The effect of spinal anesthesia on oxygen saturation

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ملخص البحث:

يتناول البحث تأثير التخدير النصفي على نسبة تشبع الأوكسجين بالدم حيث طبق هذا البحث على ٣٠ مريض أعطوا نفس الجرعة من مادة الزايلوكين (٥%) ٧٥ ملغم وبنفس الطريقة لمختلف العمليات لكلا الجنسين في مستشفى الصدر التعليمي في النجف الاشرف .

من خلال هذا البحث لاحظنا أن تأثير التخدير النصفي على تشبع الأوكسجين بالدم قليلة وفي بعض الحالات غير مؤثرة .من هذا البحث نستنتج أن التخدير النصفي هو الطريقة المفضلة للأشخاص الذين يعانون من أمراض جهاز التنفسي المزمنة وخاصة للعمليات التي تجرى تحت منطقة السرة.

Abstract:

Objective: my project study the effect of spinal anesthesia on oxygen saturation.Design: case series study. Setting:ALsader teaching hospital ,Najaf ,Iraq, during the period from 5\1\2009 to 1\7\2009.Patient and method: this project applied on 30 cases, give them the same dose of lidocaine isobaric 5% (75mg) in same anesthetic technique in different types of surgery in both sex.

Result: from this project we see the effect of spinal anesthesia on oxygen saturation is little and in some cases not significant .Conclusion :from this project conclude the spinal anesthesia is anesthetic of choice in patient suffering from chronic respiratory disease and in any operations below the umbilicus.

Introduction:

Spinal anesthesia:

Also called **sub-arachnoid block** (**SAB**), is a form of regional anaesthesia involving injection of a local anaesthetic into the cerebrospinal fluid (CSF), generally through a fine needle, usually 3.5 inches (9 cm) long. For extremely obese patients, some anaesthesiologists are known to prefer spinal needles which are seven inches (18 cm) long. The tip of the spinal needle should, theoretically, have a short or small bevel. Recently pencil point needles have been made available (Whitacre, Sprotte, & others).

There are hyperbaric, isobaric and hypobaric solutions of anesthetics to choose for the spinal anesthesia. Usually, the hyperbaric is chosen, as its spread can be effectively and predictably controlled by the anaesthesiologist, by tilting the patient.

Regardless of the anaesthetic agent (drug) used, the desired effect is to block the transmission of nerve signals to and from the affected area. Sensory signals from the site are blocked, thereby eliminating pain, and motor signals to the area eliminate movement. In effect, the result is total numbness of the area and paralysis. This allows surgical procedures to be performed with little or no sensation whatsoever to the person undergoing the procedure, and provides a still patient or area for the surgeon to work on.

Baricity is used in anaesthesia to determine the manner in which a particular drug will spread in the intrathecal space. Hyperbaric solutions (for example, hyperbaric bupivacaine) are made heavy by adding dextrose to the mixture.

Oxygen saturation:

Oxygen saturation or **dissolved oxygen** (DO) is a relative measure of the amount of oxygen that is dissolved or carried in a given medium. It can be measured with a dissolved oxygen probe such as an oxygen sensor or an optode in liquid media, usually water.

oxygen saturation (S_{O2}), commonly abbreviated as "sats", measures the percentage of hemoglobin binding sites in the bloodstream occupied by oxygen. At low partial pressures of oxygen, most hemoglobin is deoxygenated. At around 90% (the value varies according to the clinical context) oxygen saturation increases according to an oxygen-hemoglobin dissociation curve and approaches 100% at partial oxygen pressures of >10 kPa. A pulse oximeter relies on the light absorption characteristics of saturated hemoglobin to give an indication of oxygen saturation. An Sa_{O2} (arterial oxygen saturation) value below 90% causes hypoxemia (which can also be caused by anemia). Hypoxemia due to low Sa_{O2} is indicated by cyanosis.

Venous oxygen saturation (Sv_{O2}) is measured to see how much oxygen the body consumes. Under clinical treatment, a Sv_{O2} below 60%, indicates that the body is in lack of oxygen, and ischemic diseases occur. This measurement is often used under treatment with a heart-lung machine (Extra Corporal Circulation), and can give the perfusionist an idea of how much flow the patient needs to stay healthy.

