Postoperative Problems

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Managing patients in the postoperative period is often challenging. The spectrum of challenges depends on,

1. Patient factors: age, comorbid conditions etc
2. Surgical factors: site and nature of surgery, fluid and blood loss, nil by mouth status etc
3. Local factors: availability of resources, man power, drugs, equipments etc.

There is an endless list of problems that can be encountered in the postoperative period. This section will focus on some commonly occurring ones in the postoperative ward.

Management of postoperative pain

The effective relief of pain is of paramount importance to anyone treating patients undergoing surgery. This should be achieved for humanitarian reasons, but there is evidence that pain relief has significant physiological benefit.

Clinical factors

The site of the surgery has a profound effect upon the degree of postoperative pain a patient may suffer. Operations on the thorax and upper abdomen are more painful than operations on the lower abdomen which, in turn, are more painful than peripheral operations on the limbs. However, any operation involving a body cavity, large joint surfaces or deep tissues should be regarded as painful. In particular, operations on the thorax or upper abdomen may produce widespread changes in pulmonary function. The result will be an inability to cough and clear secretions which may lead to lung atelectasis and pneumonia. Matters are made worse by postoperative bowel distension or tight dressings.

Effects of pain

Pain causes an increase in the sympathetic response of the body with subsequent rises in heart rate, cardiac work and oxygen consumption. Prolonged pain can reduce physical activity and lead to venous stasis and an increased risk of deep vein thrombosis and consequent pulmonary embolism. In addition, there can be widespread effects on gut and urinary tract motility which may lead, in turn, to postoperative ileus, nausea, vomiting and urinary retention. These problems are unpleasant for the patient and may prolong hospital stay.
The choice of pain-relieving techniques may be influenced by the site of surgery. Equally, it may be influenced by drug availability and familiarity with different methods of analgesia.

Management of pain, the strategies

The World Health Organisation Analgesic Ladder was introduced to improve pain control in patients with cancer pain. However, it has lessons for the management of acute pain. As originally described, the ladder has three steps.

1. Simple analgesics (paracetamol ± NSAIDs)
2. Weak opioids (like codeine) ± Simple analgesics
3. Strong opioids (like morphine) ± Simple analgesics

The important concept reinforced by WHO is to give the analgesics by clock, not prn (prn often means pain relief nil!). There should be regular analgesics on board along with ‘as required analgesics’ for break through pain.

If the initial presentation of acute postoperative pain is severe and difficult to control, the alternate analgesic ladder recommended by The World Federation of Societies of Anaesthesiologists (WFSA) is useful. Here the initial control of severe pain is accomplished with stronger opioids ± judicious use of local anaesthetic techniques. Then switch over to opioids by mouth and finally to simple analgesics when the situation permits.

Pharmacology

The analgesics commonly used for post operative pain management can be grouped as follows:

1. Paracetamol
2. Non steroidal anti-inflammatory drugs (NSAIDs)
3. Opioids
4. Miscellaneous: Tramadol

Regional anaesthetic techniques like epidural, peripheral nerve blocks can be used as a sole technique to manage postoperative pain or as an adjunct to above mentioned drugs.

Paracetamol

Paracetamol has analgesic and antipyretic properties but little anti-inflammatory effect. It is well absorbed orally and is metabolised almost entirely in the liver. It has few side effects in normal dosage and is widely used for the treatment of minor pain. It causes hepatotoxicity in overdosage. It is a good analgesic when prescribed on regular basis.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency</th>
<th>Max. daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Paracetamol</td>
<td>Per oral / Per rectal</td>
<td>1G</td>
<td>4-6 hourly</td>
<td>4G (in adults)</td>
</tr>
</tbody>
</table>
An injectable form of paracetamol for intravenous use is recently introduced.

**Non-steroidal anti-inflammatory drugs**

NSAIDs have both analgesic and anti-inflammatory actions. Their mechanism of action is predominantly by inhibition of prostaglandin synthesis by the enzyme cyclo-oxygenase which catalyses the conversion of arachidonic acid to the various prostaglandins that are the chief mediators of inflammation. All NSAIDs work in the same way and thus prescribing more that one NSAID at the same time is unsafe. NSAIDs may be usefully combined with opioids due to their different modes of action.

