Dexmedetomidine Compare with Fentanyl for Postoperative Analgesia in Outpatient Gynecologic Laparoscopy: A Randomized Controlled Trial

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Background: *Low-dose dexmedetomidine provides postoperative analgesia with anti-emetic and anti-shivering. This prospective, randomized, double-blind study was designed to evaluate intraoperative infusion of dexmedetomidine and fentanyl in postoperative analgesia in outpatient gynecologic diagnostic laparoscopy under general anesthesia.*

Material and Method: *Forty ASA physical status I and II patients scheduled for outpatient gynecologic diagnostic laparoscopy were randomly allocated into two groups, dexmedetomidine group (DEX group, n = 20), or fentanyl group (FEN group, n = 20). Either dexmedetomidine 0.5 μg/Kg or fentanyl 0.5 μg/Kg in normal saline 10 ml was infused intravenously for 10 min after induction of general anesthesia. An additional intravenous fentanyl 25 μg was provided for postoperative pain relief in PACU.*

Results: *Intraoperative hemodynamic data and time to tracheal extubation were similar in both groups. In the PACU, median VRS pain scores were lower in the DEX group at 15 min, 30 min, and 1 h postoperatively (3, 2, and 2 in DEX group vs. 5, 4, and 3 in FEN group, $p < 0.05$). In addition, the percentage of patients who required treatment of pain was less in the DEX group (45% vs. 85%, $p < 0.05$). There was less incidence of postoperative nausea in the DEX group (5% vs. 25%, $p < 0.05$). No statistical difference in shivering and sedation was found between groups.*

Conclusion: *The present study demonstrates that intravenous infusion of 0.5 μg/Kg of dexmedetomidine after induction of anesthesia was better analgesia than 0.5 μg/Kg of fentanyl in the postoperative period without delayed discharge and provided perioperative hemodynamic stability during gynecologic diagnostic laparoscopy.*

Keywords: *Dexmedetomidine, Analgesia, Laparoscopy*

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Gynecologic diagnostic laparoscopy is one of the commonly performed procedures in outpatient surgery. Postoperative pain, nausea, vomiting, and shivering have been found as the frequent causes of delayed discharge and unexpected admission in outpatient surgery[1]. It is essential that the provided analgesia is sufficient for the patient to be mobilized in the day of surgery, and the side effects such as nausea, vomiting, and dizziness have to be minimized.

At King Chulalongkorn Memorial Hospital, Thailand, the techniques of analgesia in gynecologic diagnostic laparoscopy are normally wound infiltration with 0.5% bupivacaine 10 ml and intravenous injection with fentanyl 0.5 μg/Kg. However, some patients in the post-anesthetic care unit (PACU) complained of nausea/vomiting if after additional dose of fentanyl 0.5 μg/Kg was administration.

Dexmedetomidine is a highly selective α2 adrenergic agonist, registered for use as a sedative-analgesic in the intensive care settings[2-4]. It has one of the most impressive actions of dramatic reduction in the minimal alveolar concentration of volatile anesthetics[5-8]. It offers additional advantages of analgesia, sympatholytic action[9,10], reduction of shivering incidence[11,12] and the incidence of respiratory depression[13,14].

Many reports suggested that 1 μg/Kg intravenous loading dose of dexmedetomidine, followed by maintenance intravenous infusion of

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0.2-0.7 μg/Kg/h offers advantages of postoperative analgesia. Gurbert[16] using dexmedetomidine 1 μg/Kg with 0.5 μg/Kg/h in patients who underwent total abdominal hysterectomy, and they demonstrated lesser opioids need for 48 h and less nausea/vomiting postoperatively. Dholakia[17] studied patients undergoing laparoscopic bariatric procedure that received dexmedetomidine 1 μg/Kg with 0.2-0.7 μg/Kg/h and found adequate postoperative pain control, less opioids need, and shortened duration of hospital stay. Zeyneloglu[18] studied outpatients undergoing sedation and analgesia for extracorporeal shock wave lithotripsy with dexmedetomidine 1 μg/Kg, and they had lower sedative and analgesic need but longer recovery time than those who received midazolam 0.05 mg/Kg with fentanyl 1 μg/Kg. In general, presynaptic activation of α2 adrenoceptor inhibits the release of norepinephrine, and terminates the propagation of pain signals. The explanation for prolonged postoperative analgesia with dexmedetomidine may be explained by the anxiolytic and thymoanaleptic properties of α2-agonists that act on the emotional components of postoperative pain[19].

