Post Operative Effect of Bupivacaine as Local Anesthesia in Abdominal Incisions

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ABSTRACT:

BACK GROUND:

Pain after abdominal incisions is responsible for many postoperative problems, especially pulmonary and thromboembolic complications. Although many analgesic drugs are available yet they have to be given systemically to be effective with a real danger of respiratory depression.

The use of local anesthetic drug infiltrated in the wound at the end of surgery is a logical solution .The aim of this study is to evaluate the effect of local anesthesia in the control of postoperative pain

METHODS:

During the period January 2007 until December 2007 hundred and twelve patients had abdominal operations at Baghdad Teaching hospital .Patients were randomly allocated to two groups .Group (1) included 56 patients who had 10 ml bupivacaine infiltrated in the wound by a sub facial catheter before wound closure and Group (2) 56 patients had placebo injected (2 ml of normal saline).Visual analogue scale was used for post operative pain assessment

RESULTS:

There was a significant decrease in pain score and the requirement of the systemic analgesic in Group (1) during the 1st 24h after surgery as compared to Group (2) with (P. < 0.05) .The type of surgery which showed marked decrease in pain score were repair of hernia, open cholecystectomy and appendesectomy and was least obvious after midline incision.

CONCLUSION:

There was a significant decrease in pain intensity and the analgesic requirement in patients who had local wound infiltration with bupivacaine as compared to placebo group thus making it an effective, simple and cheap method in relieving pain after abdominal incisions.

KEY WORDS : local anesthesia –bupivacaine – postoperative pain-abdominal incisions.

INTRODUCTION:

Effective post operative pain relief has numerous benefits such as improved comfort, enhanced breathing, increased mobility, patient cooperation assured, prevention of gastrointestinal immobility [(1)].

Patients vary greatly (up to 8 fold) in their requirements for analgesia, even after identical surgical procedures. Under treatment results in an unacceptable levels of pain with tachycardia, hypertension, vasoconstriction, and splinting of the effective part [(1, 2)].

Painful abdominal and thoracic wounds restrict inspiration, leading to tachypnoea, small tidal volumes and inhibition of the patient from effective coughing and mobilization, this predisposes to chest infection, delayed mobilization, deep venous thrombosis, muscle wasting and pressure sore.

However, analgesic administration above the patients' requirement increases the risk of side effect such as nausea, vomiting, somnolence and dizziness or, if greatly in excess, severe central effects including depressed consciousness and respiration. [(1)]Pain serves a biological function, it signals the presence of damage or disease within the body. In the case of post operative pain, it is the result of the surgery. [(2)]The goal for postoperative pain management is to reduce or eliminate pain and discomfort with a minimum of side effects as cheaply as possible [(3,4)]. Post operative pain relief must reflect the needs of each patient and this can be achieved only if many factors are taken into account, these maybe summarized as clinical factors, patient- related factors and local factors. In the final analysis the ultimate determinate of the adequacy of pain relief will be the patient's own perception of pain [(3)].Bupivacaine is a long acting local anesthetic drug, maximum dose of 0.25% solution is 150 mg or 60ml [(1)].The aim of this study is to evaluate the effect of wound infiltration with local anesthesia for post operative pain control, assessed with visual analogue scale.

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PATIENTS AND METHODS:

The study is prospective randomized placebo controlled clinical trial. A hundred and twelve patients of different abdominal operations were included in the study, which was done in Baghdad general hospital from January 2007 to December 2007.

The patients were divided randomly into two groups, the first group was the (Intervention) group which consist of (56) patients, the 2nd group was (placebo) group which consist of (56) patients. Data form included history, physical examination and any concomitant illness and medication in use, in addition an appropriate laboratory investigations were done for each patient.

In both groups the patients underwent clean and clean contaminated abdominal operations. Contaminated or dirty operations were excluded. At the end of abdominal surgery a fenestrated plastic catheter was inserted in the sub facial plane of the surgical wound i.e. under the rectus sheath or external oblique apponeorosis and fixed to the skin through a separated stab wound and separated from the wound dressing.

In group (1) 10 ml of bupivacaine 0.25% was slowly infused in the sub facial

plane just after skin closure the drug was given slowly in patients with cardiac or liver disease.

In group (2) , 2 ml of normal saline was used. Injections were repeated every 6 hours after pain assessment. The assessment of pain was by visual analogue scale. The visual analogue scale (VAS) was explained to each patient making sure the end points of the scale were understood(5).

Asking the patient to take a deep breath or to cough or move will also provide useful information and it is important to emphasis that measurement of pain while the patient is at rest is unlikely to indicate the need for analgesia.

Pain distant from the operative site may indicate complications not associated with the procedure which may require separate treatment.