**Relative contraindications to the use of NSAIDs**

- History of peptic ulceration, gastrointestinal bleeding or bleeding diathesis;
- Operations associated with high blood loss;
- Asthmatics with history of sensitivity to aspirin or other NSAIDs;
- Renal impairment

NSAIDs are available in a variety of formulations: tablet, injection, topical cream and suppository. The incidence of side effects and adverse reactions with an individual drug is similar regardless of the route of delivery.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency</th>
<th>Max. daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ibuprofen</td>
<td>Per oral</td>
<td>400 – 600 mg</td>
<td>4-6 hourly</td>
<td>2400 mg</td>
</tr>
<tr>
<td>Diclofenac</td>
<td>Per oral / Per rectal</td>
<td>50 mg</td>
<td>8 hourly</td>
<td>150 mg</td>
</tr>
<tr>
<td>Diclofenac</td>
<td>Per rectal</td>
<td>100 mg</td>
<td>16 hourly</td>
<td>150 mg</td>
</tr>
<tr>
<td>Piroxicam</td>
<td>Buccal / Per oral</td>
<td>10 – 20 mg</td>
<td>Once daily</td>
<td>Max. 2 days</td>
</tr>
<tr>
<td>Ketorolac</td>
<td>Intravenous</td>
<td>10-30 mg</td>
<td>8 hourly</td>
<td>90 mg (max. 2 days)</td>
</tr>
</tbody>
</table>

The new COX-2 inhibitors may be a better choice in patients where postoperative bleeding and effects on gastrointestinal tract is of concern. They are still unsafe in NSAID sensitive asthmatics and in presence of renal impairment. The experience with the use of these drugs in postoperative pain management is limited.

**Opioids - Codeine**

Codeine is a weak opioid analgesic which is derived from opium alkaloids (as is morphine). Codeine is markedly less active than morphine, has predictable effects when given orally and is effective against mild to moderate pain. It may be combined with paracetamol but care should be taken not to exceed the maximum recommended dose of paracetamol when using combination tablets.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency</th>
<th>Maximum daily dose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Codeine</td>
<td>Per oral</td>
<td>30-60 mg</td>
<td>4-6 hourly</td>
<td>300 mg</td>
</tr>
</tbody>
</table>

**Morphine**
Severe pain arising from deep or visceral structures requires the use of strong opioids. Appropriate treatment begins with an understanding of the correct drug, route of administration and the mode of action. Early administration will achieve effective analgesic concentrations and make it easier to maintain the therapeutic level of the drug in the blood. Once a satisfactory level of pain relief has been achieved this can be maintained by regular administration of opioid. Administration of adequate doses of analgesic may be inhibited because of side effects, notably nausea and vomiting.

Though there are other strong opioids like pethidine their analgesic effect is less satisfactory than morphine and is often reserved for patients with documented allergy to morphine.

**Methods of using opioid drugs**

The oral route of administration is the most widely used route and most acceptable for the patient. Disadvantages of the oral route to treat acute pain are that absorption of opioids may be reduced by the delay in gastric emptying that follows surgery. Nausea and vomiting may prevent absorption of drugs administered orally. Thus the oral route may be unsuitable in certain instances in postoperative period.

Intramuscular administration represents the optimum technique for the strong opioids. This method of analgesia may be associated with peaks and troughs in effect.

Intravenous administration that involves incremental administration of small doses of strong opioids has the advantage of faster onset and predictable effect. But, by convention, this route is not much preferred in general wards for the fear of respiratory depression. The person who administers the intravenous opioids should have sufficient knowledge and familiarity with the concerned drug and should be skilled enough to recognize and manage respiratory depression.

