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Research Article

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Comparison of Spinal or General Anesthesia for Cardiac Complications with Using High Sensitive Cardiac Troponins in Non-cardiac Surgeries

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Abstract

Objective: There is uncertainty of prognostic value of serum high sensitive cardiac troponin (hs-cTns) measurement after non-cardiac surgery and which anesthetic method cause more harmful cardiac event. Even silent cardiac complications can be detected by monitoring hg-cTns measurements after non-cardiac surgery. In this study we aimed to show the role of cardiac troponins that are preferred markers of their high specificity and sensitivity instead of classical markers such as creatine kinase MB.

Methods: The study group included 86 preoperative non- cardiac surgery patients that were separated randomly into the general or spinal anesthesia groups. We obtained patients 12 lead electrocardiograms and hs-cTns on the operation day and post operation 1, 2 and 3 days.

Results: In both groups all patients had a low level of hs-cTnT concentrations but didn't have any cardiac complication. In spinal anesthesia group there is slight increase near significant hs-cTnT on postoperative third day.

Conclusion: In this study we wanted to show we wanted to show which anesthetic method is safer for cardiac tissue by monitoring serum hs- cTns.

Keywords: Cardiac complications; Non-cardiac surgery; Troponins

Introduction

Perioperative acute myocardial infarction (PAMI) is a serious complication which is the one of the leading cause of death within the first 30 days after non-cardiac surgery [1]. One million patients die from PAMI yearly [2]. Nagele et al. [3] found that preoperative hs-cTnT can be a specific, sensitive and rapid biomarker for categorizing the risk for PAMI and mortality in preoperative patients [4,5]. Recent studies denoted that even a sligth increase in cardiac troponins (c-T) and also hs-TcT assays which were introduced to detect the low level of c-Tns were associated with increased cardiac complications [6-8]. There is a debate about which anesthetic method is safer for myocardial tissue.

In this study we aimed to show the correlation between the hs-cTnT levels before and after operation and the cardiac complications in the patients undergoing surgery with two different anesthetic methods and to compare the methods for cardiac complications and find out which anesthetic method is more safer for the cardiac tissue.

Methods

Study populations

Following getting our trial permission from our hospital local ethics and trial committee and collection of informed consent, 86 ASA I-III patients 18-65 years of age who were scheduled to undergoing elective orthopedic lower limb surgery and randomized in two groups: Group G (n=43) and Group R (n=43) undergoing surgery with spinal or general anesthesia. The trial number was 629/2013 and designed as prospective, randomized, double-blind study and conducted between January and February 2014 in at our hospital orthopedics clinics.

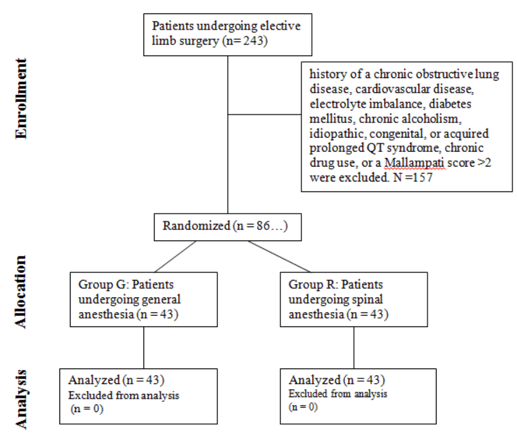

Figure 1: Consort Flow Diagram of our randomized trial.

The study was performed by the person unaware of clinical outcomes. Anesthesia doctors and technicians were collected the blood samples but didn't know the analysis groups. The technicians, physicians and analysts who performed the tests were not informed about the study. A Consort flow chart diagram of the trial was shown in Figure 1.

Patient characteristics were listed in Table 1. A Mallampati score>2, long QT syndrome (acquired or congenital), cardiovascular disease, chronic obstructive lung disease, diabetes mellitus, chronic alcohol and drug using patients were excluded from the study. Hemodynamic monitoring data's that are consist of peripheral oxygen saturation (SpO2), heart rate (HR)and mean arterial pressure (MAP) were evaluated preoperative section and patients didn't get any premedication. Propanol and fentanyl were used to get the anesthesia induction and endotracheal intubation was performed after neuromuscular block with 0.1 mg kg-1 rocuronium in Group G. Maintenance of anesthesia was ensured with 50% N_2O/O_2 and 2-2.5% sevoflurane inhalation. When the patients were in the sitting position 15 mg 0.5% hyperbaric bupivacaine were given to the L4-L5 space in the midline to get the spinal anesthesia in Group R. The pinprick test and the Bromage scale were used for sensory and motor block. Surgery was started when the T10 level sensory block was reached.

