

## Comparison between General Anesthesia and Epidural Anesthesia in Inguinal Herniorrhaphy Regarding the Incidence of Urinary Retention

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Received date: March 02, 2016; Accepted date: April 18, 2016; Published date: April 22, 2016

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### Abstract

**Background:** Inguinal herniorrhaphy is among the most common type of surgeries in adults. One of the important side effects of herniorrhaphy is post-operative urinary retention (UR). The incidence of urinary retention after herniorrhaphy may vary depending on the method of anesthesia.

**Methods:** This is a double blind randomized clinical trial conducted on 80 patients undergoing inguinal hernia repair. Half of the cases were generally anesthetized (GA) and the other half underwent continuous lumbar epidural anesthesia (EA). The epidural catheter was inserted before the procedure and remained for 24 hours post-operative period. The need for urinary catheterizing either in post anesthetic care unit (PACU) or in ward was compared between two groups, beside the incidence of urination in, the mean interval between the end of surgery and first urination. Also the duration of the surgery, length of PACU admission, surgeon and patients satisfaction with the method of their anesthesia was compared between the groups.

**Results:** The incidence of urination in PACU was one patient (2.5%) in EA and 5 patients (12.5%) in GA (P=0.09). The mean interval between the end of surgery and first urination was  $3.40 \pm 2.30$  in EA and  $3.06 \pm 2.50$  in GA (P=0.2). The incidence of urinary retention in PACU was 4 patients (10%) in EA and one patient (2.5%) in GA (P=0.1).

**Conclusion:** According to this study the incidence of urinary retention is not higher in epidural anesthesia compared with general anesthesia according to statistical significance.

**Keywords:** Urinary retention; General anesthesia; Epidural anesthesia; Inguinal hernia repair

patients undergoing herniorrhaphy either with general or epidural anesthesia.

### Introduction

Inguinal herniorrhaphy is among the most common type of surgeries in adults [1-5]. The cause of this event is abdominal wall defect due to loss of strength in inguinal area [1-5]. The patients undergoing hernia repair surgeries are in older ages and choosing appropriate method of anesthesia is very important for them, because they may have some underlying disease [1,3]. The policy of most medical centers is short period of admission and early discharge for this type of surgery and because of that these centers are trend to employ regional methods of anesthesia obviating the risks of general anesthesia [1,6-13]. One of the important side effects of herniorrhaphy is post-operative urinary retention (UR) [13,14]. Postoperative urinary retention is defined as any situation in which patient develops with voiding difficulty and the incidence of this problem may increase in advanced age [15-19]. On the other hand UR may be side effect of the method of anesthesia [19-22]. There is no double blind clinical trial in literature comparing the incidence of UR between general and epidural anesthesia, which are both two common methods of anesthesia for herniorrhaphy. In this study we compared the incidence of UR in

### Methods

This is a double blind randomized clinical trial which is conducted on eighty patients undergoing herniorrhaphy in Imam Khomeini General Hospital between March 2014 and March 2015. The patients were otherwise healthy subjects with unilateral or bilateral inguinal hernia which were scheduled for surgical intervention. All of the patients aged between 30- 50 years old. The cases were randomly assigned into two age and sex matched groups by using code numbers kept in sealed envelopes by a secretary not involved in the study, the codes were computer random generated. One group underwent herniorrhaphy by general anesthesia (GA) and the other group underwent herniorrhaphy by epidural anesthesia (EA). Inclusion criteria was need for inguinal hernia repair surgery and exclusion criteria was any underlying disease that needs special anesthetic consideration, age lower than thirty and higher than fifty, any history of previous urinary retention for any cause and history of benign prostatic hypertrophy in males, any anatomical problem in lumbar spine that makes epidural anesthesia difficult, obesity with body mass index higher than 30, and patient's refusal for epidural anesthesia. Any

event of hemodynamic instability during the procedure and in PACU was considered to exclude the patient from study. Institutional ethics committee and patients informed consent was obtained before the study.

According to similar studies the incidence of UR was 8-15 percent post-operative period [15-19], and with this data we considered 10 pilot cases:  $n = \frac{Z^2}{1 - \frac{\alpha}{2}} pq/d^2$

$$\alpha=0.05$$

$$Z_{1-\alpha/2}=1.961150776$$

$$d=0.18$$

$$p=0.08$$

$$n=9$$

And with the result of pilot study the sample size was determined for this clinical trial, by considering no incidence of UR in GA and 20 percent in EA according to previous studies and estimating 10 percent

$$\text{loss to follow up: } n = \left( Z_{1-\frac{\alpha}{2}} + Z_{1-\beta} \right)^2 \frac{pq}{(P_1 - P_2)}$$

