AIM OF THE WORK

The aim of the present work is to compare intravenous PCA using morphine therapy with Contineous bupivacaine epidural analgesia for pain control after open cholecystectomy as regards:

- Analgesic efficacy
- Side effects
- Patient satisfaction.

PATIENTS

After obtaining the Ethical Committee of the Faculty of Medicine approval and informed consent from patient, the research was carried out on thirty adult ASA I, II patients admitted to the Medical Research Institute hospital, University of Alexandria and scheduled for open cholecystectomy.

This sample size is according to the recommendation of the Department of Statistics, Medical Research Institute, University of Alexandria.

The patients were randomly divided using closed envelope method into two equal groups each of fifteen patients:

Group I: Continuous epidural analgesia group.

Group II: PCA Intravenous morphine group.

Exclusion Criteria:

1. Patient refusal.
2. Patient on anti coagulation therapy.
3. Allergy or contraindications to any of the studied medications or anesthetic agents.
4. Chronic opioid analgesic use.
5. Pregnant females.
6. Patient inability to use PCA or to describe postoperative pain to investigators (dementia, delirium or psychiatric disorders).
7. Renal dysfunction (serum creatinine > 1.2 mg/dl) – liver dysfunction.
8. Contraindications to epidural analgesia.
9. Duration of surgery more than one hour.

METHODS

Preoperative evaluation:

Evaluation of the patients was carried out on the day before surgery through:

- Proper history taking
- Thorough Clinical examination
- Laboratory investigations(fasting blood sugar, complete blood count, coagulation profile, AST, ALT, blood urea and serum creatinine).

All patients were informed with the procedure of epidural block and PCA, they were trained to use the visual analogue scale (VAS) [15].

Preanesthetic preparation and premedication:

On arrival to the operative theatre a peripheral venous catheter was inserted, multichannel monitor (Vamos- Drager-Germany) was attached to the patient to display ECG (lead II), heart rate (beats/min), non invasive mean arterial blood pressure (mmHg) oxygen saturation (SpO_2) and end tidal carbon dioxide ($EtCO_2$). All patients received midazolam 0.02mg/kg IV before anesthesia.

Anesthesia:

- **Thoracic epidural block in group I was conducted as following:**

After complete aseptic technique and local infiltration with 3 ml lignocaine 2% an 18G Tuohy needle was inserted through the T7-T8 interspace, with patients in the sitting position using paramedian approach, with the epidural space identified by loss of resistance technique, Then a 20G epidural catheter was advanced 4-5cm in epidural space in cephalad direction. After negative aspiration for blood and CSF, a test dose of 2% lignocaine (3ml) was administered through epidural catheter. A 6 ml bolus of Bupivacaine (0.25%) with 50 µg fentanyl was administered via the epidural catheter ten minutes before surgical incision. Successful block was assessed by the onset of sensory block at T7 and maximum sensory block T7-T10 using loss of cold sensation to a piece of ice.

- **Standardized general anesthesia was used in all patients as following:**

Patients were put in supine position and the patients were pre-oxygenated with 100% oxygen by a face mask for 3 min. Induction of anesthesia was carried out with Fentanyl 1.5-2ug/kg I.V., Propofol 2 mg/kg I.V. injected slowly till loss of communication and cisatracurium 0.15 mg/kg I.V. to facilitate endotracheal intubation using a proper size Macintosh laryngoscope. Tracheal tubes of ID 7.0 mm and 7.5 mm were used for female and male patients respectively. Ventilation was maintained at tidal volume 7ml/kg and respiratory rate to adjust $EtCO_2$ at 35mmHg using the ventilator "Fabius GS Drager". Anesthesia was maintained with 1.2% isoflurane in 100% O_2 and intermittent boluses of cisatracurium (0.03mg/kg).

Intraoperative analgesia:

It was conducted in both groups using ketorolac 30 mg IV when needed.

Recovery:

At the end of surgery anesthesia was discontinued , residual neuromuscular block was antagonized by atropine 0.02 mg/kg and neostigmine 0.04 mg/kg , the trachea had been extubated and patients were transferred to postoperative anesthesia care unit (PACU) for the next 24 hours.

Postoperative analgesia:

- Group (I): continuous infusion of epidural bupivacaine 0.125 % by a rate of 6 ml/h and fentanyl 100 mcg /24h using electronic syringe pump.

- Group (II): PCA using Fres. , Master PCA, Pilote CIS 3, France.
  Morphine conc. 1 mg/ml
  Bolus dose: 2 mg
  Patient activated dose: 1 mg
  Basal infusion: 0.5mg/h
  Lockout time: 8 min.
  4 hours maximum dose is 20 mg
  The 24 hr morphine consumption in this group was calculated.

Tramadol was administered intravenously throughout the first 24 hours as a rescue analgesic to all patients with VAS>3 as bolus of 30 mg, with maximum daily dose 1-1.5 mg/kg.

Measurements:

The following measurements have been carried out:

1. Demographic Data:

Age (years), Sex, body weight (kg) and Duration of surgery.

2. Vital signs:

1. Heart rate (beats/min).
2. Mean arterial blood pressure (MABP) in mmHg.
3. Oxygen saturation SpO_2%.
4. End tidal CO_2 (mmHg)

3. Pain assessment

a) The intensity of postoperative pain within the first 24 hours postoperatively was assessed by using visual analogue scale [15] which consists of 10 cm line, 0 is equivalent to no pain and 10 denoting the worst imaginable pain. [15]
b) Time of requesting analgesia in PACU was recorded in both groups.

c) The total rescue tramadol requirement in 24 hrs by each patient was calculated.
d) Satisfaction score with medical care and postoperative pain management was recorded before patients are discharged as follows:
   - Very satisfactory
   - Somehow satisfactory
   - Not satisfactory

4. Sedation was assessed using Ramsay Sedation Scale [8] :

I. Agitated restless patient
II. Co-operative, oriented and tranquil patient
III. Patient responds to commands only
IV. Brisk response to a light glabellar tap or loud auditory stimulus
V. Slight response to light glabellar tap or loud auditory stimulus
VI. Exhibits no response.

5. Postoperative complications:

Any postoperative complications has been spotted and recorded:

- Local anesthetic toxicity (tinnitus, perioral numbness, seizure).
- Postoperative nausea and vomiting [12] (PONV):
  1- None.
  2- Yes, and relieved by treatment.
  3- Yes, but not relieved by treatment.

Intravenous metoclopramide (10 mg) and ondansetron (4 mg) was given as the first and second lines of treatment of vomiting respectively.

- Arrhythmias.
- Respiratory depression:
  Respiratory rate (RR) <10: close observation,
  RR<8: the analgesic infusion was stopped in both groups.
- Pruritus, was treated by diphenhydramine 10 mg IV.

Timing of measurements:

1. Heart rate, oxygen saturation and mean arterial blood pressure were recorded before induction of anesthesia, every 10 minutes in the first 30 minutes intraoperatively then every 15 min. till the end of surgery and in the PACU, then every hour for the first 4 postoperative hours then every 4 hours for the rest of the first 24 postoperative hours.
2. Continuous monitoring of ECG intraoperatively and for the first 24 postoperative hours with recording of any abnormalities.
3. Postoperative pain assessment using VAS pain score was assessed by a doctor not involved in the study after 30 minutes in the recovery room and every hour for the first 4 hours postoperatively then every 4 hours for the rest of the first 24 postoperative hours.
4. Total amount of IV morphine was calculated at the end of the 24 postoperative hours.
5. The sedation scores: It was recorded at 30 min., and every 4 hours for the first 24 postoperative hours.

Statistical analysis

Data were fed to the computer and analyzed using IBM SPSS software package version 20.0. Qualitative data were described using number and percent. Quantitative data were described using range (minimum and maximum), mean, standard deviation and median. Paired t test was used for comparison of each parameter between groups, while Analysis of variance (ANOVA) or F. test was used to test significance of the difference in the same group. Comparison between different groups regarding qualitative parameters was tested using Chi-square test. [97]

RESULTS

This study was carried out in the surgery department of the Medical Research Institute on patients who underwent open cholecystectomy.

Patients' characteristics:

Sex:

Twelve female patients (80%) and 3 male patients (20%) were in group I. Eleven female patients (73.3%) and 4 male patients (26.7%) were in the group II. (Table II, figure 9)

Age (years):

The age of the patients in group I ranged between 25 and 51 years with a mean value 38.07±7.81 years .While the age of the patients in group II ranged between 24 and 50 years with a mean value 38.93±8.80 years. (Table III, figure 10)

Body weight:

The weight of the patients in group I ranged between 70 and 105kg with a mean value 84.93±10.55 kg. The weight of the patients in group II ranged between 65 and 100 kg with a mean value 82.93±10.93 kg. (Table IV, figure 11)

The comparison of age, sex and weight between the two studied groups did not show any significant difference.

