COMPARISON OF ILIOINGUINAL /ILIOHYPOGASTRIC NERVE BLOCKS AND INTRAVENOUS MORPHINE FOR CONTROL OF POST-ORCHIDOPEXY PAIN IN PEDIATRIC AMBULATORY SURGERY

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Abstract

Background: The present study is a prospective randomized double-blinded study that designed to evaluate and compare the effectiveness of postoperative pain control and incidence of complications between ilioinguinal/iliohypogastric nerve block and intravenous morphine in paediatric patients undergoing unilateral orchidopexy in day surgery unit**.**

Methods: Seventy patients aged 2-12 years were randomly allocated to two groups of thirty five. One group received intravenous morphine 100 microgram/kg before skin incision and the other group had ilioinguinal/iliohypogastric nerve block with 0.25ml/kg bupivacaine 0.5% also before skin incision. All patients have received standardized anaesthesia. Postoperative pain was assessed using 0 - 10 scale at 0, 1, 2, 3 and 4 postoperative hours, also the intraoperative fentanyl requirements, time to first postoperative analgesia, the total number of paracetamol doses and any extra analgesic requirements were recorded, side effects like respiratory depression, vomiting, itching, inguinal hematoma and lower limb weakness were assessed during the first 24 hours.

Results: Pain scores were significantly lower in the morphine group compared to the block group on admission and one hour after admission to the postanaesthesia care unit, no significant difference in pain score on 2nd, 3rd and 4th postoperative hours.

The total number of intraoperative fentanyl doses was significantly higher in the block group compared to morphine group, there was no significant difference in the duration of analgesia, number of total paracetamol doses, need for extra analgesics in both groups over the 24 postoperative hours.

None of the seventy patients experienced postoperative respiratory depression, inguinal hematoma or lower limb weakness, but significantly more patients in morphine group experienced vomiting and itching compared to the block group.

Conclusion: Ilioinguinal/iliohypogastric nerve block and intravenous morphine administered following general anaesthesia for unilateral orchidopexy in day surgery unit are safe and effective in controlling postoperative pain, morphine analgesia had a higher incidence of postoperative vomiting and itching.

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Keywords: Orchidopexy, pain, Ilioinguinal block, morphine.

Conflict of interest: All authors declare that there are no conflicts of interests.

Introduction

Orchidopexy is one of the procedures which is increasingly being performed in children on outpatient basis. It is considered as one of the common 1-day surgical procedure that requires additional analgesia in the 1-day surgery unit and at home[1], It is identified as the only procedure requiring orally administered narcotics for the control of postoperative pain following discharge[2]. The incidence of postoperative pain after orchidopexy is reported to range from 30-60%[1,3].

Preoperative ilioinguinal / iliohypogastric nerve block is a common regional anesthetic technique for surgical procedures in the inguinal area[4]. These nerve blocks are simple and quick but can be associated with serious side- effects[5] and have a high failure rate[6].

Morphine is commonly used to treat postoperative pain in children. However, its administration can be associated with some side effects that can cause considerable distress and may restrict its use in 1-day surgery units in countries with limited paramedical facilities[7,8].

This study compares the use of intravenous morphine and ilioinguinal / iliohypogastric nerve block in pediatric patients undergoing unilateral orchidopexy in the day surgery unit with respect to analgesic efficacy and the incidence of side effects.

Methods

This prospective randomized double-blinded study was conducted at Jordan University Hospital, Amman, Jordan after obtaining the approval of the Scientific and Institutional Review Board committee (No 4/2011) on 5 April 2011. We studied seventy children aged 2-12 years admitted to the 1-day surgery unit for unilateral orchidopexy.

All children were of ASA-1 anesthesia risk class. Patients who had bilateral orchidopexy or had respiratory, blood clotting disorder or had a known allergy to the study drugs were excluded from the study.

On the day of operation, the study purpose and details were explained to the parents of the children, they were instructed on how to monitor their children for the next 24 hours after surgery for the need for analgesics and possible complications such as itching, vomiting or respiratory depression. A signed informed consent was then obtained for each patient.

On arrival to the operating room, standard patient monitoring was established which included ECG, noninvasive blood pressure, pulse oximetry and capnography. For all patients, general anesthesia was induced by inhalation of oxygen, air and sevoflurane. After securing the intravenous line, propofol (2mg/kg) and fentanyl (1 µg/kg) were administered to facilitate laryngeal mask insertion. Anesthesia was maintained through spontaneous breathing of 2-3 % sevoflurane, air and oxygen. Intraoperative fluid management was provided by the administration of Ringer's lactate solution for necessary deficit volumes and maintenance rates.

