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ORIGINAL RESEARCH

Effect of Mild Intra-Operative Hypothermia Prolongs Post-Anesthetic Recovery

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ABSTRACT:

The mild intra-operative hypothermia prolongs post-anesthetic recovery, the aim: to describe the effect of mild intra-operative hypothermia prolongs post anesthetic recovery. Material and Methods: selected by convenience sampling of 18 diabetic patients went to operation theater, by the following criteria: 1) Alert, and be able to communicate verbally. 2) They are going to surgery under general anesthesia. Result: Majority (83.3%) of them were females and (16.7%) were males. Less than half (44.4%) of patients had university degree. Two-third of patient (66.7%) were married and (22.2%) were single. More than half (55.6%) of patients were housewives. The majority (88.9%) of patients were lived in urban, vice versa (11.1%) of patients were came from rural, Cesarean section (27.8%) and cholecystectomy (27.8%), hysterectomy (11.1%) and laparotomy (11.1%) and (5.6%) were went to appendectomy, two-

third (61.1%) of patients were administered ketamine as induction, majority (88.9%) of patient were administer thiopental. all patients were administered N2O and muscle relaxant as maintenance, half (50.0%) of patient were give them ISO: Conclusion: hypothermia is frequent during anesthetic-surgical procedures due to several mechanisms, especially the internal heat redistribution between core and peripheral compartments, which is a direct function of their temperature gradient. Hypothermia during anesthesia develops in three stages. General anesthesia usually ends up in a thermal balance state, which may reestablish the gradient between compartments.

KEYWORDS: Operative, Hypothermia, Anesthesia, Thiopental, Reestablish.

INTRODUCTION

Perioperative thermoregulation is an important aspect of the anesthetic management of ambulatory surgery patients. Perioperative hypothermia increases the incidence of cardiac morbidity, sympathetic over-activity, wound infection, increased surgical bleeding, prolonged hospitalization, intensive care unit admission, impaired immunity, abnormal drug metabolism, impaired wound healing, thermal discomfort and shivering (Sessler, D.I, 2005). Hypothermia may delay recovery from anesthesia, with prolonged stay in the post-anesthesia care unit or the ambulatory surgery unit. It may also delay the discharge of ambulatory surgery patients with cost implications on hospital beds, surgical operating schedule and other resources. According to American Society of Anesthesiologists (ASA); the risk factors that may contribute to perioperative hypothermia include old age, general anaesthesia, endocrine or metabolic disease, prolonged duration of surgery, open thoracic surgery, open abdominal surgery, burns, cold infusions or transfusions, massive haemorrhage and low operating room temperature (Wicks, T.C, 2006). Intraoperative hypothermia, defined as core temperature <36.0C during surgery, is a common complication among surgical patients (Matthews, E. P. (2008). Hypothermia is associated with numerous adverse consequences, including postoperative cardiovascular events, perioperative hemorrhage, disturbed drug metabolism, and postoperative infection. Hypothermia may also lead to prolonged retention time ICU and decrease in thermal comfort, patient satisfaction and increasing cost (Wicks, T.C, 2006)., Matthews, E. P. (2008) . Intraoperative hypothermia is most likely in patients undergoing complicated and long operations, or in those who are elderly, have little body fat, or have preexisting illnesses. However, each of these factors confounds evaluation of post-anesthetic recovery because the oldest, sickest patients, and those having the most extensive operations are also most likely to require prolonged recovery time. Failure to randomly assign intraoperative thermal management is therefore a major bias in any study evaluating complications of hypothermia (Arkilic, C.F, et al, 2000). A

complication attributed to typical mild intraoperative hypothermia is prolonged duration of post-anesthetic recovery. Delayed recovery is, perhaps, not surprising because mild hypothermia increases anesthetic potency, decreases drug metabolisms, reduces cognitive performance, and is associated with cardiovascular instability (Patel, P.M, 2005, Arrest, H. A. C. (2002).

MATERIALS AND METHODS

This was descriptive study conducted between May and October 2019. This study was carried out in Operation Theater at Al-Wahda Hospital/Derna.

Patients were selected by convenience sampling of 18 diabetic patients went to operation theater.

Patients were included in this study have the following criteria:

1. Alert, and be able to communicate verbally.
2. They are going to surgery under general anesthesia.

Questionnaire used to collect sociodemographic characteristics of patients, types of surgery, duration of surgery, induction and aqnalgesia used, anesthetic maintenance. Body temperature were measuring pre-operative, during operative through first, second, third hour and at the period of recovery.

