JURNAL RISET
KESEHATAN TERAPAN

https://journalpedia.com/1/index.php/jrkt/index Vol. 06 No. 01 Maret 2024

PERBANDINGAN OKSIKODON DAN FENTANYL DALAM MEMPENGARUHI RESPON HEMODINAMIK DAN KEDALAMAN ANESTESI SAAT INTUBASI ENDOTRAKEAL PADA PASIEN DENGAN ANESTESI UMUM DI RUMAH SAKIT UMUM DAERAH GRATI PASURUAN

Aninda Tanggono[1], Fitri Sepviyanti Sumardi[2]
[1,2]Universitas Pembangunan Nasional Surabaya, Jawa Timur

Email : aninda.tanggono.fk@upnjatim.ac.id[1], fitri.sepviyanti.fk@upnjatim.ac.id[2]

ABSTRAK

Tindakan intubasi endotrakeal menimbulkan respon stimulasi adrenergic yang ditandai dengan peningkatan tekanan darah dan laju nadi akibat dari pelepasan katekolamin. Intubasi endotrakeal biasanya menggunakan obat opiat sebagai analgetik untuk memperoleh kondisi intubasi yang ideal. Oksikodon dan fentanyl sebagai opioid dengan waktu pemberian yang tepat, diharapkan dapat mengontrol respon hemodinamik pada pasien yang menjalani intubasi endotrakeal dan menjaga kedalaman anestesi selama tindakan intubasi endotrakeal. Sebanyak 40 pasien ASA I-III yang menjalani operasi dengan teknik anestesi umum, dikumpulkan dengan teknik *consecutive sampling*. Kriteria inklusi, eksklusi, dan *drop out* diberlakukan. Jenis penelitian adalah eksperimental murni dengan rancangan *double blind randomized controlled trial*. Sampel dibagi menjadi 2 kelompok, yaitu kelompok A mendapat oksikodon 0,2 mg/kgBB dan atrakurium 0,5 mg/kgbb IV dan kelompok B mendapat Fentanyl 2 µg/kgbb via *syringe pump* dan atrakurium 0,5 mg/kgbb IV sebagai kontrol saat induksi anestesi. Kedua kelompok dilakukan pengukuran hemodinamik MAP dan nadi sebanyak lima kali dan pengukuran USCOM, selain itu dilakukan pengukuran kedalaman anestesi saat intubasi dengan CONOX. Hasil diantara kedua kelompok dibandingkan dan dilakukan analisis secara statistik. Karakteristik subjek penelitian pada kelompok A (n = 20 sampel) dan B (n = 20 sampel) tidak berbeda bermakna. Respon hemodinamik (p >0,05) tidak berbeda bermakna secara statistik pada pengukuran MAP maupun nadi. Respon hemodinamik berupa perubahan *stroke volume* melalui pengukuran USCOM (p<0,05) berbeda bermakna secara statistik dengan perubahan nilai yang lebih rendah pada kelompok A. Kedalaman anestesi yang diukur dengan *CONOX* (p<0,05) berbeda bermakna secara statistik dengan kedalaman anestesi lebih baik pada kelompok A. Respon hemodinamik pada saat intubasi relatif berimbang antara oksikodon dengan fentanyl secara pengukuran MAP dan nadi namun oksikodon menghasilkan respon hemodinamik lebih stabil saat dilakukan pengukuran dengan USCOM dan kedalaman anestesi yang lebih baik dengan CONOX.

Kata Kunci: Oksikodon, Fentanyl, Respon Hemodinamik, USCOM, CONOX.

ABSTRACT

The act of endotracheal intubation causes an adrenergic stimulation response which is characterized by an increase in blood pressure and pulse rate due to the release of

catecholamines. Endotracheal intubation usually uses opiate drugs as an analgesic to obtain ideal intubation conditions. Oxycodone and fentanyl as opioids, with the correct administration time, are expected to be able to control the hemodynamic response in patients undergoing endotracheal intubation and maintain the depth of anesthesia during endotracheal intubation. A total of 40 ASA I-III patients who underwent surgery using general anesthesia were collected using consecutive sampling technique. Inclusion, exclusion and drop out criteria were applied. The type of research is pure experimental with a double blind randomized controlled trial design. The samples were divided into 2 groups, namely group A received oxycodone 0.2 mg/kgBW and atracurium 0.5 mg/kgBW IV and group B received Fentanyl 2 µg/kgBW via syringe pump and atracurium 0.5 mg/kgBW IV as a control at this time. induction of anesthesia. Both groups underwent hemodynamic MAP and pulse measurements five times and USCOM measurements, in addition to measuring the depth of anesthesia during intubation with CONOX. The results between the two groups were compared and statistical analysis was carried out. The characteristics of research subjects in groups A (n = 20 samples) and B (n = 20 samples) were not significantly different. The hemodynamic response (p > 0.05) did not differ statistically significantly in MAP or pulse measurements. The hemodynamic response in the form of changes in stroke volume via USCOM measurements (p<0.05) was statistically significantly different from the change in lower values in group A. The depth of anesthesia measured by CONOX (p<0.05) was statistically significantly different from the depth of anesthesia better in group A. The hemodynamic response during intubation was relatively balanced between oxycodone and fentanyl based on MAP and pulse measurements, but oxycodone produced a more stable hemodynamic response when measured with USCOM and a better depth of anesthesia with CONOX.