Tissue oxygen saturation (St_{O2}) can be measured by near infrared spectroscopy. Although the measurements are still widely discussed, they give an idea of tissue oxygenation in various conditions.

Saturation of peripheral oxygen (Sp_{O2}) is an estimation of the oxygen saturation level usually measured with a pulse oximeter device.

Pulse oximetry: is a non-invasive method allowing the monitoring of the oxygenation of a patient's hemoglobin.

A sensor is placed on a thin part of the patient's anatomy, usually a fingertip or earlobe, or in the case of a neonate, across a foot, and a light containing both red and infrared wavelengths is passed from one side to the other. Changing absorbance of each of the two wavelengths is measured, allowing determination of the absorbances due to the pulsing arteria blood alone, excluding venous blood, skin, bone, muscle, fat, and (in most cases) fingernail polish.[1] Based upon the ratio of changing absorbance of the red and infrared light caused by the difference in color between oxygen-bound (bright red) and oxygen unbound (dark red or blue, in severe cases) blood hemoglobin, a measure of oxygenation (the per cent of hemoglobin molecules bound with oxygen molecules) can be made.

Patients and method:

The of 30 cases of ASA I to III, both sexes,different surgeries all of them below the umblicus ,they were selected randomly from patients who admitted to the surgical ward at Alsader teachimg hospital ,during period from 5\1\2009 to 1\7\2009 ,same anesthetic technique(lidocaine 5%-75 mg) and the same level L3-L4 ,same gauge of spinal needle (22) and all patients premedicated with atropine (0.5 mg) and preloaded with 500 ml of crystaloid solution.These data are analysed and studied to know the effect of spinal anesthesia on oxygen saturation by using pulse oximetry for its monitoring .Statistical analysis done to know the significanse of these data completely.

Result:

Table (1) :To show different data about the cases related to spo2.

Case	Age	Sex	Type of surgery
1	37	M	Anal fistula
2	18	M	Hydrocile
3	40	M	Orcidectomy
4	34	M	Uretral catheter
5	68	M	Vesicle stone
6	27	M	Double J-catheter
7	30	M	Double J-catheter
8	23	M	Optical urethra
9	50	F	Cystoscopy
10	24	M	Hydrocile
11	45	F	Cystoscopy
12	24	M	Cystoscopy
13	25	M	Varicosile
14	29	M	Cystoscopy
15	60	M	Cystoscopy
16	35	M	Cystoscopy
17	50	M	Cystoscopy
18	28	M	Varicosile
19	59	M	Prostectomy
20	75	M	Cystoscopy
21	39	M	Cystoscopy
22	24	M	Cystoscopy
23	45	M	Varicosile
24	70	M	Cystoscopy
25	40	M	Cystoscopy
26	30	M	Varicosile
27	27	M	Varicosile
28	62	M	Double J-catheter
29	75	M	TURT
30	57	M	Double J-catheter

Table (2) :To show the changes of spo2 with spinal anesthesia without oxygen supplement

Case	Spo2 before spinal anesthesia	Spo2 after spinal anesthesia
1	96%	95%
2	99%	99%
3	99%	97%
4	98%	98%
5	98%	98%
6	99%	99%
7	99%	99%
8	98%	98%
9	98%	98%
10	99%	99%
11	99%	99%
12	98%	98%
13	98%	98%
14	98%	98%
15	97%	97%
16	99%	99%
17	99%	98%
18	99%	99%
19	96%	97%
20	97%	96%
21	99%	99%
22	99%	99%
23	95%	99%
24	97%	97%
25	98%	98%
26	96%	99%
27	99%	99%
28	97%	97%
29	98%	99%
30	99%	99%
Mean	98%	98%

Parameter	Spo2 before spinal anesthesia	Spo2 after spinal anesthesia	P-value
M ± SD	98% ± 0.011447	98% ± 0.010417	p>0.05

P- value (NS)