RESULTS AND DISCUSSION

A total of 18 patients were included in this study. Nearly two-third of patients (61.1%) were in age between 30-39 years old. Majority (83.3%) of them were females and (16.7%) were males. Less than half (44.4%) of patients had university degree. Two-third of patient (66.7%) were married and (22.2%) were single. More than half (55.6%) of patients were housewives. The majority (88.9%) of patients were lived in urban, vice versa (11.1%) of patients were came from rural (Table 1).

Table (1): Sociodemographic Characteristics of Patients

Sociodemographic characteristics		N=18	%
Age	20<30	4	22.2
	30<40	11	61.1
	40<50	1	5.6
	50<60	2	11.1
Sex	Male	3	16.7
	Female	15	83.3
Marital status	Single	4	22.2
	Married	12	66.7
	Divorced	1	5.6
	Widow	1	5.6
Level of education	Primary	3	16.7
	Preparatory	2	11.1
	Secondary	5	27.8
	University	8	44.4
Occupation	Housewife	10	55.6
	Clerical	3	16.7
	Students	2	11.1
	Other	2	11.1
Residence	Urban	16	88.9
	Rural	2	11.1

Cesarean section and cholecystectomy were the most included surgery. Cesarean section (27.8%) and cholecystectomy (27.8%), hysterectomy (11.1%) and laparotomy (11.1%) and (5.6%) were went to appendectomy (Figure 1).

In relation to duration of surgery, exactly half of the studied sample taken two hours to finishing the surgery, while just two patients consumed one hour, on the other hand more than one-tenth of eighteen patients were

needed three hours to finishing the surgery (Figure 2).

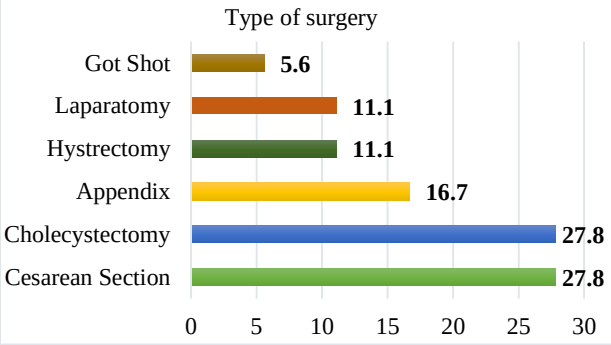

Figure 1: Distribution of Patients in Relation to Types of Surgery

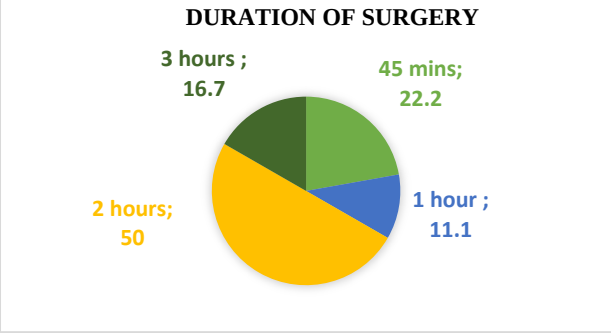

Figure 2: Distribution of Studied Patients in Relation to Duration of Surgery

Table (2): Distribution of Patients in Relation to Anesthetic Agents' Induction and Analgesia

Induction and Analgesia		N	%
Ketamine	Yes	7	38.9
	No	11	61.1
Thiopental	Yes	2	11.1
	No	16	88.9
Propofol	Yes	16	88.9
	No	2	11.1
Tramadol	Yes	15	83.3
	No	3	16.7
Fentanyle	Yes	2	11.1
	No	16	88.9

It was found that, about two-third (61.1%) of patients were administered ketamine as induction, majority (88.9%) of patient were administer thiopental.

While the majority (88.9%) of all the studied patients were administer protocol.

We noted that; the majority of patient were administering tramadol as analgesia, while just two patients were administering fentanyle as analgesia (Table 2).

Table (3): Distribution of Patients in Relation to Anesthetic Maintenance

Maintenance		N=18	%
N2o	Yes	18	100
	No	0	0
ISO	Yes	9	50.0
	No	9	50.0
Muscle relaxant	Yes	18	100
	No	0	0

It was found that, all patients were administered N2O and muscle relaxant as maintenance, half (50.0%) of patient were give them ISO (Tabl3 3).

Table (4): Distribution of Patients in Relation to Temperature Measuring.

Temperature measuring		N	%
Initial Assessment	37-38	13	72.2
	<38-39	5	27.8
1st hour	37-38	13	72.2
	<38-39	5	27.8
2nd hour	34-36	9	56.3
	36.50-38.50	7	43.8
3rd hour	34-36	5	55.6
	36.50-38.50	4	44.4
Recovery Time	>5	9	50
	<5	9	50

In relation to initial measuring of temperature, 72.2% of patients were had normal temperature, as same as at the first hour of surgery, while at the end of second hour the temperature were falling between 34c and 36c.