Table (II): Comparison between the two studied groups according to sex

Case number	Group I	Group II
1	Female	Male
2	Female	Female
3	Female	Female
4	Male	Female
5	Female	Male
6	Female	Female
7	Female	Female
8	Male	Male
9	Female	Male
10	Female	Female
11	Female	Female
12	Female	Female
13	Female	Female
14	Male	Female
15	Female	Female
Male **Female**	3 (20.0%) 12 (80.0%)	4 (26.7%) 11 (73.3%)
χ^2	0.186	
^{FE}p	1.000	

χ^2: Chi square test
FE: Fisher Exact test

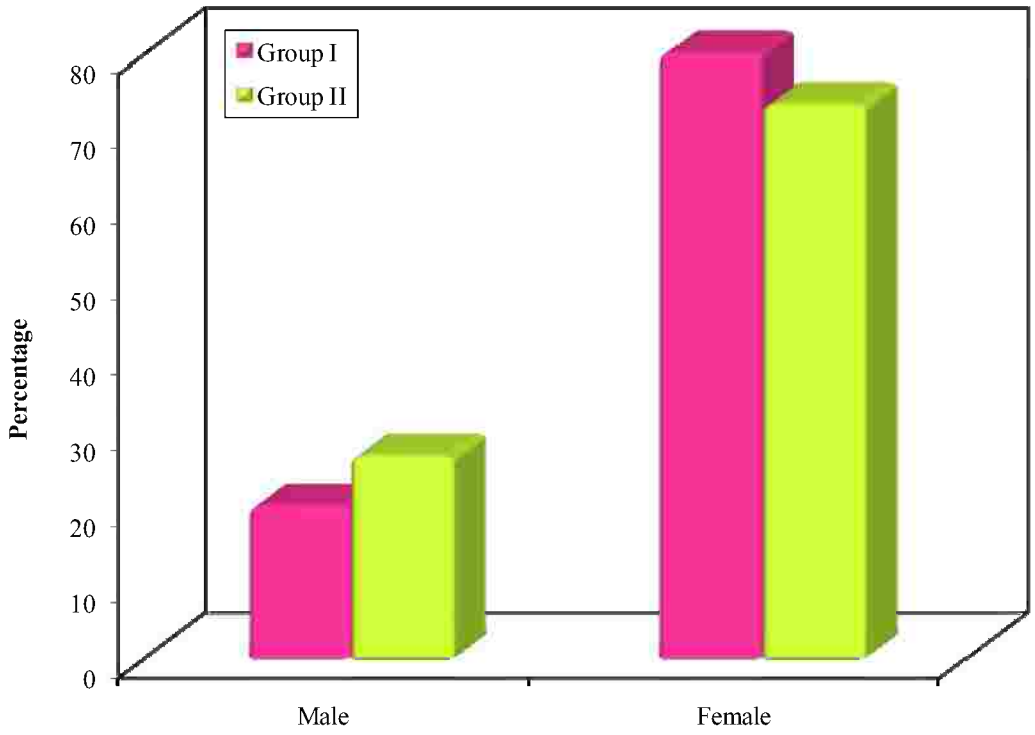

Figure (9): Comparison between the two studied groups according to sex

Table (III): Comparison between the two studied groups according to age (years)

Case number	Group I	Group II
1	32	48
2	40	28
3	44	45
4	48	50
5	47	49
6	30	44
7	45	31
8	25	35
9	36	24
10	41	38
11	45	40
12	51	30
13	29	50
14	32	42
15	44	30
Min. – Max.	25.0 – 51.0	24.0 – 50.0
Mean ± SD.	39.27 ± 8.01	38.93 ± 8.80
t	0.109	
p	0.914	

t: Student t-test

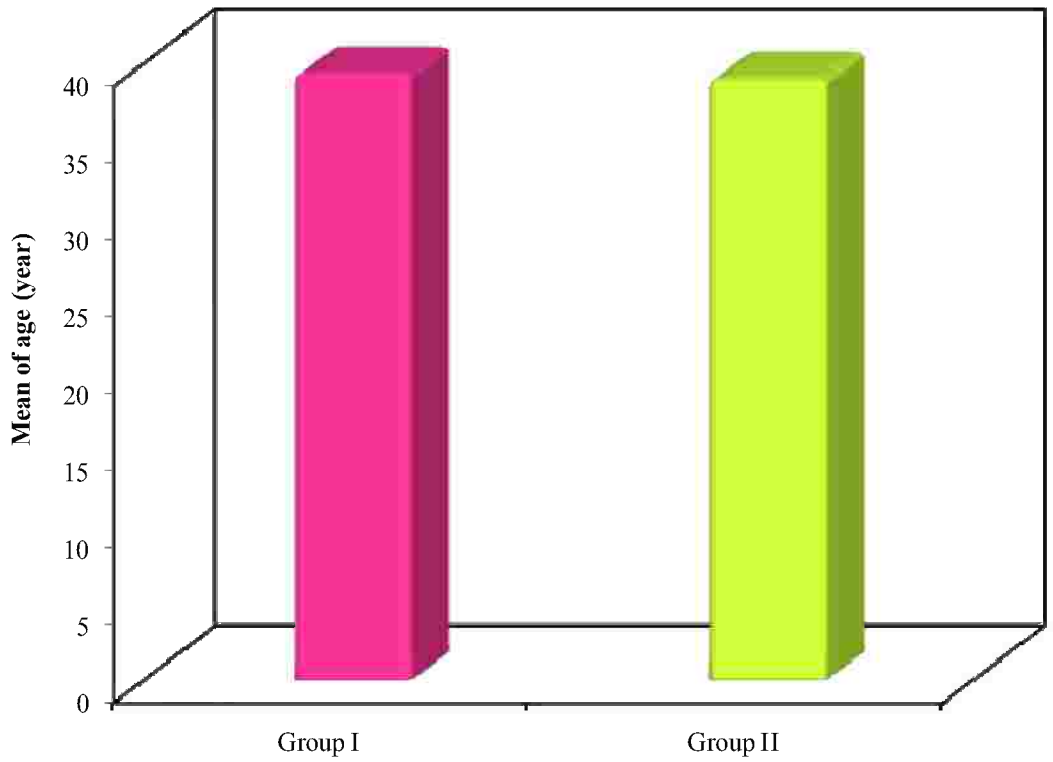

Figure (10): Comparison between the two studied groups according to age (years)

Table (IV): Comparison between the two studied groups according to weight (kg)

Case number	Group I	Group II
1	32	48
2	40	28
3	44	45
4	48	50
5	47	49
6	30	44
7	45	31
8	25	35
9	36	24
10	41	38
11	45	40
12	51	30
13	29	50
14	32	42
15	44	30
Min. – Max.	70.0 – 105.0	65.0 – 100.0
Mean ± SD.	84.93 ± 10.55	82.93 ± 10.93
t	0.510	
p	0.614	

t: Student t-test

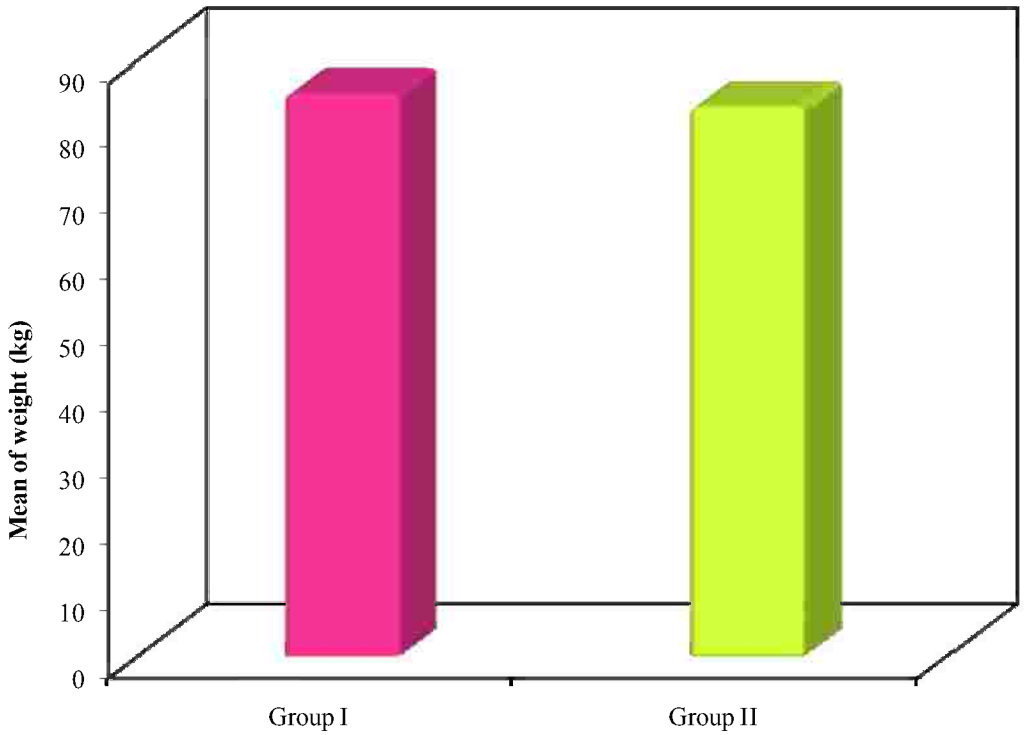

Figure (11): Comparison between the two studied groups according to weight (kg)

Haemodynamic parameters:

- **Mean arterial blood pressure in mmHg:**

The mean arterial blood pressure did not significantly change at intra-operative and postoperative time periods in comparison to pre-operative values in each studied group. (Table V and VI)

The comparison of mean arterial blood pressure between the two studied groups revealed that the mean arterial blood pressure was significantly lower at all time points in the intraoperative and the postoperative periods in group I. (Table VII)

Table (V): Changes in mean arterial blood pressure (mmHg) in group I

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	88	85	78	74	80	73	70	75	72	70	74	85	76	75	78
2	120	115	100	99	94	87	90	85	85	84	84	89	75	74	79
3	79	75	70	72	74	77	79	95	75	74	76	80	82	74	81
4	92	87	87	70	80	77	80	84	83	81	70	71	68	65	72
5	99	93	95	93	91	90	83	80	79	77	80	86	72	70	73
6	80	80	82	84	77	81	79	73	77	84	84	81	76	78	82
7	75	77	75	84	84	78	75	71	77	75	73	76	84	80	77
8	101	95	102	93	86	92	85	95	93	96	84	89	80	91	88
9	74	70	72	70	73	75	100	78	76	76	70	75	73	73	77
10	81	84	88	83	87	86	83	84	83	83	86	81	84	82	82
11	71	70	68	73	70	72	72	69	71	74	71	72	74	70	76
12	77	78	80	92	97	85	89	80	82	80	77	79	82	87	81
13	77	78	76	82	84	79	92	77	80	79	94	78	72	75	75
14	84	89	93	90	88	80	82	86	85	84	87	84	83	88	84
15	96	90	96	87	91	94	86	103	89	90	88	89	87	83	87
Min.	71.0	70.0	68.0	70.0	70.0	72.0	70.0	69.0	71.0	70.0	70.0	71.0	68.0	65.0	72.0
Max.	120.0	115.0	102.0	99.0	97.0	94.0	100.0	103.0	93.0	96.0	94.0	89.0	87.0	91.0	88.0
Mean	86.27	84.40	84.13	83.07	83.73	81.73	83.0	82.33	80.47	80.47	79.87	81.0	77.87	77.67	79.47
SD.	13.24	11.47	11.17	9.43	7.99	6.90	7.86	9.56	6.12	6.73	7.48	5.96	5.63	7.39	4.72
p		0.068	0.266	0.266	0.391	0.114	0.392	0.227	0.057	0.071	0.082	0.058	0.055	0.052	0.068