NS=non significant

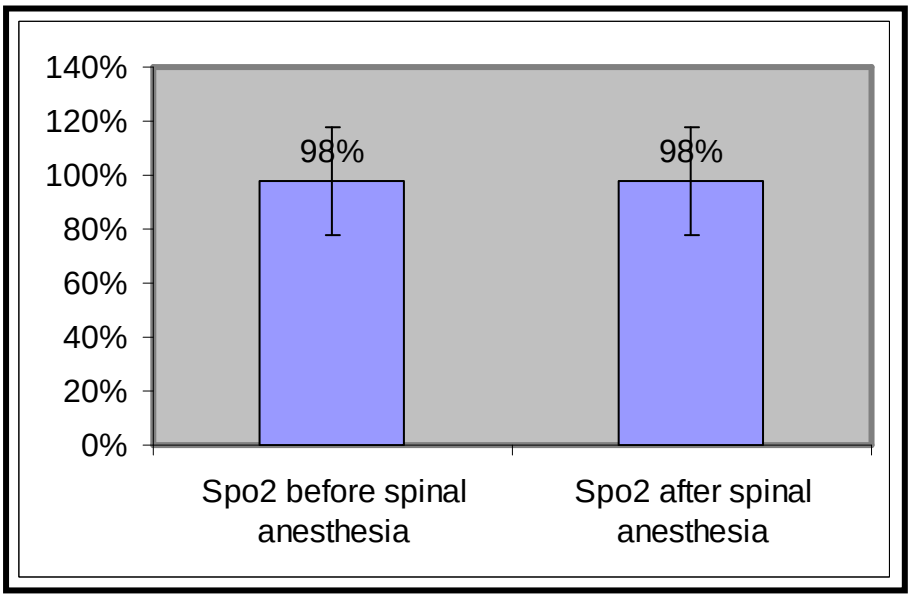

Fig. This

Discussion:

The table (1) the age of the patients and its sex and the type of surgery.The table (2) show the peripheral oxygen saturation before and after spinal anesthesia. The effect of spinal anesthesia on oxygen saturation is little or not significant, so the spinal anesthesia has little effect on respiratory system when given in proper technique and dose which include premeditated the patients with atropine 0.5mg and preloaded with crystalloid solution about 500ml to prevent hypotension which is the most common complications of spinal anesthesia, so the spinal anesthesia is preferable than general anesthesia for any surgery below the umbilicus because has little effect on respiratory system than general anesthesia.

Conclusion and Recommendation :

From this study and its data we conclude the effect of spinal anesthesia on oxygen saturation is a little or not significant . So the spinal anesthesia is perfect anesthetic technique for any surgery below the umbilicus and patients suffering from respiratory disease.The spinal anesthesia is more preferable than general anesthesia because

References:

1-Barash, Paul G., Cullen, Bruce F. &, Stoelting, Robert K. (2001). Clinical Anesthesia. (4th ed). Philadelphia: Lippincott Williams & Wilkins.

2-Hughes, Samuel C., Levinson, Gershon, & Rosen, Mark A. (2002). Snider and Levinson's Anesthesia for Obstetrics.(4th ed). Philadelphia: Lippincott, Williams & Wilkins.

3-Morgan, Edward G., Mikhail, Maged S., & Murray, Michael J. (2002) Clinical Anesthesiology. (3rd ed). New York: McGraw-Hill Companies Inc.

4-Mulroy, Michael F. (2002) Regional Anesthesia: An Illustrated Procedural Guide. (3rd ed). Philadelphia: Lippincott, Williams & Wilkins.

5-O'Donnell, John M. (2003). Powerpoint Presentation, Regional Anesthetic Techniques.

6-Reese, Charles A. (1996). Clinical Techniques of Regional Anesthesia. (4th ed). Park Ridge: American Association of Nurse Anesthetists.
7-Zwiers, William., Bauer, Jason., Hughes, Amy. (2003). Powerpoint Presentation, Spinal Anesthesia, The Subarachnoid Block.
8-Carroll, Patricia, R.N., M.S., C, CEN, RRT, "Pulse Oximetry - At Your Fingertips," *RN* 60.2 (February 1997): 22-27
9-Woodrow, Philip, MA, RGN, DipN, Cert Ed, "Pulse Oximetry," *Nursing Standard*, 13.42 (July 7-13, 1999): 42-46.
10-UTMB Pulmonary Care Services, *Pulse Oximetry Protocol*.