However, there were reported complications of dexmedetomidine in hemodynamic responses such as the bradycardia and hypotension or hypertension and also the delay emergence, delay discharge from PACU. To avoid these complications, it is recommended to give low doses of intravenous dexmedetomidine. Aantaa[20] studied four different doses of dexmedetomidine (0.167, 0.33, 0.67, and 1.0 μg/Kg) in comparison with saline in women scheduled for dilatation and curettage of the uterus and it was found that the doses of 0.33, 0.67 and 1.0 μg/Kg decrease the anesthetic requirements but the dose of 1.0 μg/Kg prolonged recovery time. Olutoye[21] compared dexmedetomidine 0.5 μg/Kg with morphine 0.5 mg/Kg in pediatric tonsillectomy with adenoidectomy and found similar analgesic effects, opioids needed and recovery time. Bulow[22] reported that dexmedetomidine 0.5 μg/Kg provided good perioperative hemodynamic stability in comparison to remifentanil 0.3 μg/Kg in patients undergoing invasive video gynecologic surgical procedures. Feld[23] studied morbid obesity patients (mean body mass index of 50 kg/m^2) scheduled for laparoscopic gastric banding received either dexmedetomidine 0.5 μg/Kg followed by 0.4 μg/Kg/h or fentanyl 0.5 μg/Kg followed by 1 μg/Kg/h and it was found that dexmedetomidine produced a greater decrease in sympathovagal balance than fentanyl.

The aim of the present study was to evaluate whether or not intraoperative infusion of low dose dexmedetomidine (0.5 μg/Kg) is effective for postoperative analgesia. To address this question, the authors compared dexmedetomidine (0.5 μg/Kg) versus fentanyl (0.5 μg/Kg)[23] regarding its usefulness during postoperative pain in ambulatory gynecologic laparoscopy patients.

Material and Method

After obtaining approval from the Ethics Committee of the Faculty of Medicine and written informed consent from each patient, this prospective, randomized, double-blind, placebo-controlled study was conducted at King Chulalongkorn Memorial Hospital. Patients of ASA physical status I and II who were scheduled for elective ambulatory gynecologic diagnostic laparoscopy with minor intervention under general anesthesia were recruited into the present study. The minor operative interventions included lysis, some adhesions, and ablation of endometriosis. The exclusion criteria were chronic pain, advanced heart block, hypovolemia, shock, renal or hepatic impairment, psychiatric disorder, inadequate communication, allergic to DEX and other drugs in the present study protocol, history of delayed emergence and those who could not use verbal rating score (VRS).

The patients were randomly allocated into two groups. The DEX group (n = 20) wherein each member received dexmedetomidine 0.5 μg/Kg in 10 ml of normal saline and the FEN group (n = 20) wherein each member received fentanyl 0.5 μg/Kg in 10 ml of normal saline. The randomization sequence was selected based on a random number table. Randomly allocated coded syringe of drug was prepared by anesthesiology resident who would not be involved in perioperative cares and postoperative visits.

No patients received premedication. On their arrival to the operating room, a venous cannula was inserted into their arm, and 0.9% saline solution was administered. The perioperative monitoring included electrocardiogram, pulse oximetry, noninvasive blood pressure, and capnography.

Anesthesia was induced with propofol (2 mg/Kg), and atracurium (0.5 mg/Kg) was given to facilitate laryngoscopy and endotracheal intubation. Anesthesia was maintained with desflurane in 60% nitrous oxide and 40% oxygen. After tracheal intubation, the present study drug (dexmedetomidine or fentanyl) was given by intravenously infusion for a period of 10 min with a syringe pump. Laparoscopy

began no sooner than 15 min after tracheal intubation and was performed with the table at 15-degree head-down tilt. To ensure adequate visibility in the surgical field, the peritoneal cavity was filled with carbon dioxide at a pressure of 10 to 12 mmHg. No other opiate narcotics or analgesics were administered during the operation. At the end of anesthesia, neuromuscular blockage was antagonized with 2.5 mg of neostigmine and 1.2 mg of atropine intravenously. The patient did not receive any routine antiemetic prophylaxis. The anesthetic time, operation time and time to awake extubation were recorded.

After the patient arrived to the PACU, an anesthetist nurse who was not involved with the perioperative care observed and assessed the patient until discharge to home. After staying in PACU for 1 h, and having modified Aldrete score ≥ 9 with VRS pain score ≤ 3, then the patient was then transported to the step-down recovery area (SRA) for another 1 h or until discharge to home. The discharge criteria at SRA consisted of patients having Post-Anesthetic-Discharge Scoring System (PADSS) score ≥ 9 and addition drinking fluids, voiding, ambulating without dizziness.