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between Before induction with each other period

Table (VI): Changes in mean arterial blood pressure (mmHg) in group II

	Before Induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	70	77	90	87	93	98	87	92	80	81	92	83	85	79	82
2	93	102	96	80	82	76	91	80	86	79	83	80	72	76	90
3	77	82	74	79	87	.	65	94	80	73	64	70	68	73	59
4	81	82	81	88	81	100	108	82	77	88	100	76	76	71	71
5	90	100	107	99	94	97	93	86	85	79	82	72	90	96	76
6	88	84	87	85	105	113	107	100	111	75	99	99	100	92	91
7	118	105	106	105	105	107	106	112	79	105	91	97	100	99	102
8	70	92	90	86	79	108	91	99	105	116	95	98	93	100	93
9	75	89	91	90	99	80	86	95	91	86	62	99	77	82	92
10	87	95	109	91	104	.	85	70	88	108	79	95	88	86	88
11	79	82	81	78	79	77	86	80	100	77	91	87	63	75	93
12	106	107	108	113	101	107	92	93	103	93	89	89	95	82	93
13	75	100	115	121	110	109	100	87	98	96	104	96	100	96	96
14	94	102	92	109	98	93	91	98	87	81	81	77	89	83	87
15	86	94	79	90	81	79	74	90	100	95	107	103	94	98	100
Min.	70.0	77.0	74.0	78.0	79.0	76.0	65.0	70.0	77.0	73.0	62.0	70.0	63.0	71.0	59.0
Max.	118.0	107.0	115.0	121.0	110.0	113.0	108.0	112.0	111.0	116.0	107.0	103.0	100.0	100.0	102.0
Mean	85.93	92.87	93.73	93.40	93.20	95.69	90.80	90.53	91.33	88.80	87.93	88.07	86.0	85.87	87.53
SD.	13.27	9.72	12.63	13.10	10.89	13.47	11.72	10.24	10.75	13.04	13.12	11.01	12.08	10.18	11.39
P		0.058	0.080	0.078	0.145	0.089	0.123	0.171	0.291	0.695	0.471	0.642	0.872	0.946	0.442

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between Before induction with each other period

Table (VII): Comparison between the two studied groups according to mean arterial blood pressure (mmHg)

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
Group I															
Min.	71.0	70.0	68.0	70.0	70.0	72.0	70.0	69.0	71.0	70.0	70.0	71.0	68.0	65.0	72.0
Max.	120.0	115.0	102.0	99.0	97.0	94.0	100.0	103.0	93.0	96.0	94.0	89.0	87.0	91.0	88.0
Mean	86.27	84.40	84.13	83.07	83.73	81.73	83.0	82.33	80.47	80.47	79.87	81.0	77.87	77.67	79.47
SD.	13.24	11.47	11.17	9.43	7.99	6.90	7.86	9.56	6.12	6.73	7.48	5.96	5.63	7.39	4.72
Group II															
Min.	70.0	77.0	74.0	78.0	79.0	76.0	65.0	70.0	77.0	73.0	62.0	70.0	63.0	71.0	59.0
Max.	118.0	107.0	115.0	121.0	110.0	113.0	108.0	112.0	111.0	116.0	107.0	103.0	100.0	100.0	102.0
Mean	85.93	92.87	93.73	93.40	93.20	95.69	90.80	90.53	91.33	88.80	87.93	88.07	86.0	85.87	87.53
SD.	13.27	9.72	12.63	13.10	10.89	13.47	11.72	10.24	10.75	13.04	13.12	11.01	12.08	10.18	11.39
T	0.069	2.181	2.204	2.479	2.715	3.371	2.141	2.267	3.403	2.200	2.069	2.186	2.364	2.525	2.534
P	0.946	0.038*	0.036*	0.019*	0.011*	0.004*	0.041*	0.031*	0.003*	0.039*	0.048*	0.040*	0.028*	0.018*	0.020*

t: Student t-test
*: Statistically significant at $p \leq 0.05$

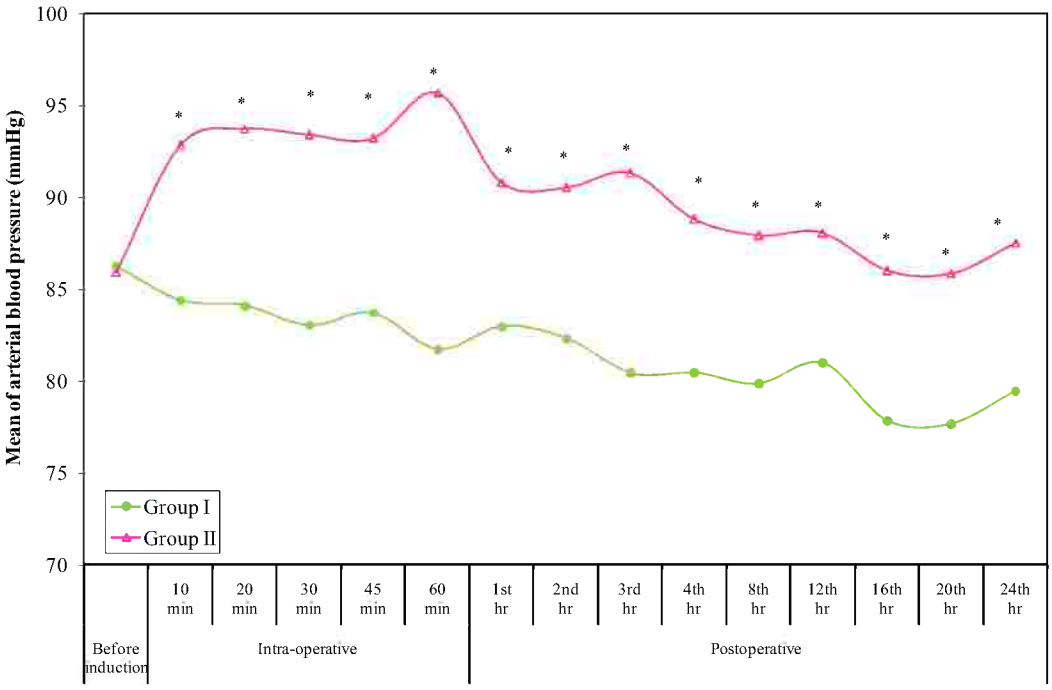

Figure (12): Comparison between the two studied groups according to arterial blood pressure (mmHg)

- **Heart rate (HR) (beats/min)**

Heart rate showed no significant changes in intraoperative and postoperative times in comparison to preoperative recording in both studied groups. (Table VIII and IX).

The comparison between both groups revealed that the heart rate was significantly lower at all time points in the intra and the postoperative periods in group I. (Table X)

Table (VIII): Changes in heart rate (beats/min) in group I

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	61	80	87	95	79	80	89	75	80	83	70	77	66	73	73
2	81	70	73	75	72	72	76	90	79	92	80	84	80	82	81
3	73	70	68	79	70	86	83	85	75	77	78	95	85	90	85
4	57	60	71	68	67	76	85	71	80	89	79	82	77	69	80
5	99	80	89	89	79	87	88	100	86	91	71	93	103	88	79
6	73	82	81	90	88	83	81	88	77	70	81	80	79	79	85
7	89	80	87	81	79	74	74	70	80	85	70	81	87	80	77
8	60	59	63	59	66	66	61	75	66	70	73	61	68	80	61
9	80	70	72	71	82	85	90	91	95	81	84	87	80	83	82
10	91	80	83	80	82	89	104	69	92	81	79	86	91	87	80
11	69	65	70	64	74	77	82	71	80	72	74	81	70	70	71
12	112	59	98	94	92	99	90	98	91	90	88	65	95	80	78
13	76	70	74	70	82	81	88	79	73	68	80	71	70	82	62
14	67	70	80	65	65	83	75	77	69	74	70	70	69	71	75
15	74	60	55	60	78	71	88	94	92	87	92	89	84	80	80
Min.	57.0	59.0	55.0	59.0	65.0	66.0	61.0	69.0	66.0	68.0	70.0	61.0	66.0	69.0	61.0
Max.	112.0	82.0	98.0	95.0	92.0	99.0	104.0	100.0	95.0	92.0	92.0	95.0	103.0	90.0	85.0
Mean	77.47	70.33	76.73	76.0	77.0	80.60	83.60	82.20	81.0	80.0	77.93	80.13	80.27	79.60	76.60
SD.	15.17	8.49	11.15	12.0	7.94	8.31	9.75	10.69	8.68	8.36	6.72	9.85	10.81	6.43	7.25
P		0.105	0.815	0.681	0.877	0.313	0.119	0.184	0.287	0.375	0.905	0.556	0.221	0.528	0.824

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between Before induction with each other period.

