

# EFFECTS OF INTRAPERITONEAL ANAESTHESIA ON PAIN AND ENDOCRINE RESPONSE TO GYNAECOLOGIC LAPAROSCOPY

Füsün BOZKIRLI, M.D., Şehri ELBEK\*, Ph.D.

Gazi University, Faculty of Medicine, Departments of Anaesthesiology and Nuclear Medicine\*,  
Ankara, Turkey  
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**SUMMARY :** *The effects of intraperitoneal administration of bupivacaine on pain and the endocrine response to gynaecologic laparoscopy were studied in 30 female patients. 20 ml bupivacaine 0.25 % administered into peritoneal cavity and right subdiaphragmatic area 10 min before the procedure (n = 15). 0.9 % NaCl was administered to the control group of patients (n = 15). Analgesic requirement, pain scores and endocrine response were investigated. There were no significant differences in pain scores and pethidine requirements between the groups during the first 4 hours following laparoscopy but endocrine stress response were less in bupivacaine administrated group than saline group during and after the procedure. Our results suggest that 20 ml bupivacaine 0.25 % intraperitoneally does not affect postoperative pain but it is efficient in reducing endocrine response to gynaecologic laparoscopy.*

**Key Words :** *Gynaecologic Laparoscopy, Pain, Endocrine Response.*

## INTRODUCTION

The use of laparoscopy has increased recently in gynaecology. Abdominal and shoulder pain are common at the following day after laparoscopy. Pain relief requires the use of potent opiate analgesics (13) with undesirable side-effects such as respiratory depression (2) and gastrointestinal inhibition (10). In addition sympathoadrenal response to sympathetic hyperactivity (1, 5, 14) may result in a prolonged catabolic state.

Although it was observed that the administration of local anaesthetics intraperitoneally was not effective in reducing postoperative pain and metabolic endocrine response after laparoscopic cholecystectomy (11), intraperitoneal administration of bupivacaine was suggested to reduce postoperative pain following minor gynaecologic laparoscopic

surgery (6).

We decided to investigate the effects of intraperitoneal bupivacaine on pain and sympathoadrenal response to gynaecologic laparoscopy.

## MATERIALS AND METHODS

Thirty women aged between 24-35 years was taken to the study. They were all ASA Class I, II and scheduled for elective laparoscopy for intermittent pelvic pain, infertilization, suspected endometriosis and tubal ligation. Patients with known hepatic, renal, cardiovascular or hormonal diseases were excluded.

All subjects fasted for at least 8h before the operation. Preanaesthetic medication consisted of diazepam 10 mg and atropine 0.50 mg intramuscularly. All the laparoscopies were performed between 9.00-12.00 am. Standard monitoring was used.

Anaesthesia was induced with thiopental 4 mg / kg. Following the administration of 0.1mg / kg vecuronium, tracheal intubation was performed. Anaesthesia was maintained with 70 % nitrous oxide, 30 % oxygen and 0.5 to 1 % enflurane. Ventilation was adjusted to maintain normocapnia. Additional doses of vecuronium were given to maintain one or two responses to train of four stimulation. At the end of the procedure, 1 mg of atropine followed by 2.5 mg of neostigmine was administered to reverse neuromuscular blockade. Postoperative pain relief was achieved by intramuscular injections of pethidine 50 mg if necessary. Intravenous infusions were done by isotonic saline or lactated Ringer solutions

For each laparoscopy a 1 cm subumbilical incision was made and 20 ml bupivacaine 0.25 % (Marcain, ASTRA, Sweden) or the same volume of 0.9 % NaCl was randomly instilled through the 10 mm diameter laparoscopic cannula (Karl Storz CO2 - Pneu W. Germany) into peritoneal cavity and in the right subdiaphragmatic area and the patients were kept in the right tilt - head down position. 3 ml bupivacaine or saline was injected around the incision site and ten minutes after the laparoscopy proceed as planned.