Though other routes like buccal and suppositories are available to administer opioids they are less commonly used and hence are not elaborated here.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Morphine</td>
<td>Per oral</td>
<td>10 – 20 mg</td>
<td>2 hourly</td>
</tr>
<tr>
<td>Morphine</td>
<td>Intramuscular</td>
<td>10 – 15 mg</td>
<td>2 hourly</td>
</tr>
<tr>
<td>Pethidine</td>
<td>Intramuscular</td>
<td>50 – 100 mg</td>
<td>2 hourly</td>
</tr>
</tbody>
</table>

**Patient Controlled Analgesia (PCA)**

PCA became popular when it was realised that individual requirements for opioids varied considerably. Therefore a system was devised whereby patients could administer their own intravenous analgesia and so titrate the dose to their own end-point of pain relief. In theory, the plasma level of the analgesic will be relatively constant and side effects caused by fluctuations in plasma level will be eliminated.
### Monitoring of patients on PCA

Patients on PCA and those receiving strong opioids should be carefully monitored for their side effects. Normal postoperative observation of blood pressure, heart rate, temperature and oxygen saturation should be continued. Respiratory rate should be monitored hourly whilst on PCA. In addition volume of morphine solution infused, pain scores and nausea vomiting score should be documented. Supplementary oxygen should be administered whilst on PCA. Concurrent administration of other opioids or same drug via other routes should be avoided as it will increase the risk of respiratory depression.

### Side effects and toxicity of opioids

Opioid analgesics share many side effects though the degree may vary between agents. The most common include nausea, vomiting, constipation and drowsiness. Larger doses produce respiratory depression and hypotension. The specific antidote naloxone is indicated if there is coma or very slow respiration. Because of its short action, repeated injections of 200 – 400 mcg intravenously may be necessary.

### Tramadol

Tramadol is a weak opioid (mu) receptor agonist. It also acts though other pathways involving serotonin and norepinephrine. Though the analgesic effect is only one-tenth of morphine still in instances where stronger opioids need to be avoided then tramadol is a good alternative. Care need to be taken if patients have history of epilepsy. Nausea and vomiting are frequent side effects to this drug.

### Local Anaesthetics

Regional anaesthetic techniques used for surgery will provide near perfect postoperative pain relief if it can be prolonged beyond the duration of the surgery. There are many local anaesthetic techniques which can be continued into the postoperative period to provide effective pain relief. Most of these can be carried out with minimal risk to the patient and include local infiltration of incisions with long-acting local anaesthetics, blockade of peripheral nerves or plexuses and continuous block techniques peripherally or centrally (spinal or epidural).

Continuous infusion of combination of local anaesthetics with opioids given epidurally produces very effective analgesia. They may also produce undesirable side effects such as hypotension, sensory and motor block, nausea, vomiting and urinary retention.
Care of patients with local anaesthetic infusion in post-operative ward

Patients with continuous local anaesthetic infusion, either peripherally or through epidural catheters usually come with clear prescription and instruction from the operating room by the anaesthetist involved. Still, awareness about some possible complications that can be encountered in the postoperative period can help in early intervention and safe clinical practice.

As for as peripheral catheter techniques are concerned, the common cause for which the doctors will be involved is for incomplete block or failed block with poor pain relief. The pain team can be called and in the mean time the management of the acute pain can be in the lines as discussed earlier with analgesic medications. Other than this the personnel involved in the management of postoperative patients should be aware of local anaesthetic toxicity (refer chapter 6: Regional Anaesthesia).

Patients with epidural infusion

Observations should include pain score, level of sedation, respiratory rate, nausea and vomiting and epidural pump observations. Apart from the local anaesthetic toxicity, epidural infusion has its own complications that warrant immediate attention.

1. Hypotension
2. Respiratory insufficiency due to high block or epidural opioids.

Post-operative Respiratory Insufficiency

Postoperative respiratory insufficiency can be precipitated by a variety of factors.

Anaesthesia related: Residual effects of anaesthetic medications, opioids, muscle relaxants; Spinal or epidural opioids can cause delayed respiratory depression. Epidural infusion of local anaesthetics can cause weakness of intercostal muscles.

Patient related: Hypotension, hypothermia, metabolic derangements like hypoglycaemia, acidosis can impair respiratory function; Existing cardio respiratory problems can get exacerbated due to perioperative stress and manifest as respiratory failure; Other pathologies can include pneumothorax, pulmonary embolism etc.

Surgery related: Surgeries involving thorax and upper abdomen, laparoscopic procedures can predispose to mechanical factors that can reduce vital capacity, lead to atelectasis and manifest as hypoxaemia.