At the third hour the percentage still as in second hour (Table 4).

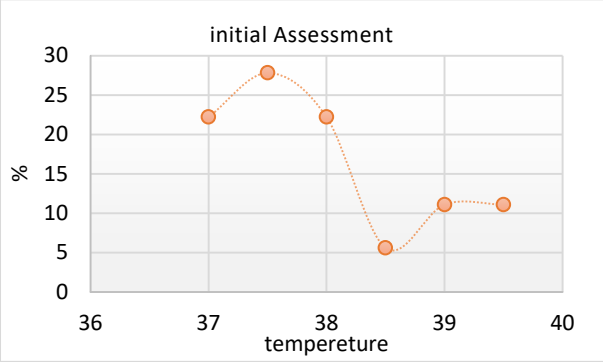

Figure 6: Distribution of Patients in Relation to Temperature's Initial Assessment

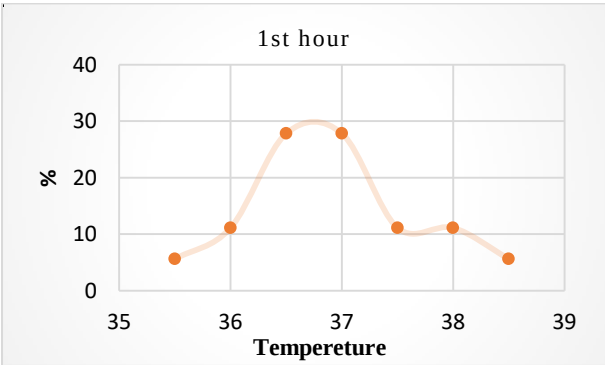

Figure 7: Distribution of Patients in Relation to Temperature's 1st Hour

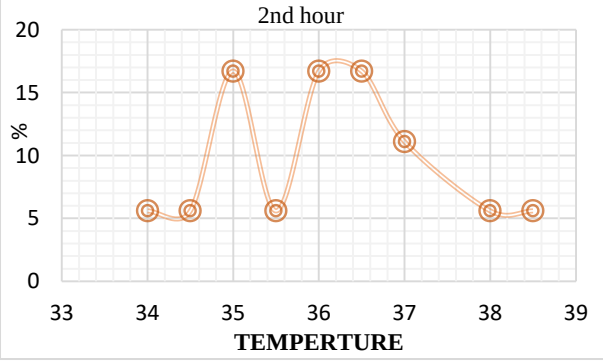

Figure 8: Distribution of patients in relation to temperature's 2nd hour

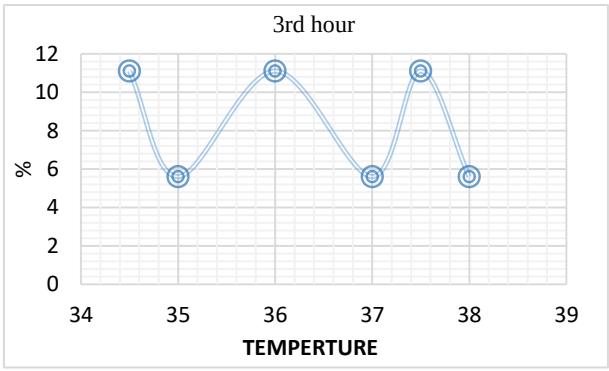

Figure 9: Distribution of Patients in Relation to Temperature's 3rd Hour

Normal body temperature is around 37 °C (98.6 °F). Hypothermia occurs as the body temperature falls lower than normal; usually below 35 °C (95 °F). Hypothermia occurs when the body fails to produce heat during metabolic processes, in cells that support vital body functions. Most heat is lost from the skin's surface through convection, conduction, radiation, and evaporation. When the body temperature drops, the heart, nervous system and other organs can't work normally leading to complete failure of the heart and respiratory system and eventually to death (Choi KE, Park B, et al, 2017, Winkler M, et al, 2000).

Intraoperative core hypothermia develops in three phases: core-to-peripheral redistribution of body heat, a slow linear decrease in core temperature caused by heat loss exceeding metabolic heat production, and core temperature plateau as vasoconstriction constrains heat in the core compartment. The highest rated item was neonates. The head constitutes a larger fraction of the total surface area in neonates. Heat loss from the head by neonates may be greater than in adults because the skull and scalp are thin, allowing loss of heat delivered to the

brain (Kitamura A, et al, 2000).

