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Ilioinguinal/Iliohypogsstric Nerve Block Vs General Anesthesia in Varicocelectomy Surgery

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Abstract

This observational retrospective study compared two anesthetic techniques—general anesthesia (GA) and regional anesthesia (RA) with ultrasound-guided(us) ilioinguinal/iliohypogastric nerve block—in patients undergoing sub-inguinal microsurgical varicocelectomy.

The primary objectives were to evaluate the time to first postoperative mobilization and spontaneous urination. Secondary outcomes included acute and chronic postoperative pain and anesthesia-related side effects. The study included 124 male patients divided into two groups (62 in each).

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Results showed that RA was associated with shorter times to mobilization and urination, as well as lower acute postoperative pain levels, particularly in the first hour and morning after surgery, compared to GA. There were no significant differences in chronic pain, and no patients developed chronic postsurgical pain (CPSP). Both anesthesia techniques were effective and without complications, but RA demonstrated superiority in reducing acute postoperative pain and facilitating recovery.

Despite limitations such as the small, single-center sample, the findings support the use of RA for better postoperative pain management in varicocelectomy procedures. Further randomized controlled trials are recommended to validate these results.

Keywords

General anesthesia; Varicocelectomy surgery; Nerve block.

Introduction

A varicocele is an abnormal dilatation and tortuosity of the veins of the spermatic cord [1]. It can result in disordered spermatogenesis, germ cell sloughing within the seminiferous tubules, testicular atrophy and decreased testosterone secretion, leading to decreased testicular function [2]. Varicocele occurs in approximately 19 to 41% of men with primary infertility and in 45 to 81% of men with secondary infertility [1,3-5].

The sub-inguinal microsurgical (Marmar) varicocelectomy is the most common surgical procedure [6] with the advantage of preserving the arterial flow; [7] it combines microdissection of the spermatic cord at the external inguinal ring, ligation of the dilated veins and controlled sclerosis of small cross-collateral veins.

The Marmar technique is routinely performed in a day surgery regimen (DS); therefore, anesthetic techniques should ensure a rapid recovery and mobilization, minimal postoperative nausea and vomiting (PONV), dizziness or drowsiness and postoperative pain control; [8,9] moreover it should prevent the risk of chronic post-surgical pain (CPSP) [10].

The aim of the following observational study was to compare two anesthetic techniques used in our hospital in patients undergoing sub-inguinal microsurgical varicocelectomy:

- General anesthesia (group A)
- Regional anesthesia with the ultrasound-guided ilioinguinal/iliohypogastric nerve block (group B)

The primary goal was to verify in these groups the elapsed time between the induction of anesthesia and the time of first postoperative mobilization and time of first spontaneous urination.

Secondary aims were to compare:

- Differences in the onset of acute post-operative pain
- Differences in the onset of chronic pain -1 month and 3 months follow-up-

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- Anesthesia-related side effects (i.e. PONV, dizziness, drowsiness).

Materials and Methods

Our trial was an observational retrospective study, approved by the local research ethics committee of the Health Unit of Varese (Italy). The study was conducted at Ospedale di Circolo e Fondazione Macchi (Varese, Italy). Written informed consent was obtained from all patients or their legal surrogates.

All participants fulfilled following inclusion criteria: male patients over the age of 18; American Society of Anesthesiologists (ASA) physical status I – II; scheduled varicocele correction with Marmar technique. Patients who met following criteria were excluded: postoperative transfer to the Intensive Care Unit; regular or long-term opioid use or opioid abuse; coagulopathies and bleeding disorders; NSAIDs assumption within 5 days before hospital admission; severe renal or liver failure; neurocognitive disorders and psychiatric diseases.

All patients underwent pre-operative evaluation. The information recorded included gender, age, level of education in years, race, employment (yes/no), BMI (kg/m2), heart rate (HR), systolic blood pressure (SBP), diastolic blood pressure (DBP), and oxygen arterial saturation (SaO2%).

A total of 124 patients were enrolled and then divided into two groups based on the type of anesthesia:

- General anesthesia -group A: 62 patients
- Regional anesthesia (ultrasound-guided ilioinguinal and iliohypogastric nerve block) – group B: 62 patients

Only 1 patient was excluded because of surgery wound infection resulting in a 7 days long hospitalization. Peripheral venous access was obtained and premedication with i.v. midazolam (0.03 mg/Kg) was performed in each patient from 10 to 15 minutes before the anesthetic procedure.

During surgery, the vital and respiratory parameters (HR, BP, SaO2% and EtCO2) were monitored; if the recorded values were greater or less than 30% of the baseline parameters, appropriate supportive and pharmacological treatments were initiated to correct the values. Each patient received intraoperative crystalloid loading at 5 ml/kg/h in the first 3 hours after surgery.

