Techniques**

Regional anesthetic techniques utilize anatomically targeted local anesthetics and adjuvants that interrupt afferent transmission and modulate the

neuro endocrine and inflammatory response. Neuroaxial techniques have been used in gynecologic surgery as primary anesthetic as well as in combination with general anesthesia and regional blocks. Intrathecal morphine prolongs postoperative analgesia and has parenteral opioid-sparing effect but doses greater than 0.2mg may increase side effects without additional benefit .Regional block techniques used in pelvic surgery may target branches of the sacral plexus (pudendal and paracervical blocks) or the lumbar plexus and intercostal nerves [Tranversus Abdominal Plane (TAP) and QuadartusLumborum Blocks (QLB) **(20)**.

The transversusabdominis plane (TAP) block was first described in 2001 by Rafi, who performed the traditional landmark technique, through the lumbar triangle of Petit.TAP block is beneficial in reducing postoperative pain following abdominal surgery. In trials completed in gynecologic population, ropivacaine and bupivacaine were found to improve postoperative pain or reduce morphine consumption for up to 48h. Intra peritoneal instillation of local anesthetics may decrease pain for up to 6h following gynecologic laparoscopy **(21)**.

Preemptive Analgesia is one method that may likely prevent or decrease postoperative pain, is the administration of analgesics via local wound infiltration, epidural or systemic administration prior to surgical incision. The use of multiple pharmacological agents that decrease or block receptors activation is the main key to achieve effective preemptive analgesia. These drugs may also work by the inhibition of pain neurotransmitters, or the reduction of their production**(22)**.

In order for preemptive analgesia to be successful, three critical principles must be adhered to: (1) The depth of



analgesia must be adequate enough to block all nociceptive input during surgery, (2) the analgesic technique must be extensive enough to include the entire surgical field, and (3) the duration of analgesia must include both the surgical and postsurgical periods. Patients with preexisting chronic pain may not respond as well to these techniques because of preexisting sensitization of the nervous system (10).

Women, following Caesarean delivery, have even more compelling reasons to receive optimal post-operative pain relief, for improved maternal and neonatal well-being. Also adequate pain relief helps patient to ambulate early and prevent any thrombotic incidents (23).

Dexmedetomidine, an imidazole compound, is the pharmacologically active dextroisomer of medetomidine that displays specific and selective  $\alpha_2$ -adrenoceptor agonist activity and causes sedation, analgesia without any delirium, or respiratory depression. The mechanism of action is unique and differs from those of currently used agents, including clonidine. Activation of the receptors in the brain and spinal cord by dexmedetomidine inhibits neuronal firing, causing hypotension, bradycardia, sedation, and analgesia(24, 25).The addition of dexmedetomidine to local anaesthetics in TAP block decreases the opioid requirement and prolongs the duration of time for the first dose of rescue analgesia with opioids(26).

TAP block reduces the dose of opioids used in the post-operative period, prolongs the duration of analgesia, and provides excellent pain relief, while decreasing opioid-related side effects such as sedation and post-operative nausea and vomiting (27).These results were noted in both abdominal and gynaecologic procedures (28). In addition,

the use of ultrasound helps us to perform the block more precisely (29).

#### Conclusion:

TAP block had a significant effect in the control of post-operative pain following Caesarean section due to it reduce the opioid requirement. It shows that the addition of dexmedetomidine to local anaesthetics further reduced the need for rescue analgesia with opioids. It also significantly prolonged the duration of time at which the first dose of opioid was given.

#### No Conflict of interest.

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