Pain intensity using verbal rating score (VRS) (0-10, 0 indicate no pain, and 10 indicating the worst pain imaginable) was recorded at 15 min, 30 min, 1 h and 2 h postoperatively. In PACU, the moderate pain with VRS pain score > 3 would be treated with incremented dose of 25 μg fentanyl intravenously for rescue analgesics. The need of fentanyl doses in the PACU was then recorded. At SRA, paracetamol 1 g was given orally if the VRS pain score > 3.

The severity of sedation was assessed using 4-point rating scale (0 = fully awake, 1 = somnolent, respond to call, 2 = somnolent, respond to tactile stimuli, 3 = deep sedation respond to painful stimuli). The severity of nausea, vomiting and shivering was assessed using 4-point rating scale (0 = no symptom, 1 = mild symptom, 2 = moderate symptom, 3 = severe symptom).

The episode of intraoperative and post-operative side effects included bradycardia (HR < 50 beat/min), hypotension (systolic blood pressure < 30% of baseline level or < 80 mmHg), respiratory depression (RR < 12 beat/min or oxygen saturation < 92%), deep sedation, nausea, vomiting, shivering and delayed discharge time for more than 2 hour (h) were recorded. Intravenous ondansetron 4 mg was required for the treatment of severe nausea or vomiting in the PACU. Shivering was treated by radiant warmer and forced air warming. Bradycardia was treated with atropine 0.6 mg intravenously. Hypotension was treated with ephedrine 6 mg intravenous and fluid administration.

Statistical analysis

Sample size calculation showed that approximate by 20 patients would need to be recruited into each group to ensure a power of 80% and drop out 10% to detect a different of VRS between the two groups. This allowed for the probability of a type 2 error of 0.1 and type 1 error of 0.05, considering the success rate of the postoperative pain relief for one SD. An expected VRS pain score was 0-3 range at 30 min postoperatively. The statistical analysis was carried out with SPSS version 11. Data presented are mean $\pm$ SD, median (minimum-maximum), number of patients (percent). Continuous data was compared between groups by Student's t-test. Ordinal scale data was compared by Mann-Whitney U test. Repeated measures analysis of variance was done to compare continuous variables using analysis of Covariance. Nominal scale data was compared by Chi-square test and Fisher exact test. The p-value < 0.05 was considered statistically significant

Results

There were no significant differences between the two groups in terms of patient characteristics (age, weight, and height) as show in Table 1. The heart rate (HR), systolic blood pressure (SBP), and diastolic blood pressure (DBP) were not different between the groups. None had any pain pre-operatively.

The anesthetic time, operation time, and time to awake extubation showed a skewed (asymmetrical) distribution and variability was considerably different across the groups. Therefore, the authors moved to use Mann-Whitney U-test instead of Student t-test, which is more appropriate in dealing with skewed data. After analysis with Mann-Whitney U-test, the median anesthetic time, operation time, and time to awake extubation were not significantly different between the two groups.

The median VRS pain score of the DEX group was significantly lower than that of the FEN group at 15 min (3 in DEX group and 5 in FEN group), 30 min (2 in DEX group and 4 in FEN group), and 1 h (2 in DEX group and 3 in FEN group) (Table 2). At 2 h, the median VRS pain score in both groups were not significantly different (2 in both groups). The incidence of moderate to severe pain (VRS pain score 4-10) in the

Table 1. Patient characteristics

Characteristics	DEX group (n = 20)	FEN group (n = 20)	p-value
Age (y)[a]	33.9 ± 4.1	35.1 ± 3.4	0.348
Weight (kg)	54.1 ± 7.3	53.2 ± 8.3	0.708
Height (cm)	158.1 ± 5.5	159.0 ± 5.9	0.605
HR (bpm)	77.5 ± 8.9	79.1 ± 10.9	0.614
SBP (mmHg)	113.2 ± 8.4	115.5 ± 9.2	0.407
DBP (mmHg)	71.6 ± 6.2	71.8 ± 10.9	0.943
Anesthetic time (min)[b]	50 (26-80)	60 (30-105)	0.101
Operation time (min)	35 (15-60)	35 (10-95)	0.118
Time to awake extubation (min)	10 (5-25)	6 (5-20)	0.124

[a] Data are mean ± SD
[b] Data are median (minimum-maximum)

