

*Research Article*

## Effects of dexmedetomidine versus nalbuphen as a premedication on blood glucose level and haemodynamics during gynecological diagnostic laparoscopy.

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### Abstract

**Objective:** This study is designed to evaluate the effect of dexmedetomidine versus nalbuphine on haemodynamics and blood glucose level as an indicator of neuro-endocrine stress response during gynecological diagnostic laparoscopy. **Patients and Methods:** This study were conducted in Minia University Hospital. Ninety female patients, ASA I or II , aged 20-50 years old were scheduled for gynecological diagnostic laparoscopy under general anesthesia were included in this double blinded study. Patients were allocated into three groups. Group I were given dexmedetomidine 1 mic/kg, Group II were given nalbuphine 0.5 mg/kg and Group III were given 10 ml saline 0.9% before induction of general anesthesia. Perioperative blood glucose levels were analyzed preoperatively, at 30 min after beginning of surgery, and 2.0 h after surgery. Anesthetic and surgical techniques were standardized. All patients were also assessed for intraoperative hemodynamic changes Visual analogue pain score and Postoperative Ramsay sedation score at specific timings. **Results:** Hemodynamic parameters, MAP and HR were significantly lower in groups [I] & [II] when compared to group [III] and significantly lower in group [I] when compared to group [II]. Random blood glucose level was significantly lower in groups [I] & [II] when compared to group [III]. **Conclusion:** Premedication with dexmedetomidine and nalbuphine has effectively modulated the neuroendocrine stress response during gynecological diagnostic laparoscopy under general anesthesia as assessed by analysis of perioperative blood glucose variation, but dexmedetomidine was better.

**Key words:** dexmedetomidine, nalbuphine, gynecological diagnostic laparoscopy, pneumoperitoneum.

### Introduction

The gynecological diagnostic laparoscopy is considered as a low stress level surgery with fewer pulmonary complications and more rapid convalescence, but it predictably leads to increased hemodynamic stress responses (Ros et al., 2010). Blood glucose concentrations increase after surgical incision. The cortisol and catecholamines facilitate glucose production as a result of increased hepatic glycogenolysis and gluconeogenesis. In addition, peripheral use of glucose is decreased due to insulin resistance. The blood glucose concentrations are related to the intensity of the surgical injury; the changes follow closely the increases in catecholamines (Harsoor et al., 2014).

Dexmedetomidine, an alpha<sub>2</sub> adrenergic agonist, has shown clinically useful drug profile due to its sympatholytic, hypnotic, sedative, anxiolytic, analgesic, and anesthetic sparing effects without respiratory depression. It has also shown attenuation of the hemodynamic responses associated with laryngoscopy by reducing norepinephrine release (Bhattacharjee et al., 2010).

Nalbuphine is a partial kappa agonist / mu antagonist opioid of phenanthrene series. It was synthesized in an attempt to produce analgesia without the undesirable side effects of a mu agonist, notably respiratory depression and drug dependence. It has been observed that nalbuphine provides cardiovascular stability (Robert et al., 2011).

### Patients and methods

After obtaining approval from our hospital ethical committee and consent from each patient. A total of 90 patients as ASA class I or II, aged from 20- 40 years old, undergoing diagnostic gynecological laparoscopy surgery under general anesthesia will be selected for this blind prospective randomized Study in Minia University Hospital. After consent is obtained, patient will be subcategorized into three groups (n=30 each). Group (I) received 1mcg/kg dexmedetomidine intravenous route as a premedication, group (II) received 0.5mg/kg nalbuphen and group (III) received saline.

On arrival to operation room, routine, hemodynamic monitoring is performed by noninvasive blood pressure measurement, five leads ECG monitor, and pulse oximetry. An intravenous infusion of normal saline as a preload.

After preoxygenation for 3 min, the anesthesia is induced with propofol (3 mg/kg) and tracheal intubation was facilitated by atracurium 0.5 mg/kg. Anesthesia is maintained with isoflurane. The patient's lungs were initially mechanically ventilated with a tidal volume of 8 ml/kg, a respiratory rate of 12 breaths/min, and an I:E ratio of 1:2 in volume controlled mode. Five minutes after securing the airway and abdominal insufflation by carbon dioxide, the lung mechanics were adjusted to maintain normocapnia (an end tidal carbon dioxide

value of 30-40 mm Hg) and intraabdominal pressure is maintained between 12 and 10 mm Hg.

All patients are assessed for changes in hemodynamic parameters of heart rate, oxygen saturation and mean arterial pressure prior to premedication, before induction, after intubation, and after pneumoperitoneum, followed by every 5 min for 30 min, there after every 10 min till the end of surgery and after extubation. Blood samples were drawn to measure blood glucose prior to premedication, intraoperative after pneumoperitoneum and 2.0 hour postoperatively.

### Results

A total of 90 patients were randomly assigned to three groups of 30 patients each. The groups were comparable in age, weight, ASA and duration of surgery.

As regard hemodynamic parameters, MAP and HR were significantly lower in groups [I] & [II] when compared to group [III] and significantly lower in group [I] when compared to group [II] (figure 1&2).

Random blood glucose level was significantly lower in groups [I] & [II] when compared to group [III] (figure 3).

Visual analogue pain score was significantly lower in groups [I] & [II] when compared to group [III] (figure 4).

Postoperative Ramsay sedation score was significantly lower in groups [II] & [III] when compared to group [I] during the first hour postoperatively (figure 5).

