Preoperative Single Dose Dexamethasone Effectively Diminishes Postoperative Pain after Laparoscopic Surgery

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ABSTRACT

Background: Pain after laparoscopic gynaecological procedures is multifactorial, and different treatments have been advocated to provide pain relief. Dexamethasone is best known for its anti-inflammatory property that reduces tissue edema during surgical procedure. A single dose of Dexamethasone has been shown to reduce postoperative pain scores as well as PONV. We evaluated the efficacy of analgesic effect of single dose (8mg) of injection Dexamethasone 1 hour before induction of anaesthesia on reducing post operative pain and reduction in opioid usage in laparoscopic procedures.

Materials and methods: In this double blind prospective study 50 patients undergoing laparoscopic gynaecological procedures received intravenous Dexamethasone (8mg) or placebo (normal saline) one hour before induction of GA. Patients received standardised anaesthetics, with similar surgical and multimodal analgesic treatment. Total dose of consumed analgesic and pain intensity during first 24 hours postoperative period were evaluated in both groups.

Result: Pain intensity in Dexamethasone group was significantly less than in control group in the first 12 hour post operative period (p < 0.05). Opioid consumption in Dexamethasone group was significantly less than placebo group (p < 0.05).

Conclusion: We concluded that 8mg single dose of Intravenous Dexamethasone given at least one hour prior to surgery is a safe, effective and inexpensive choice to control postoperative pain and at the same time to reduce opioid consumption in comparison with placebo.

KEYWORDS: Laparoscopic, Dexamethasone, postoperative pain, analgesia

Laparoscopic surgery is a standard treatment for diagnostic and therapeutic gynaecology due to decreased post operative trauma and less side effects. However, pain is still considered the most common complaint and the reason of prolonged hospitalisation, more morbidity and delayed functional recovery. There are many causes of laparoscopic induced pain, of which stretching of intra abdominal organs, peritoneal inflammation and phrenic nerve irritation by residual carbon dioxide (CO2) in peritoneal cavity are important. Pain is more severe on the day of operation and the following day. Dexamethasone is a powerful anti-inflammatory drug with a long half life and its administration is considered safe for periods shorter than 2 weeks even in amount above the physiological doses.

Several clinical trials in many different surgical procedures evaluated the effects of a single dose of dexamethasone administered on post operative pain but have inconsistent findings. Furthermore there are very few articles on use of preoperative Dexamethasone for postoperative pain relief in the Indian Scenario. We therefore performed this study to observe the efficacy of use of preoperative Dexamethasone in reducing post operative pain as well as analgesic requirements in patients undergoing diagnostic laparoscopic surgery.

Material and method

After taking institutional approval and informed consent 100 patients aged 18-60 yrs of both sexes ASA I & II scheduled for laparoscopic gynaecological surgery under general anaesthesia (GA) were for this study conducted at Midnapore Medical College & Hospital. Patients with hepatic and renal insufficiency; history of corticosteroid hypersensitivity; previous gastric ulcer; diabetes mellitus; receiving any corticosteroid, immunosuppressive analgesics or opioid medications were excluded from the study. Visual Analogue Score (VAS) where 0 means no pain, 10 means worst possible pain were explained to all patients during their preoperative visit. Patients were randomly allocated using a random list. Patients were monitored during GA by continuous ECG, NIBP, pulse oximetry and capnometry. At the completion of surgery residual neuromuscular blockade was antagonised with neostigmine (0.05 mg.kg-1) and glycopyrrolate (0.01 mg.kg-1) administered intravenously.