Keywords: *Oksikodon, Fentanyl, Respon hemodinamik, USCOM, CONOX.*

A. INTRODUCTION

Endotracheal intubation is a high-risk action, resulting in an adrenergic stimulation response. The symptom is an increase in blood pressure and pulse rate due to the release of catecholamines. Usually, endotracheal intubation uses opiate drugs as an analgesic to obtain ideal intubation conditions.[1,2,3]

The use of opiates can reduce the effect of adrenergic-sympathetic response due to intubation.[1] Oxycodone (14-hydroxy-7, 8- dihydrocodeinone) is a potent, and mu-opioid receptor agonist and its potency are similar to morphine. The onset time of oxycodone is a rapid onset time of approximately 5- 8 minutes. Thus, it can be used effectively to minimize a patient's hemodynamic response to sudden stimuli, such as intubation.[2] In the Regional Public Hospital of Grati, oxycodone is generally used as a post-surgery analgesic, and the research on intubation with oxycodone related to depth of anesthesia and hemodynamic response has not

been conducted yet.

Hemodynamic evaluation that has been performed is the measurement of blood pressure, pulse, and their changes. With the development of technology, the measurement of invasive and non-invasive is being developed. One of the measurements of non-invasive hemodynamics is USCOM (Ultrasonic Cardiac Outputs Monitors).[3,4]

The depth of general anesthesia can be clinically assessed and it is by monitoring anesthetic based on EEG (Electroencephalogram). Some monitoring devices based on EEG are known as BIS (Bispectral Index), IOC (Index of Consciousness), and, most recently, CONOX, which has the advantage of measuring the depth of anesthesia with qCON and qNOX, which can used as predictions of painful stimulus.[5,6]

Based on data obtained from medical records of the Regional Public Hospital of Grati, Pasuruan from January to December 2019, general anesthesia with endotracheal intubation in elective patients was 70%. 90% used fentanyl for intubation. During intubation, tachycardia occurred in 50-60% of patients during both laryngoscopy and intubation due to a lack of monitoring anesthesia's depth.[7,8] Therefore, the researcher is interested in analyzing the comparison of depth of anesthesia and hemodynamic response between fentanyl with oxycodone on surgery with general anesthesia in the Regional Public Hospital of Grati, Pasuruan.

B. METHOD AND RESULTS

This research was a prospective-observational study conducted on patients undergoing surgery using general anesthesia in the surgery room at the Central Surgical Installation, Wing Amerta Installation, and Emergency Care Installation of the Regional Public Hospital of Grati, Pasuruan from June to August 2019. The total of the required samples was 40 patients. It was divided into 2 treatment groups, such as oxycodone and fentanyl groups with 20 samples respectively in each treatment group. In this research, none of the drop-out patients was obtained.

Further, in this research, a comparison of hemodynamic response and depth of anesthesia between oxycodone and fentanyl as epidural analgesia adjuvant was performed. The hemodynamic response was assessed by 5 times hemodynamic measurements, measured pre-induction, post-induction, and during intubation, where 3 minutes were post-intubation and 5 minutes were post-intubation. The comparison of hemodynamic stability was also measured

using pulse and mean arterial pressure, which was measured from 5 measurements. Then, the comparison of depth of anesthesia between oxycodone and fentanyl was measured through the enhancement value of qCON on the CONOX monitor, installed on the patient. A numeric data-scaled variable, if normally distributed, would display the mean and standard deviation, while if it was not normally distributed, the mean and interquartile range are shown. Categorical data-scaled variable displayed relatively frequency distribution.

Characteristic of the Research's Subject

Characteristics of the research's subject are shown in Table 5.1. It aimed to see whether both groups had been comparable or not. The numeric data-scaled variables were age and body mass index (BMI). The distribution of age and BMI data with a normal distribution was shown in mean ± standard deviation. The test used was an independent t-test. Categorical data-scaled variables were gender and ASA physical status, displayed in proportional distribution, and the test used was a Chi-squared test.