Group A: 62 patients receiving general anesthesia (GA)

The anesthesiologist-in-charge was free to choose what kind of anesthetic regimen to use for each patient. After the induction of GA and the insertion of a laryngeal mask the ventilator was set with pressure support ventilation. Anesthesia was maintained by sevoflurane (MAC 0.8) or by a TIVA (BIS 40-60). The peri-operative pain management was obtained with 1g of acetaminophen IV plus 30 mg of ketorolac IV if the NRS score was ≥ 5 after awakening from anesthesia. 4 mg of ondasentron IV and 4 mg of dexamethasone IV were given as antiemetic therapy.

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Anaesthesia Induction	n (%)	Anaesthesia Maintenance	%	Intraoperative Analgesics	%
Fentanyl 1 mcg/kg	77	Sevoflurane	42	Acetaminophen 1g	100
Remifentanil 0.1 mcg/kg/min	23	TIVA	58	Keteorolac 30mg	31
Propofol 2 mg/kg	100				

Table 1: Anesthesia and pain killers.

Group B: 62 patient receiving regional anesthesia (RA)

A USG-Ilioinguinal/Iliohypogastric Nerve Block was performed bilaterally using a 22-gauge 50mm atraumatic Sprotte-type needle for peripheral nerve block. Under aseptic conditions, a linear ultrasound probe (10-12 MHz) was used to identify the abdominal wall muscles.

The probe was placed oblique, along a line joining the anterior superior iliac spine (ASIS) and the umbilicus; then the external oblique (EOM), internal oblique (IOM), and transversus abdominis (TAM) muscles were identified. The ilioinguinal (II) and the iliohypogastric (IH) nerves were expected to lie within the fascial plane between the transverse abdominis and internal oblique muscles above the ASIS.

Once the two nerves where the needle was inserted in plane towards the fascial sheath of the internal oblique and transverse abdominis muscle layers. 15 ml of 0,5% levobupivacaine were injected, surrounding the II/IH nerves. At the end of surgery 1g of acetaminophen IV was given to all patients.

After the surgical procedure, each patient included in the trial was assessed every 60 minutes for the first 3 hours (T1, T2, T3); every 12 hours for the first 3 days (I T8/IT20, II T8/IIT20, III T8/IIIT/20); at one month and three months after surgery.

The antalgic therapy planned for the first 3 days after discharge consisted of 37.5 mg Tramadol/325 mg Acetaminophen orally once daily. Rescue therapy was 10 mg ketorolac (maximum 2 tablets daily). The patients were evaluated at the urology clinic four days after surgery. A telephonic evaluation was performed by a clinician on the 30th, 90th and 150th day after surgery.

The following variables were evaluated:

- Elapsed time between induction of anesthesia and first spontaneous urination
- Elapsed time between induction of anesthesia and mobilization
- The acute incident pian (NRSm) and resting pain (NRS) and the occurrence of PONV or itching 3 hours
- NRS, NRSm twice daily (8am and 20pm) and any type of complications in the first 3 days
- NRS, NRSm and any type of complications after one, three and five months

Statical Analysis

We analyzed data calculating mean values and standard deviations of BMI, age, time passed between the end of surgery and mobilization/spontaneous urination of both groups. We perform a t-test to see if there was a statistically significant difference between groups, setting alpha of 0.05. We analyzed data about pain calculating the percentage of patients who reported NRS ≥ 5 and perform a chi-square to determine if there was a statistically significant difference between groups, $p<0.05$. All data are reported in Table 2.

	Group A	**Group B**	**t-student**	**p value**
	mean ± SD	**mean ± SD**		
BMI (kg/cm^2)	22,5 ± 3,0	21,8 ±2 ,8	1,34	0,18
AGE (yrs)	27,2 ± 7,9	26,9 ± 7,8	0,21	0,83
Mobilization (min)	225,3 ± 53,4	184 ± 67,8	3,77	**0,0003**
Urination (min)	228,7 ± 49,3	187,2± 58,4	4,27	**0,000038**
	Group A	**Group B**	**chi-square**	**p value**
	n; %	**n; %**		
NRS T0 ≥ 5	2;3	1;2	0,56	<0.05
NRSm T0 ≥ 5	12;19	1;2	10,40	**0,0013**
NRS T1 ≥ 5	2;3	1;2	0,56	>0.05
NRSm T1 ≥ 5	3;5	2;3	0,64	>0.05
NRS T3 ≥ 5	0;0	0;0	/	/
NRSm T3 ≥ 5	0;0	1;2	/	/
NRS I T8 ≥ 5	17;27	7;11	5,17	**0,02**
NRSm I T8 ≥ 5	29;47	18;29	4,15	**0,04**
NRS I T20 ≥ 5	7;11	5;8	0,37	>0.05
NRSm I T20 ≥ 5	17;27	15;24	0,17	>0.05
NRS II T8 ≥ 5	4;6	2;3	0,70	>0.05
NRSm II T8 ≥ 5	9;15	5;8	1,29	>0.05
NRS II T20 ≥ 5	4;6	2;3	0,70	>0.05
NRSm II T20 ≥ 5	7;11	3;5	1,74	>0.05
NRS III T8 ≥ 5	5;8	1;2	2,80	>0.05
NRSm III T8 ≥ 5	2;3	2;3	1,00	>0.05
NRS III T20 ≥ 5	2;3	0;0	/	/
NRSm III T20 ≥ 5	4;6	2;3	0,40	>0.05
NRS 1stmonth	0;0	0;0	/	/