Table (IX): Changes in heart rate (beats/min) in group II

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	73	77	83	91	84	101	108	115	96	82	100	82	95	100	68
2	74	73	67	78	73	92	90	82	88	88	95	89	93	100	107
3	77	76	91	88	94		121	100	105	86	100	79	85	103	88
4	105	100	94	100	99	72	83	92	90	93	94	89	79	84	77
5	74	78	96	95	90	85	97	90	89	91	105	100	88	78	83
6	88	60	62	76	86	90	115	103	91	87	81	93	73	100	86
7	90	83	86	76	70	72	85	73	80	100	110	100	94	84	97
8	73	70	76	80	99	87	93	85	104	95	92	86	94	101	90
9	93	95	98	99	88	110	99	90	78	75	79	76	91	79	75
10	77	80	104	92	85		95	91	82	80	86	98	90	71	106
11	99	100	97	102	93	107	93	105	101	98	79	85	80	102	70
12	79	80	82	90	93	92	83	100	78	80	83	83	79	80	88
13	106	85	91	65	81	102	95	90	94	85	102	78	90	91	70
14	118	78	88	93	77	78	115	99	94	100	100	87	92	89	83
15	78	66	69	72	87	83	76	88	105	94	101	100	87	98	93
Min.	73.0	60.0	62.0	65.0	70.0	72.0	76.0	73.0	78.0	75.0	79.0	76.0	73.0	71.0	68.0
Max.	118.0	100.0	104.0	102.0	99.0	110.0	121.0	115.0	105.0	100.0	110.0	100.0	95.0	103.0	107.0
Mean	86.93	80.07	85.60	86.47	86.60	90.08	96.53	93.53	91.67	88.93	93.80	88.33	87.33	90.67	85.40
SD.	14.42	11.45	12.41	11.23	8.67	12.37	13.13	10.35	9.45	7.75	10.02	8.27	6.73	10.66	12.21
P		0.061	0.752	0.917	0.944	0.780	0.063	0.161	0.318	0.584	0.158	0.771	0.928	0.457	0.798

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between Before induction with each other period

Table (X): Comparison between the two studied groups according to heart rate (beats/min)

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
Group I															
Min.	57.0	59.0	55.0	59.0	65.0	66.0	61.0	69.0	66.0	68.0	70.0	61.0	66.0	69.0	61.0
Max.	112.0	82.0	98.0	95.0	92.0	99.0	104.0	100.0	95.0	92.0	92.0	95.0	103.0	90.0	85.0
Mean	77.47	70.33	76.73	76.0	77.0	80.60	83.60	82.20	81.0	80.0	77.93	80.13	80.27	79.60	76.60
SD.	15.17	8.49	11.15	12.0	7.94	8.31	9.75	10.69	8.68	8.36	6.72	9.85	10.81	6.43	7.25
Group II															
Min.	73.0	60.0	62.0	65.0	70.0	72.0	76.0	73.0	78.0	75.0	79.0	76.0	73.0	71.0	68.0
Max.	118.0	100.0	104.0	102.0	99.0	110.0	121.0	115.0	105.0	100.0	110.0	100.0	95.0	103.0	107.0
Mean	86.93	80.07	85.60	86.47	86.60	90.08	96.53	93.53	91.67	88.93	93.80	88.33	87.33	90.67	85.40
SD.	14.42	11.45	12.41	11.23	8.67	12.37	13.13	10.35	9.45	7.75	10.02	8.27	6.73	10.66	12.21
T	1.752	2.644	2.058	2.460	3.164	2.408	3.063	2.950	3.218	2.809	5.092	2.470	2.150	3.442	2.401
P	0.091	0.013*	0.049*	0.020*	0.004*	0.023*	0.005*	0.006*	0.003*	0.009*	<0.001*	0.020*	0.040*	0.002*	0.023*

t: Student t-test

*: Statistically significant at $p \leq 0.05$

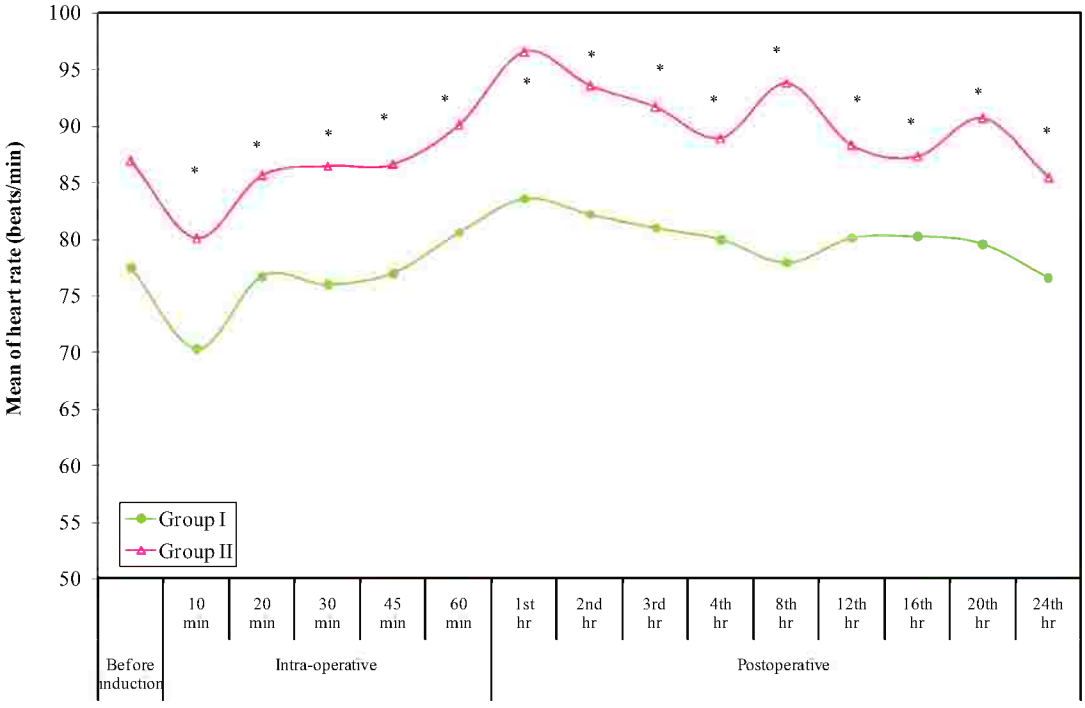

Figure (13): Comparison between the two studied groups according to mean heart rate (beats/min)

Rhythm assessment:

No abnormalities were recorded during continuous monitoring of the lead II.

- **Oxygen saturation:**

No abnormalities were recorded during continuous monitoring of oxygen saturation intraoperatively and postoperatively in either group (table XI, XII and XIII) with no significant difference between both groups.

Table (XI): Changes in Oxygen saturation (%) in group I

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	99	99	99	100	100	98	95	98	98	98	98	99	98	99	99
2	97	100	100	100	100	100	97	97	98	94	100	99	98	99	99
3	99	99	99	100	99	99	99	98	100	99	96	98	98	100	98
4	99	99	99	99	99	99	100	100	99	99	99	99	99	99	99
5	100	98	98	97	99	97	100	99	100	98	100	97	98	99	99
6	98	100	100	98	100	99	100	98	99	99	99	99	99	98	99
7	100	99	99	99	99	97	99	97	99	98	98	99	98	97	99
8	100	99	99	97	97	98	98	99	97	100	100	98	98	100	97
9	99	97	97	98	100	99	98	100	100	99	99	98	98	100	98
10	97	99	99	98	100	100	96	99	99	98	99	97	99	99	99
11	98	100	100	100	100	100	99	95	98	99	96	97	98	98	98
12	98	100	100	100	99	99	98	97	96	99	99	99	98	97	99
13	100	100	100	98	98	100	97	100	98	99	98	99	98	98	99
14	99	99	99	100	100	99	98	100	99	99	99	99	98	99	99
15	98	100	100	98	97	100	99	99	96	100	100	98	98	99	98
Min.	97.0	97.0	97.0	97.0	97.0	97.0	95.0	95.0	96.0	94.0	96.0	97.0	98.0	97.0	97.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	99.0	100.0	99.0
Mean	98.73	99.20	99.20	98.80	99.13	98.93	98.20	98.40	98.40	98.53	98.67	98.33	98.20	98.73	98.60
SD.	1.03	0.86	0.86	1.15	1.06	1.03	1.47	1.45	1.30	1.41	1.29	0.82	0.41	0.96	0.63
P		0.277	0.277	0.887	0.395	0.689	0.217	0.388	0.388	0.582	0.882	0.233	0.120	1.000	0.698

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between Before induction with each other period

Table (XII): Changes in Oxygen saturation (%) in group II

	Before induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	99	100	100	100	100	100	100	99	99	97	99	99	99	99	99
2	98	99	99	99	99	98	98	99	99	99	99	99	99	99	98
3	98	99	99	100	98		98	99	98	98	99	99	99	98	99
4	99	100	100	99	100	100	99	99	97	98	97	96	97	97	99
5	98	99	99	98	98	99	98	99	99	99	99	99	99	99	98
6	98	100	100	100	100	99	100	100	95	98	99	99	99	99	98
7	98	99	99	100	100	97	98	97	98	98	99	98	98	99	100
8	98	98	98	100	100	96	100	99	96	97	97	98	98	99	100
9	99	99	99	97	99	99	94	97	98	99	99	96	97	100	99
10	100	99	99	99	99		96	97	100	98	98	98	98	98	100
11	97	99	99	98	99	99	100	100	98	98	98	100	96	100	97
12	99	99	99	99	99	99	97	97	95	98	100	100	97	99	99
13	99	98	98	98	99	100	100	99	100	99	99	100	99	100	99
14	99	99	99	98	99	99	97	100	97	99	97	97	97	98	99
15	99	100	100	99	99	99	99	100	97	99	98	99	99	99	99
Min.	97.0	98.0	98.0	97.0	98.0	96.0	94.0	97.0	95.0	97.0	97.0	96.0	96.0	97.0	97.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	100.0	100.0	99.0	100.0	100.0
Mean	98.53	99.13	99.13	98.93	99.20	98.77	98.27	98.73	97.73	98.27	98.47	98.47	98.07	98.87	98.87
SD.	0.74	0.64	0.64	0.96	0.68	1.17	1.75	1.16	1.58	0.70	0.92	1.30	1.03	0.83	0.83
P		0.142	0.142	0.253	0.019	0.303	0.644	0.638	0.075	0.301	0.836	0.882	0.169	0.334	0.096

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between Before induction with each other period

*: Statistically significant at $p \leq 0.05$

Table (XIII): Comparison between the two studied groups according to oxygen saturation SpO_2

