



Changes in Blood Glucose In Diabetic Patients During Cataract Surgery Which Manner Is Better?

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Changes in blood glucose in diabetic patients during cataract surgery which manner is better?

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ABSTRACT

Background: Surgery is a kind of trauma which Hemodynamic, metabolic and hormonal responses. Anesthesia and Analgesia can cause extra stress for body. blood glucose levels can be measured as an indicator of stress factors, Blood glucose rising in Diabetic patient is unpleasant. Method: 60 diabetic patients aged between 40 and 70 treated with oral glycemc agents that underwent elective Blood glucose level was scaled by BioNime GM 100 half an hour prior to anesthesia or sedation, exactly after anesthesia or sedation and after surgery. After OR admission, patients underwent standard monitoring like ECG, NIBP and pulse-oximetry. First group was anesthetize by Topical Anesthesia with Tetracaine and second group was anesthetized by Retrobulbar Block. Prior to anesthesia, in both groups, sedation was performed with 2mg Midazolam and 1µgr/kg Fentanyl. For the third group, candidate for General Anesthesia, 1.5 mg/kg Propofol was administered for induction and 0.5 mg/kg Atracorium was used for preparing appropriate muscle relaxation before intubation. After successful tracheal intubation, patients were ventilated with Isoflurane on its maintenance dosage 1.5% V/V. Patients of 3rd group were extubated after surgery and the reverse of muscle relaxants. As mentioned, blood glucose level was assessed and recorded exactly after anesthesia, exactly after surgery and every 30 minutes after entering the recovery room. Result: In the group underwent General Anesthesia changes during surgery and after it are statistically significant (P<0.05). In groups underwent Retrobulbar block and Topical anesthesia no significant change in BS after anesthesia, during surgery or after it .no significant difference between blood glucose levels after anesthesia among three groups. changes in BS at the time of entering recovery room and 30 minutes after it are statistically



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significant in all patients The last measured BS, 30 minutes after recovery, was higher in patients under went general anesthesia than in other patients with topical anesthesia or Retrobulbar block . It means that in patients underwent general anesthesia, the rise of blood glucose level is not only higher but also more persistent. Conclusion: General Anesthesia impose more stress to patients than two other methods. the rise of blood glucose level is not only higher but also more persistent.

Keyword: cataract,Retrobulbar , topical, General anesthesia



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1. INTRODUCTION

Cataract refers to the loss of the normal transparency of the lens that is one of the main causes of blindness in the world. It seems diabetic patients with high amount of HbA1c are highly susceptible to this problem.¹⁻⁶ Another risk factors for Cataract are aging, nutritional insufficiency and smoking.¹ Nowadays, surgery is an acceptable and common treatment for cataract that seems to be the most beneficial choice among all.⁷ Cataract surgery can be done under General anesthesia, Topical Anesthesia or Retrobulbar Block.^{8,9,10}

Surgery is a kind of trauma which provoke Hemodynamic, metabolic and hormonal responses same as all stress triggering factors.¹¹ In addition to surgical stress, Anesthesia and Analgesia can cause extra stress for body. Since blood glucose levels can be measured as an indicator of stress factors,¹² two problems are considerable in diabetic patients: first, Cataract surgery is associated with more complications in these cases;¹³ secondly, surgical management is more complicated due to hormonal and hemodynamic deficiency.^{14,15}

In most of studies, only the effects of diabetes on surgery had surveyed and the blood glucose level during surgery, its management and the effects on surgery are ignored.¹⁷ On the other hand, it's difficult to find a significant relation between blood glucose level and the result of surgery because of low number of complications and it needs studies with large sample size. It seems that step-by-step surveys have better results. So, in this study we evaluated three different methods of anesthesia on blood glucose level during surgery and in recovery room in diabetic patients underwent cataract surgery.

2. METHODOLOGY

After Ethical committee approval, this cross-sectional study was performed on 60 diabetic patients aged between 40 and 70 treated with oral glycemetic agents that underwent elective cataract surgery at Farabi Eye Hospital. Patients were surveyed in three groups consists of 20. Patients older than 70 or younger than 40, with history of corticosteroid use, blood glucose level higher than 250mg/dl, complications during anesthesia or surgery, severe heart



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or pulmonary diseases, emergency surgeries and patients need special interventions were excluded.

Blood glucose level was scaled by BioNime GM 100 half an hour prior to anesthesia or sedation, exactly after anesthesia or sedation and after surgery. After OR admission, patients underwent standard monitoring like ECG, NIBP and pulse-oximetry. The type of surgery and anesthesia were previously determined and there was no changes because of this study. First group was anesthetize by Topical Anesthesia with Tetracaine and second group was anesthetized by Retrobulbar Block. Prior to anesthesia, in both groups, sedation was performed with 2mg Midazolam and 1 μ gr/kg Fentanyl. For the third group, candidate for General Anesthesia, 1.5 mg/kg Propofol was administered for induction and 0.5 mg/kg Atracorium was used for preparing appropriate muscle relaxation before intubation. After successful tracheal intubation, patients were ventilated with Isoflurane on its maintenance dosage 1.5% V/V. Patients of 3rd group were extubated after surgery and the reverse of muscle relaxants.