NRS 3rdmonth	0;0	0;0	/	/
NRS 5thmonth	0;0	0;0	/	/
	Group A	**Group B**		
	n; %	**n; %**		
Nausea	0;0	0;0		
Itching	0;0	0;0		
Any complications	1;2	1;2		

Table2: Studied variables and statistical analysis

No significant differences were recorded in terms of epidemiological variables (ASA, age, BMI) between the two groups. There was a significant difference regarding mobilization and spontaneous urination after surgery with a shorter time in group A compared with group B ($p<0.05$). Group A reported a pain level always equal or higher than group B, with a significant difference after 1 hour and the morning of first day after surgery ($p<0.05$).

No patients in either group exhibited PONV and itching. One patient in each group had a perioperative complication, in group A it was reported urinary tract infection, in group B a testicular hematoma.

Discussion

Groups were epidemiologically comparable. Both anesthesia techniques routinely used for varicocele repair were valid in our study, with no complication due to anesthesia, no PONV nor itching after surgery. There was a statistically significant difference between two groups in terms of time of first postoperative mobilization and first spontaneous urination.

Postoperative pain showed a statistically significant difference in group A and B: regional anesthesia group had a lower NRS/NRSm than general anesthesia one, particularly after the first postoperative hour and the morning of the first day. There were no differences regarding postoperative pain at 1,3 and 5 months: none of the patients developed CPSP.

These results support the strategy of multimodal analgesia/anesthesia, including also RA techniques, which also has a role in reducing postoperative hyperalgesia and thus the onset of chronic pain, according to literature [12,13]. Persistent pain data may be very interesting since many recent trials aim at finding a correlation between acute postoperative pain and regional anesthesia, to demonstrate the efficacy of a long-term pain relief in case of ultrasound guided nerves block anesthesia [11].

We can affirm that regional anesthesia appears better than general anesthesia concerning our primary study goal. For sure ilioinguinal/iliohypogastric nerve block guarantees less complications and offers several advantages over general analgesia, it maintains the patients awake in spontaneous breathing, permitting to perform a safe anesthesia also in patients with lots of comorbidities.

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Additionally, it can be safely brough off even by less experienced anesthesiologists, as it has a very rapid learning curve thanks to the use of ultra-sound [12]. The collected data agree with what was stated by the literature: the use of regional anesthesia seems to reduce the acute inflammatory response and the early production of cytokines/markers involved in central sensitization which leads to the onset of acute post-operative pain [13].

Based on the results of the study we can affirm that RA seems to be superior compared to GA in varicocelectomy surgery. However, the mayor limitations of our study are that it was conducted in a single center, involving a small number of patients, all of whom were ASA I-II; additionally, there was noticeable heterogeneity in intra-operative strategy management in the group who underwent general anesthesia.

Despite these limitations, our observational study leads to prefer regional anesthesia, to optimize postoperative pain management, according with previous RCTs [14].

Conclusion

Based on our study findings, we suggest performing ilioinguinal/iliohypogastric nerve block for intraoperative and postoperative pain control. It offers as a starting point for future RCTs with a larger sample size involving multiple centers, enhance the generalizability and robustness of the results, providing a clearer understanding of the efficacy of RA in preventing CPSP in patients undergoing sub-inguinal microsurgical varicocelectomy.

Author Contributions

Andrea Luigi Ambrosoli and Silvia Agrati planned the presented study. Andrea Ambrosoli supervised the work. Silvia Agrati contributed to the design and implementation of the research, to the analysis of the results and to the writing of the manuscript and performed the statistical analysis. All authors discussed the results and contributed to the final manuscript.

Conflict of Interest and Grant Information

All the authors declare no conflict of interests. The authors received no specific funding for this work.

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