Table 2.1 Characteristics of Subject Based on Research Group

Variables	Oxycodone Group (n = 20)	Fentanyl Group (n = 20)	*p*-Value
Age (years)Mean ± SD	47.2 ± 11.4	47.4 ± 11.9	0.957
Sex			
Men	10 (50.0)	8 (40.0)	0.525
Women	10 (50.0)	12 (60.0)	
BMI (kg/m ^{2})Mean ± SD	23.1 ± 3.0	23.8 ± 3,2	0.519
ASA Physical Status			
I	6 (30.0)	8 (40.0)	0.531
II	9 (45.0)	8 (40.0)	
III	5 (25.0)	4 (20.0)	

The population of patient consisted of 40 patients, undergoing general anesthesia surgery with 20 samples of oxycodone and 20 samples of fentanyl. The analysis shows that the mean age ± standard deviation in the oxycodone group was 47.2 ± 11.4, while the fentanyl group was 47.4 ± 11.9. After statistical tests were performed, there was an insignificant difference with a p-value of 0.957. The BMI mean in the oxycodone group was 23.1 with a standard deviation of 3, while the fentanyl group was 23.8 kg/m2 with a standard deviation of 3.2. Statistically, the BMI variable was insignificantly different with a p-value of 0.531.

Patients' sex was classified into 2 groups with a proportional distribution of men in the oxycodone group was 50% and women was 50%. Moreover, in the fentanyl group, 40% of men and 60% of women had a statistically insignificant difference with a p-value of 0.525. The patient's physical status was classified into 3 groups, such as physical status ASA I, ASA II, and ASA III. The proportional distribution of the ASA I physical status variable in the oxycodone group was 30% and the fentanyl group was 40%. ASA II physical status variable in the oxycodone group was 45% and the fentanyl group was 40%. Further, the ASA III physical status variable in the oxycodone group was 25% and in the fentanyl group was 20%. Statistically, there was an insignificant difference in the proportional distribution of ASA physical status variables with a *p*-value of 0.531. Also, there was an insignificant different impact statistically on patient characteristics between the two groups, so the conclusion was that the second group had been comparable.

Comparison of Hemodynamic Reponses Based on Treatment Groups

Pressure arteries mean variable was calculated based on systolic and diastolic blood pressure. It was monitored 5 times, starting from pre-induction in the second group Then, after induction, during laryngoscopy intubation, it was 3 minutes and 5 minutes post-intubation. The pressure arteries mean variable was a type of numeric data and had data distribution and normal distribution. The test used was an independent t-test, and it was displayed in mean ± standard deviation.

The pulse rate variable was monitored 5 times, started pre-induction in both groups. Then, after induction, during intubation laryngoscopy, it was 3 minutes and 5 minutes post-intubation. The pulse rate variable was a type of numerical data and had data distribution and normal distribution. The test used was an independent t-test. It was shown in mean ± standard deviation.

Table 2.2 Hemodynamics Response from FOLDER and Pulse Rate Based on Treatment Groups

Variables	Oxycodone Group (n = 20)	Fentanyl Group (n = 20)	Different mean	*p*-Value
FOLDER				
1	92.6 ± 9.6	90.3 ± 11.5	2,3	0.493
2	80.9 ± 18.0	79.4 ± 11.7	1.5	0.759
3	84.2 ± 13.6	81.8 ± 19.5	2.5	0.647
4	86.5 ± 14.2	82.0 ± 17.9	4.6	0.380
5	85.0 ± 13.3	80.5 ± 11.2	4.5	0.255
HR				
1	74.9 ± 10.4	80.9 ± 15.5	-6.1	0.153
2	74.2 ± 13.4	75.50 ± 14.9	-1.3	0.774
3	73.1 ± 11.6	75.3 ± 8.2	-2.2	0.502
4	74.5 ± 9.9	73.7 ± 10.0	0.8	0.802
5	74.0 ± 10.0	74.0 ± 10.1	-1.56	0.629

A comparison of mean arterial pressure by group is described in Table 5.2. Based on the table, an insignificant difference was found in statistics on the pressure arteries of average patients in group oxycodone nor fentanyl on 5 measurements. There was also no comparison of pulse rate between the two groups statistically significant differences were found which were indicated by values p>0.05. The absence of hemodynamic differences indicates no difference in response hemodynamics between drugs for guarding hemodynamic stability.