Study sample (n= 86)	Group G (n=43)	Group R (n=43)	Unadjusted p value
Mean age. y (SD)	59.2 ± 2.4	57 ± 4.5	0.15
Female sex. n (%)	17 (39.5)	18 (41.8)	0.43
Smoking history. n (%)	28 (65.1)	26 (67.4)	0.41
Diabetes. n(%)	14 (32.5)	12 (27.9)	0.12
Hypertension. n(%)	10 (23.2)	11 (25.5)	0.32
Hyperchlosterolemia. n(%)	17 (39.5)	14 (32.5)	0.45
Coronary artery disease. n(%)	0	0	0
Atrial fibrillation. n(%)	0	0	0
Lee's revised cardiac risk index			
1	23 (53.5)	26 (60.5)	0.22
2	20 (46.5)	17 (39.5)	0.19
3	0	0	0
4	0	0	0
Medications			
Aspirin. n(%)	5 (11.6)	7 (16.2)	0.55
Clopidogrel. n(%)	0	0	0
Warfarin. n(%)	0	0	0
B- blocker. n(%)	3 (6.9)	4 (9.3)	0.78
Statin. n(%)	0 (0)	0	0
ACE inhibitors. n(%)	3 (6.9)	2 (7.1)	0.17
Calcium-channel			
Blocker. n(%)	3 (6.9)	4 (9.3)	0.56
ARB. n(%)	1 (3.5)	2 (7.1)	0.67
Nitrates. n(%)	0	0	0
Diuretics. n(%)	0	0	0

Table 1: Characteristics of the study population.

Biomarker assays

Blood samples and 12-lead ECCs were taken on preoperative (baseline) and the mornings of postoperative days 1,2 and 3, collected in serum separation tubes and centrifuged. Samples were separated into aliquots and were frozen -80°C until they were assayed. Biomarker measurements were carried out in batches and no more than 2 freezethaw cycles. Hs-cTnT concentrations (presented as nanograms per liter equal to picograms per mililiter) were measured by on Cobas e601 autoanalyzer (Roche Diagnostics, Germany). Measurable Ranges were 3-10000 ng/L or pg/mL. (Limit of detection 5 ng/L) The hs-cTnT level with 10% coefficient of variation was 13 ng/L.

Statistical analysis

SPSS software (Version 18.0, SPSS Inc. Chicago, IL, USA) was used for statistical analysis. Variables were analyzed using the Kolmogorov-Simirnov test. Categorical variables were presented as percentages and parametric variables were presented as mean ± standard deviation. Non-parametric variables were expressed as median (minimum-maximum). The normally distributed numeric variables were analyzed with the Student's t-test, and non-normally distributed variables were eveluated by the Mann–Whitney U test variance analysis. The categorical variables compared with Chi-square test. P value<0.05 was accepted as statistically significant.

Results

Before and after surgery, all patients had a level of >5 ng/L hs-cTnT concentration. Before operation Group G had a mean of 12.79 ± 22.241 ng/L and Group R had 8.44 ± 5.019 ng/L hs-cTnT. (p value: 0.079). On postoperative day 1, Group G patients had a mean hs-cTnT 11, 25 ± 19, 941 ng/L and Group R patients had a hs-cTnT9, 89 ± 10, 199 ng/L. (pvalue: 0.454) On postoperative second and third days Group G had a mean 12.56 ± 21.591 ng/L and 13.83 ± 26.992 ng/L, and Group R had mean 8.02 ± 4.042 ng/L and 17.27 ± 22.707 ng/L, (p value: 0.407 and 0.055) respectively. The distribution of these values is shown in Table 2.

	Group G (n: 43)	Group R (n: 43)	P value
Before surgery	12.79 ± 22.241	8.44 ± 5.019	0.079
Postoperative day 1	11.25 ± 19.941	9.89 ± 10.199	0.454

Postoperative day 2	12.56 ± 21.591	8.02 ± 4.042	0.407
Postoperative day 3	13.83 ± 26.992	17.27 ± 22.707	0.055

Table 2: Hs-cTnT levels of preopertive day and postoperative days 1-3 (median±SD n/L)

Before and after surgery of two different anesthesia patients had a detectable hs-cTnT concentrations but not significant rise in hs-cTnT levels. In spinal anesthesia group there is slight increase near significant hs-cTnT on postoperative third day (p value: 0.055) (Figure 2).