Trachea was extubated once the patient was awake. All patients received supplementation of oxygen (3 litres / min) by a face mask in the post operative period for 2 hours and were monitored continuously in the recovery room. After 2 hours the patients were sent to their respective wards. Pain intensity and capillary glucose concentration was measured at 0, 1, 2, 4, 6, 12 and 24 hours postoperatively. Pain was classified as mild - 0 to 3, moderate - 4 to 7 and severe – 8 to 10 based on the VAS score of the patients. If VAS score was ≥ 3, pethidine 1 mg.kg-1 was administered intravenously. Total consumed meperidine during the first 24 hours postoperative period was recorded. Details of adverse effects were recorded during study period by attending anaesthesiologist.
Postoperative infection, glucose intolerance and gastric mucosa
perioperative glucose levels which was insignificant in our study. We only
studied from our study. We also did not study of serum concentration of
dexamethasone effect postoperatively could not be ascertained
A limitation of this study was that we did not measure pain intensity
the first 12 hours in recovery room and ward in group D was significantly
lower compared with group S (p < 0.05). Table 3. However, at 24 hours the VAS scores of the two groups were similar. There were no
adverse events in any patient.
Discussion
Our study result revealed that a single intravenous dose of
preoperative dexamethasone 8mg reduced intensity of
postoperative pain in first 12 hours in comparison with placebo and it also decreases total consumption of post operative analgesic.
The results are similar with studies conducted by Fukami et al9 and Lim et al.10 The mechanism of pain relief by dexamethasone is mainly
provided by peripheral suppression of phospholipase enzyme, thereby significantly decreasing the products of cyclooxygenase and
lipooxygenase pathways in the inflammatory response.9,11,12 Additionally dexamethasone reduced bradykinin which reinforces pain in
the inflamed tissues and operated area, and also the decreased concentration of nerve proteins secreted from the
peripheral nerve system are involved in the analgesic effect.12
Postoperative pain after laparoscopic surgery is induced by multiple factors i.e. from skin incision, visceral pain, diaphragmatic irritation, different individual characteristics, nature of underlying diseases, surgical factors and type and volume of gas and also induced intra abdominal pressure. Hence the multimodal approaches are considered for post operative pain relief.13,14 The timing of steroid administration is important to reducing postoperative pain, as initiation of its biological effect is one or two hour of its injection.15 The dose of dexamethasone 8mg one hour before induction was based on previous reports showing a decrease in postoperative pain.16,17
We measured the pain intensity of the patient at 12 hours followed by 24 hours after the operation. While pain relief was significantly more at 12 hours with Dexamethasone, it was similar at 24 hours compared with normal saline, a finding similar to the study of Mohtadi et al15.
A limitation of this study was that we did not measure pain intensity at any time between 12 to 24 hours, so the exact duration of dexamethasone effect postoperatively could not be ascertained from our study. We also did not study of serum concentration of dexamethasone and stress hormones. We only studied perioperative glucose levels which was insignificant in our study. With use of steroids complication such as delays recovery, postoperative infection, glucose intolerance and gastric mucosa ulcer can occur. Sauerland et al.16 reported in their meta analysis that there was no significant increase in complications when they used 15-30 mg/kg of methylprednisolone in one dose which is fifty times the amount of dexamethasone used in our study. In our study we did not find any complication related to use of a single dose of dexamethasone.
To conclude, 8 mg dexamethasone pre operatively helps in better postoperative pain control as well as reduced opioid consumption.

References:

Table 1. Demographic Data (Mean)

<table>
<thead>
<tr>
<th>Group</th>
<th>Age (years)</th>
<th>Height (cm)</th>
<th>Weight (kg)</th>
<th>BMI</th>
<th>ASA I / ASA II</th>
<th>Duration of anaesthesia (min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group D</td>
<td>46.4 ± 10</td>
<td>143.7 ± 4</td>
<td>54.2 ± 6</td>
<td>26.2 ± 0.6</td>
<td>42/8</td>
<td>47.8 ± 26</td>
</tr>
<tr>
<td>Group S</td>
<td>44.8 ± 8</td>
<td>140.9 ± 5</td>
<td>51.6 ± 8</td>
<td>26.4 ± 0.4</td>
<td>43/7</td>
<td>50.1 ± 30</td>
</tr>
</tbody>
</table>

p > 0.05

Table 2. Meperidine consumption per patient during study period (mean ± std. deviation)

<table>
<thead>
<tr>
<th>Group</th>
<th>Meperidine consumption (mg)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group D</td>
<td>228.8 ± 21.5</td>
</tr>
<tr>
<td>Group S</td>
<td>35.4 ± 25.7 *</td>
</tr>
</tbody>
</table>

*p < 0.05

Table 3. Comparison of pain intensity amongst two study groups

<table>
<thead>
<tr>
<th>VAS</th>
<th>Group D</th>
<th>Group S</th>
</tr>
</thead>
<tbody>
<tr>
<td>On arrival to PACU (0 hour)</td>
<td>5.4 ± 2.5</td>
<td>5.3 ± 2.7</td>
</tr>
<tr>
<td>After 1 hour</td>
<td>5.4 ± 2.7</td>
<td>5.4 ± 2.7</td>
</tr>
<tr>
<td>After 2 hour</td>
<td>5.4 ± 2.7</td>
<td>5.4 ± 2.7</td>
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<tr>
<td>After 4 hour</td>
<td>5.4 ± 2.7</td>
<td>5.4 ± 2.7</td>
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<tr>
<td>After 6 hour</td>
<td>5.4 ± 2.7</td>
<td>5.4 ± 2.7</td>
</tr>
<tr>
<td>After 12 hour</td>
<td>5.4 ± 2.7</td>
<td>5.4 ± 2.7</td>
</tr>
<tr>
<td>After 24 hour</td>
<td>5.4 ± 2.7</td>
<td>5.4 ± 2.7</td>
</tr>
</tbody>
</table>

Data are presented as means or number ± standard deviation, * signifies a p value of significance (<0.05)