Serum concentrations of cortisol (by radioimmunoassay - Diagnostic Products Corporation, 672, USA), insulin (by radioimmunoassay - Diagnostic Products Corporation, 506, USA), hGH (by radioimmunoassay - Kallestad, 510309, France), ACTH (by immunoradiometric method - CIS Biointernati-

%,

Intensity of total pain, abdominal pain and shoulder pain were recorded using 10 cm visual analogue pain scale (VAS) and verbal rating scale (VRS) within the first four hours after procedure (0=no pain on coughing, 1=pain on coughing but not when breathing deeply, 2= pain when breathing deeply but not at rest, 3= slight pain at rest, 4= severe pain at rest). Analgesic requirements were investigated during the first 24 hours. No pethidine was administered before the first pain assesment. When patients complained of pain, they were given intramuscular injections of pethidine 50 mg until pain was relieved. Also postoperative nausea and vomiting was investigated and recorded.

Results were analysed by Mann-Whitney U test, repeated measures analysis of variance test and Fisher's exact test.

## RESULTS

The groups were similar with regard to age, weight, duration of anaesthesia and postoperative analgesic requirements (Table 1).

There were no significant differences between the two groups in postoperative VAS and VRS during the first 4 h after operation (Table 2 - 3).

In saline group, during and after laparoscopy, there were statistically significant differences in the cortisol, insulin, hGH, ACTH and blood sugar levels compared with the bupivacaine group

	<b>Group I Bupivacaine (n = 15)</b>	<b>Group II NaCl (n = 15)</b>
Age (yr)	32.80 ± 6.90	34.80 ± 5.60
Weight (kg)	62.60 ± 9.90	59.10 ± 4.40
Duration of anaesthesia (min)	66.50 ± 17.80	65.00 ± 13.90
Analgesic requirement (mg / 24h)	10.00 ± 21.08	20.00 ± 25.82

Values : Mean ± SD

Table 1 : Patient characteristics.

onal, 82A, France) and glucose (by autoanalyser, glucose - oxidase method - Sigma Diagnostics, 315, USA) were measured before induction and at 30, 60, 120 min and 4 hours after bupivacaine administration.

Normal values were cortisol 5-25 µg/dl (in the morning), Insulin 0-30 µIU/ml, hGH <5 ng/ml or 5 µg/l, ACTH < 60 pg/ml and blood sugar 70-110 mg

<b>Time (Hour)</b>	<b>Group I Bupivacaine (n = 15)</b>	<b>Group II NaCl (n = 15)</b>
1	5.50 ± 2.50	7.60 ± 3.16
2	4.90 ± 2.88	7.20 ± 3.08
3	3.70 ± 2.05	5.50 ± 3.10
4	3.10 ± 1.37	4.00 ± 1.70

Table 2 : Mean values of visual analogue pain scale (VAS : 0 - 10).

Time (Hour)	Group I Bupivacaine (n = 15)	Group II NaCl (n = 15)
1	2.80 ± 1.13	3.50 ± 1.08
2	2.40 ± 1.17	2.90 ± 1.19
3	2.10 ± 1.10	2.70 ± 1.16
4	1.70 ± 0.48	2.00 ± 0.47

Table 3 : Mean values of verbal rating scale (VAS :0 - 4).

(p<0.05). But they returned to normal levels at the fourth hour following laparoscopy (Table 4, 5, 6, 7, 8).

Time (Hour)	Group I Bupivacaine (n = 15)	Group II NaCl (n = 15)
Control	12.80 ± 7.20	12.60 ± 7.30
30 min	20.60 ± 8.00	31.90 ± 11.30*
60 min	20.30 ± 9.00	23.10 ± 11.50
120 min	19.30 ± 9.00	22.60 ± 11.00
Postop. 4. h	14.20 ± 9.20	21.90 ± 7.20*

\* : P < 0.05 (between two groups).

Table 4 : Serum cortisol levels.

Time (Hour)	Group I Bupivacaine (n = 15)	Group II NaCl (n = 15)
Control	9.51 ± 6.13	10.63 ± 6.13
30 min	8.26 ± 5.36	15.28 ± 9.88*
60 min	6.34 ± 2.70	11.17 ± 8.28*
120 min	8.03 ± 4.79	15.78 ± 11.21*
Postop. 4. h	8.03 ± 3.39	8.63 ± 4.47

\* : P < 0.05 (between two groups).

Table 5 : Serum insulin levels.

