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Continuous Spinal Anaesthesia Versus Single-Shot Spinal Anaesthesia in Terms of Hemodynamic Stability

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Abstract: A cross-sectional study was conducted based on observation and comparison, and this paper aimed to find out the effects of Continuous spinal anaesthesia versus single-shot spinal anaesthesia in terms of hemodynamic stability. In this study, 65 patients were recruited and distributed into two groups (the first group included 35 patients who underwent CSA) (and the second group included patients who underwent single-shot spinal anaesthesia (for 30 patients). Most patients with Lower Abdominal and Hip Surgeries whose physiological cardiovascular reserve is limited, which also leads to severe heart disease and other comorbidities that cannot be improved, and this leads to high morbidity, so perioperative management and choice of anaesthesia technique are very important. The results which found (45.22 ± 15.2 of the age group with Continuous spinal anaesthesia and 44.3 ± 10.53 of the group with single-shot spinal anaesthesia), The duration of surgery for patients who underwent CSA was 144±33, while for patients who underwent single-shot spinal anaesthesia, it was MEAN+SD 120±27, results according to Volume of fluid infused (ml) were 1190±291 of group CSA and 1512±290 ml of group Single Shot Spinal Anaesthesia. In this study, the most common complications were found in the group of patients who underwent SSSA, with 12 patients (40%). As for the group of CSA patients, the prevalence of complications was in 3 patients out of 35 patients, with 5.6%. We can conclude from this research of 65 patients that patients who underwent CSA achieved better outcomes than patients who underwent SSSA according to the prevalence of complications and assessment of patients' quality of life.

Keywords: SSSA, CSA, Anaesthesia, Complications, Underwent.

INTRODUCTION

The decision to use Continuous spinal anaesthesia depends on many factors. The characteristics of the patient [Sanatkar, M. *et al*., 2013], the type of surgery proposed, and the potential anaesthesia risks will influence the choice of anaesthesia and perioperative management. [Fanelli, G. *et al*., 2009; Elzinga, L. *et al*., 2014; Baydilek, Y. *et al*., 2014] In patients with cardiovascular disease, aesthetic techniques may provide the potential benefits of surgery in mitigating the stress response, cardiac sympathectomy, early extubation, shorter hospital stay, and aggressive postoperative analgesia. However, the decision to use anaesthesia should be made with caution in some circumstances. [Fyneface-Ogan, S. *et al*., 2014; Minville, V. *et al*., 2006].

Continuous spinal or subarachnoid anaesthesia (CSA) is a local anaesthesia technique that uses small doses of local anaesthetics administered intermittently into the subarachnoid space through a catheter. [De Andres, J. *et al*., 1994; Saber, R. *et al*., 2015]. It combines the advantages of single subarachnoid anaesthesia in terms of speed and depth of anaesthesia with the advantages of a continuous technique. Perhaps the term continuous is not the most appropriate, and we should call it progressive or progressive subarachnoid anaesthesia because it best describes the real possibilities it presents to us. [Lundorff, L. *et al*., 1999; Fettes, P.D.W. *et al*., 2005]

Its indications are indicated in orthopaedics of the lower extremities, obstetrics, or lower abdominal procedures. It has several advantages over single-dose epidural and continuous epidural anaesthesia: 1) administration of local aesthetic in additional small doses that are titrated to the patient's needs, 2) reduction of local anaesthesia doses and thus reduction of toxins systemic; 3) greater cardiovascular stability, and 4) in unexpectedly prolonged surgeries, it allows the technique to continue without further complications. [Baydilek, Y. *et al*., 2014; Minville, V. *et al*., 2006; De Andres, J. *et al*., 1994; Saber, R. *et al*., 2015]

Despite its theoretical and obvious advantages, it has been marginalized in recent years, possibly due to uncertainty about the emergence of potential side effects, especially neurological complications and headache after a Dura puncture (PDPH). [Lundorff, L. *et al*., 1999; Fettes, P.D.W. *et al*., 2005]

The most frequent neurological complication in previous studies is the use of the technique and clinically, characterized by pain at the lumbar

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level, sensory disturbances in the region of the affected roots, loss of strength in the lower extremities, and/or loss of sphincter control.