Table 2. Postoperative pain score

VRS pain score	DEX group (n = 20)	FEN group (n = 20)	p-value
15 min	3 (0-7)*	5 (0-8)	0.043
30 min	2 (0-5)*	4 (1-7)	0.005
1 h	2 (0-3)*	3 (0-3)	0.009
2 h	2 (0-3)	2 (0-3)	0.314

Data are median (minimum-maximum)
* $p < 0.05$ considered significant by Mann-Whitney U-test

DEX group was lower in comparison with the FEN group at 15 min (40% and 80%) and 30 min (5% and 60%). At 1 h and 2 h postoperative, none in both groups had moderate to severe pain. There were more patients in the DEX group who had no pain (VRS pain score 0) (compared with the FEN group (15% and 5%) at 1 h postoperative.

During the time patients were assessed in PACU, the incidence of postoperative fentanyl requirement as rescue analgesia was significantly lower in the DEX group than the FEN group (9 patients; 45% and 17 patients; 85%, respectively). In addition, all of the nine patients in the DEX group requested only one dose fentanyl (25 μg) in contrast to FEN group, eight of 17 patients requested one dose and nine of 17 patients requested two doses fentanyl (50 μg) (Table 3).

During the operation, there was no difference in the incidences of hypotension and bradycardia between the groups. Ephedrine 6 mg was administered to treat hypotension in two patients in the DEX group and one patient in the FEN group. Atropine 0.6 mg was administered to treat bradycardia in one patient in each group. None developed both hypotension and bradycardia. Incidences of nausea were lower in the DEX group, one patient (5%) in the DEX group had nausea whereas five patients (25%) in the FEN group. None had developed retching or vomiting. The symptom of nausea was gone after ondansetron administration and prior the time discharge from PACU. Shivering found no statistical significance, one patient in the DEX group and two patients in FEN group experienced mild to moderate shivering in 30 min postoperative. The level of sedation was similar between the groups in the PACU. All patients were fully awake at 2 h postoperative. None had deep sedation, prolonged discharge from SRA (> 2 h) or required the unplanned hospital admission.

Discussion

It is clear that intraoperative venous administered of dexmedetomidine 0.5 μg/Kg was alleviating postoperative pain after gynecologic diagnostic laparoscopy in most patients. In spite of the higher amount of fentanyl administered in PACU, the patients in the FEN group relatively experienced

Table 3. The postoperative fentanyl requirement

	DEX group (n = 20)	FEN group (n = 20)	p-value
Fentanyl requirement (No.)	9 (45%)*	17 (85%)	0.009
1 dose (25 μg)	9 (45%)	8 (40%)	
2 doses (50 μg)	0	9 (45%)	

Data are number of patients (percent)
* $p < 0.05$ considered significant by Chi-square test

Table 4. The intraoperative and postoperative adverse effects

Adverse effects	DEX group (n = 20)	FEN group (n = 20)	p-value
Hypotension	2 (10%)	1 (5%)	1.000
Bradycardia	1 (5%)	1 (5%)	1.000
Nausea	1 (5%)*	5 (25%)	0.009
Shivering	1 (5%)	2 (10%)	1.000

Data are number of patients (percent)
* $p < 0.05$ considered significant by Chi-square test

postoperative pain, compared to the patients in the DEX group at 15, 30 min, and 1 h later. Sixty percent of the patients in the DEX group had VRS pain score of 0 to 3 at 15 min after laparoscopy, 95% at 30 min and then 100% at 1 and 2 h, when compared to 20%, 40%, 100%, and 100% of the patients in the FEN group.

Dexmedetomidine has sedative and analgesia sparing effects via the central actions in the locus ceruleus and in the dorsal horn of the spinal cord. The onset of action of intravenous dexmedetomidine is 5 to 10 min, the duration of action is 30 to 60 min and the elimination half-life is approximately 2 hours[15]. Since the mid 1980s, many publications of dexmedetomidine in animal studies have reported significant volatile anesthetic minimum alveolar concentration reduction and suggestion that this drug may be a "complete" anesthetic agent[5]. Later, dexmedetomidine has been approved by the FDA in 1999 for sedation of critically ill or injured patients in an intensive care unit setting with a remarkable margin of safety.

