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Efficacy of Intravenous versus Intrathecal Meperidine on Post-Spinal Shivering after Knee Arthroscopy: A Randomized Controlled Study

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Abstract

Background and Aims: Hypothermia is considered a common problem with anesthesia. Spinal anesthesia, affects the process of temperature regulation. The aim of this study was to compare the prophylactic effect of intravenous (IV) meperidine with intrathecal (IT) meperidine on the prevention of shivering during spinal anesthesia in patients underwent knee arthroscopy. **Aim of the Study:** The aim of this work is to study the effect of meperidine either intravenous (IV) vs intrathecal (IT) on controlling postoperative shriving after knee arthroscopy**. Materials and Methods:** This study will be conducted in accordance with the principles of the ethics committee Benha University hospitals. Full written informed consent will be obtained from all patients before inclusion in the study, and a prospective randomized double-blinded study was conducted in adult patients undergoing knee arthroscopy under spinal anesthesia. Cases are divided into three equal groups (20 patients in each). Group IT: will receive spinal anesthesia (12.5 mg heavy bupivacaine) with intrathecal meperidine (25 mg). Group IV: will receive spinal anesthesia (12.5 mg heavy bupivacaine) with intravenous meperidine (25 mg). Group C: will receive spinal anesthesia (12.5 mg heavy bupivacaine) only postoperatively. Incidence and degree of shivering (*SS*), sedation score (RSS), pain score (VAS), hemodynamics, and PONV will be measured at the following intervals: 0 min (once arrived at PACU), 20 min later, 40 min later, 80 min later. **Results:** Shivering was observed in 0%, 0%, and 10.5% of patients in Groups IT, IV, and C, respectively. There was a significant difference between Group IT and IV compared to Group C ($P < 0.001$). Shivering incidence and intensity in IT group and IV group was significantly lower than C group ($P < 0.001$). There was a better postoperative pain control in IT group than IV group, and also IT group was showed less side effects as it showed less PONV than IV group. **Conclusion:** We concluded that IT meperidine and IV mepe-

weight and sex. There was no significant difference in attenuating post-operative shivering at all intervals.

As regard the shivering scale (SS) showed in (Table 2).

There was a significant difference between the control group and other two groups (IT and IV groups).

But there was no significant difference between intrathecal (IT) group and intravenous (IV) group at different intervals.

As regard the shivering scale (SS) showed in (Figure 1).

There was a significant difference between the control group and other two groups (IT and IV groups).

But there was no significant difference between intrathecal (IT) group and intravenous (IV) group at different intervals.

Table 1. Demographic data with median and IQR.

	IT group (20)		IV group (20)		C group (20)		Statistical test (KW)	P value	MWU
	Median	IQR	Median	IQR	Median	IQR			
Age	23.0	21.0 - 28.0	26.0	22.25 - 35.0	23.0	21.0 - 28.0	2.11	0.35	
Wt	65.0	65.0 - 72.0	66.5	64.0 - 70.75	65.0	65.0 - 72.0	0.06	0.97	
BMI	24.0	22.0 - 25.0	25.0	22.0 - 27.0	24.0	22.0 - 25.0	2.12	0.35	

Table 2. Shivering score (SS) in the three groups at different intervals.

	IT group (20)		IV group (20)		C group (20)		Statistical test (KW)	P value	MWU
	Median	IQR	Median	IQR	Median	IQR			
SS									
0	0.0	0.0 - 1.0	0.0	0.0 - 0.75	2.5	2.0 - 3.0	35.16	<0.001	bc
20	0.0	0.0 - 0.0	0.0	0.0 - 0.0	2.0	2.0 - 3.0	37.76	<0.001	bc
40	0.0	0.0 - 0.0	0.0	0.0 - 0.0	2.0	1.0 - 2.0	47.84	<0.001	bc
80	0.0	0.0 - 0.0	0.0	0.0 - 0.0	1.0	1.0 - 2.0	39.01	<0.001	bc

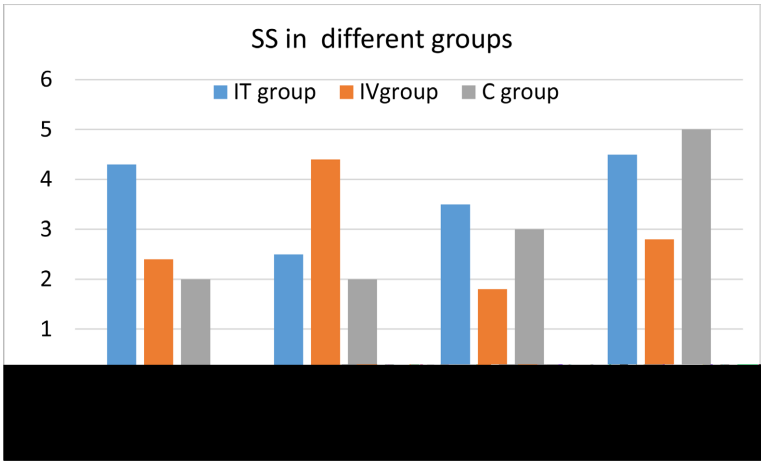

Figure 1. Shivering score (SS) in the three groups at different intervals.

Table 4. Ramsay sedation score (RSS) in the three groups at different intervals.

