

Hypotension in Spinal and Epidural Anesthesia

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Background: Hypotension occurs during spinal block and may be associated with serious complications. The blood pressure decreases by 39-45% after intrathecal and epidural anesthesia.

Objective: To evaluate intrathecal and epidural anesthesia in patients with gynecological surgery and compare hypotension in both methods.

Design: Randomized clinical trial.

Setting: Sina Hospital, Tehran, Iran.

Method: Sixty patients were evaluated for hypotension induced by Lidocaine used intrathecally or epidurally. The patients were randomly assigned in the two groups; all the patients had gynecological surgery. Intrathecal anesthesia was administered using 75mg (1.5ml) of Lidocaine 5% in the first group and epidural anesthesia was administered using 300mg (20ml) of Lidocaine 1.5% in the second group. The injections were done in L4-L5 space.

Result: The decrease in systolic blood pressure was faster and significantly more in intrathecal than in the epidural group ($p < 0.05$).

Conclusion: The decrease in blood pressure is less seen in epidural anesthesia. Cardiovascular conditions are more stable during epidural anesthesia.

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Spinal anesthesia is used to minimize the complications during surgery and to avoid difficult intubations, but the procedure has its own complications and it is necessary to try reducing them¹.

Spinal and epidural are widely used. There is a preganglionic sympathetic block additional to sensory and motor blocks in spinal and epidural anesthesia. The sympathetic block is unwanted and causes complications such as hypotension.

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In regional anesthesia, hypotension is the most common cardiovascular response². The decrease in blood pressure is approximately reduced by 39-45% after spinal and epidural anesthesia³. The changes occur in systolic blood pressure, mean arterial pressure, peripheral vascular resistance without a change in cardiac output. On the other hand, hypotension in general anesthesia is commonly due to decrease in myocardial contraction.

Hypotension in spinal anesthesia is directly due to a sympathetic block, whereas in epidural anesthesia it is more complicated by the level of sensory block and the dosage of the anesthesia drug. Administering a higher dosage of the anesthetic drug epidurally can result in profound decrease in blood pressure.

If hypotension occurs, the treatment should be rapid and include: 1) head down position; 2) intravenous hydration; 3) oxygen therapy; and 4) vasopressors^{1,3-6}.

The aim of this study is to evaluate intrathecal and epidural anesthesia in patients during gynecological surgery and compare hypotension in both methods.

METHOD

In this double blind randomized clinical trial, 60 patients were recruited for the study. The study protocol was approved by the research ethics committee of Tehran University of Medical Sciences. All patients gave written informed consent. The patients were randomly assigned to receive either intrathecal or epidural anesthesia using a Lidocaine injection. Epinephrine was not used because of its effect on the cardiovascular system which could interfere with the results of the study. Lidocaine was injected alone in standard doses as described in Miller's textbook of anesthesia.

Women under 40 years old were recruited. The patients who were more than 40 years old and patients who had neurosis or history of psychiatric diseases were excluded from the study.

Thirty patients were randomly assigned in each group and all patients received 500ml intravenous Ringer's solution prior to receiving anesthesia. Lidocaine was injected in L4-L5 space using needle No. 23 in the intrathecal group and needle No. 16 in the epidural group. In the intrathecal group, 75mg (1.5ml) of 5% Lidocaine was used for patients who were shorter than 155cm and 100mg for those who were taller than 155cm. In the epidural group, 300mg (20ml) of 1.5% Lidocaine was used. Patients were put in the supine position and systolic blood pressure was measured after 5, 10, 15 and 30 minutes. The sensory level was about T6. Hydration treatment was initiated when blood pressure reduced by more than 30% or when systolic blood pressure was less than 100mmHg. When patients did not respond to hydration, intravenous Epinephrine was administered. All patients had cardiac monitoring and pulse oxymetry during anesthesia. Data were analyzed by SPSS software and statistical comparisons between the two groups were performed using t-tests.

RESULT

In this study thirty patients under 40 years of age had regional anesthesia in two groups (intrathecal and epidural group). The mean age in intrathecal and epidural group was 27.2 and 26.3 years, respectively. There was no difference in age and ASA (American Society of Anesthesiologists) risk classes ($P>0.05$) among the patients (see Table 1 and Table 2).