Comparison Mark Strokes Volume on USCOM between Group Treatment

SV Stroke Volume variable from USCOM was measured before induction and the re-

measurement was conducted after intubation. Stroke Volume was a type of numeric data. The test used was Mann Whitney because data was not normally distributed in both groups and shown in the mean and interquartile range.

Table 2 .3 Mark Strokes Volume based on Group Treatment

Variables	Oxycodone Group (n = 20)	Fentanyl Group (n = 20)	Different mean	*p*-Value
SV mean ± SD12	60.6 ± 4.6	63.5 ± 4.6	-2.9	0.051
	58.0 ± 5.4	51.9 ± 7.6	6.1	0.006
Δ SV (IQR mean)	3 (2)	11.5 (8.5)	8.5	<0.001

The comparison of stroke volume changes based on the group is explained in Table 5.3. The table shows that there was an SV decline after intubation compared to values before induction in the second research group. The Stroke Volume value was found with a mean of 3 and an interquartile range of 2 for oxycodone and a mean of 11.5 and an interquartile range of 8.5 in the fentanyl group. It demonstrated a significant difference with p-value < 0.001.

Comparison of Anesthesia Depth from qCON and qNOX Valuesin CONOX between Treatment Group

qCON Variable was a type of numeric data and had data distribution and normal distribution. The test used was an independent t-test and displayed in mean ± standard deviation.

Table 2.4 qCON and qNOX Values based on Research Group

Variables	Oxycodone Group (n = 20)	Fentanyl Group (n = 20)	Different mean	*p*-Value
qCON	51.0 ± 5.8	60.5 ± 7.5	-9.6	<0.001

qNOX	56.8 ± 10.2	60.0 ± 7.7	-3.2	0.278

C. CONCLUSIONS AND SUGGESTIONS

Conclusion

The conclusion based on analysis and discussion of the results of this research, comparing hemodynamic response and depth of anesthesia of oxycodone with fentanyl in surgery with general anesthesia is:

1. Hemodynamic response on intubation has been relatively balanced between oxycodone with fentanyl by MAP and pulse measurement, but oxycodone has produced a more stable hemodynamic response when the measurement with USCOM is performed.
2. Depth of anesthesia during intubation with oxycodone can produce a better depth of anesthesia than with fentanyl when the measurement with CONOX is conducted.

Suggestions

The results of this research are expected as a reference for assessing the depth of anesthesia during endotracheal intubation in the future.

For the following researchers, the Durante operation measurement and brief monitoring before extubation can be performed to assess hemodynamic response between the fentanyl group with oxycodone.

REFERENCES

Park, JH et al. (2015) “Comparison of oxycodone and fentanyl for postoperative patient-controlled analgesia after laparoscopic gynecological surgery,” Korean Journal of Anesthesiology. Korean Society of Anesthesiologists, 68(2), p. 153– 158. doi: 10.4097/kjae.2015.68.2.153.

Kim, N. S. et al. (2017) “Oxycodone versus fentanyl for intravenous patient-controlled analgesia after laparoscopic supracervical hysterectomy," Medicine (United States), 96(10). doi: 10.1097/MD.0000000000006286

Lee, KH et al. (2017) “Intravenous oxycodone versus intravenous morphine in Cancer pain: A randomized, open-label, parallel-group, active-control study," Pain Research and Management. Hindawi Limited, 2017. doi: 10.1155/2017/9741729

CONOX: a Smart Anaesthesia Monitoring - Quantum Medical (2019). Available on:

https://quantiummedical.com/products/conox/ (Accessed: 10 April 2020).

Wealthy, I. N. B. et al. (2016) "Validity Strokes Volume Variations with Ultrasonic Cardiac Outputs Monitors (USCOM) For Evaluate Fluid Responsiveness," Sari Pediatrics, 17(5), p. 367. doi 10.14238/sp17.5.2016.367- 372.

Koh, G.H. et al. (2019) "Effect of different doses of intravenous oxycodone and fentanyl on intubation-related hemodynamic responses: A prospective double-blind randomized controlled trial (CONSORT)," Medicine (United States). Lippincott Williams and Wilkins, 98(18). doi: 10.1097/MD.0000000000015509.

Kurniyanta, P. et al. (2019) "The ultrasonic cardiac output monitor (USCOM) as a tool in evaluating fluid responsiveness in pediatric patients undergoing emergency surgery," Bali Journal of Anesthesiology, 3(1), matter. 19. doi: 10.15562/bjoa.v3i1.111.

Hines, R. L. dan Marschall, K. E. (2018) "Stoelting's anesthesia and co-existing disease."Tersediapada:https://www.clinicalkey.com/dura/browse/bookChapter/3-s2.0-C20150003987.

