Original Article

Postoperative analgesia after inguinal herniorrhaphy with bupivacaine by instillation and nerve block

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Abstract

Background: Inguinal herniorrhaphy in adults is considered a minor surgical procedure but can be associated with significant postoperative pain. This study was undertaken to evaluate and compare instillation and nerve block techniques using 0.5% bupivacaine for postoperative analgesia after inguinal herniorrhaphy in adults. **Material and Methods:** In this study a total of 90 patients, above the age of 20 years, posted for elective inguinal herniotomy and herniorrhaphy were divided into three equal groups of 30 each. Group I received general anaesthesia, Group II and III received 0.5% bupivacaine instillation and nerve block in addition to general anaesthesia. Pain scores, degree of pain and duration of satisfactory analgesia was determined for each patient in groups. **Results:** The mean pain scores in group II and III when compared with control group the difference was found to be statistically significantly ($p < 0.05$). In group II, 73% of patients had satisfactory analgesia for 0-6 hours, in group III, 83% of patients had satisfactory analgesia for 7-12 hours. **Discussion:** The postoperative pain relief provided with 0.5% bupivacaine in conjunction with general anaesthesia gives good results after herniotomy and herniorrhaphy with instillation and nerve block techniques.
Keywords: Bupivacaine, Inguinal herniorrhaphy, instillation, nerve block, postoperative analgesia.

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INTRODUCTION

Pain is an inevitable consequence of any surgery and the problem of inadequate postoperative pain relief has been recognized for many years. Inguinal hernia repair is a common surgical procedure[1]. Pain after inguinal hernia repair is mainly due to activation of cutaneous and subcutaneous reception of afferent nerve fibres involved in the transmission of pain. Chronicpainoccursin 5-10% after the inguinalhernia repair that creates an important problem[2]. Despite advances in the knowledge of pathophysiology and pharmacology of analgesics and development of more effective techniques for postoperative pain relief, many patients continue to experience considerable discomfort. The source and degree of nociceptive stimulation differ among individuals and surgeries and hence multimodal analgesic approaches have been encouraged for pain relief. It is advantageous to design a technique of anaesthesia which will provide residual analgesia in the postoperative period as it will reduce the total quantity of analgesic required. Various methods and medications are used in postoperative pain management. Peripheral nerve blocks with local anesthetics are a method that may be used in inguinal hernia surgeries for surgery and pain management. Nerve blocks of the ilio-inguinal nerve (IIN), Ilio-hypogastric nerve (IHN) and/or genito-femoral nerve (GFN) have been used for both diagnostic and therapeutic purposes in the diagnosis and treatment of chronic postherniorrhaphy inguinal pain (CPIP)[3,4]. A possible alternative, might be direct perfusion of surgical wound with local anesthetic solution. Many researchers have used topical analgesia with lignocaine or bupivacaine using the method of perfusion, instillation and nerve block etc. for relief of pain after inguinal hernia repair. They have quoted that the above techniques not only give pain relief but also improves respiratory functions. Furthermore, postoperative mobilization is facilitated and the requirement for potent analgesics is

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reduced[5-7]. Taking into consideration the beneficial effect of these techniques the present study was undertaken to evaluate and compare instillation and nerve block techniques using 0.5% bupivacaine for postoperative analgesia after inguinal herniorrhaphy in adults.

MATERIAL AND METHOD

In this study a total of 90 patients, above the age of 20 years, posted for elective inguinal herniotomy and herniorrhaphy were divided into three equal groups of 30 each. All patients were evaluated preoperatively day before operation for any respiratory, cardiovascular, central nervous system disorders. Patients with restrictive and obstructive lung diseases, cerebrovascular accident, cardiac diseases such as ischemic heart diseases were excluded from the study. Informed consent was obtained from each patient. No premedication was given to any patient in any group. Height and weight of all patients was recorded preoperatively. Group I served as control group in which 30 patients received general anaesthesia with intravenous thiopentone sodium in the dose of 5mg/kg body weight and suxamethonium 2mg/kg body weight, which was followed by endotracheal intubation. Anaesthesia was maintained with nitrous oxide and oxygen 50%; 50% and intravenous pancuronium bromide as muscle relaxant on controlled ventilation without any analgesics, on closed circuit with Boyle machine. Halothane in the concentration of 0.5% was administered with fluotec mark II vapourizer intermittently. Hernia repair was carried out in standard manner and at the end of operative procedure, neuromuscular block was reversed with neostigmine, atropine combination and patients shifted to recovery room.

Remaining patients were divided into the following group for study purpose.

Group II: 30 patients received instillation block with bupivacaine 0.5% dose 2mg/kg body weight.

Group III: 30 patients received nerve block (ilioinguinal, iliohypogastric and genitofemoral nerve) with bupivacaine 0.5%, dose 2mg/kg body weight. In group II, instillation block technique with bupivacaine 0.5% was carried out. The calculated dose of local anaesthetic was taken in a sterile syringe and it was instilled at the edges of the incision and on the cutenous and sub-cutaneous surface of the surgical wound after carefully wiping the surface, and left for two minutes. This was repeated before skin closure. In group III, nerve block technique with bupivacaine 0.5% was carried out. Anterior superior iliac spine was palpated and a point 2.5 cm medial to it was taken and the needle was inserted through this point with a direction as downward and outwards until it strikes the inside ranging from 0 to 10. Pulse rate, blood pressure and respiratory rate was recorded as mentioned above. In all above group II and III, all patients received general anaesthesia as in group I. Hernia repair was carried out in usual manner, at the end of operation before skin closure local anaesthetic technique was applied. On the 7th postoperative day while dressings were changed patients were examined for wound infection, skin avulsion or any other problem. Pain score was determined in each patient by using linger analogue scale ranging from 0-10, postoperatively for first 24 hours. All these observations were statistically evaluated by students 't' test or chi-square test for statistical significance.

