

Original article:

Multimodal protocol for post operative pain management

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Abstract

Purpose: Post-operative pain management after abdominal surgery is still an unresolved issue. Despite of availability of various modalities of pain management, post-operative pain relief is still not achieved fully. This comparative study was undertaken to assess efficacy of multimodal pain management protocol and to compare it with routine pain protocol.

Methods: Prospective study of 150 patients undergoing abdominal surgeries. All patients were counseled before surgery regarding pain. Patients equally distributed in Group A (standard protocol) and Group B (Multimodal protocol). Post-operative pain and functional activity was assessed with visual analogue scale (VAS) and functional activity score (FAS). Pain and related complications were assessed during immediate post-operative period, and on 3rd monthly and 6th monthly followup.

Results: Age, gender distribution was comparable in both groups. Pain was less in group B. There was significant difference in VAS in multimodal and Group A till post-operative day 4. But there was no difference in VAS at POD 10. Patient in group B had better FAS than group A. Post-operative complications were less in Group B. On follow up no case was found having chronic pain. Group A was more economical.

Conclusions: Multimodal Group had effective analgesia. Early recovery and return to routine were also observed. Multimodal protocol proved to reduce pain related complications and economical.

Keywords: post-operative pain, TENS, multimodality pain protocol.

Introduction

"Acute pain in peri-operative setting is defined as pain that is present in a surgical patient because of pre-existing disease, surgical procedure or a combination of these."⁽¹⁾

Pain is an unpleasant and inevitable postsurgical experience. The bulk of this is from the incision made on the abdominal wall. Inadequate post-operative pain relief results in clinical and psychological changes in patient that increases morbidity, mortality, cost of treatment and affect quality of life post-operatively.⁽²⁾

In pre-anesthetic era skilled surgeons were operating faster, to minimize their patient's agony.⁽³⁾ Later

opium was used to manage operative and post-operative pain. Various pharmacological agents such as non-steroidal anti-inflammatory drugs (NSAIDs), adjuvant medications, epidural analgesia and regional pain management techniques were used to treat pain. Pain relief is considered patients' fundamental right and it is considered "fifth vital sign". Hence team approach and pain free post-operative period is now considered an equal responsibility of the surgical and anesthetic team.⁽⁴⁾

Current practice of pain management is time based analgesia or analgesia on patient's demand. This does not warrant repeated assessment of pain and so post-operative pain relief remains an unresolved issue.⁽⁵⁾

Thus, multimodal, preemptive analgesia emerged.⁽⁶⁾Multimodal analgesia is achieved by combining different groups of analgesics that act by different mechanisms and at different levels in the nervous system, resulting in additive or synergistic effect and lowers adverse effects due to sole administration of individual analgesics.⁽⁶⁾

In view of the above, this study is being undertaken to assess efficacy of multimodal pain management protocol by comparing it with the routine protocol.

Patients and methods

Institutional Ethics Committee Clearance was obtained before start of study. Informed consent was obtained from all the patients before inclusion in the study. The detailed case history and clinical examination of one hundred and fifty cases undergoing abdominal surgery were recorded. All patients were counseled regarding pain, educating about multimodality pain relief with an aim to relieve anxiety and increase compliance with help of flip chart. Group A was receiving standard analgesia (75 cases) and Group B was receiving multimodal protocol (75 cases). Standard protocol included Injection Diclofenac intravenous 75 mg 8 hourly along with Injection Tramadol 100 mg intravenous HS were used for initial 48 hours later followed by Tablet Diclofenac 50 mg 8 hourly on day 3 & 4. From day 5 Tablet Diclofenac 50 mg was used SOS. Group B received local anesthetic infiltration around incision at the time of closure with Bupivacaine (0.5%, 9 ml with equal dilution with normal saline), TENS applied around suture line in recovery room and continued for next 48 hours in ward. Injection Paracetamol 150 mg im 8 hourly and Injection Tramadol 100 mg intravenous HS were used for initial 48 hrs in multimodal protocol. This was followed by Tablet Paracetamol 650 mg 6

hourly on day 3 & 4. Day 4 onwards Tablet Paracetamol 650 mg was used SOS.