	IT group (20)		IV group (20)		C group (20)		Statistical test (KW)	P value	MWU
	Median	IQR	Median	IQR	Median	IQR			
RSS									
0	2.0	2.0 - 2.0	2.0	2.0 - 3.0	2.0	2.0 - 2.0	12.03	0.002	bc
20	2.0	2.0 - 3.0	2.0	2.0 - 3.0	2.0	1.0 - 2.0	21.12	<0.001	bc
40	2.0	2.0 - 3.0	2.0	2.0 - 3.0	2.0	2.0 - 2.0	11.12	0.004	bc
80	2.0	2.0 - 2.0	2.0	2.0 - 2.75	2.0	1.25 - 2.0	12.76	0.002	bc

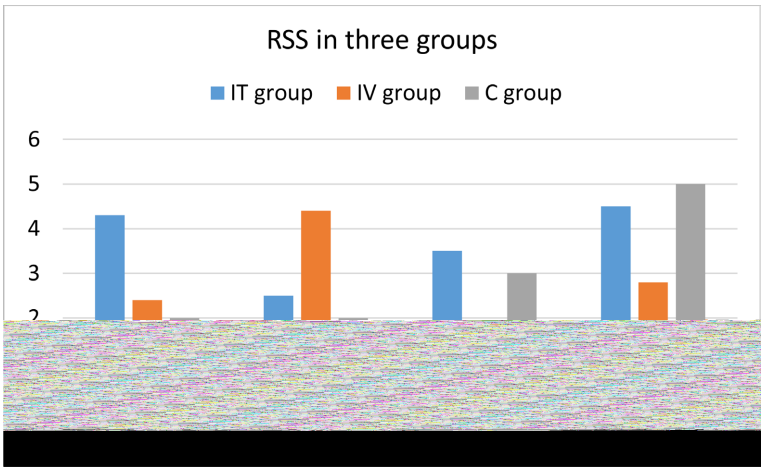

Figure 3. Ramsay analogue scale (RSS) in the three groups at different intervals.

Table 5. Bradycardia in the three groups at different intervals.

	IT group (20)		IV group (20)		C group (20)		Statistical test (KW)	P value	MWU
	Median	IQR	Median	IQR	Median	IQR			
Bradycardia									
0	76.5	68.0 - 82.0	74.5	66.0 - 82.0	77.5	68.25 - 80.75	0.48	0.79	
20	76.0	74.0 - 81.0	75.0	68.0 - 81.0	82.0	80.25 - 84.75	17.19	<0.001	bc
40	78.0	69.0 - 79.75	75.5	65.0 - 80.0	83.0	81.0 - 86.0	26.60	<0.001	bc
80	78.0	71.0 - 82.0	77.0	66.0 - 79.0	81.0	79.0 - 84.75	9.78	0.008	bc

groups (IT and IV groups) in two intervals only (20 min and 40 min).

But there was no significant difference between the control (C) group and other two groups, intrathecal (IT) group and intravenous (IV) group at two intervals (0 min and 80 min).

As regard the bradycardia (VAS) showed in (**Figure 4**) there was a significant difference between the control group and other two groups (IT and IV groups) in two intervals only (20 min and 40 min).

But there was no significant difference between the control (C) group and other two groups, intrathecal (IT) group and intravenous (IV) group at two in-

group at all different intervals.

As regard the postoperative nausea and vomiting (PONV) showed in (Table 7).

There was a significant difference (p value 0.03) between intrathecal (IT) group, and intravenous (IV) group, at all different intervals. Intrathecal (IT) group showed less side effects as PONV less occurred in this group than IV group and C group at 0, 20, 40, and 80 min postoperatively.

As regard the postoperative nausea and vomiting (PONV) showed in (Figure 6).

There was a significant difference (p value 0.03) between intrathecal (IT) group, and intravenous (IV) group, at all different intervals. Intrathecal (IT) group showed less side effects as PONV less occurred in this group than IV group and C group at 0, 20, 40, and 80 min postoperatively.

3. Discussion

Shivering is a usual and current problem after surgery under spinal anesthesia. Exact mechanism of the shivering after spinal anesthesia has not been completely investigated. Only There are some hypotheses in this object: [19] [20]

As regard to previous studies, IV meperidine for shivering removing has shown

Table 7. Postoperative nausea and vomiting (PONV) in the three groups at different intervals.

	IT group (20)		IV group (20)		C group (20)		Statistical test (KW)	P value	MWU
	Median	IQR	Median	IQR	Median	IQR			
PONV									
0	3	15.0	11	55.0	8	40.0	X2 = 7.03	0.03	
20	1	5.0	6	30.0	8	40.0	X2 = 6.93	0.03	
40	0	0.0	3	15.0	7	35.0	FET = 6.51	0.04	
80	0	0.0	0	0.0	5	25.0	FET = 7.04	0.03	

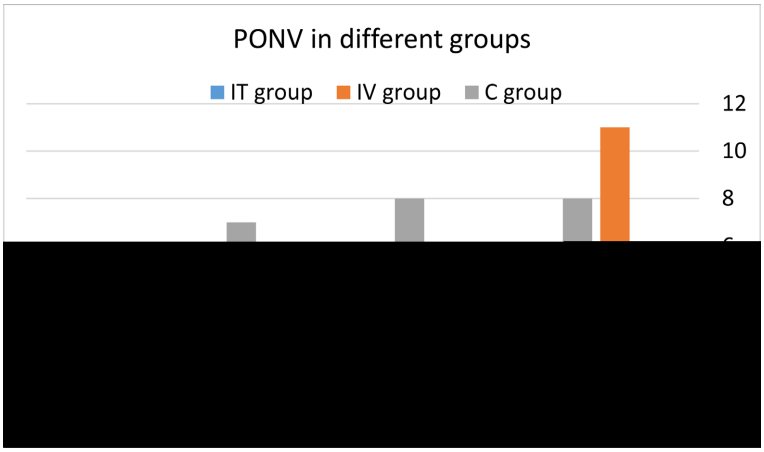

Figure 6. Postoperative nausea and vomiting (PONV) in the three groups at different intervals.

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