	Before Induction	Intra-operative					Postoperative								
		10 min	20 min	30 min	45 min	60 min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
Group I															
Min.	97.0	97.0	97.0	97.0	97.0	97.0	95.0	95.0	96.0	94.0	96.0	97.0	98.0	97.0	97.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	99.0	100.0	99.0
Mean	98.73	99.20	99.20	98.80	99.13	98.93	98.20	98.40	98.40	98.53	98.67	98.33	98.20	98.73	98.60
SD.	1.03	0.86	0.86	1.15	1.06	1.03	1.47	1.45	1.30	1.41	1.29	0.82	0.41	0.96	0.63
Group II															
Min.	97.0	98.0	98.0	97.0	98.0	96.0	94.0	97.0	95.0	97.0	97.0	96.0	96.0	97.0	97.0
Max.	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	99.0	100.0	100.0	99.0	100.0	100.0
Mean	98.53	99.13	99.13	98.93	99.20	98.77	98.27	98.73	97.73	98.27	98.47	98.47	98.07	98.87	98.87
SD.	0.74	0.64	0.64	0.96	0.68	1.17	1.75	1.16	1.58	0.70	0.92	1.30	1.03	0.83	0.83
t	0.609	0.241	0.241	0.345	0.205	0.395	0.113	0.693	1.263	0.656	0.489	0.336	0.464	0.406	0.987
p	0.548	0.812	0.812	0.733	0.839	0.696	0.911	0.494	0.217	0.517	0.628	0.739	0.648	0.688	0.332

t: Student t-test

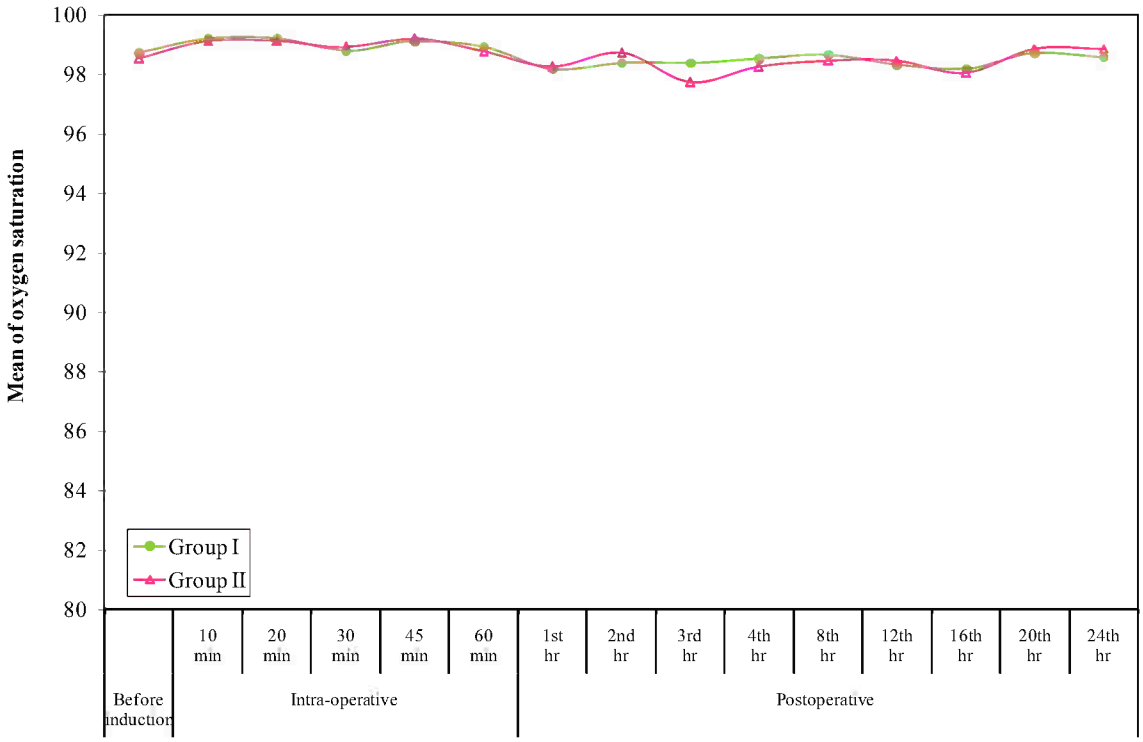

Figure (14): Comparison between the two studied groups according to oxygen saturation

- **End tidal CO_2 (mmHg):**

End tidal CO_2 did not significantly change in both studied groups during the whole period of measurements in comparison to the pre-operative values. (Table XIV and XV)

No significant difference was detected in $EtCO_2$ between the studied groups. (Table XVI, Figure 15).

Table (XIV): Changes in intraoperative End-tidal CO_2 (mmHg) in group I

	0 min	10 min	20 min	30 min	45 min	60 min
1	27	25	25	28	30	30
2	21	23	22	26	32	27
3	37	37	35	30	29	31
4	29	24	25	26	28	28
5	35	33	35	41	37	33
6	31	34	30	27	32	30
7	31	29	27	25	27	30
8	28	30	28	30	30	28
9	26	28	25	24	26	30
10	35	31	32	28	38	44
11	33	30	30	32	29	32
12	22	23	24	24	21	24
13	30	27	27	27	25	30
14	27	25	23	23	22	24
15	27	30	32	33	38	30
Min.	21.0	23.0	22.0	23.0	21.0	24.0
Max.	37.0	37.0	35.0	41.0	38.0	44.0
Mean	29.27	28.60	28.0	28.27	29.60	30.07
SD.	4.59	4.17	4.17	4.57	5.23	4.62
p		0.349	0.075	0.401	0.816	0.424

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between k Before induction with each other period

Table (XV): Changes in intraoperative End-tidal CO_2 (mmHg) in group II

	0 min	10 min	20 min	30 min	45 min	60 min
1	31	29	30	33	34	28
2	34	30	32	30	36	35
3	29	28	25	23	25	
4	34	36	36	29	28	25
5	35	33	32	30	30	28
6	41	39	35	34	29	35
7	38	33	32	33	33	32
8	37	37	34	32	30	30
9	33	32	30	29	28	28
10	26	27	28	28	28	
11	30	30	28	32	28	31
12	25	28	26	28	31	34
13	28	28	29	29	33	33
14	31	31	33	34	35	41
15	27	25	27	28	29	27
Min.	25.0	25.0	25.0	23.0	25.0	25.0
Max.	41.0	39.0	36.0	34.0	36.0	41.0
Mean	31.93	31.07	30.47	30.13	30.47	31.31
SD.	4.64	3.95	3.31	2.95	3.11	4.33
p		0.127	0.062	0.114	0.338	0.466

p: Stands for adjusted Bonferroni p-value for ANOVA with repeated measures for comparison between before induction with each other period

*: Statistically significant at $p \leq 0.05$

Table (XVI): Comparison between the two studied groups according to intraoperative End-tidal CO_2 (mmHg)

	0 min	10 min	20 min	30 min	45 min	60 min
Group I						
Min.	21.0	23.0	22.0	23.0	21.0	24.0
Max.	37.0	37.0	35.0	41.0	38.0	44.0
Mean	29.27	28.60	28.0	28.27	29.60	30.07
SD.	4.59	4.17	4.17	4.57	5.23	4.62
Group II						
Min.	25.0	25.0	25.0	23.0	25.0	25.0
Max.	41.0	39.0	36.0	34.0	36.0	41.0
Mean	31.93	31.07	30.47	30.13	30.47	31.31
SD.	4.64	3.95	3.31	2.95	3.11	4.33
T	1.583	1.662	1.792	1.328	0.551	0.730
p	0.125	0.108	0.084	0.195	0.586	0.472

t: Student t-test

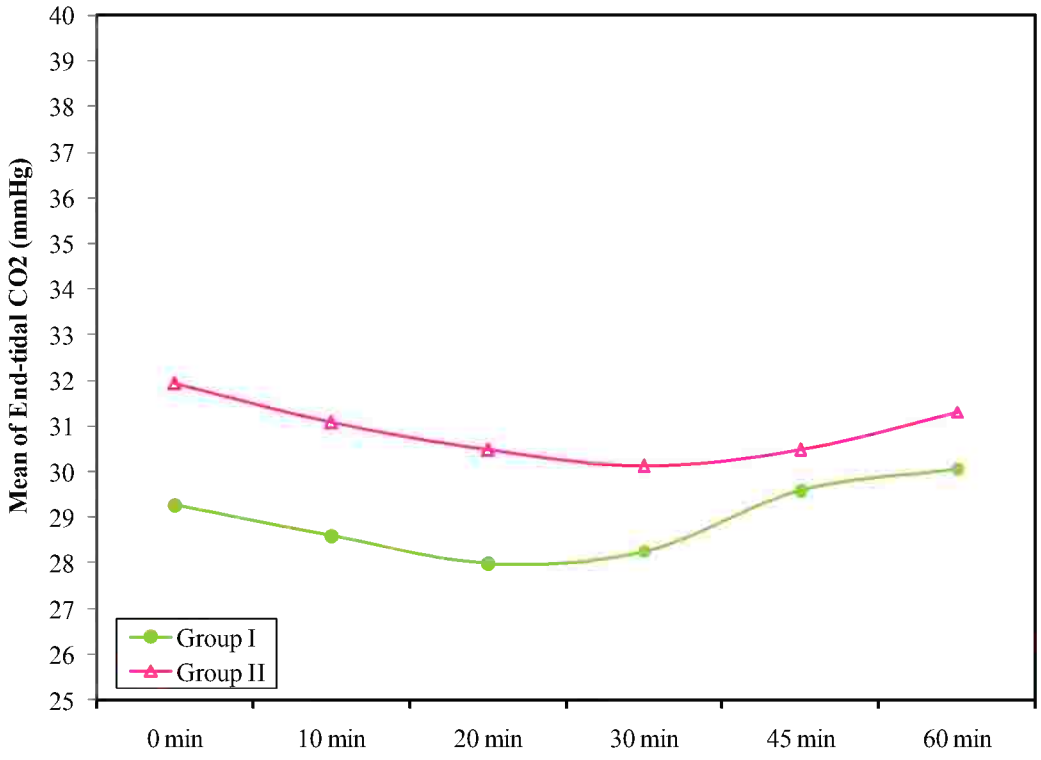

Figure (15): Comparison between the two studied groups according to End-tidal CO2 (mmHg)

Visual analogue scale:

- **In group I (EPI block):** table XVII

visual analogue scale (VAS) at 30 min after reaching the PACU ranged between 0 and 5 with a mean value 1.73 ± 1.58, at 60 min it ranged between 0 and 5 (mean 1.53 ± 1.68,P=0.873), at 2 hr it ranged between 0 and 5 (mean 1.87 ± 1.7,P=1.0), at 3 hr it ranged between 0 and 3 (mean 1.27 ± 1.16, P=1.0), at 4 hr it ranged between 1 and 4 (mean 1.87 ± 0.92,P=0.749), at 8 hr it ranged between 0 and 4 (mean 1.80 ± 1.37,P=0.899) at 12hr it ranged between 1 and 3 (mean 1.67 ± 0.62,P=0,842), at 16 hr and 20 hr it ranged between 0 and 4 (mean 1.93± 1.22,P=0.506) and at 24hr it ranged between 0 and 3 (mean 1.87 ± 1.06,P=0.748).

