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Dose Propofol Cause Hemodynamic Instability in Al-wahada Hospital in Derna City

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Abstract:
Background: The adverse hemodynamic effects of the intravenous anesthetic propofol are well known, yet few empirical models have explored the dose–response relationship. Evidence suggests that hypotension during general anesthesia is associated with postoperative mortality. We developed a mechanism-based model that quantitatively characterizes the magnitude of propofol-induced hemodynamic effects during general anesthesia. Materials &method: The descriptive prospective study of 30 critically ill patients who admitted to OT under general anesthesia in AL-wahada hospital {surgical department} under monitoring hemodynamic of propofol injection to the patients pre, intra & post operations in Derna city. Data were collected from March 2024 until June 2024.The result: this study demonstrated that about 48% of the patients had changed in pulse rate &Bp range & HR showed statistically significant difference in time. Conclusion: Propofol had a hemodynamic instability during intra and post operation as an induction agent, however time for recovery in propofol group took a shorter period, with no complication during the inductions.

Keywords: Hemodynamic Stability, Laparoscopic Surgeries, Postoperative Recovery, Propofol**.**

Introduction

Patient safety has always been a major concern for the physicians of both ancient and modern eras.1 The adverse hemodynamic effects of the intravenous anaesthetic propofol are well known, yet few empirical models have explored the dose–response relationship (Aboeldahab *et al*, 2011). Propofol is a widely administered hypnotic agent that is of unique advantages yet some disadvantages. Induction of anaesthesia with propofol is associated with significant blood pressure reduction and hemodynamic instability especially in patients over 50 years old (Akin *et al*, 2005). In patients with previous hypotension and those with American society of anaesthesiologists' physical status (ASAPS)>II, this drop is more dramatic (Atashkhoyi *et al*, 2013 & Fairfield *et al*, 1991). Geriatric patients do require different medical and surgical settings. Blood pressure instability in young patients due to propofol administration at different stages of the operation may not have any clinical value, but in older patients and special surgeries it is of great importance to maintain stable hemodynamic both throughout and after the surgery (Adapa *et al*, 2017). Various methods have been recommended to prevent hemodynamic instability caused by propofol induction. Current study evaluates hemodynamic effects of ketamine and propofol in comparison to etomidate and propofol during anaesthesia induction (Akin *et al*, 2005). Propofol, a positive modulator of γ-aminobutyric acid receptors, is one of the most commonly used drugs for sedation and anaesthesia in clinical practice (Alkire *et al*, 2000). The hypnotic and analgesic effects of propofol and the dose–exposure–response relationship have been extensively studied through pharmacokinetic–pharmacodynamic (PK–PD) modelling (Bormann, 2000 & Dewhirst *et al*, 2012). The effects of propofol on changes in hemodynamic variables has also been studied after target-controlled infusion in healthy volunteers and patients (Fiset et al, 1999). The most pronounced propofol-induced hemodynamic effect is a decrease in sympathetic tone resulting in vasodilation and a decrease in total peripheral resistance (TPR), which leads to a decrease in MAP (Leung *et al*, 2014 & Marko *et al*, 2013). There is considerable concern that intraoperative hypotension is associated with postoperative mortality (Mashour&Alkire,2013).

Although extensive descriptive knowledge on the association between exposure and the cardiovascular safety of propofol is available, only a few mathematical models have addressed changes in hemodynamic variables during propofol infusion in humans, and they all use empirical approaches ignoring the complex interactions in the cardiovascular system (Marko et al, 2001& Moruzzi & Magoun, 1949). In contrast to empirical models, mechanism-based PK–PD models can distinguish between drug-specific parameters, describing the interaction between the drug and biological system, and biological system-specific parameters describing the functioning of the biological system such as feedback mechanisms (Raoof et al, 1996 & Rudolph &Antkowiak, 2004). Mechanism-based models have better extrapolation properties, and therefore better characterize propofol-induced hemodynamic side-effects Saper *et al*, 2010 & Saper *et al*, 2001). Snelder and colleagues have developed a PK–PD model in rats that integrates a quantitative description of the physiology of the cardiovascular system and the effect of cardiovascular drugs on the relationship between MAP, TPR, HR, and stroke volume (SV) (Sieghart, 1995). This model has been extended by including heart contractility data in dogs, and recent models with similar structure perform reasonably well in humans (Vahle *et al*, 1999). Aim of this descriptive prospective study is to identify the hemodynamic changes during induction with propofol in order to find proper drugs establishing more stable hemodynamic & to examine the effect of injection rate of propofol on vital signs, dose requirement and induction time during induction period post operation (Velly *et al*, 2007).