After each assessment when the score was 4 cm and above and the patient is not satisfied from analgesia we use one of the systemic analgesic drugs (NSAID and weak narcotic opiates such as Tramadol). The injection of Bupivacaine was done by one of the members of the surgical team.

The 1st injection was done in the theater and the rest were done in the ward. During the assessment of pain we assessed in addition the need for systemic analgesia as well as any complication of the local anesthetic drug and the subfacial catheter in each patient.

The catheter was removed 24h after operation .We followed the ethics and roles of clinical research and took the permission from the patient for the use of the local anesthetic drug, and the insertion of the catheter before taking the consent for the operation.

Statistical analysis:

All data were coded and entered in the computer. Analysis was done by using Epi 6 programme (software).Comparison between discrete variables was done by using Chi-Squre. Difference between continuous variables measured by using t-test. $P<0.05$ considered as level of significance.

RESULTS:

A hundred & twelve patients were randomly divided into intervention group (Number. = 56) & placebo group (Number. = 56).

Age & gender distribution:

There were 51 female patients 45.53% & 61 male patient 54.46% with age ranging between (14-50) years. most of them 50 patient 44.64% were in the (14-20) year age group, 37 patient 33.03% were in the (21-30) year group, 17 patient 15.17% were in the (31-40) year age group & 8 patients 7.14% were in the (41-50) year age group & as in Table 1-A.

Table 1: A Distribution of patients according to age group and gender.

Age	Male		Female		Total	
	No	%	No.	%	No.	%
14-20	27	24.10	23	20.53	50	44.64
21-30	20	17.85	17	15.17	37	33.03
31-40	10	8.92	7	6.25	17	15.17
41-50	4	3.57	4	3.57	8	7.14
Total	61	54.46	51	45.53	112	100%

$X^2 = 0.20$ P= 0.977

Types of Abdominal Incisions:

Abdominal incisions were as follows: grid iron incision 66 patients 58.92% divided equally in the 2 groups, inguinal incision 24 patients 21.42% also divided equally in the 2 groups and right subcostal incision for open cholecysectomy 12 patients10.71% & laporatomy with midline incision 10 patients 8.92% both of then divided equally between the two groups as shown in table 2.

Table 2: Distribution of the 2 groups according to the type of incision.

Type of operation	Type of incsion	Intervention		Placebo		total	
		No.	%	No.	%	No.	%
Appendicectomy	Gridiron incision	33	58.92	33	58.92	66	58.92
Inguinal Herniorrhaphy	Inguinal incision	12	21.42	12	21.42	24	21.42
Open cholecystectomy	Right subcostal incision	6	10.71	6	10.71	12	10.17
Laparatomy for other conditions	Midline incision	5	8.92	5	8.92	10	8.92
Total		56	100	56	100	112	100

P = 1.0

Table 3: Comparison of post operative mean pain score between the interventional and placebo groups.

Time	Intervent gr. no. 56		Placebo gr. no.56		P-value
	Mean pain score	ST-Dev.	Mean pain score	ST. Dev.	
1st hour	2.925	0.9425	6.290	1.1925	0.0001
6th hour	2.8425	0.9000	6.060	1.160	0.0001
12th hour	2.985	0.870	5.832	1.1325	0.001
18th hour	2.907	0.940	5.550	1.1325	0.001
24th hour	2.897	0.847	5.277	1.120	0.001

The pain intensity was significantly less in the intervention group as compared to the placebo group, especially in the first 6 hours post operatively, and the mean pain score was significantly less in the intervention group especially in the first 6 hours. This significant difference in the pain intensity & mean score was more obvious in the hernia group.

Table 4: Comparison between the 2 groups regarding the systemic analgesic requirement.

Time	Intervent gr. no. 56		Placebo gr. no.56		P-value
	No.	%	No.	%	
1st hour	15	26.78	51	96.2	0.00001
6th hour	14	25	51	94.44	0.00001
12th hour	17	30.35	48	88.88	0.0001
18th hour	18	32.14	44	81.48	0.0001
24th hour	17	30.35	41	75.22	0.001

The need for systemic analgesic requirement in the first hour was in 15 patients 26.78% in the intervention group versus 52 patients 98.2% in the placebo group, and for the rest 6,12 18 & 24th hour post operatively are shown in Table 5.

Table 5: A comparison between the 2 groups regarding systemic analgesic requirement for each type of skin incision.