The systematic use of ASC with local anaesthesia at non-neurotoxic concentrations and the abandonment of the technique when exceeding the usual doses will prevent the appearance of this complication. [Baydilek, Y. *et al*., 2014; Minville, V. *et al*., 2006].

PATIENT AND METHOD

A cross-sectional study was conducted to compare between continuous spinal anesthesia versus single-shot spinal anesthesia in terms of hemodynamic stability.

Where demographic information and data were collected from different hospitals in Iraq, which is located in Baghdad – Iraq.

In this study, 65 patients were recruited and distributed into two groups (the first group included 35 patients who underwent CSA) (and the second group included patients who underwent single-shot spinal anesthesia (for 30 patients).

The medical records of patients with surgery were reviewed who underwent Total hip replacement, Inguinal hernia repair with mesh From August 2019 to March 2020 with severe heart disease.

Demographic data, associated diseases, examinations, echocardiography, intraoperative hemodynamic variables, number of doses, complications, surgical time, and 7-month survival were obtained.

The preparation takes into account the equipment and the selection of the drug or drugs to be used depending on variables such as patient characteristics: age, biometric parameters, physiological state, type of surgery to determine the level of anesthesia required, and the duration of these.

Prior to the puncture procedure, all precautions should be taken to minimize the risks as all patients were monitored with a continuous electrocardiogram, pulse oximetry, and non-invasive blood pressure, in addition to having a patented intravenous line through which anesthesia could be administered or treat potential complications during the procedure.

In this study, all data and demographic information of patients were analyzed through the use of the statistical analysis program IBM soft SPSS 22. In addition to that, Microsoft Excel 2013 was used, where the distribution of patients was extracted according to percentages, standard regression, SD, and Type of correlation.

RESULTS

Table 1: Demographic data, age, BMI and type of surgeries, Level of education

Variable	Continuous spinal anesthesia	single shot spinal anesthesia	P-value
Age	45.22 ± 15.2	44.3 ± 10.53	0.4
BMI	29.2±3.4	30.9±4.2	0.874
Sex			
Male	25	15	0.03
Female	10	15	0.2
comorbidities			
Hypertension	12	11	0.44
Diabetes	7	10	0.73
Heart disease	8	4	0.63
Other	8	5	0.35
Level Education			
Low	6	5	
Secondary	10	10	
College	15	10	0.54
High	4	5	
Duration of performance block (min)	5.6 ± 0.66	----	---
Type of surgeries			
Total hip replacement	10	11	0.94
Inguinal hernia repair with mesh	25	19	0.67

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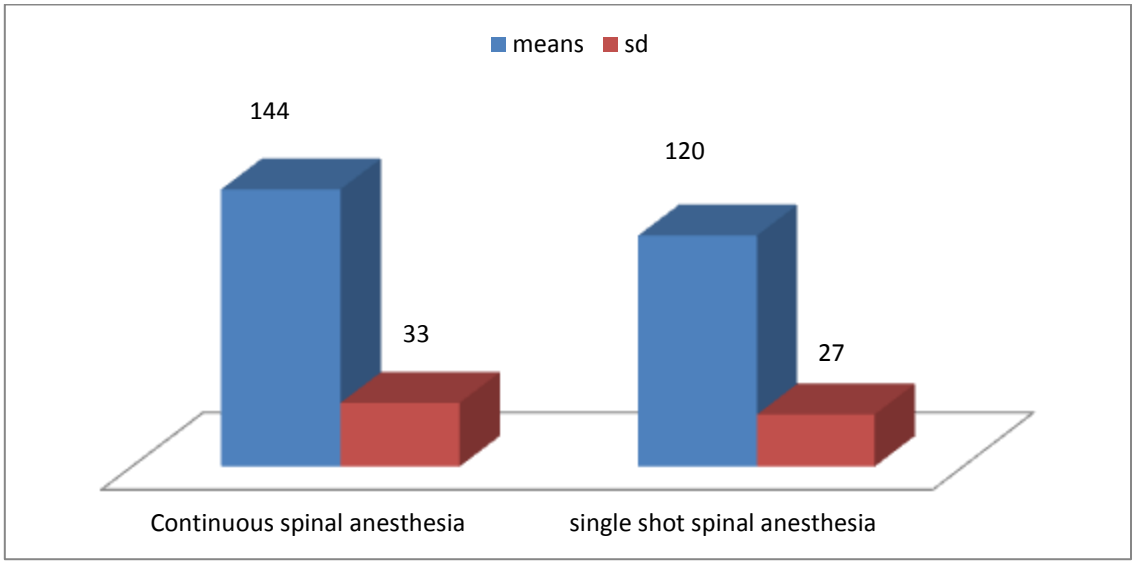