Material and Methods

Thirty critically patients who took part in the study were admitted to AL-Wahda hospital (surgical department) in Derna city. The data were collected by monitoring patients pre, intra &post operation in OT in the period from March 2024 to June 2024 (by using a questioner's form). Data analysis was performed using SPSS software version 20. Descriptive statistics, including percentage, mean, range, and standard deviations, were calculated for all variables. Patient who took part in this study were asked to sign the consent form. The ethical approval was obtained from college of medical technology/Derna/Libya committee.

Research Limitations

When we planning this study, we estimated the sample size, based on 1-year data collection, however, the overall number during our study were significantly lower than expected. The reason for this is likely to be multifactorial and have not been subject of robust research. we were required to attend before the patient entered the operation at the preparation time during his entry into the operation and after leaving it. the sample size was not as required.

Results

physiological changes associated with the creation of a pneumoperitoneum. The combined use of ketamine and propofol has been addressed with great success in anesthesiology for many years. propofol have a rapid onset, and are safe and effective for sedation and analgesia in minimally invasive procedures. In our study we compared between the induction of propofol during 10, 20 & 30 minute in intra operative. The results of this study demonstrated that propofol have instability in BP & pulse during intra and post-operative. We found that the heart rate, systolic, diastolic, and mean arterial blood pressure was significantly lower in propofol group after induction, 5 min and 10 min after intubation

Table -1: Frequancy & percentage of patients age

Age of patients	%
Less than 30y	20%
From 30 to 40y	16.70%
From 41 to 50y	33.30%
From 51 to 60 y	13.30%
More than 60y	16.70%