Patients were randomly assigned to two groups of analgesia modalities. The first group (Group B) included patients who received a pre-incisional ilioinguinal / iliohypogastric nerve block (n=35), while the second group (Group M) received intravenous morphine analgesia (n=35).

Ilioinguinal and iliohypogastric nerve blocks in group B were performed by the anesthesiologist immediately after laryngeal mask insertion with 0.25 ml /kg Bupivacaine 0.5% administered using a short-beveled 23 G, 1.5 inch-long needle. Surgery was allowed to start at an average time of 10 minutes after the block. In group M, morphine (0.10 mg /kg) was administered intravenously and surgical incision was allowed after 10 minutes. Intravenous fentanyl of 1 µg/kg boluses were given if there is an elevation in blood pressure or heart rate of more than 20% of their baseline and the total number of additional fentanyl doses administered during the operation was recorded.

All the cases enrolled in the study had their surgery done by the same surgeon through inguinal and scrotal incisions and none of the operations lasted more than 45 minutes.

At the end of surgery, patients were transferred to the post anesthesia care unit (PACU) where they were monitored for 4 hours before discharge. Pain scores were recorded by specialized nurse on admission to PACU (0 minute), 1 hr, 2hrs, 3hrs and 4 hrs postoperatively using an objective pain score (OPS), which uses five criteria: localization of pain, movement, crying, agitation and posture[9]. Each criterion is given a score between 0 and 2, with 2 being the worst, yielding to a total score between 0 and 10. OPS pain scores of more than 4 were managed with rectal paracetamol (30 mg /kg).

Postoperative complications such as vomiting, itching, respiratory depression (decrease in oxygen saturation less than 95% on room air) were recorded by the same nurse, vomiting were treated with iv ondansetrone 0.15 mg/kg.

After 4 hours of PACU, the child was assessed by an anesthesiologist and discharged home if the patient is having an Aldrete discharge score of 9 or 10[10]. Parents were asked to assess the child regularly and to give acetaminophen syrup at a dose of 15 mg/kg, not more frequent than 4 hourly dosing limits if the objective pain score reached 4 or more and ibuprofen 5 mg/kg if the acetaminophen syrup was not adequate for pain control. Also the parents were asked to observe for vomiting, itching, inguinal hematoma and lower limb weakness.

After 24 hrs, parents were contacted by telephone by an anesthesiologist. In this interview, the time to first rescue analgesic dose, the total number of acetaminophen doses, the need for extra analgesics over 24 hrs and any complications (vomiting, itching, inguinal hematoma lower limb weakness) were recorded.

All the blocks were performed by the same anesthesiologist, the parents and all persons involved in postoperative management and data collection were blinded to the type of analgesia used.

Statistical Analysis

Statistical analysis was carried out using stat graphics centurion XV version 15.1.02 (statpoint Inc, USA). Values are expressed as either mean and standard deviations or number of observations and percentages. The demographic data of patients were studied for each of the two groups. Continuous covariates were compared using the t-test whereas for the categorical covariates, Fisher's exact test was used to compare the frequency of occurrence of vomiting and itching between the two study groups. A *P* value of ≤ 0.05 was considered to be statistically significant.

Results

A total of seventy patients were enrolled in the study in two groups. The two groups were identical for age, weight and duration of surgery (Table 1).

Table 1

*Demographic data**

	Group B (N=35)	**Group M (N=35)**	***P* value**
Age (years)	3.5 ±3.1	3.6 ±2.6	0.959
Weight (kg)	16.1±8.2	16.3±8.3	0.942
Duration of surgery (minutes)	41.9±8.2	42.5±10.5	0.776

* Data are presented as mean ± SD, Group B: Nerve block group, Group M: morphine group.
P<0.05 is considered significant.

Patients in the morphine group had a significant lower pain score than the block group on admission to the PACU and up to one hour after admission to the PACU (Table 2). There were no significant differences in pain scores between the two groups in the following 3 hour period of PACU stay (Table 2).

Table 2

Pain scores over 4 hours in postanaesthesia care unit in both groups

Time (minute)	**Group B**	**Group M**	***p* value**
0	1.6 ± 2.51	0.44 ± 1.18	0.015
60	1.54 ± 1.8	0.78 ± 1.1	0.035
120	1.66 ± 1.33	1.56 ± 0.84	0.70
180	1.83 ± 1.12	2.06 ± 0.59	0.29
240	2.46 ±1.09	2.44 ± 1.08	0.96

* Data are presented as mean ± SD.
P<0.05 is considered significant.