$$\alpha=0.05$$

$$\beta=0.2$$

$$Z_{1-\alpha/2}=1.96$$

$$Z_{1-\beta}=0.84$$

$$p_1=0$$

$$p_2=0.2$$

$$n=36$$

All the patients voided before performance of anesthesia. In GA after premedication with midazolam (0.02 µg/kg) and fentanyl (2 µg/kg), induction of anesthesia was performed by NA-thiopental (5 mg/kg) and atracurium (0.6 mg/kg) and proper size of endotracheal tube was applied for all patients. The anesthesia was maintained by 1.2-1.5% isoflurane. Fentanyl and atracurium were repeated in 30 minutes intervals as needed. At the end of the procedure the muscle relaxant reversed in the operative room and patients were extubated before transferring to post anesthetic care unit (PACU). In EA epidural anesthesia performed for all patients by the same anesthesiologist in sitting position and at the L3-L4 level. All Epidural Kits were no 18, provided by Sepanomed Medical Company. Bupivacaine 0.5% (15-20 ml) was administered in the beginning and after achieving the desired level of epidural anesthesia all patients received intravenous sedation by midazolam (2 mg). Epidural injection was repeated in one hour interval as needed. At the end of the surgery the patients were transferred to PACU by remaining the epidural catheter in place. The administered intravenous fluid in both groups was exactly recorded [23,24].

The study one site double blinded because neither the patient and nor the nurse who collected the data were informed about the details of the study. The same nurse, who completed the data sheets for all patients, visited them in the surgery ward when all the patients were ready for discharge, she used anesthetic and PACU sheets to complete the data beside a brief interview with the patients. The length of

hospital staying was recorded for each patient, too. All the interventions in PACU including urinary catheterization was recorded in data collection sheet, this sheet also included patient's age, sex, the extent of surgery (unilateral or bilateral herniorrhaphy), duration of the surgery, length of PACU admission, time of first urination in PACU, and patients satisfaction with the method of their anesthesia. We also asked the surgeon to indicate in his operation report whether he was satisfied with the method of anesthesia or not. The patients were discharged from PACU according to Alderete's PACU discharge scoring system [25]. The first episode of urination was recorded by time in their chart either in PACU or in surgery ward. For those patients who had UR, and needed urinary catheterization, several ward visits by an anesthesiologist, who was not involved in the research team, was considered and either the time of first urination or any episodes of urinary catheterization was recorded in their chart too.

At the end of the study data were entered in SPSS software version 16 (SPSS Inc., Chicago, IL, USA), as cod sheet and master sheet. Student's t test and chi-square test were employed for data analysis. The power of this study was 99% and P value ≤ 0.05 was considered statistically significant.

## Results

Forty individuals recruited in each study group in this clinical trial as defined. There was no incidence of hemodynamic instability during the surgery and post-operative period in both groups.

There were 38 (95%) male and 2 (5%) female patients in GA, and 39 (97.5%) male and 1 (2.5%) female patients in EA (P=0.6).

The mean age of the patients was 47.55 ± 6.9 and 48.10 ± 5.9 in GA and EA respectively (P=0.7).

The mean weight of the patient was 78.52 ± 12.58 Kg in GA and 79.65 ± 13.00 Kg in EA (P=0.4).

The extent of surgery was also statistically identical in both groups, in GA 36 (90%) patients had bilateral inguinal hernia and in EA 35 (87.5%) patients had bilateral inguinal hernia (P=0.7).

The mean amount of intravenous fluid administered was 1.45 ± 6.2 liter and 1.40 ± 0.20 liter in GA and EA respectively (P=0.2).

The length of PACU staying was 0.9 ± 0.39 hour for GA and 1.29 ± 0.56 hours for EA (P=0.004).

The period of hospital staying was 1.44 ± 0.62 days for GA and 1.43 ± 0.63 for EA (P=0.9).

The interval between adequate level of anesthesia and start of operation was 26.37 ± 2.34 minutes for EA and 14.32 ± 1.96 minutes for GA (P=0.001) (Table 2).

|   | GA           | EA           | P value   |
|---|--------------|--------------|-----------|
| Bilateral inguinal hernia                         | 36 (90%)     | 35 (87.5%)   | (P=0.7)   |
| Intravenous fluid (L)                             | 1.45 ± 6.2   | 1.40 ± 0.20  | (P=0.2)   |
| PACU staying (hrs.)                               | 0.9 ± 0.39   | 1.29 ± 0.56  | (P=0.004) |
| Hospital staying (day)                            | 1.44 ± 0.62  | 1.43 ± 0.63  | (P=0.9)   |
| Interval between anesthesia & operation (minutes) | 14.32 ± 1.96 | 26.37 ± 2.34 | (P=0.001) |

|   |             |             |          |
|---|-------------|-------------|----------|
| Interval between operation & first urination (hrs.) | 3.06 ± 2.50 | 3.40 ± 2.30 | (P=0.2)  |
| First urination in PACU                             | 5 (12.5%)   | 1 (2.5%)    | (P=0.09) |
| Urinary retention                                   | 1 (2.5%)    | 4 (10%)     | (P=0.1)  |
| Patient's satisfaction                              | 38 (95%)    | 37 (92.5%)  | (P=0.6)  |
| Surgeon's satisfaction                              | 38 (95%)    | 38 (95%)    | (P=0.9)  |

**Table 2:** Compared variables between two groups.

The mean interval between conclusion of operation and first episode of urination was 3.06 ± 2.50 hours for GA and 3.40 ± 2.30 hours for EA (P=0.2).