Fig 1: Mean value and standard division Duration of surgery

Table 2: Characteristics of results related to hemodynamic changes (Heart rate (beat/min))

Heart rate beat/min	Continuous spinal anesthesia	single shot spinal anesthesia	P-value
Baseline	81 ± 4.4	80±4.5	0.85
T 1	74 ± 5.1	73±4.8	0.45
T2	82 ± 6.6	80.4±3.9	0.01
T3	76 ± 3.9	75.1±4.2	0.79
T4	75 ± 3.8	74.3±4.1	0.76
T5	74 ± 4.8	73.9±3.6	0.88
T6	79± 4.4	78.6±3.8	0.12

Table 3: hemodynamic changes according to Mean Arterial Pressure

Heart rate beat/min	Continuous spinal anesthesia	single shot spinal anesthesia	P-value
Baseline	99 ± 12.2	98 ± 10.2	0.8
T 1	88 ± 10.2	87±9.2	0.33
T2	91 ± 7.2	90.5±6.8	0.98
T3	91 ± 5.7	90.7±5.2	0.78
T4	90 ± 3.9	88.6±4.7	0.92
T5	89.2± 5.4	86.6±4.1	0.845
T6	88.5± 5.6	82.2±4.1	0.05

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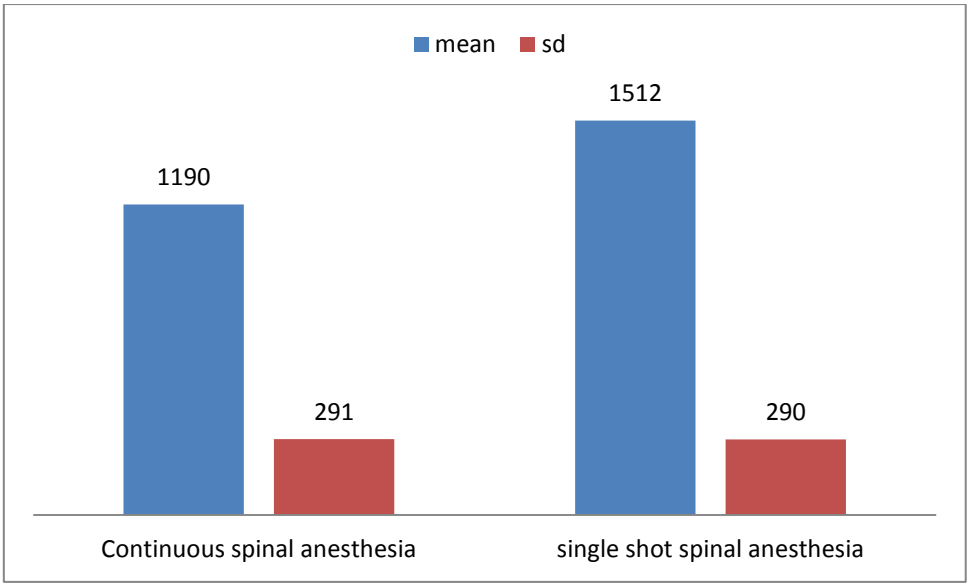