Redistribution of body heat that is most prominent in the first hour of anesthesia contributes less to hypothermia in infants (than in adults) because their extremities are small compared with their trunk and head (also resulting in a large surface area to body weight ratio) (Stroup DF, et al, 2008). The second highest rated item was a low ambient OR temperature. At OR temperatures <21°C, hypothermia often occurs, especially during general anesthesia (Surgenor S, et al, 2001). At 23°C, hypothermia occurs less often. In a study of 40 patients receiving general anesthesia for orthopedic surgery, an ambient OR temperature near 26°C (79°F) was effective in preventing core hypothermia during general anesthesia regardless of patient age (Surgenor S , et al,2001). Another highly rated item was general anesthesia with neuraxial anesthesia. Because both general and regional anesthetics impair the thermoregulatory system, anesthetized patients become relatively poikilothermic, whereby core temperature drifts toward ambient temperature (El-Gamal N, et al, 2000). Patients receiving epidural or spinal anesthesia have impaired thermoregulation because of vasodilation in the lower extremities and an impaired hypothalamic response with decreased shivering and vasoconstriction thresholds. This effect is proportional to the number of dermatomes blocked. General anesthesia inhibits the shivering that might otherwise increase heat production during neuraxial anesthesia (Cattaneo CG, et al, 2000). Three other risk factors deemed important by both researchers and clinicians were patient age (i.e., geriatric patients), low temperature of the patient before induction, and a thin body habitus. Geriatric patients thermoregulate via vasoconstriction and shivering less effectively than younger patients, both in the presence and absence of anesthesia. Patient temperature before induction refers to peripheral tissue heat content and core-to-peripheral tissue temperature gradient, which determines the magnitude of redistribution. The effects of body morphology have also been reasonably well evaluated (Cattaneo CG, et al, 2000).

CONCLUSION

Although perioperative normothermia is an accepted primary goal, unintentional hypothermia is frequent during anesthetic-surgical procedures due to several mechanisms, especially the internal heat redistribution between core and peripheral compartments, which is a direct function of their temperature gradient. Hypothermia during anesthesia develops in three stages. General anesthesia usually ends up in a thermal balance state, which may reestablish the gradient between compartments.

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الملخص

يؤدي انخفاض درجة حرارة الجسم بشكل طفيف أثناء الجراحة إلى إطالة فترة التعافي بعد التخدير، والهدف: وصف تأثير انخفاض درجة حرارة الجسم بشكل طفيف أثناء الجراحة على إطالة فترة التعافي بعد التخدير. المواد والأساليب: تم اختيار 18 مريضًا مصابًا بداء السكري، والذين دخلوا غرفة العمليات، وفقًا للمعايير التالية: 1) أن يكونوا واعين وقادرين على التواصل لفظيًا. 2) أن يخضعوا لعملية جراحية تحت التخدير العام. النتائج: كانت غالبية المرضى (83.3%) من الإناث، بينما كانت النسبة (16.7%) من الذكور. أقل من نصف المرضى (44.4%) حاصلون على شهادة جامعية. ثلثا المرضى (66.7%) متزوجون، بينما (22.2%) عازبون. أكثر من نصف المرضى (55.6%) ربات بيوت. كانت غالبية المرضى (88.9%) من سكان المدن، بينما كان 11.1% منهم من سكان الريف. خضع 27.8% منهم لعملية قيصرية، و27.8% لعملية استئصال المرارة، و11.1% لعملية استئصال الرحم، و11.1% لعملية فتح البطن، و5.6% لعملية استئصال الزائدة الدودية. تم إعطاء الكيتامين لثلثي المرضى (61.1%) كجرعة تحريضية، بينما تم إعطاء الثيوبنتال لغالبية المرضى (88.9%). تم إعطاء جميع المرضى أكسيد النيتروز ومرخيات العضلات كجرعة صيانة، وتم إعطاء نصف المرضى (50.0%) هذه الجرعات. الخلاصة: يُعد انخفاض حرارة الجسم شائعًا أثناء التخدير والعمليات الجراحية نتيجة لعدة آليات، وخاصة إعادة توزيع الحرارة الداخلية بين حجرات الجسم المركزية والمحيطية، وهو ما يرتبط ارتباطًا مباشرًا بتدرج درجة الحرارة بينهما. يتطور انخفاض حرارة الجسم أثناء التخدير على ثلاث مراحل. عادةً ما ينتهي التخدير العام بحالة توازن حراري، مما قد يُعيد تدرج درجة الحرارة بين حجرات الجسم.

الكلمات المفتاحية: جراحة، انخفاض حرارة الجسم، تخدير، ثيوبنتال، إعادة التوازن.