About 5 patients in GA (12.5%) and 1 patient in EA (2.5%) had their first episode of post-operative urination in PACU (P=0.09).

The incidence of urinary retention was 1 (2.5%) patient in GA and (4%) patients in EA (P=0.1).

Thirty eight (95%) patients had satisfaction with the method of their anesthesia in GA and thirty seven (92.5%) patients in EA (P=0.6).

The surgeon was satisfied with the condition provided by anesthesia in 38 (95%) cases in GA and the same number in EA (P=0.9).

## Discussion

Nowadays, inguinal hernioplasty is generally a widely performed surgery in Iranian population. Day surgery of this type of surgery has been significantly expanded in last decay, because by application of it's less interference on patients daily activity and a faster it's faster recovery [1- 5]. To aim early ambulation of patients and sufficient pain control many centers prefer to apply regional techniques of anesthesia for this procedure especially in older population. Many studies are designed to confirm that regional methods of anesthesia including neuraxial blocks are acceptable or even preferable methods of anesthesia in this setting [6-13]. UR may delay discharge and in recent years different studies were designed to purpose a method of anesthesia for herniorrhaphy that may have lower incidence of urinary retention [13]. Previous studies compared the incidence of post-operative UR in general and regional anesthesia and most of these studies showed that the incidence of UR was much more in regional anesthesia [19-22], but some studies refused to confirm this result [23,24].

This randomized clinical trial was conducted on 80 patients in two equal, age and sex matched study groups which were similar with respect to demographic characteristics and showed no statistically significant difference. The extent of herniorrhaphy (P=0.7), the mean length of operation (P=0.3) and hospitalization (P=0.9) was statistically similar in both groups, too. The same result was obtained in previous studied comparing neuraxial block and general anesthesia for inguinal herniorrhaphy (Table 1) [13].

|           | GA          | EA          | P value |
|-----------|-------------|-------------|---------|
| Age       | 47.55 ± 6.9 | 48.10 ± 5.9 | 0.7     |
| Sex (F/M) | 2/38        | 1/39        | 0.6     |

|             |               |               |     |
|-------------|---------------|---------------|-----|
| Mean Weight | 78.52 ± 12.58 | 79.65 ± 13.00 | 0.4 |
|-------------|---------------|---------------|-----|

**Table 1:** Demographic characteristic of groups.

As expected according to previous studies the mean period of PACU admission was longer in EA group, (P=0.004). The mean interval between proper level of anesthesia and start of operation was longer in EA, due to time consumption for performing epidural procedure (P=0.001). By applying spinal and epidural techniques patients benefit from avoiding muscle relaxants and endotracheal intubation, but they will experience slow recovery of motor and sensory function, longer PACU admission period [11,13].

There was no study in literature to compare the incidence of UR between EA and GA in herniorrhaphy, but according to the studies comparing different methods of regional anesthesia with general anesthesia the incidence of post-operative UR was higher by applying neuraxial blocks [19-22]. This is because of that neuraxial local anesthetic injection blocks detrusor muscle that causes bladder over distention, and as a result urinary retention develops [26]. But some studies refused to confirm this event [23,24]. In this study we detected UR in 10% of patients in EA and 2.5% of patients in GA, this finding was not statistically significant (P=0.1) and this is in the setting that the amount of administered intravenous fluid was similar in both groups (P=0.2). Among the patients in EA one patient (2.5%) and in GA five patients (12.5%) had voluntary urination in PACU (P=0.09) which was not statistically important. The interval between conclusion of operation and first episode of urination was longer in EA but this was not statistically significant. This result may be justifiable because all we know that general anesthesia may lead to urinary retention due to bladder atony as a result of muscle relaxation and interfering with autonomic regulation of detrusor muscle tone [27].

Both patients and surgeons satisfaction from the method of anesthesia was identical in the two study groups and it was not statistically significant (P=0.9).

It seems that employing epidural anesthesia will not result in higher incidence of UR in comparison with GA in inguinal herniorrhaphy surgery. And beside acceptable hemodynamic condition and feasibility of its performance we can consider using epidural anesthesia for herniorrhaphy surgery to obviate risks of general anesthesia, and to benefit from its post-operative analgesic properties, especially in older subjects [1,28-30]. The brief elongation of recovery period and anesthesia establishment is acceptable due to several advantages of neuraxial methods for herniorrhaphy [1,13,28-30].

We suggest further studies by using quantified methods like measuring bladder contents with ultrasound in larger number of cases to confirm this result.

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