Post-operative pain was assessed with visual analogue scale. It was assessed 2 hourly on day of operation, 6 hourly on POD1 and 8 hourly from POD2, till POD10. Functional activity score assessed similarly for functional activity from POD 1 to POD 10. Pain related postoperative complications namely nausea, vomiting, and respiratory complications were documented 2nd hourly for first 48 hours and 8 hourly thereafter. All patients were followed at 3 month and 6 month and assessed for pain and pain related complications. All data was collected by the resident and statistical analysis was done by using Chi-square, Mann Whitney test as applicable using SPSS software. (Version 17)

Results

The mean age in Group A was 39.2 years. The mean age in Group B was 41.3 years. In Group A out of 75 cases 46 were males and 29 were females. In Group B, 53 were males and 22 females. Maximum numbers of surgeries were lower abdominal (57%). Open Appendicectomy (43 cases) and Meshplasty (37 cases) for inguinal hernia were commonest lower abdominal surgeries. Upper abdominal surgeries were 22% and Open Cholecystectomy (26 cases) was commonest surgery in upper abdominal incision group. Midline abdominal incisions were 20 % and majority of them were emergent. (Table 1)

Visual Analog Score: VAS was more in Group A than Group B. ($p < 0.0001$) Difference in VAS was statistically significant till POD4. There was no significant difference in pain on POD10. (**Table 2, Graph 1**).

Functional Activity Score: FAS was more in Group B compared to Group A. Difference in FAS was

significant till post-operative day 10. (**Table 3, Graph 2**).

Pain related complications: The incidence of nausea was more in cases of Group A. There was significant difference in both groups. ($p < 0.0001$) Nausea was predominant on the day of surgery (39% cases) and POD 1 (20%). After day 3 no case was having nausea.

Vomiting: Group B had lesser incidence of vomiting. ($p < 0.0001$) Vomiting was more on POD0 and POD1 in both groups. No case of vomiting from 3rd post-operative day.

Urinary Retention: Group A had more incidence of urinary retention than Group B. Difference in both groups was statistically significant. ($p < 0.05$) Incidence was highest on the day of operation.

(24.66%) None developed urinary retention after 1st post-operative day.

Respiratory complications: In Group B the respiratory complications were less as compared to Group A. Respiratory complications were more during first 48 hours post-operative. (**Table 4, Graph 3**).

Cost effectiveness: There was significant difference between the total protocol costs. ($p < 0.001$) It was more Group A (135.9 ± 12.3) compared Group B (91.3 ± 15.7).

Follow up:

Follow up was done at 3 months and 6 months. VAS and pain related complication as chronic pain was assessed during follow up. There was no significant difference in VAS on follow up and no case was found suffering from chronic pain.

TABLE 1: TYPE OF SURGERIES IN STUDY GROUP

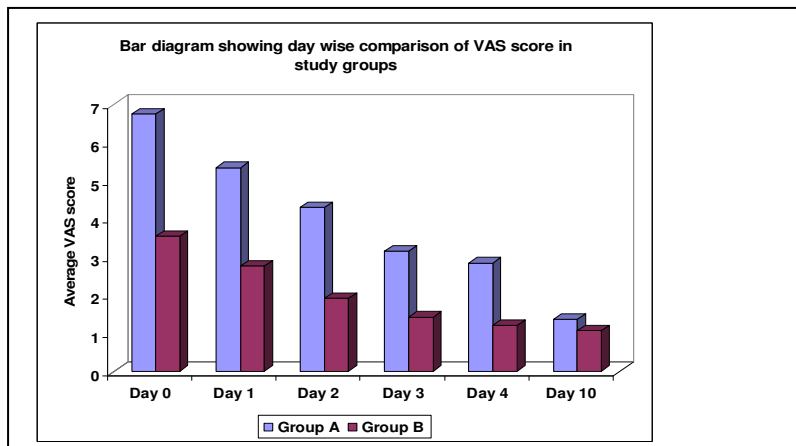
	Type of Surgery	Group	
		A (%)	B (%)
Upper Abdominal	Open Cholecystectomy	15 (20)	11 (14.66)
	Nephrectomy	1 (1.33)	1 (1.33)
	Pyloolithotomy	3 (4)	3 (4)
Total		19 (25.33)	15 (20)
Midline	Intestinal obstruction	2 (2.66)	4 (5.33)
	Perforation (laparotomy)	5 (6.66)	3 (4)
	Incisional hernia repair	1 (1.33)	1 (1.33)
	SMA thrombosis (laparotomy)	1 (1.33)	1 (1.33)
	Ca rectum	1 (1.33)	1 (1.33)
	Retroperitoneal sarcoma	2 (2.66)	1 (1.33)
	Volvulus (laparotomy)	1 (1.33)	2 (2.66)
	Ca Oesophagus (laparotomy)	1 (1.33)	1 (1.33)
	Heller's	1 (1.33)	1 (1.33)