As mentioned, blood glucose level was assessed and recorded exactly after anesthesia, exactly after surgery and every 30 minutes after entering the recovery room. For all patients, blood sugar was recorded in mg/dl. The information was analyzed by SPSS, the averages assessed with T test and qualitative data was evaluated with Chi Square. The ANOVA test was used for comparing blood glucose level changes between all groups, while Chi Square was used for assessing blood glucose level within each group members.

3. RESULTS

60 patients consisted of 29 men (48.3%) and 31 women (51.7%) with the mean age of 55.32 were included in the study. Comparison of demographic variables such as age, sex, weight, showed no significant difference between groups. The mean amount of blood glucose level in following times are shown in table 1: basic level at the beginning of study (BS1), after anesthesia (BS2), after entering recovery room (BS3) and 30 minutes after entering the recovery room (BS4).



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Table 1: The mean amounts of blood glucose level in different times

		N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
						Lower Bound	Upper Bound
BS1	<i>General</i>	20	146.20	20.192	4.962	136.45	156.00
	<i>Block</i>	20	151.60	20.094	4.940	141.81	161.40
	<i>Topical</i>	20	142.40	14.830	3.316	135.82	149.09
	<i>Total</i>	60	146.73	19.961	2.577	141.53	151.87
BS2	<i>General</i>	20	148.75	17.480	3.909	140.95	156.55
	<i>Block</i>	20	147.25	23.642	5.286	136.85	157.65
	<i>Topical</i>	20	140.25	23.088	5.163	130.05	150.45
	<i>Total</i>	60	145.41	22.092	2.852	139.71	151.11
BS3	<i>General</i>	20	176.40	12.202	2.728	151.00	181.80
	<i>Block</i>	20	159.65	20.502	4.584	150.65	168.25
	<i>Topical</i>	20	163.15	18.256	4.082	155.61	171.69
	<i>Total</i>	60	166.73	18.760	2.422	161.89	171.58
BS4	<i>General</i>	20	171.05	16.851	3.768	163.53	178.57
	<i>Block</i>	20	156.05	21.197	4.740	146.65	165.45
	<i>Topical</i>	20	162.60	10.495	2.347	157.69	166.51
	<i>Total</i>	60	163.23	18.339	2.368	158.50	167.97

In the group underwent General Anesthesia there was no significant relation between basic BS and BS after anesthesia, however the changes during surgery and after it are statistically significant ($P < 0.05$). In groups underwent Retrobulbar block and Topical anesthesia with Tetracaine there was no significant change in BS after anesthesia, during surgery or after it ($P > 0.05$).



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There was no significant difference between blood glucose levels after anesthesia among three groups ($P=0.65$). Whereas the changes in BS at the time of entering recovery room and 30 minutes after it are statistically significant in all patients (respectively $P=0.03$ and $P=0.01$). The last measured BS, 30 minutes after recovery, was higher in patients under went general anesthesia than in other patients with topical anesthesia or Retrobulbar block ($P=0.002$ and $P=0.037$). It means that in patients underwent general anesthesia, the rise of blood glucose level is not only higher but also more persistent.

4. DISCUSSION

There are lots of methods for performing anesthesia and analgesia for cataract surgery and operation team bring up different reasons for choosing one. One of the factors affecting this choice is the impact of anesthesia on surgery and its result. Next important factors are patient satisfaction and the amount of stress imposed on patients by anesthesia. Blood sugar is an important index shows the effects of stress during surgery. The blood sugar management is more complicated and difficult in diabetic patients that is very important. This issue was surveyed in this study.

60 patients were studied in three different groups underwent General Anesthesia, Retrobulbar Block and Topical anesthesia with Tetracaine. Comparison of demographic variables such as age, sex, weight, showed no significant difference between groups. Regarding results, it's concluded that blood glucose level increased following all anesthesia methods but none of detected changes was statistically significant.

Barker et al, in 1993, compared 30 patients underwent cataract surgery with three different anesthesia methods and achieved similar results.¹⁷ Also, in 1995, they compared General Anesthesia and Retrobulbar block in 20 diabetic and 20 non-diabetic patients and reported that there was a rise in BS in both groups of patients underwent General Anesthesia. It should be mentioned that, in this study, there are significant changes in BS level in patients underwent general anesthesia which is similar to Barker's survey. In both studies BS level raised in patients underwent General anesthesia although Retrobulbar block and Topical



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anesthesia with Tetracaine had no significant effects on BS changes. It's important to mention that sample size of our study is approximately 2 times larger than Barker's survey. In 2000, Schwall et al, compared general anesthesia with Retrobulbar block and achieved similar results. However, the approach of general anesthesia was different in this study.¹⁸ To our best knowledge, in the scientific review performed prior to study, there was no survey that compared topical anesthesia with Tetracaine with Retrobulbar block in the term of BS changes. According to our results, there was no significant difference between these two methods in the term of BS changes during surgery and the changes in BS levels during and after surgery with both methods were not statistically significant.

5. CONCLUSION

By comparing this survey with previous studies, we can conclude that General Anesthesia impose more stress to patients than two other methods. However, relying on this issue that how effective can the amount of stress be on surgical result and its complications, needs more studies. On the other hand, maybe increasing the number of sample size on the basis of patient's physical statue (weight, MBI, etc.) different types of diabetes, diabetes treatments and controls can be useful in achieving more reliable and accurate results.

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