Kim, N. S. dkk. (2017) "Oxycodone versus fentanyl for intravenous patient- controlled analgesia after laparoscopic supracervical hysterectomy," Medicine (United States), 96(10). doi: 10.1097/MD.0000000000006286

Lee, K. H. dkk. (2017) "Intravenous oxycodone versus intravenous morphine in cancer pain: A randomized, open-label, parallel-group, active-control study," Pain Research and Management. Hindawi Limited, 2017. doi: 10.1155/2017/9741729.

Messieha, Z. S., Guirguis, S. dan Hanna, S. (2011) "Bispectral index monitoring

BIS) as a guide for intubation without neuromuscular blockade in office-based pediatric general anesthesia: a retrospective evaluation.," Anesthesia progress, 58(1), hal. 3–7. doi: 10.2344/0003-3006-58.1.3.

Park, K. B., Ann, J. dan Lee, H. (2016) "Effects of different dosages of oxycodone and fentanyl on the hemodynamic changes during intubation," Saudi Medical Journal. Saudi Arabian Armed Forces Hospital, 37(8), hal. 847–852. doi: 10.15537/smj.2016.8.14822.

Saari, T. I. dkk. (2012) "Oxycodone clearance is markedly reduced with advancing age: A population pharmacokinetic study," British Journal of Anaesthesia. Oxford University Press, 108(3), hal. 491–498. doi: 10.1093/bja/aer395.

Smith MB, B. E. dan Professor, R. (tanpa tanggal) "The USCOM and

Haemodynamics A Guide for Junior Medical and Nursing Staff."

Hartawan, I. N. B. dkk. (2016) "Validitas Stroke Volume Variation dengan Ultrasonic Cardiac Output Monitor (USCOM) untuk Menilai Fluid Responsiveness,"SariPediatri,17(5),hal.367. doi: 10.14238/sp17.5.2016.367- 372.

Collins, V. J. (1993) Principles of anesthesiology : general and regional anesthesia. Philadelphia: Lea & Febiger.

Gurulingappa dkk. (2012) "Attenuation of cardiovascular responses to direct laryngoscopy and intubation-A comparative study between iv bolus fentanyl, lignocaine and placebo (NS)," Journal of Clinical and Diagnostic Research, 6(10), hal. 1749–1752. doi: 10.7860/JCDR/2012/4070.2619

Jensen, E. W. dkk. (2004) "Pitfalls and challenges when assessing the depth of hypnosis during general anaesthesia by clinical signs and electronic indices," Acta Anaesthesiologica Scandinavica, 48(10), hal. 1260–1267. doi: 10.1111/j.1399- 6576.2004.00521.x.

Takahashi, J. dkk. (2018) "Association of Fentanyl Use in Rapid Sequence Intubation with Post-Intubation Hypotension," American Journal of Emergency Medicine. Elsevier Inc, (Association of Fentanyl Use in Rapid Sequence Intubation with Post-Intubation Hypotension), hal. 2044–2049. doi: 10.1016/ j.ajem.2018.03.026.

Sudiwala, S. dan Knox, S. M. (2019) "The emerging role of cranial nerves in shaping craniofacial development," Genesis, 57(1), hal. 1–13. doi: 10.1002/dvg.23282.

Smith MB, B. E. dan Professor, R. (tanpa tanggal) "The USCOM and
Haemodynamics A Guide for Junior Medical and Nursing Staff.

Miller, R. R. D. . C. N. H. . E. L. I. . F. L. A. . W.-K. J. P. . Y. W. . dan D, N. (2015)
Miller's anesthesia. Eight-Edit. Diedit oleh R. D. Miller. Philadelphia: Elsevier- Sanders.

Megalla, S. A., Abdou, K. A. dan Mohamed, A. I. (2019) "Bispectral index guided attenuation of hemodynamic and arousal response to endotracheal intubation using magnesium sulfate and fentanyl. Randomized, controlled trial," Egyptian Journal of Anaesthesia. Taylor & Francis, 35(1), hal. 37–42. doi: 10.1080/11101849.2019.1595346.

Jensen, E. W. dkk. (2004) "Pitfalls and challenges when assessing the depth of hypnosis during general anaesthesia by clinical signs and electronic indices," Acta Anaesthesiologica Scandinavica, 48(10), hal. 1260–1267. doi: 10.1111/j.1399- 6576.2004.00521.x

Fontanet, J. dkk. (2014) "Comparison of the qNOX and ANI Indices of Nociception during Propofol and Remifentanil Anaesthesia," Esgco, (Esgco), hal. 243–244.Tersediapada:http://quantiummedical.com/wp-content/uploads/2015/05/

ESCGO2014.pdf.