	Cardiomyotomy		
Total		15 (20)	15 (20)
Lower Abdominal	Open Appendicectomy	20 (26.66)	23 (30.66)
	Meshplasty (for inguinal hernia)	18 (24)	19 (25.33)
	Varicocele	1 (1.33)	1 (1.33)
	Cystolithotomy	1 (1.33)	1 (1.33)
	Open prostatectomy	1 (1.33)	1 (1.33)
Total		41 (54.66)	45 (60)
TOTAL		75	75

2 COMPARISONS OF PAIN SCORE

Table 2: Day wise comparison of Visual Analogue Score (VAS)in study groups

VAS score on	Group A	Group B	MW test	P Value
	Mean ± SD (n=75)	Mean ± SD (n=75)	Z Value	
Day 0	6.76 ± 0.85	3.55 ± 1.22	10.29	<0.0001
Day 1	5.35 ± 0.98	2.77 ± 1.33	9.15	<0.0001
Day 2	4.31 ± 1.06	1.91 ± 1.14	9.17	<0.0001
Day 3	3.16 ± 1.10	1.42 ± 0.87	8.72	<0.0001
Day 4	2.85 ± 1.07	1.20 ± 0.59	8.94	<0.0001
Day 10	1.37 ± 1.11	1.07 ± 0.25	1.49	>0.05



3 COMPARISONS OF ACTIVITY SCORE

Table 3: Day wise comparison of Functional Activity Score (FAS) in study groups

FAS score on	Group A	Group B	MW test	P Value
	Mean ± SD (n=75)	Mean ± SD (n=75)	Z Value	
Day 0	2.92 ± 0.82	5.41 ± 1.51	8.63	<0.0001
Day 1	3.95 ± 1.14	6.20 ± 1.33	8.29	<0.0001
Day 2	4.48 ± 1.07	6.95 ± 1.13	9.25	<0.0001
Day 3	6.09 ± 1.15	7.60 ± 0.96	7.41	<0.0001
Day 10	7.17 ± 1.14	8.63 ± 1.24	6.59	<0.0001

4COMPARISON OF PAIN RELATED COMPLICATIONS

Table 4: Comparison of pain related complications in study groups

Complication		Group A(%)	Group B(%)	Z Value	P Value
Nausea	Day 0	42 (56)	17 (22.67)	4.45	<0.0001
	Day 1	28 (37.33)	2 (2.67)	5.89	<0.0001
	Day 2	4 (5.33)	2 (2.67)	0.84	>0.05
	Day 3	0	0	0	>0.05
Vomiting	Day 0	32 (42.67)	8 (10.67)	4.75	<0.0001
	Day 1	19 (25.33)	0	5.04	<0.0001
	Day 2	5 (6.67)	0	2.31	<0.05
	Day 3	0	0	0	>0.05
Urinary	Day 0	24 (32)	13 (17.33)	2.11	<0.05

retention	Day 1	4 (5.33)	1 (1.33)	1.37	>0.05
	Day 2	0	0	0	>0.05
	Day 3	0	0	0	>0.05
Respiratory complication	Day 0	41 (54.67)	19 (25.33)	3.84	<0.0001
	Day 1	39 (52)	12 (16)	5.03	<0.0001
	Day 2	15 (20)	2 (2.67)	3.48	<0.001
	Day 3	0	0	0	>0.05