Fig 2: Outcomes of patients according to Volume of fluid infused (ml)

Table 4: Evaluate the final results to patients according to the Incidence of side effects

Items	Continuous spinal anesthesia	single shot spinal anesthesia	P-value
Postdural puncture headache.	1 (2.8)	2 (6.6)	0.05
Hypotension	0	1 (3.3)	0.01
Bradycardia	1 (2.8)	2 (6.6)	0.05
Neurological deficit	0	1 (3.3)	0.01
Delayed Micturition	0	1 (3.3)	0.01
Vomiting	1	2 (6.6)	0.05
Arrhythmia	0	3 (10)	<0.001

Table 5: Person correlation between side effects and type of anaesthesia

Variable	side effects	Continuous spinal anesthesia	single shot spinal anesthesia
R correlation	1.00	-0.45	0.98*
s-sig	---	0.56	0.03
N		65	

Table 6: Assessment of Patient's satisfaction of study for the type of anaesthesia

Variable	Continuous spinal anesthesia	single shot spinal anesthesia
High	24	12
Moderate	8	6
Low	3	12

DISCUSSION

A cross-sectional study was conducted to compare between continuous spinal anaesthesia versus single-shot spinal anaesthesia in terms of hemodynamic stability.

Where demographic information and data were collected from different hospitals in Iraq, which is located in Baghdad – Iraq.

In this study, 65 patients were recruited and distributed into two groups (the first group included 35 patients who underwent CSA) (and the second group included patients who underwent single-shot spinal anaesthesia (for 30 patients)

In this study, patients were distributed according to gender. In the CSA group, 25 patients were males, and ten patients were females. As for the group of patients who underwent single-shot spinal anaesthesia for 15 male patients and 15 female patients). As for the surgeries that were studied in this research, they included.

Total hip replacement for ten patients in the CSA group and 25 patients for Inguinal hernia repair with mesh. As for patients who underwent single-

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shot spinal anaesthesia, 11 patients were distributed according to the surgical procedure, Total hip replacement, and 19 patients with Inguinal hernia repair with mesh.

The duration of surgery for patients who underwent CSA was 144±33, while for patients who underwent single-shot spinal anaesthesia, it was MEAN+SD 120±27.

Although most anaesthesiologists use general anaesthesia for these procedures, CSA techniques have shown Certain advantages, such as better pain control, reduced response to surgical stress, preservation of perioperative immune function, oxygenation, and functional capacity. Vascular capacity, less bleeding, early recovery from postoperative ileum [Sell, A. *et al*., 2005]

Once the catheter is installed, small doses of anaesthesia are administered, which are titrated to the required level. Once the dose considered adequate is reached and adequate clinical anaesthesia has not been obtained, [McLeod, G.A. *et al*., 2001]it has been suggested to change the local anaesthesia or abandon the technique due to the risk of facing a poorly dispensed condition and the risks of Neurological damage. Good clinical practice recommendations include not to exceed normal doses for single injections [Biboulet, P. *et al*., 1993].

Advantages in the CSA, when to compare to single-shot spinal anaesthesia, are a lower risk of circulatory and reversible respiratory effects and having a catheter that can prolong anaesthesia or postoperative analgesia. [De Andres, J. *et al*., 1994] As for the complications, they are: Postdural puncture headache, Hypotension, Bradycardia, Neurological deficit.

Delayed Micturition, Vomiting, and Arrhythmia [Fettes, P.D.W. *et al*., 2005].

Previous published studies reported a lower number of patients exposed to this technique, although complications were reduced with CSA.

When comparing CSA with single-shot spinal anaesthesia with, the results of clinical studies show both advantages and disadvantages, as it is difficult to prove the absolute superiority of one over the other and may have a higher incidence of headaches with single-shot spinal anaesthesia. [Reisli, R. *et al*., 1999].

CONCLUSION

In this study, we conclude that administration of CSA in small effective doses is feasible and effective in not affecting the baseline cardiovascular status of this group which is evidenced by the absence of mortality and perioperative cardiovascular complications.

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