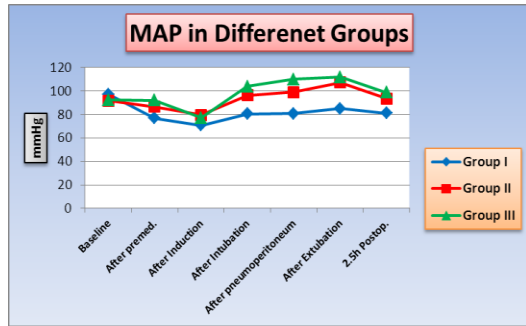


Fig (1): MAP values among the studied groups

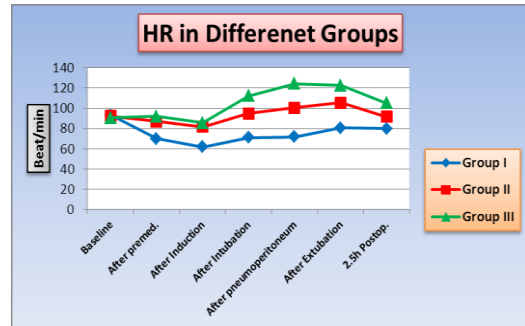


Fig. (2): Heart rate (HR) values among the studied groups

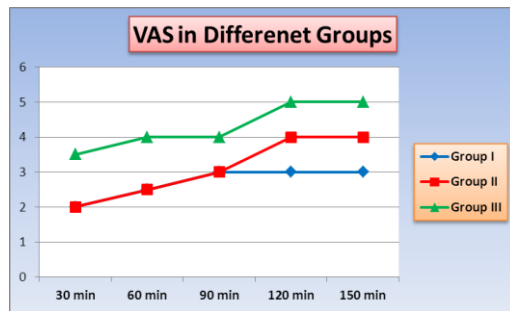


Fig (3): (VAS) during the first 2.0 hours

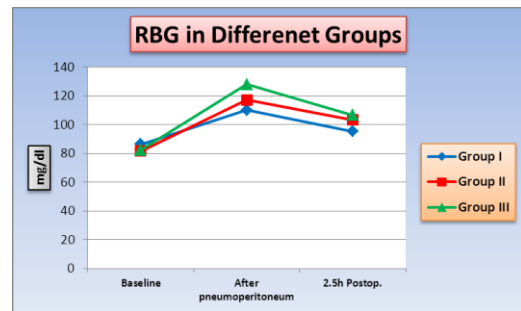


Figure (4): RBG values among the studied groups

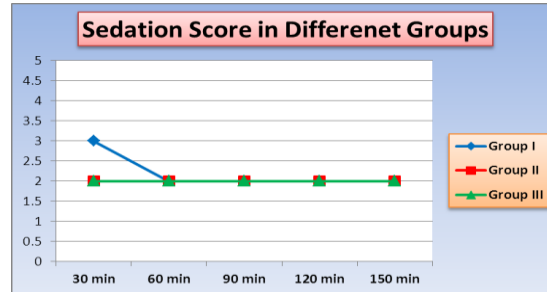


Fig (5): postoperative Ramsay sedation score during the first 2.0 hours in the three studied groups.

**Discussion**

Surgical procedures induce complex stress responses manifested by metabolic, neurohumoral, and immunological changes (Marana et al., 2003). Hyperglycemia is a feature of the metabolic response to surgery and depends on patient age, anesthetic technique, severity of tissue trauma, type and magnitude of surgery, total operative time, amount of intraoperative blood loss, and postoperative pain (Schricker et al., 2000). Dexmedetomidine is also an important sedative because of its significant opioid-sparing effects. Initially, dexme-

detomidine was used as an anaesthetic premedication to attenuate the sympathetic response following a surgical procedure, such as laryngoscopy and intubation but later it became more widely used as an analgesic or anaesthetic (Bulow et al., 2014). After its initial approval for sedation in 1999, dexmedetomidine was also approved in 2008 for surgical sedation and related procedures (Ayoglu et al., 2008).

Nalbuphine is an opioid with agonist antagonist action, weak antagonist at mu and agonist at kappa opioid receptors

(Sharma and Parikh, 2014). It has been used in many major surgeries intra operatively as it is cardiovascular stable and has longer duration of action (Chaudhari et al., 2010). In this double blinded study, we aimed to evaluate the effect of dexmedetomidine versus nalbuphine on haemodynamics and neuroendocrine stress response as indicated by blood glucose levels during gynecological diagnostic laparoscopy. In this study, there were significant differences between the three groups as regard heart rate, mean arterial blood pressure and random blood glucose levels. As regard post operative sedation, we found significant difference in the sedation score in group (I) when compared with group (II) or group (III). As regard postoperative visual analogue score, there were significant differences in the dexmedetomidine group and nalbuphine group when compared with the control group.

In agreement with this results, Kumar et al., (2016) had evaluated the effect of dexmedetomidine on haemodynamic response of intraoperative events like laryngoscopy, endotracheal intubation, pneumoperitoneum, extubation time, and sedation during and after laproscopic hysterectomy. They found that dexmedetomidine premedication produced significant fall in arterial blood pressure and heart rate with no adverse events occurred.

Also, Gupta et al., (2014) compared the effect of premdication with dexmedetomidine versus fentanyl on modulation of neuroendocrine stress response by analyzing the perioperative variation of blood glucose level during laparoscopic cholecystectomy under general anesthesia. They found that there was significant increase in blood glucose concentration during the surgery and remained increased postoperatively in both groups.

## Conclusion

*From this study, we concluded that:*

Premedication with dexmedetomidine and nalbuphine has effectively modulated the neuroendocrine stress response during gynecological diagnostic laparoscopy under general anesthesia as assessed by analysis

of perioperative blood glucose variation, but dexmedetomidine was better.

Dexmedetomidine produce better maintenance of haemodynamics during perioperative period and more sedation when compared to nalbuphine.

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