Table-2: Frequency & percentage of patients' gender

Sex	No	%
Male	11	36.7
Female	19	63.3

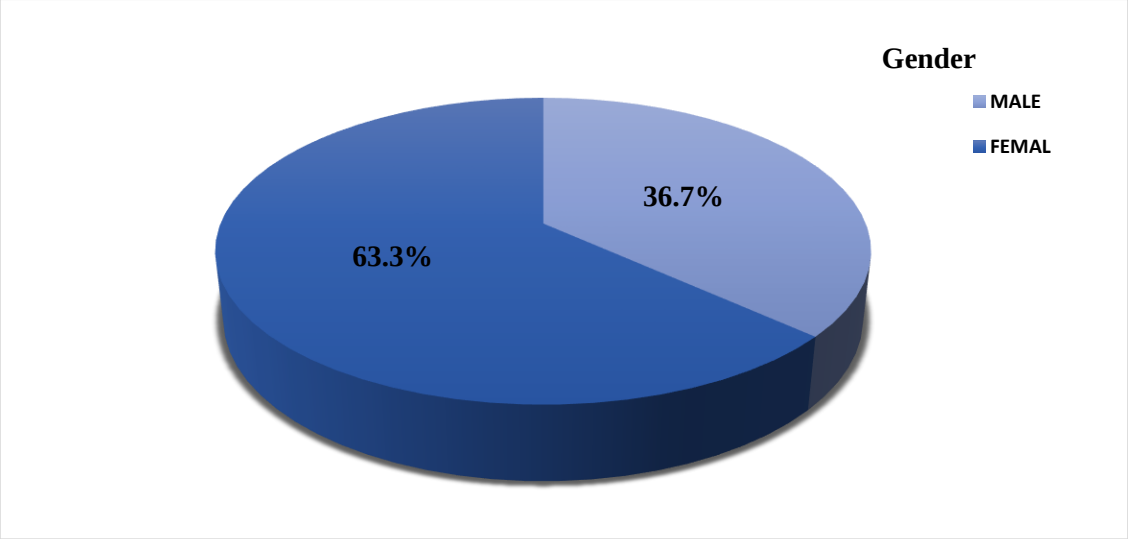

Fig-1: Frequancy & percentage of patients age

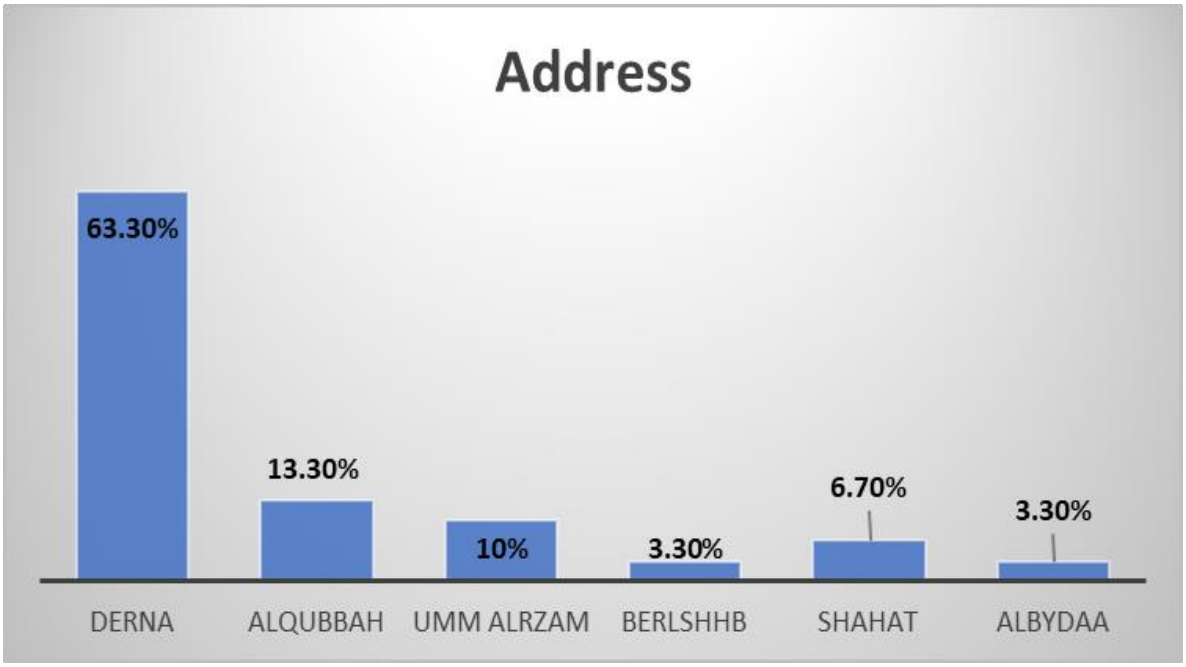

Fig-2: percentage of patients address

Table-3: Frequency & percentage of Operations type

Operation Type	No	%
Cholecystectomy	19	63.3
Laboratomy	2	6.7
Thirodectomy	3	10.0
Hernia	3	10.0
Appendectomy	2	6.7
Infernal Fixation	1	3.3