Discussion

Pain assessment using VAS showed better analgesia in Group B from POD 1 to 4. Post-surgery, the first 48 hours is very painful. Multimodal protocol kept the pain at mild scale during this period also. This is comparable to a study done by E. Moizo, et al. In this study Multimodal therapy included nonsteroidal anti-inflammatory drugs (NSAIDs) and Opioids. They found that post-operative pain was significantly lower in multimodal group than the other group receiving patient controlled analgesia during post-operative 72 hours. ($p=0.002$).⁽⁷⁾ Having a check at various levels of pain perception reduced the nociception to a significant amount reflected by the VAS scores. However, similar results can be achieved by the standard protocol also provided the dosages of the drugs are increased. But this has to be a calculated risk.

In Group B patient regained daily activities earlier than in Group A. Group B patients ambulated early in the post-operative period. It helped in early recovery of patients. Dougal T simet al studied 30 patients undergoing elective Cholecystectomy. The

effectiveness of TENS was evaluated by measuring both the analgesic and pulmonary effects on the first, second and fifth post-operative days. Using linear analogue pain scales, observations recorded at rest, following deep breathing and following cough. They found Significant decrease ($p < 0.05$) of pain without any activity and also at deep breathing for the TENS group on the second post-operative day. Patients within the TENS group also recorded significantly less pain following coughing on the fifth post-operative day.⁽⁸⁾ TENS application also provided comfort with endorphin release. Its application is relatively easy and is not associated with any side effect. TENS also qualifies a patient controlled analgesia. It significantly reduces the nociception from the site of insult. Along with the systemic analgesia, TENS as local anesthetic delivers better results.

Post-operative complications associated with pain are often under noticed. Apart from the usual nausea and vomiting, inability to move the diaphragm results in significant morbidity. This part manifests as pulmonary complications and post-operative ileus

which further increases the morbidity and increases the cost of treatment. Reduced functional activity due to pain can cause increased calcium losses, bed sore, poor fluid metabolism and also poor wound healing. Study done by E. Moizo et al found higher incidence of postoperative nausea and vomiting in patient control analgesia group (27.2%)⁽⁷⁾ Engberg G studied respiratory capacity during the first 2 days postoperatively in 94 patients, aged 19 to 75 years and undergoing abdominal surgery with or without regional anesthesia. It concluded that patient in regional anesthesia group had better respiratory function than other group receiving only centrally acting analgesics during the first 2 days postoperatively.⁽⁹⁾

Group B was cost effective. It had less cost and effective analgesia compared to Group A. In an analysis done by Brodner G et al with 6349 surgical patient managed by multimodal approach post-operatively. After analysis they found saving of economy due to reduced burden on hospital as less analgesia requirement in this group.⁽¹⁰⁾

Conclusions

Post-operative pain relief was better with multimodal analgesia. Combine and synergistic effect of local infiltration, TENS application followed by analgesic drugs acting at different centers made it possible to keep post-operative pain under mild level.

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TENS is a simple, non-invasive analgesia technique, easy to apply due to its ease of administration and rapid onset; it is cheaper compared to long term use of drugs with minimum side effects. Multimodal protocol was effective for pain relief and early regain of daily activities in post-operative period. Incidence of pain related complication was more in patient receiving standard pain protocol.

There was significant difference in total cost of protocol which was lower in multimodal analgesia. At 3 month and 6 month follow up there was no difference in VAS and no patient was suffering from chronic pain.

Limitations:

1. Pain is a subjective feeling. The VAS is based on patients own subjective assessment which may not be correct.
2. Data as VAS and FAS collected by resident only. Assessment for expected pain score was done by resident only. So the bias of the mentee in analysis of data cannot be ruled out.
3. Pain protocols were decided before operation. So pre emptive analgesia to the patients with high expected pain score could not be given.

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