Time (Hour)	Group I Bupivacaine (n = 15)	Group II NaCl (n = 15)
Control	2.46 ± 2.67	3.39 ± 2.32
30 min	5.22 ± 3.15	7.12 ± 2.45*
60 min	3.29 ± 2.46	6.33 ± 4.59*
120 min	4.20 ± 3.60	5.55 ± 1.07
Postop. 4. h	1.78 ± 1.63	4.46 ± 0.94*

\* : P < 0.05 (between two groups).

Table 6 : Serum hGH levels.

## DISCUSSION

Endocrine response to stress is associated with greater perioperative morbidity and mortality and is mediated by complex interactions between the nervous, endocrine, immune and haematopoietic systems (4). In recent years, there are some studies

Time (Hour)	Group I Bupivacaine (n = 15)	Group II NaCl (n = 15)
Control	17.60 ± 8.20	20.67 ± 7.32
30 min	39.23 ± 6.00	62.55 ± 11.32*
60 min	14.80 ± 9.04	44.87 ± 7.21*
120 min	21.01 ± 9.51	30.00 ± 11.00
Postop. 4. h	20.02 ± 7.20	21.90 ± 7.12r

\* : P < 0.05 (between two groups).

Table 7 : Serum ACTH levels.

Time (Hour)	Group I Bupivacaine (n = 15)	Group II NaCl (n = 15)
Control	88.00 ± 15.78	99.40 ± 14.39
30 min	99.80 ± 13.91	119.70 ± 31.34*
60 min	87.20 ± 19.66	135.30 ± 75.37*
120 min	93.00 ± 9.73	140.50 ± 98.61*
Postop. 4. h	87.20 ± 6.08	94.80 ± 4.98

\* : P < 0.05 (between two groups).

Table 8 : Serum blood sugar levels.

dealing with the endocrine response to stress following administration of intraperitoneal local anaesthetics (3, 6, 7, 8, 11, 14). Results of these studies were different because there were many factors affecting the results such as volume, type, concentration and administration time of local anaesthetic.

Narchi et al (10) showed that before the surgical procedure 80 ml lignocaine 0.5 % and 80 ml bupivacaine 0.125 % in the right subdiaphragmatic area were effective in reducing postoperative pain after day case diagnostic laparoscopy. Helvacioğlu and Weis (3) suggested that the patients received 10 mg lidocaine peritoneally with 25 mg intracincisional bupivacaine before extubation has less pain in recovery. Loughney and Ryatt (7) instilled 17 ml bupivacaine 0.25 % intraperitoneally at the end of the laparoscopy and they were able to achieve a significant reduction in postoperative pain. But Wallin et al (15) could not demonstrate any effect on postoperative analgesia of bupivacaine 2 mg/kg dissolved in 300 ml of isotonic saline administered intraperitoneally after cholecystectomy by laparotomy. Rademaker et al (11) suggested that the administration of 20 ml of 0.25 % bupivacaine and 0.5 % lignocaine intraperitoneally is not effective in reducing postoperative pain after laparoscopic cholecystectomy. And they also could not be able to reduce the metabolic endocrine response.

Minor laparoscopic gynaecological surgery is performed in the head-down position. Instillation of local anaesthetic in this position may improve analgesia due to the flow of the drugs over the coeliac plexus and the phrenic nerve endings (12).

Since we couldn't measure plasma concentration of local anaesthetic we had to use a low volume and concentration of bupivacaine in our study. Thus we were not able to achieve a significant reduction in postoperative pain with intraperitoneal bupivacaine. However it was efficient to reduce the endocrine response. Narchi and co-workers (9) suggested that it was safe to administer large amounts of local anaesthetics after minor gynaecological procedures. Further studies are required to settle the efficiency of bupivacaine in pain relief with larger doses.

In conclusion our results show that 20 ml bupivacaine 0.25 % intraperitoneally does not affect postoperative pain but it is efficient in reducing endocrine response to gynaecologic laparoscopy.

**Correspondence to :** Dr.Füsun BOZKIRLI  
Gazi Üniversitesi Tıp Fakültesi  
Anesteziyoloji Anabilim Dalı  
Beşevler  
06500 ANKARA - TÜRKİYE  
Phone : 312 - 214 10 00 / 5314

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