Table 1: Age Distribution in Spinal and Epidural Groups

Age group (years)	<20	20-25	25-30	30-35	35-40	Total
Anesthesia group	N (%)	N (%)	N (%)	N (%)	N (%)	N (%)
Intrathecal	2 (6.6%)	8 (26.7%)	11 (36.7%)	5 (16.7%)	4 (13.3%)	30 (100%)
Epidural	2 (6.6%)	10 (33.3%)	9 (30%)	6 (20%)	3 (10%)	30 (100%)
Total	4 (6.6%)	18 (30%)	20 (33.3%)	11 (18.3%)	7 (11.6%)	60 (100%)

*There were no age differences between the intrathecal and epidural groups ($p>0.05$)

Table 2: A.S.A Class Distribution in Spinal and Epidural Groups

A.S.A class	A.S.A Class I	A.S.A Class II	Total
Anesthesia group	No (%)	No (%)	No (%)
Intrathecal	26 (86.7%)	4 (13.3%)	30 (100%)
Epidural	27 (90%)	3 (10%)	30 (100%)
Total	53 (88.3%)	7 (11.7%)	60 (100%)

*There were no ASA class differences between the intrathecal and epidural groups ($p>0.05$)

ASA has five classes for anesthetic risk: Class I, normal healthy patients; Class II, patients with mild systemic disease (pregnancy, NIDDM, well controlled asthma, well controlled epilepsy); Class III, patients with severe systemic disease that is limiting but not incapacitating; Class IV, patients with incapacitating disease that is a constant threat to life; Class V, patients not expecting to live more than 24 hours. In our study, all patients were in Classes I and II.

There was a significant difference in systemic blood pressure between the intrathecal and epidural groups ($p=0.013$). There was also a significant decrease in systolic blood pressure in the intrathecal group compared to the epidural group (see Figure 1).

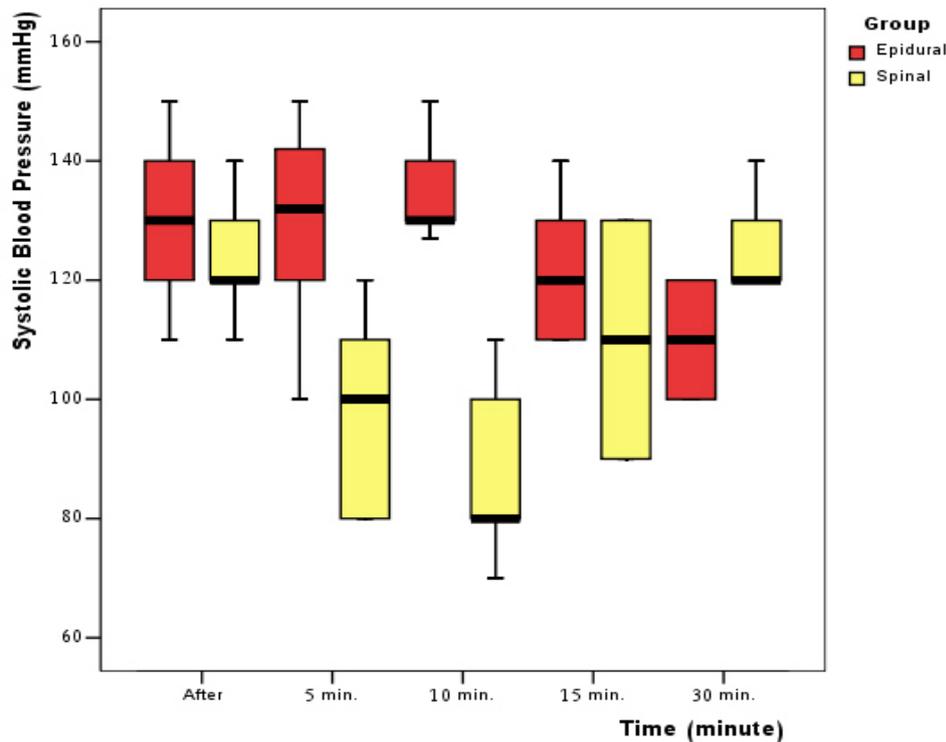


Figure 1: Comparison of Systolic Blood Pressure during the Anesthesia in Epidural and Spinal Groups (p<0.05)

In the spinal group, blood pressure decreased immediately after 15 minutes of the onset anesthesia, whereas in the epidural group, the stability of blood pressure was seen more as the blood pressure slowly decreased during the 30-minutes after receiving anesthesia.

DISCUSSION

A study by Kamenik et al showed that the reduction of blood pressure can change cardiac output and should be treated³. Our study showed similar result in the spinal group. The result of the spinal group of this study showed reduction of blood pressure, which could destabilizes the cardiovascular symptom and result in further complications. This hypotension is due to a preganglionic sympathetic block, which results in vasodilator effect and pooling of blood below the block level especially in the lower extremities.

Mojico et al treated hypotension of regional anesthesia with hydration⁴. There is a danger of sympathetic block after epidural anesthesia, which could be stabilized with hydration⁶. Regional anesthesia using spinal and epidural methods has cardiovascular complications which are more obvious in the former method. Carpenter and Caplan evaluated these cardiovascular changes and found that the decrease of blood pressure in spinal anesthesia is more pronounced and occurs in short time. Hypotension was also less intense during epidural anesthesia and was delayed in its occurrence⁷. These findings are similar those of our current study.

CONCLUSION

By comparison, spinal anesthesia affects the cardiovascular system more compared to epidural anesthesia. There is a pronounced reduction in the mean arterial pressure in spinal method. According to our study, it is better to use epidural anesthesia in patients who require a more stable cardiovascular condition.

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