RESULTS

A total of 90 patients posted for elective herniotomy and herniorrhaphy were studied. The patients were equally distributed in three equal groups. All the groups under study were comparable as far as number of patients, age, height and weight is considered. The three groups were comparable in age as well as in height and weight wise distribution.

Table 1: Group wise Age distribution (n=90)

Age (yrs)	Group I	Group II	Group III
20-29	7	5	7
30-39	6	7	8
40-49	17	18	15
Total	**30**	**30**	**30**

Table 2: Mean pain score in different groups

Group	Mean pain score (in 24 hours)	S.D	S.E
I	5.78	0.33	0.04
II	3.40	0.30	0.06
III	1.99	0.29	0.04

In group I, mean pain score was 5.78, in group II, mean pain score was 3.4, when compared with control group the difference was found to be statistically significant ($p < 0.05$). In group III, mean pain score was 1.99, when compared with control group the difference was found to be statistically significant ($p < 0.05$). The percentage of patients showing degree of pain in first 24 hours was as shown in Table 3.

Table 3: Degree of pain in first 24 hours

Group	No pain	Mild pain	Moderate pain	Severe pain
I	-	-	21(70%)	9(30%)
II	6(20.0%)	12(40.0%)	12(40%)	-
III	15(50.0%)	10(33.0%)	5(17%)	-

All the patients were observed for duration of satisfactory analgesia in each group. Patients with either 'no pain' or 'mild pain' were taken as having satisfactory analgesia.

Table 4: Duration of satisfactory analgesia

Duration of satisfactory analgesia in hours	Groups		
	I	II	III
0-6	-	18(60%)	1(3%)
7-12	-	8(27%)	3(10%)
13-18	-	4(27%)	25(83%)
19-24	-	-	1(3%)
Total	**-**	**30**	**30**

From above observations in group II, 60% patients have satisfactory analgesia for 0-6 hours and in group III, 83% patients had satisfactory analgesia for 13 to 18 hours. In our study we did not observe postoperative wound infection, wound irritation inflammatory reaction or delayed wound healing in any of the patients.

DISCUSSION

The provision of adequate postoperative analgesiaisan important element of day-caseanaesthesia; the preoperative use of aninguinal field block achieves this successfully[8-10]. Only long-acting local anesthetics provide sufficient duration of analgesia after infiltration at the surgical site[11]. Bupivacaine is the classical long-acting local anesthetic that has been used successfully for local infiltration. It is more potent thanlignocaine 3-4 times) and produces rapid and prolonged analgesia in the postoperative period when used for peripheralnerve blocks[12]. In our study, the pain scores were significantly reduced in patients receiving postoperative analgesia as compared to control group. The analgesia induced by topical bupivacaine was long lasting. This might be due to blockade of sodium channels by bupivacaine, however the lasting analgesic effect can be due to the effect of bupivacaine on membrane associated proteins and anti-inflammatory action alters the release and action of agents such as prostaglandins, lysosomal enzymes, sensitizing or stimulating the nocicepters and participating in inflammation. Bugedo *et al*[13] studied the safety, effectiveness and duration of a percutaneous ilioinguinal-iliohypogastric nerve block with 10 ml 0.5% bupivacaine, as a method for postoperative analgesia and found this technique to be a simple and safe for providing effective and long-lasting postoperative analgesia. A study conducted by Sanjay and Woodword[14] used combination of 0.5% bupivacaine and adrenaline and demonstrated that the use of local anaesthesia resulted in increased day-case rates, lower postoperative analgesic requirements and fewer micturition problems as compared to general anaesthesia. Peripheral nerve block of the ilioinguinal (IIN), iliohypogastric (IHN) and genito-femoral (GF) nerves is a relatively well known method for postoperative pain management. In our study, all patients received general anesthesia and had peripheral nerve blocks administered with the combination of 2% lignocaine and adrenaline solution. Baerentzen *et al*[15] found that ultrasound-guided blocks of the ilioinguinal and iliohypogastric nerves resulted in a statistically significant and clinically relevant reduction in postoperative pain. Kehlet and White[16] have previously reported that the use of peripheral nerve block techniques promotes faster postoperative recovery compared with both general and spinal anesthesia. These previous studies report a reduction in postoperative pain and a reduction in the postoperative consumption of analgesics. Bupivacaine instillation has numerous advantages over a preoperative inguinalfield block. Asitis carried out towards the conclusion of the operation, the anaesthetistis not distracted from his care of the patient. A smaller dose of local anaestheticis used, with toxicity and costimplications, and the possibility of disturbing tissue planes, haemorrhage and infectivese quelaeare reduced. In the present study, 60% patients have satisfactory analgesia for 0-6 hours after instillation of 0.5% bupivacaine. Trial by Spittal *et al*[17] showed that the peroperative instillation of bupivacaine produced good postoperative analgesia, demonstrating noevidence of a difference in effect of more than20%when compared with aninguinalfiel dblock. To conclude, the postoperative pain relief provided with 0.5% bupivacaine in conjunction with general anaesthesiagives good results after herniotomy and herniorrhaphy with instillation and nerve block techniques. Moreover, the technique of bupivacaine instillation is eminently suitable for use in day-casesurgery because of its ease, efficacy and freedom from complications.

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