Heart rate (HR) decreases after a bolus injection of dexmedetomidine, which may or may not be associated with transient increase in mean arterial blood pressure (MAP), whereas the response to larger boluses (1-4 μg/Kg) has been a transient increase in MAP[9]. The initial reaction can be explained by the direct peripheral α2-adrenoceptor stimulation of vascular smooth muscle, probably due to baroreflex activity, so very slow infusion of dexmedetomidine in a period of 10 min or more trends to minimize this effect and prevent of bradycardia, hypotension, or hypertension. However, in Hall's study, despite a slow infusion rates of dexmedetomidine 0.6 μg/Kg, a transient increase in MAP 7% from baseline was observed and associated with a decrease in HR 16% from baseline[2]. In the present study, the authors used a single dose of intravenous infusion of 0.5 μg/Kg of dexmedetomidine compared with 0.5 μg/Kg of fentanyl in a period of 10 min and the authors did not observe a significant difference in the incidence or severity of bradycardia, hypotension, or hypertension. Two patients had bradycardia (1 patient in each group), and three patients had hypotension (2 patients in DEX group and 1 patient in FEN group). All patients recovered after treatment with a single dose of atropine or ephedrine. Dexmedetomidine has minor effects on the respiratory system[13,14]. In the present study, all patients in both groups had neither episode of hypoventilation nor oxygen desaturation.

In spite of the large amount of fentanyl administrated in the PACU, the patients in the FEN group had more postoperative pain, compared to those in the DEX group at 15 min, 30 min, and 1 h postoperatively. However, in the last period of observation, at 2 h postoperatively, the pain was not significantly different between the two groups. It

seems that the postoperative analgesia of the DEX group was superior to the FEN group in the first hour. This is probably due to the duration of action of intravenous dexmedetomidine, which was reported to be about 60 to 120 min but of fentanyl was 30 to 60 min. In the present study, the median anesthetic time was 50 and 60 min in the DEX group and FEN group; respectively, and the study drug was infused completely in 10 min after the induction of anesthesia. Therefore, the analgesic effects of dexmedetomidine would show for 30 to 60 min after surgery. The other explanation of the higher requirement for "rescue analgesics" in the fentanyl group while they were in PACU may have been because an insufficient dose of fentanyl 0.5 μg/Kg was administered during the course of the anesthesia to provide adequate post-operative analgesia. Therefore, future studies should employed more of dose-ranging design. Particularly in the case of fentanyl, it would have certainly been easier to determine if there were significant benefits associated with the use of dexmedetomidine 0.5 μg/Kg vs. fentanyl 0.5 μg/Kg and 1 μg/Kg. Particularly, when equivalent analgesic dose were employed or give the repeated doses or infusion doses of both drugs to maintain the analgesic property of them.

In the first 24 postoperative hours, the most common adverse effects of opioids used for the analgesia were nausea, vomiting and respiratory depression[24]. These risks are important in the ambulatory practice that required rapid patient recovery and readiness for home discharge. In the normal practices, fentanyl is opioids with less postoperative nausea and vomiting (PONV) side effects usually considered for analgesic in patients undergoing day-case laparoscopic gynecologic surgery in Thailand. Dexmedetomidine had been reported the low incidence PONV. Even though the fact that none received routine antiemetic prophylaxis and the protocol used was highly susceptible to provoke PONV (i.e. laparoscopic surgery, women group, 60% nitrous oxide, neostigmine to antagonize muscle relaxant), no patient in both groups developed retching or vomiting. The incidence of nausea in the FEN group in the present study was shown to be higher than the DEX group (25% vs. 5%). It is possible that the anti-emetic effect of dexmedetomidine in the DEX group or the more amount of fentanyl administered in the FEN group caused more incidences of nausea in the FEN group. However, this difference was exceedingly small and did not appear to result in any delay in time to discharge. In the authors' observation, there was no difference in the time from stop anesthesia to extubation, time to discharge from PACU and SRA in both groups. For this reason, 0.5 μg/Kg of dexmedetomidine could be safe for use intra-operatively as an analgesic as fentanyl in day-case surgery that requires no delay in recovery time.

The limitations of the present study were the type of operation. In technically, this does not qualify as a real "diagnostic" gynecologic laparoscopy. All of the patients who underwent diagnostic laparoscopy were infertility with normal pre-operative gynecologic ultrasound and almost all of the intraoperative findings were some endometriosis or small endometriomas. To improve the fertility, the surgeon had removed the adhesions and destroyed the small lesions, nodules, or endometriomas using an electrical current. Only one case in each group had a normal finding and had no any intervention. It is possible that more aggressive intervention will influence the amount of pain and other side effects, which the patients may have experienced during recovery. It would be important to note whether there was a difference in the frequency of these more aggressive interventions between the two groups but the authors did not record them in detail.