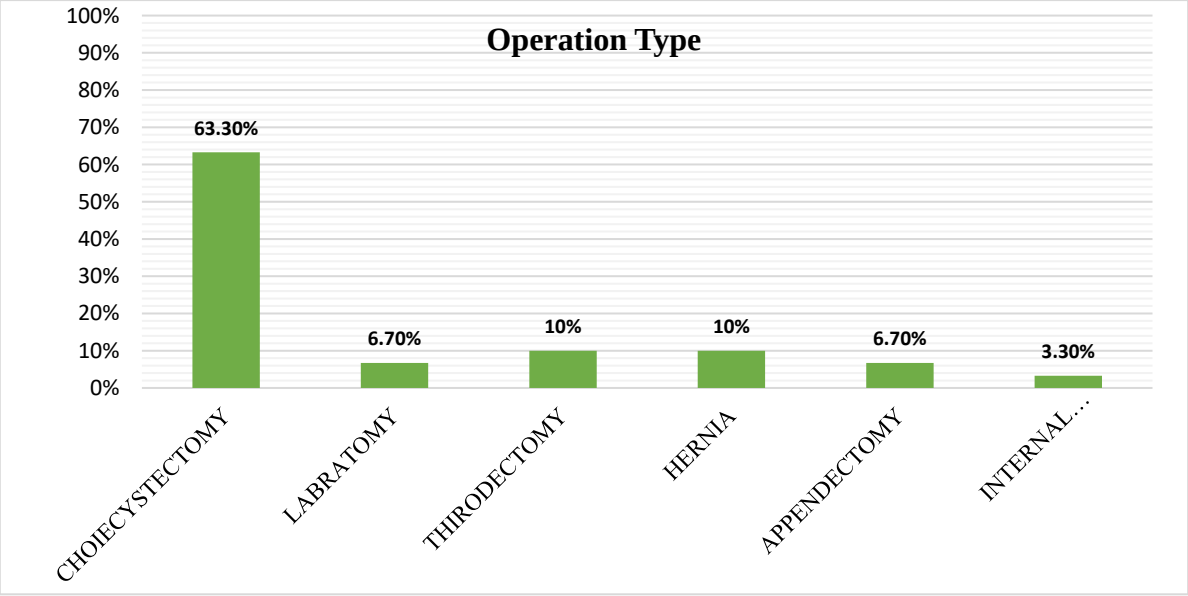

Fig-3: Percentage Operations type

Table-5: Bp, pulse &oxygen pre- operation

BP, P&O2	BP.PRE	PULSE.PRE	OXYGEN.PRE
Mean	136.7096	92.1724	97.5862
Std. Deviation	26.21059	18.87755	2.88490

Table-6: Bp, pulse &oxygen intra-operation 10min

IN-10 MINUTE	PB. INTRA.10MIN	PULSE.INTRA.10MIN	REOXYGEN.INTRA.10MIN
Mean	126.4564	96.0345	99.0690
Std. Deviation	21.11038	21.62915	0.70361

Table-7: Bp, pulse &oxygen intra-operation 20min

IN-20-MINUTE	PB. INTRA .20MIN	PULSE.INTRA. 20MIN	REOXYGEN.INTRA. 20MIN
Mean	129.3933	95.6207	98.7931
Std. D	21.10164	18.53840	1.65571

Table-8: Bp, pulse &oxygen intra-operation 30min

IN-30-MINUTE	PB. INTRA .30MIN	PULSE.INTRA.30MIN	REOXYGEN.INTRA.30MIN
Mean	120.7900	90.2759	98.8966
Std. Deviation	23.24916	15.04492	1.04693

Table-9: Frequency & percentage of oxygen intra- operation 10 min

OXYGEN.INTRA.10MIN	Frequency	%
97.00	1	3.3
98.00	3	10.0
99.00	18	60.0
100.00	7	23.3
Total	29	96.7

Table-10: Frequency & percentage of oxygen intra- operation 20 min

OXYGEN.INTRA.20MIN	Frequency	%
91.00	1	3.3
97.00	1	3.3
98.00	3	10.0
99.00	17	56.7
100.00	7	23.3
Total	29	96.7

Table-11: Frequency & percentage of oxygen intra- operation 30 min

OXYGEN.INTRA.30MIN	No	%
96.00	2	6.7
97.00	1	3.3
98.00	2	6.7
99.00	17	56.7
100.00	7	23.3
Total	29	96.7

Discussion

During the study period, a total of 30 patients were included who admitted to surgical department in AL-wahada hospital in Derna city. The age of the patients ranged from 30 up to 60 years & their wight around 50 to 100. The operations were (19 cholestectomy, 2 laparotomy, 3 thyroidectomy, 3 hernia &2 appendectomy). More than half of patients 63.3% of patients were from Derna and 13.3% from Al-Qubia, 10% from Al Marzeem,6.7% from Shahat, 3.3% were from Albyda & 3.3% from Ber-alshabe city. Concerning the hemodynamic signs during pr-operation it was stable, however there were changes during intra operation about 48% of the patients had changed in pulse rate &Bp range & HR showed statistically significant difference in time. Also, the oxygen was statically stable during intra operative induction of propofol & no significant change during post-operative induction. The propofol have ***instability*** in BP & pulse during intra and post-operative. We found that the heart rate, systolic, diastolic, and mean arterial blood pressure was significantly lower in propofol group after induction, 5 min and 10 min after intubation.

Conclusion

We concluded that propofol had a hemodynamic instability during intra and post operation as an induction agent, however time for recovery in propofol group took a shorter period, with no complication during the inductions.

Specific recommendations

- ✓ More research is needed to determine the hemodynamic instability that cause by propofol.
- ✓ Paying more attention to anesthesia devices and providing complete measuring tools since we were not able to measure some of the vital signs due to the lack of complete equipment and focus on measuring weight before preparing the anesthesia dose.
- ✓ More research is needing to be publishing on the appropriate dose of propofol for anesthesia induction in morbidly obese patients & the effect of injection speed on vital signs and the required dose and induction time for induction of anesthesia with propofol

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