Irrespective of the underlying cause for the respiratory insufficiency the initial management involves assessment and management of airway, breathing (refer chapter 2: Airway management) and circulation. Epidural infusion can be discontinued while the cause of respiratory insufficiency is investigated.
If clinical situation suggests opioid as the cause for respiratory depression then intravenous administration naloxone 200 to 400 mcg can be tried to reverse the effects. The dose can be repeated as gauged by the response to the initial bolus. Hypotension should be managed with fluid boluses and judicious use of vasopressors like ephedrine or metaraminol. Basic monitoring such as ECG, non-invasive blood pressure, and pulse oximeter should be instituted simultaneously.

If the situation warrants, summon help from resuscitation team which should contain anesthetists who are generally capable of evaluating the condition, identify the underlying cause and manage appropriately.

**Post-operative nausea and vomiting (PONV)**

Nausea and vomiting in the postoperative period may be the most unpleasant memory for the patients in association with the hospital stay. Often the experience is described as that worse than having pain.

**Risk factors**

Patients undergoing gynecological and urological procedures, bowel and gall-bladder surgeries, ENT and eye procedures and prolonged operations are at a higher risk.

The patient factors include females of child bearing age group, obesity, previous history of PONV, migraine, motion sickness etc.

Some of the anaesthetic drugs including nitrous oxide, inhalational agents can increase the incidence. Both pain as well as strong analgesics like morphine can cause PONV.

**Effects of PONV**

Other than the unpleasantness, PONV is a common cause for unplanned admission following day surgeries and increased length of hospital stay.

Retching and forceful vomiting in severe cases can increase blood loss, predispose to wound dehiscence and incisional hernia, aspiration pneumonia. Persistent vomiting can lead to dehydration and metabolic derangements.

**Management**

There are simple, but important, measures to be taken to minimize the incidence of PONV.

These include

- Avoiding hypoxaemia
- Avoiding dehydration and hypotension
• Avoiding too early feeding in the postoperative period
• Pain management with judicious mix of analgesics including local anaesthetic techniques when appropriate.

There is no single drug that is superior to other in management of PONV. In high risk groups, it has been consistently shown that a combination of antiemetics is more effective than single drugs. Interestingly there is evidence that the ‘conventional’ antiemetics like metaclopramide and droperidol have limited or no effect in the management of PONV.

There are a list of drugs available to treat PONV and is often classified based on their mechanism of action. It includes antidopaminergics, antihistamines, anticholinergics, antiserotonergic (5-HT \textsubscript{3} antagonists) and miscellaneous drugs like dexamethasone.

An organized way of approaching these patients can aid in better delivery of care. When you are involved to see a patient with PONV,

• Rule out Hypoxia, hypotension and dehydration.
• Check with the anaesthetic chart the type of surgery and the intraoperative antiemetics used.
• The following are the commonly used drugs in the management of PONV.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Route</th>
<th>Dose</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cyclizine</td>
<td>IM or IV</td>
<td>50 mg</td>
<td>8 hourly</td>
</tr>
<tr>
<td>Prochlorperazine</td>
<td>Intramuscular</td>
<td>12.5 mg</td>
<td>8 hourly</td>
</tr>
<tr>
<td>Ondansetron</td>
<td>IM, IV or PO</td>
<td>4 – 8 mg</td>
<td>8 hourly</td>
</tr>
<tr>
<td>Dexamethasone</td>
<td>IV</td>
<td>8 mg</td>
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</tr>
</tbody>
</table>

Unexpected pain or persistent severe pain or postoperative nausea and vomiting despite conventional management may be an early signal for a potential underlying problem that requires senior help and possible further investigation.

**Further reading**

• Acute Pain Management: Scientific Evidence (Second Edition 2005). The Royal College of Anaesthetists Publication [www.rcoa.ac.uk](http://www.rcoa.ac.uk)


• Acute Life Support, Resuscitation guidelines, The Resuscitation Council (UK) [www.resus.org.uk](http://www.resus.org.uk)
• Good practice in the management of continuous epidural analgesia in the hospital setting (November 2004) The Royal College of Anaesthetists Publication (www.rcoa.ac.uk)

• Pain Management Services - Good Practice (May 2003) The Royal College of Anaesthetists Publication (www.rcoa.ac.uk)