There was no significant change in VAS at the postoperative time periods in comparison to immediate postoperative reading.

- **In group II(PCA):** table XVIII

The first visual analogue scale (VAS) at 30 min after reaching the PACU ranged between 3 and 7with a mean value 4.07 ± 1.22 ,at 1 hr it ranged between 3 and 7 (mean 4.07 ± 1.22,P=0.873), at 2^{nd} hr it ranged between 0 and 8 (mean 3.47 ± 1.85, P=0.160), at 3^{rd} hr it ranged between 3 and 6 (mean 3.53 ± 0.99, P=0.131),at 4^{th} hr it ranged between 1 and 7 (mean 3.07 ± 1.53,P=0.066) at 8^{th} hr it ranged between 3 and 8 (mean 3.67 ± 1.40,P=0.250), at 12^{th} hr it ranged between 3 and 5 (mean 3.27 ± 0.7 ,P=0.07), at 16^{th} hr it ranged between 3 and 4 (mean 3.4± 0.51 ,P=0.12), at 20^{th} hr it ranged between 1 and 4 (mean 3.3± 0.82,P=0.064), and at 24hr it ranged between 1 and 4 (mean 3.87 ± 1.01, P=0.065) .

Comparison between the two groups revealed that VAS at all time points of measurements was significantly lower in group I (table XIX, figure 16).

Table (XVII): Changes in visual analogue scale in group I

	30min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	4	0	3	0	1	0	1	0	1	2
2	0	3	1	2	2	3	2	0	3	2
3	2	0	5	0	2	3	1	3	3	3
4	1	1	1	3	2	0	2	1	2	1
5	1	3	1	2	2	3	1	1	3	3
6	0	2	0	0	1	3	3	2	3	2
7	3	1	2	0	2	1	1	3	2	2
8	2	0	4	1	3	1	2	3	4	0
9	1	5	1	0	1	2	2	1	1	1
10	4	0	0	1	1	0	2	2	0	0
11	0	0	3	3	1	0	1	2	1	3
12	5	3	0	2	2	2	2	4	2	3
13	1	4	0	1	1	4	2	3	1	2
14	1	1	2	1	3	2	1	1	1	3
15	1	0	5	3	4	3	2	3	2	1
Min.	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0
Max.	5.0	5.0	5.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0
Mean	1.73	1.53	1.87	1.27	1.87	1.80	1.67	1.93	1.93	1.87
SD.	1.58	1.68	1.77	1.16	0.92	1.37	0.62	1.22	1.10	1.06
p		0.873	0.753	0.384	0.749	0.899	0.842	0.506	0.691	0.748

p: p value for Wilcoxon signed ranks test for comparing between 30min with each other period

Table (XVIII): Changes in visual analogue scale in group II

	30min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	5	3	5	3	4	3	3	3	3	2
2	3	5	3	4	1	4	3	4	4	4
3	4	4	5	3	2	5	5	4	3	3
4	3	4	0	3	3	3	3	4	1	1
5	7	5	2	3	1	3	3	3	3	2
6	4	6	3	3	3	3	3	4	4	4
7	3	4	3	3	7	3	3	3	4	4
8	4	3	2	5	3	3	3	3	4	4
9	4	3	3	3	2	3	3	3	3	3
10	3	7	3	3	4	3	5	4	3	4
11	5	3	4	6	5	3	3	3	3	3
12	3	3	4	3	3	3	3	3	4	2
13	4	4	2	3	2	8	3	3	3	4
14	3	4	8	3	3	3	3	4	4	4
15	6	3	5	5	3	5	3	3	4	4
Min.	3.0	3.0	0.0	3.0	1.0	3.0	3.0	3.0	1.0	1.0
Max.	7.0	7.0	8.0	6.0	7.0	8.0	5.0	4.0	4.0	4.0
Mean	4.07	4.07	3.47	3.53	3.07	3.67	3.27	3.40	3.33	3.20
SD.	1.22	1.22	1.85	0.99	1.53	1.40	0.70	0.51	0.82	1.01
p		0.873	0.160	0.131	0.066	0.250	0.070	0.120	0.064	0.065

p: p value for Wilcoxon signed ranks test for comparing between 30min with each other period

Table (XIX): Comparison between the two studied groups according to visual analogue scale

	30min	1st hr	2nd hr	3rd hr	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
Group I										
Min.	0.0	0.0	0.0	0.0	1.0	0.0	1.0	0.0	0.0	0.0
Max.	5.0	5.0	5.0	3.0	4.0	4.0	3.0	4.0	4.0	3.0
Mean	1.73	1.53	1.87	1.27	1.87	1.80	1.67	1.93	1.93	1.87
SD.	1.58	1.68	1.77	1.16	0.92	1.37	0.62	1.22	1.10	1.06
Group II										
Min.	3.0	3.0	0.0	3.0	1.0	3.0	3.0	3.0	1.0	1.0
Max.	7.0	7.0	8.0	6.0	7.0	8.0	5.0	4.0	4.0	4.0
Mean	4.07	4.07	3.47	3.53	3.07	3.67	3.27	3.40	3.33	3.20
SD.	1.22	1.22	1.85	0.99	1.53	1.40	0.70	0.51	0.82	1.01
Z	3.398*	3.521*	2.252*	4.218*	2.466*	3.317*	4.708*	3.443*	3.304*	3.035*
p	0.001*	<0.001*	0.024*	<0.001*	0.014*	0.001*	<0.001*	0.001*	0.001*	0.002*

Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

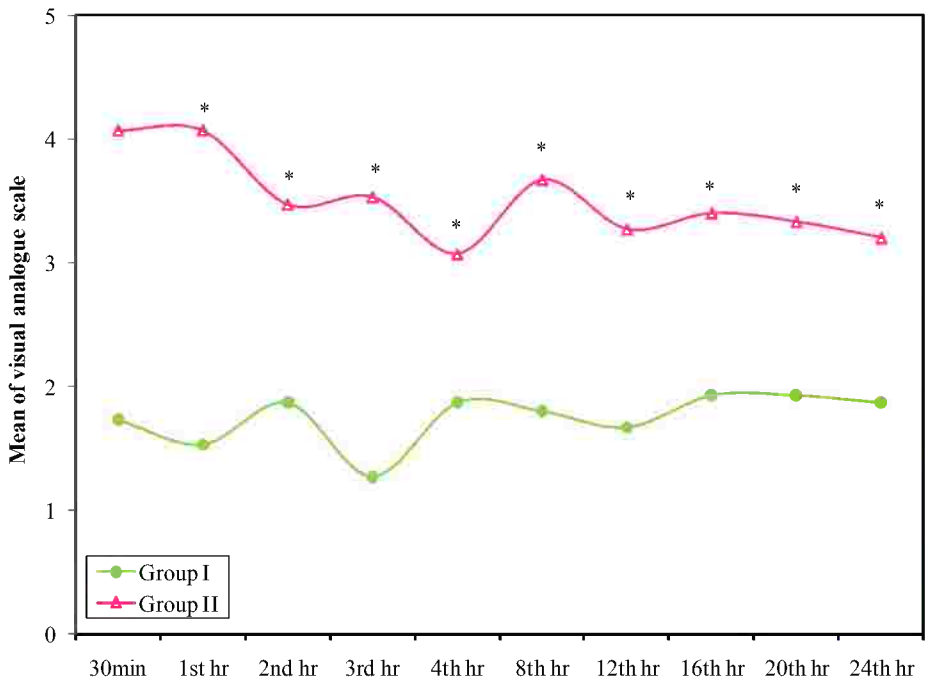

Figure (16): Comparison between the two studied groups according to visual analogue scale

Morphine consumption in group II

The total Morphine consumption/24h in group II was 13-18 mg/24 hours, mean15.93±1.62 and median=16 mg. the number of boluses ranged from 1-6 boluses in 24h, mean 3.93±1.62 and median=4 boluses.

Table (XX): Morphine consumption in group II

Case number	No of boluses	Total morphine mg
1	3	15
2	6	18
3	6	18
4	2	14
5	2	14
6	5	17
7	4	16
8	4	16
9	1	13
10	5	17
11	4	16
12	2	14
13	4	16
14	5	17
15	6	18
Min. – Max.	1.0 – 6.0	13.0 – 18.0
Mean ± SD.	3.93 ± 1.62	15.93 ± 1.62

Comparison between the two studied groups according to dose of tramadol (mg)

The mean dose of tramadol used as rescue analgesic in group I was 22mg ± 23.96mg, while in group II tramadol was not used as patients were able to have bolus doses of morphine when needed.