None of the seventy patients experienced respiratory depression but significantly more patients in the morphine group experienced vomiting and itching compared with the nerve block group (Table 3).

Table 3
*Frequency of complications observed during the first 24 postoperative hours**

Complication	Group B N(%)	Group M N(%)	*P* value
Vomiting number (%)	3(9%)	12(33%)	0.011
Itching number (%)	0(0%)	6(17%)	0.012

* Data are presented as mean ± SD.
P <0.05 is considered significant.

Intraoperatively, there were significantly more patients in the block group who required extra fentanyl doses than the morphine group (Table 4).

Table 4
*Perioperative analgesic requirements**

	Group B	Group M	P-value
% of patients needed extra fentanyl	34 %	8 %	0.007
Time to first analgesia (Minutes)	332 ± 255	431 ± 184	0.11
Number of paracetamol doses over 24 hours	3.19 ± 1.06	2.96 ± 1.07	0.74

* Data are presented as mean ± SD.
P <0.05 is considered significant.

During the first 24-postoperative hours, the use of oral paracetamol as a rescue analgesic drug after discharge from the PACU showed no difference between the two groups as well as no significant differences in the time to first required postoperative paracetamol dose and in the total number of paracetamol doses received over 24 hours (Table 4). 30% of patients in both groups required ibuprofen and none of patients in the block group had inguinal hematoma or lower limb weakness.

Discussion

Our study showed that both pre-incisional administration of 100 μg/kg intravenous morphine or ilioinguinal-iliohypogastric nerve block with 0.5% bupivacaine are effective and comparable in their post-operative analgesic effect after unilateral orchidopexy in children. Both analgesia modalities spared the need for rescue analgesia for a time period that exceeded the PACU stay. Also, the number of doses of the rescue analgesic drug in the first 24-postoperative hours was also comparable.

These results are consistent with the results of many studies which showed that the ilioinguinal / iliohypogastric nerve block with a local anaesthetic produced effective postoperative analgesia after unilateral orchidopexy with little need for postoperative analgesics[9,11], Intraoperatively, there was more need for fentanyl doses and this can be due to spermatic cord traction and testicular manipulations which was not adequately blocked by using the blind technique, however, in the adult population, several studies have demonstrated the benefit of spermatic cord block in inguino-scrotal surgery[12], while in pediatric patients, Blatt et al suggested in their retrospective study that there is a benefit when adding spermatic cord block to the ilio-inguinal block in the standard inguinal orchidopexy[13], In other studies, it was found that when using ultrasonography for ilioinguinal /iliohypogastric nerve blocks in children, the additional fentanyl doses were necessary only in 4% of patients compared to 34 % of our patients who had the nerve block using the blind technique[14].

Transient femoral nerve palsy[15] has been reported as complication of the ilioinguinal /iliohypogastric nerve block technique. None of our patients had complications related to the block procedure that may affect the reliability of our findings.

Use of narcotics can be associated with many side effects which may limit its use in 1-day- case procedures. Khalil et al, compared fentanyl (2 μg/kg) and caudal blocks for orchidopexy and showed a decrease in oxygen saturation in the postoperative period in the opioid group, compared to children who received caudal analgesia[16]. However in our study, we used a smaller dose of fentanyl (1 μg/kg) and

morphine (100 µg/kg) during induction. None of our patients experienced a decrease in oxygen saturation in the postoperative period.

Vomiting was a common side effect of morphine in our study where more than third of the patients in the morphine group had postoperative emesis. In another study on pediatric patients with inguinal surgeries[17], it was found that the incidence of postoperative emesis after single dose of morphine (100 µg/kg) was 56%. This difference may be due to the difference in the anesthesia technique which was used where used nitrous oxide, halothane and neostigmine were used during the intraoperative period.

The limitation of the current study is that we did not assess the severity of post-operative pain at home due to practical difficulties. As a surrogate to home pain indicator, we used the number of doses of rescue analgesic drug consumed which depends on the parent's observations and judgment, The two groups of patients in our trial were not different in their post-operative analgesia requirements at home in the first 24 hours and there was need for NSAID in a significant percentage of patients of both groups.

In conclusion, we found that ilioinguinal / iliohypogastric nerve block and intravenous morphine administered following general anesthesia for unilateral orchidopexy in 1-day surgery unit are safe and effective in controlling the postoperative pain. Morphine analgesia had a higher incidence of postoperative vomiting and itching.

Acknowledgements

We are grateful to the members of the nursing staff of the Day Surgery Unit, Jordan University Hospital, and to the anesthesiologist and surgeons who assisted in the collection of our data.

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