Type of incision	Intervent gr.			Placebo gr.			P-value
	Total No. of patients	No. of Patients required systemic analgesia	%	Total No. of patients	No. of Patients required systemic analgesia	%	
Grid iron	33	17	51.51	33	32	96.96	P < 0.005
Hernia incision	12	4	33.33	12	11	91.66	P< 0.005
Right subcostal incision	6	2	33.33	6	5	83.33	P< 0.005
Midline laprotomy incision	5	4	80	5	5	100	P>0.005
Total	56	27	48.21	56	53	94.46	P< 0.005

Table 5 shows the number of patients who required systemic analgesia in each type of skin incision in both groups during the first 24 hour post operatively.In this table 33 patients underwent appendicectomy in the intervention group, 17 patients 51, 51% required more than one injection of systemic analgesia.

Regarding the complications of local anesthesia & catheter insertion there was 2 patients of the placebo group got mild wound infection, treated by antibiotic after which complete resolution occurred as in table (6):

Table 6: Comparison between the 2 groups regarding the complication of cather site and local anesthetic drug.

Type of complication	Placebo group	%	Intervention group	%
Seroma	-	-	-	-
Wound infection	2	3.57	-	-

DISCUSSION:

Incisional local anesthesia has been used for post operative pain relief after different types of abdominal operation.

This study showed a significant decrease in post operative pain, systemic analgesia requirement and mean pain score after hernia repair, and the effect was more significant during the first 6 hours after operation a fact that was supported by the studies of Sinclair R. [6], Johnson B. [7] and Bays RA. [8]. However Sinclair stated that the pain relief was for the first 24h. After operation while Johansson and Bays revealed that the effect was significant only for the first 7 hour after operation.

Regarding open cholecystectomy there was a significant decrease in post operative pain, mean pain score and systemic analgesic requirement during the first 24 hours after operation which is similar to these findings presented by Sinclair R[6], while Russell WC[9] and Patel 1M[10], showed a significant effect only in the first 6hours post operatively.

In this study it was found that the effect of incisional local anesthesia on post operative pain relief and systemic analgesia sparing was more obvious after inguinal herniorraphy followed by open cholecystectomy which is supported by Johansson B. [7] who found that the best effect of incisional local anesthesia in decreasing post operative pain was on hernia operation followed by open cholecystectomy which may be due to the more inflammatory visceral component found in the condition for which cholecystectomy was done eg: (Gall stone, acute and chronic cholecystits).

A significant decrease in post operative pain and systemic analgesic requirement was also seen in this study after appendesectomy which is supported by the study of Wright JE [11], however Colbert S. [12] showed a significant effect of pain relief after subcutaneous and peritoneal instillation of bupivacaine after appendesectomy, while Tumer GA. [13] and Willard patients [14] showed in-conclusive results and less systemic analgesic sparing effect after appendectomy which may be due to a significant inflammatory visceral component that mask the benefit of somatic neural block.

Regarding midline laparotomy for other conditions there was no significant effect of incisional local anesthesia in post operative pain relief and systemic analgesic spearing which is similar to the results of the studies done by Partridge BL[15], Bartholdy J. [16] and Pfiefer U[17], as they all show no firm evidence of the beneficial effect of local anesthesia in decreasing post operative pain and in

systemic analgesic requirement although Bartholdy revealed only slight reduction in analgesic requirement for 1 – 2 hours post operatively. This insignificant effect may be due to the severe visceral pain component after major trauma (e.g. damaged liver capsule and parenchyma) which will mask the beneficial effect of somatic neural block caused by the incisional local anesthesia [15,17].

The role of this visceral component of pain on the post operative pain relief with incisional local anesthesia was demonstrated by a study done by Alexander DJ [18] and Smith BE [19], who revealed more improved effect of pain relief after the visceral structures has been infiltrated with local anesthesia in addition to the incisional infiltration and thus blocking the visceral component of pain.

In our study the catheter was inserted sub-facially and used repeated injection of bupivacaine at end of surgery followed by 6, 12, 18, and 24 hour after operation to increase the beneficial effect of local anesthesia in post operative pain relief, which is supported by Yad gaard S[20] and Holset P[21] who indicated that lidocaine was more effective when injected sub facially rather than subcutaneously, also Johansson B[7] show a significant dose – response relation ship after hernia repair and open cholecystectomy with better analgesic sparing effect and less pain score with repeated injections of bupivacaine sub facially.

Good aseptic technique is important during infusion of local anesthesia to decrease the rate of wound infection, only 2 complications of mild wound infection were recorded in the placebo group treated conservatively with antibiotics and bupivacaine was well tolerated by the patients without any side effect which was similar to the results of Bartholdy J.[16] and Mceklem MWJ[22].

CONCLUSION:

In this randomized placebo controlled clinical trial it showed a significant decrease in post operative pain and systemic analgesic requirement in the intervention group as compared to the placebo group, although this significant analgesia sparing was not conclusive in the midline incision laparotomy group .

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