Table (XXI): Comparison between the two studied groups according to dose of tramadol (mg)

Case number	Group I	Group II
1	30	0
2	0	0
3	30	0
4	0	0
5	0	0
6	0	0
7	0	0
8	60	0
9	30	0
10	30	0
11	0	0
12	60	0
13	60	0
14	0	0
15	30	0
Min. – Max.	0.0 – 60.0	0.0 – 0.0
Mean ± SD.	22.0 ± 23.96	0.0 ± 0.0
Median	30.0	0.0
Z	3.211	
p	0.001*	

Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

The time for the first need of postoperative analgesia (min): Table XXII, figure 17

Comparison between groups showed that The time for the first need of postoperative analgesia was significantly longer in group I , in group I the mean time was 75 min +/- 39.28 and in group II mean time was 42 +/- 15.2 min (P=0.034)

Table (XXII): Comparison between the two studied groups according to the time for the first need of postoperative analgesia (min)

Case number	Group I	Group II
1	120	30
2	-	60
3	60	30
4	-	60
5	-	30
6	-	30
7	-	60
8	120	30
9	60	30
10	30	60
11	-	30
12	30	60
13	60	30
14	-	60
15	120	30
Min. – Max.	30.0 – 120.0	30.0 – 60.0
Mean ± SD.	75.0 ± 39.28	42.0 ± 15.21
Median	60.0	30.0
Z	2.126	
p	0.034*	

Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

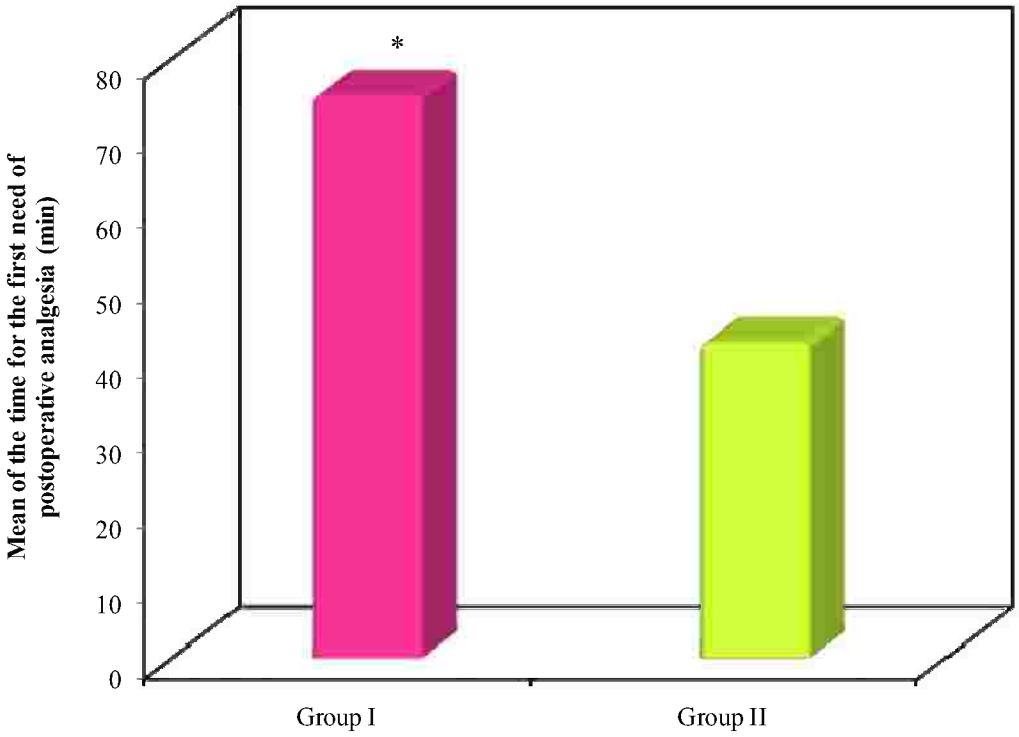

Figure (17): Comparison between the two studied groups according to the time for the first need of postoperative analgesia (min)

Complications

None of the patients experienced the following:

1. Local anaesthetic toxicity
2. Arrhythmia
3. Respiratory depression:
4. Pruritus.

Postoperative nausea and vomiting intensity scale:

In group I, 3 patients (20%) developed mild nausea which did not need treatment, 3 patients (20%) developed nausea and vomiting which was relieved by treatment. group II showed that 4 patients (26.7%) developed mild nausea which did not need treatment and 8 patients (53.3%) developed nausea and vomiting which was relieved by treatment .The comparison between the two groups showed that, postoperative nausea and vomiting was significantly higher in group II than in group I, P= (0.024). Table XXIII, figure 18

Table (XXIII): Comparison between the two studied groups according to postoperative nausea and vomiting

Case number	Group I	Group II
1	Mild	Treated with medication
2	No	No
3	No	Treated with medication
4	Treated with medication	Treated with medication
5	Mild	Treated with medication
6	No	Mild
7	Treated with medication	Mild
8	No	Treated with medication
9	No	Mild
10	No	No
11	No	Treated with medication
12	No	Treated with medication
13	Mild	No
14	Treated with medication	Treated with medication
15	No	Mild
No	9 (60.0%)	3 (20.0%)
Mild	3 (20.0%)	4 (26.7)
Treated with medication	3 (20.0%)	8 (53.3%)
Z	2.261	
P	0.024*	

Z: Z for Mann Whitney test

*: Statistically significant at $p \leq 0.05$

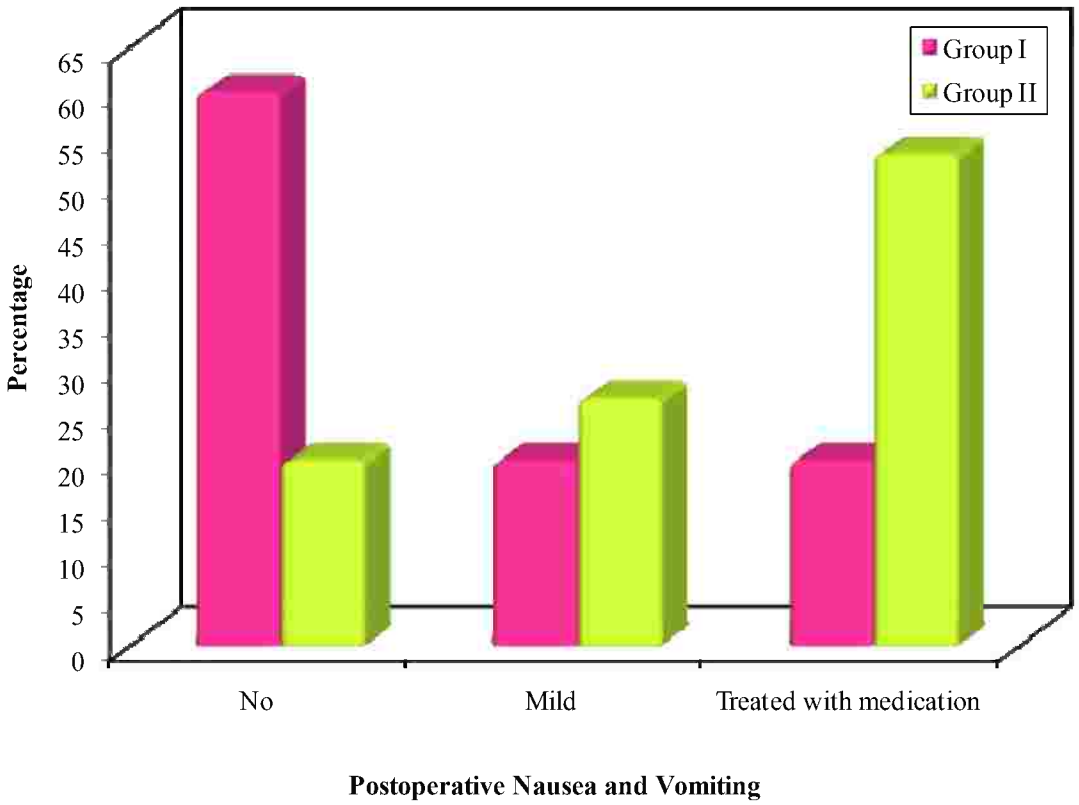

Figure (18): Comparison between the two studied groups according to postoperative nausea and vomiting

Postoperative sedation:

At 30 min. postoperatively, 4 patients in group I(26.7%) and 8(53.3%) patients in group II had sedation grade (1), 11(73.3%) patients in group I and 7(46.7%) patients in group II experienced sedation grade (2) .

At 4 hours postoperatively, 2(13.3%) patients in group I and 3(20%) patients in group II showed sedation grade (1), 13 (86%) patients in group I and 12 (80%) patients in group II had sedation grade (2).

At 8 hours postoperatively, 1(6.7) patient in group I and 4 (26.7%) patients in group II showed sedation grade (1), 14 (93.3%) patients in group I and 11(73.3) patients in group II had sedation grade (2).

At 12 hours postoperatively, 1 (6.7%) patient in group I and 4 (26.7%) patients in group II showed sedation grade (1) ,14 (93.3%) patients in group I and 11(73.3%) patients in group II had sedation grade (2).

At 16 hours postoperatively, 1 (6.7%) patient in group I and 5(33.3%) patients in group II showed sedation grade (1), 14 (93.3%) patients in group I and 10 (66.7%) patients in group II had sedation grade (2).

At 20 hours postoperatively, 1 (6.7%) patient in group I and 4 (26.7%) patient in group II showed sedation grade (1), 14 (93.3%) patients in group I and 11(73.3%) group II had sedation grade (2).

Finally at 24 hours postoperatively, 1 (6.7%) patient in group I and 4 (26.7%) patient in group II showed sedation grade (1), 14 (93.3%) patients in group I and 11(73.3%) group II had sedation grade (2).

None of the patients in group I or II experienced postoperative deep sedation scores (grade 3 or 4) (Figure 19).

The comparison between the groups showed no significant difference.