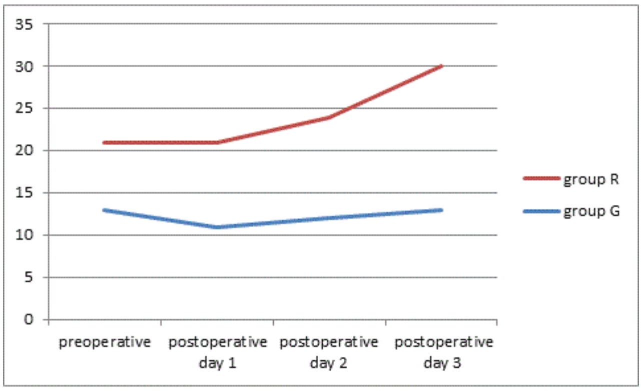

Figure 2: The chart is showing the group G and R hs- cTnT levels. In group R a near significant increase occured on postoperative day 3 (p: 0.055).

Discussion

The recent guidelines propose the use of volatile anesthetics as beneficial in high risk patients undergoing non-cardiac surgery (class IIa recommendation). A systematic review failed to retrieve studies and a small trial published in the meantime did not detect any protective effect of volatile anesthetic's on cardiovascular end points in non-cardiac surgical patients [9-15]. In addition the numbers of studies evaluating effects of spinal anesthesia are scarce. One of these studies [16] compared selective spinal anesthesia with general anesthesia technics and did not find any significant difference regarding arrythmia and hemodynamy. Another study [17] assessed effects of anesthesia technics on myocardial ischemia and reported that anesthesia technics did not affect serum CK-MB and Troponin I levels and ST segment levels on holter ECG monitorization in elderly patients undergoing urological operations. The above mentioned studies have reported similar findings. Major cardiovascular complications and deaths did not differ in larger trials, which randomized patients to combined anesthesia techniques. The results of this trial [18] may therefore be viewed in the broader evidence context, suggesting that the applied anesthetic technique may not make a difference in the occurrence of major cardiovascular complication and death after non-cardiac surgery. Absence of preoperative ischemia is a significant risk in both general and local anesthesia. In addition silent perioperative ischemic events [19] occur frequently at postoperative period. Ischemic events may occur due to postoperative pain, decreased capacity of O_2 carrying, and acute reduction of cardiac output or blood pressure, intraoperative and postoperative bleeding, increased metabolic response to increased body temperature and shivering. Many myocardial ischemic events may not result in hemodynamic compromise. In addition ECG [16] may be normal in 25-50% of patients with coronary artery disease. Usually repeated ECGs [19] show myocardial infarction findings in case of new perioperative myocardial infarction. Therefore analysis of serum cardiac markers may be useful in suspicious myocardial ischemic events. In this study no patient displayed hemodynamic compromise and an increased level of hs-cTnT denoting myocardial ischemia. Some authors suggest the increased hs-cTnT levels may be correlated with skeletal disease but if it is skeletal disease the increase must have been persistent [20]. In our study the increase was observed on the third day not before that and this make us to consider silent complications.

Our study was done on limited population at low-risk, long-term follow-up results were absent, etc. Although, our findings are compatible with the others considering that cardiac complications are caused by supply and demand mismatch, we must follow the postoperative course for 1 month after surgery.

Conclusion

In conclusion, this study we found that spinal anesthesia makes near significant increase in hs-TnT level on postoperative days. However this increase in hs-cTnT were not associated with an increased incidence of cardiac complications but this finding makes us to think spinal anesthesia can be more harmful to the cardiac tissue but we need further confirmation with other larger and longer studies.

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Mansuroglu C designed the research and analyzed the data. Turhan T, Yıldız N, Calcı E, Cıgırgan C and Ornek E performed the research. Karaca O and Ornek D contributed analytical tools. Mansuroglu C, Turhan T and Ornek D wrote the paper.

Conflicts of Interest and Source of Funding

The authors have no financial disclosures to declare, no conflicts of interest to report, and have no commercial or proprietary interest. No commercial or proprietary interest. There was no funding.