If the practitioner plans to introduce dexmedetomidine into everyday practice, the cost of this drug should be taken into account. Dexmedetomidine is still very expensive. At King Chulalongkorn Memorial Hospital, a 2-ml vial of dexmedetomidine (200 μg) cost 20 times more than a 2-ml ampule of fentanyl (100 μg). However, the authors believe that it would be justified when administering in patients with a history of PONV or allergy to opioids or other analgesics. Further study on cost-effectiveness of dexmedetomidine in this kind of operation may be needed before concluding that it is appropriate to routinely use for pain control in gynecologic diagnostic laparoscopy.

In conclusion, the present study demonstrates that 0.5 μg/Kg of dexmedetomidine compared to 0.5 μg/Kg of fentanyl as intravenous infusion over 10 min after induction of anesthesia significantly reduces analgesic requirements in the postoperative period without delaying discharge and provides peri-operative hemodynamic stability during gynecologic diagnostic laparoscopy.

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Potential conflicts of interest

None.

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การศึกษาการใช้ยา dexmedetomidine เปรียบเทียบกับ fentanyl เพื่อระงับปวดหลังการส่องกล้องวินิจฉัยทางนรีเวชในผู้ป่วยนอก

อัญชลี เตชะนิเวศน์, ศศิมา ดุสิตเกษม, ชนิดา อนุวัธนวิทย์

วัตถุประสงค์: *ทำการศึกษาถึงประสิทธิผลของยา dexmedetomidine เปรียบเทียบกับยา fentanyl ในการระงับปวดแก่ผู้ป่วยที่มารับการส่องกล้องวินิจฉัยทางนรีเวช พร้อมทั้งผลข้างเคียงที่เกิดขึ้น*

วัสดุและวิธีการ: *เป็นการศึกษาแบบ double blind randomize controlled trial ในผู้ป่วยที่มารับการส่องกล้องวินิจฉัยทางนรีเวชแบบผู้ป่วยนอก หลังจากผู้ป่วยให้ความยินยอมที่จะเข้าร่วมโครงการศึกษา และถูกสุ่มแบ่งเป็นผู้ป่วยเป็น 2 กลุ่ม กลุ่มละ 20 คน ผู้ป่วยในกลุ่ม DEX จะได้รับยา dexmedetomidine 0.5 ไมโครกรัม/กก. และกลุ่ม FEN จะได้รับยา fentanyl 0.5 ไมโครกรัม/กก. ทาง syringe pump ให้หมดภายใน 10 นาที หลังจากเริ่มดำเนินการสลบโดยวิสัญญีแพทย์ที่ไม่ทราบว่ายาที่ใช้ในการศึกษานั้นเป็นยาชนิดใด เมื่อผู้ป่วยเข้าห้องพักฟื้นจะได้รับการประเมินความเจ็บปวดหลังการผ่าตัด โดยใช้ verbal rating scale (VRS) ที่เวลา 15 นาที, 30 นาที และ 1 ชั่วโมง และจะได้รับ fentanyl ครั้งละ 25 ไมโครกรัม หากมี VRS มากกว่า 3*

ผลการศึกษา: *ความรุนแรงของความปวด (VRS) ในกลุ่ม DEX น้อยกว่าในกลุ่ม FEN อย่างมีนัยสำคัญทั้งที่ 15 นาที, 30 นาที และ 1 ชั่วโมงหลังผ่าตัด (3, 2, 2 ในกลุ่ม DEX และ 5, 4, 3 ในกลุ่ม FEN, $p < 0.05$) และมีจำนวนผู้ป่วยในกลุ่ม DEX น้อยกว่าที่ต้องการยาแก้ปวดในห้องพักฟื้น (45% และ 85%, $p < 0.05$) พบมีผู้ป่วยในกลุ่ม DEX จำนวนน้อยกว่าที่มีอาการคลื่นไส้ (5% และ 25%, $p < 0.05$) ไม่พบความแตกต่างในอาการข้างเคียงอื่น ๆ เช่น อาการสั่นและง่วงซึมในทั้งสองกลุ่ม*

สรุป: *การใช้ dexmedetomidine 0.5 ไมโครกรัม/กก. ช่วยระงับปวด ได้ดีกว่า fentanyl 0.5 ไมโครกรัม/กก. และคลื่นไส้น้อยกว่า ในผู้ป่วยที่มารับการส่องกล้องวินิจฉัยทางนรีเวช โดยไม่พบผลข้างเคียงอื่นที่แตกต่างกัน*