Table (XXIV): Changes in sedation scale in group I

	30min	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	1	2	2	2	2	2	2
2	2	2	2	2	2	2	2
3	2	2	2	2	2	2	2
4	1	1	2	2	2	2	1
5	2	2	2	1	2	2	2
6	2	2	2	2	2	2	2
7	2	2	2	2	2	2	2
8	2	1	2	2	2	1	2
9	2	2	2	2	2	2	2
10	1	2	2	2	2	2	2
11	2	2	2	2	2	2	2
12	1	2	2	2	1	2	2
13	2	2	1	2	2	2	2
14	2	2	2	2	2	2	2
15	2	2	2	2	2	2	2
Score 1	4 (26.7%)	2(13.3%)	1(6.7%)	1(6.7%)	1(6.7%)	1(6.7%)	1 (6.7%)
Score 2	11 (73.3%)	13(86.7%)	14(93.3%)	14(93.3%)	14(93.3%)	14(93.3%)	14 (93.3%)
Min.	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max.	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mean	1.73	1.87	1.93	1.93	1.93	1.93	1.93
SD.	0.46	0.35	0.26	0.26	0.26	0.26	0.26
p		0.317	0.180	0.180	0.083	0.180	0.083

p: p value for Wilcoxon signed ranks test for comparing between 30min with each other period

Table (XXV): Changes in sedation scale in group II

	30min	4th hr	8th hr	12th hr	16th hr	20th hr	24th hr
1	1	1	2	2	2	2	2
2	2	2	1	2	1	1	1
3	1	2	1	1	2	2	2
4	2	2	2	2	1	2	2
5	1	2	2	1	2	2	1
6	1	2	2	2	1	2	2
7	2	1	2	1	2	2	1
8	1	2	2	2	1	1	2
9	1	2	2	2	2	2	2
10	2	2	2	1	1	2	1
11	2	1	2	2	2	2	2
12	2	2	2	2	2	1	2
13	1	2	1	2	2	2	2
14	2	2	2	2	2	2	2
15	1	2	1	2	2	1	2
Score 1	8 (53.3%)	3(20%)	4(26.7%)	4(26.7%)	5(33.3%)	4(26.7%)	4 (26.7%)
Score 2	7 (46.7%)	12(80%)	11(73.3%)	11(73.3%)	10(66.7)	11(73.3%)	11 (73.3%)
Min.	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Max.	2.0	2.0	2.0	2.0	2.0	2.0	2.0
Mean	1.47	1.80	1.73	1.73	1.67	1.73	1.73
SD.	0.52	0.41	0.46	0.46	0.49	0.46	0.46
p		0.096	0.102	0.157	0.317	0.157	0.206

p: p value for Wilcoxon signed ranks test for comparing between 30min with each other period
*: Statistically significant at $p \leq 0.05$

Table (XXVI): Comparison between the two studied groups according to sedation scale

	30min		4th hr		8th hr		12th hr		16th hr		20th hr		24th hr	
	No.	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**	**No.**	**%**
Group I														
Score 1	4	26.7	2	13.3	1	6.7	1	6.7	1	6.7	1	6.7	1	6.7
Score 2	11	73.3	13	86.7	14	93.3	14	93.3	14	93.3	14	93.3	14	93.3
Min.	1.0		1.0		1.0		1.0		1.0		1.0		1.0	
Max.	2.0		2.0		2.0		2.0		2.0		2.0		2.0	
Mean	1.73		1.87		1.93		1.93		1.93		1.93		1.93	
SD.	0.46		0.35		0.26		0.26		0.26		0.26		0.26	
Group II														
Score 1	8	53.3	3	20.0	4	26.7	4	26.7	5	33.3	4	26.7	4	26.7
Score 2	7	46.7	12	80.0	11	73.3	11	73.3	10	66.7	11	73.3	11	73.3
Min.	1.0		1.0		1.0		1.0		1.0		1.0		1.0	
Max.	2.0		2.0		2.0		2.0		2.0		2.0		2.0	
Mean	1.47		1.80		1.73		1.73		1.67		1.73		1.73	
SD.	0.52		0.41		0.46		0.46		0.49		0.46		0.46	
Z	1.466		0.482		1.445		1.445		1.795		1.445		1.445	
P	0.143		0.630		0.148		0.148		0.073		0.148		0.148	

Z: Z for Mann Whitney test

*: Statistically significant at $p \leq 0.05$

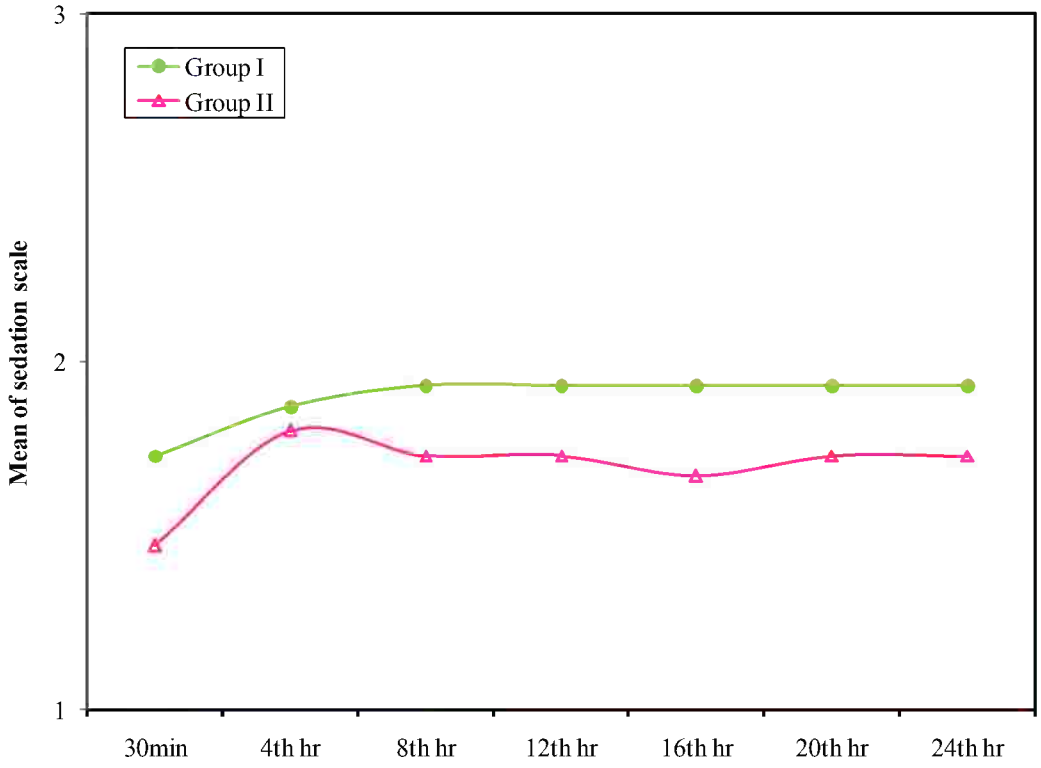

Figure (19): Comparison between the two studied groups according to sedation scale

Postoperative patient satisfaction to pain management:

10 patients in group I (66.7%) were very satisfied and 5 patients (33.3%) were somehow satisfied. While in group II, 2 patients (13.3%) were very satisfied, 7 patients (46.7%) were somehow satisfied and 6 patients (40%) were not satisfied. The overall comparison between both groups showed significant difference in the form of higher satisfaction in group I (table XXVII, figure 20).

Table (XXVII): Comparison between the two studied groups according to patient satisfaction score (1-3cm)

	Group I	Group II	Z	p
Patient satisfaction score (1-3cm)				
Very satisfied	10 (66.7%)	2 (13.3%)		
Somehow satisfied	5 (33.3%)	7 (46.7%)	3.345	0.001*
Not satisfied	0 (0.0%)	6 (40.0%)		

Z: Z for Mann Whitney test
*: Statistically significant at $p \leq 0.05$

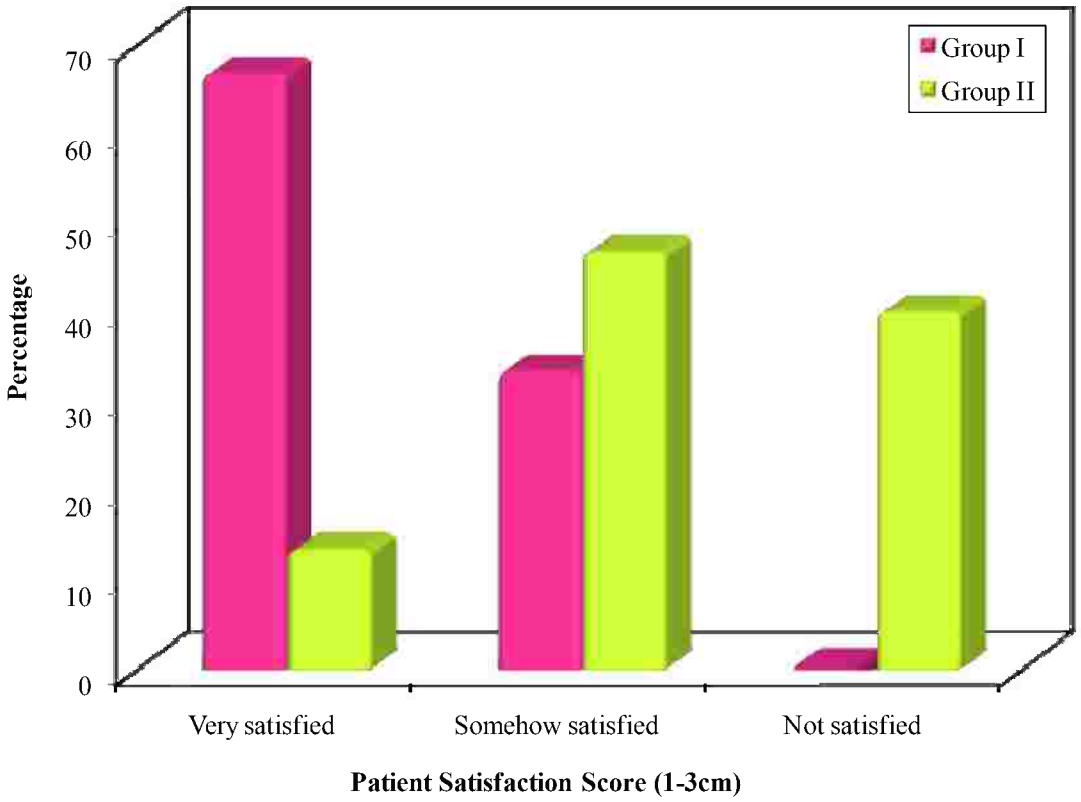

Figure (20): Comparison between the two studied groups according to patient satisfaction score (1-3cm)