References

1. Landesberg G, Beattie WS, Mosseri M, Jaffe AS, Alpert JS (2009) Perioperative myocardial infarction. Circulation 119: 2936-2944.
2. Devereaux PJ, Xavier D, Pogue J, Guyatt G, Sigamani A, et al. (2011) Characteristics and short-term prognosis of perioperative myocardial infarction in patients undergoing noncardiac surgery: a cohort study. Ann Intern Med 154: 523-528.
3. Nagele P, Brown F, Gage BF, Gibson DW, Miller JP, et al. (2013) High-sensitivity cardiac troponin T in prediction and diagnosis of myocardial infarction and long-term mortality after noncardiac surgery. Am Heart J 166: 325-332.
4. Landesberg G, Shatz V, Akopnik I, Wolf YG, Mayer M, et al. (2003) Association of cardiac troponin, CK-MB, and postoperative myocardial

ischemia with long-term survival after major vascular surgery. J Am Coll Cardiol 42: 1547-1554.

5. Levy M, Heels-Andell D, Hiralal R, Bhandari M, Gordon G, et al. (2011) Prognostic value of troponin and creatine kinase muscle and brain isoenzyme measurment after noncardiac surgery: a systematic review and meta- analysis. Anesthesiology 114: 796-806.
6. Nagele P, Rao LK, Penta M, Kallogjeri D, Spitznagel EL, et al. (2011) Postoperative myocardial injury after major head and neck cancer surgery. Head Neck 33: 1085-1091.
7. Landesberg G, Mosseri M, Shatz V, Akopnik I, Bocher M, et al. (2004) Cardiac troponin after major vascular surgery: the role of perioperative ischemia, preoperative thallium scanning, and coronary revascularization. J Am Coll Cardiol 44: 569-575.
8. Devereaux PJ, Chan MT, Alanso-Coello P, Walsh M, Berwanger O, et al. (2012) Vascular events In Noncardiac Surgery Patients Cohort Eveluation study1, Asssociation between postoperative troponin levels and 30-day mortality among patients undergoing noncardiac surgery. JAMA 307: 2295-2304.
9. Mueller M, Biener M, Valaie M, Doerr S, Keller T, et al. (2012) Absolute and relative kinetic changes of high- sensitivity cardiac troponin T in acute coronary syndrome and in patients with increased troponin in the absence of acute coronary sndrome. Clin Chem 58: 209-218.
10. Reichlin T, Irfan A, Twerebold R, Reiter M, Hochholzer W, et al. (2011) Utility of absolute and relative changes in cardiac troponin concentreations in the early diagnosis of acute myocardial infaction. Circulation 124: 136-145.
11. Ndrepepa G, Braun S, Mehilli J, Birkmeier KA, Byrne RA, et al. (2011) Prognostic value of sensitive troponin T in patients with stable and unstable angina and undetectable conventional troponin. Am Heart 16: 68-75.
12. Jaffe AS (2011) The 10 commandments of troponin, with special reference to high sensitivity assays. Heart 97: 940-946.
13. Thygesen K, Mair J, Giannitsis E, Mueller C, Lindahl B, et al. (2012) How to use high-sensitivity cardiac troponins in acute cardiac care. Eur Heart J 33: 2252-2257.
14. Lurati Buse GA, Schumacher P, Seeberger E, Studer W, Schuman RM, et al. (2012) Randomized comparison of sevoflurane versus propofol to reduce perioperative myocardial ischemia in patients undergoing noncardiac surgery. Circulation 126: 2696-2704.
15. Ornek E, Ornek D, Alkent ZP, Ekin A, Basaran M, et al. (2010) The effects of volatile induction and maintenance of anesthesia and selective spinal anesthesia on QT interval, QT dispersion, and arrhythmia incidence. Clinics (Sao Paulo) 65: 763-767.
16. Alkent ZP, Ornek D, Sahin D, Turhan T, Un C, et al. (2012) The effects of anesthesia techniques on myocardial ischemia in geriatric patients. Turkish Journal of Geriatrics 15: 195-200.
17. Liu SS, Wu CL (2007) Effect of postoperative analgesia on major postoperative complications: a systematic update of the evidence. Anesth Analg 104: 689-702.
18. Lucreziotti S, Foroni C, Fiorentini C (2002) Perioperative myocardial infarction in noncardiac surgery: the diagnostic and prognostic role of cardiac troponins. J Intern Med 252: 11-20.
19. Adams JE, Sicard GA, Allen BT, Bridwell KH, Lenke LG, et al. (1994) Diagnosis of perioperative myocardial infarction with measurement of cardiac troponin I. N Engl J Med 330: 670-674.
20. Rittoo D, Jones A, Lecky B, Neithercut D (2014) Elevation of cardiac troponin T, but not cardiac troponin I, in patients with neuromuscular diseases: implications for the diagnosis of myocardial infarction. J Am Coll Cardiol 63: 2411-2420.