

Effect of General Anesthesia on Blood Glucose Level during Radical Mastectomy

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Abstract: Breast cancer is a heterogeneous disease resulting in various complications especially in women having diabetes mellitus. The aim of the study is to evaluate the effect of general anesthesia during radical mastectomy in breast cancer patients with controlled diabetes and without diabetes. The study was conducted on 120 breast cancer patients underwent for radical mastectomy. Out of 120, 60 were non-diabetic breast cancer patients and 60 controlled diabetic breast cancer patients. In our study blood glucose level was found increased significantly ($p < 0.05$) in breast cancer patients with controlled diabetes in comparison to breast cancer patients without diabetes during 30min after induction while there is no significant difference observed during 5 min preoperatively. Hyperglycemia may represent surgical stress which can be controlled by judicious use of anesthetic agents including opioids especially in diabetics.

Keywords: Blood Glucose, Diabetes Mellitus, General Anesthesia, Radical Mastectomy.

INTRODUCTION

Surgery provides a stress response resulting in various biochemical and hormonal changes. Hormonal interplay is the key role, in the evolution of stress response, which has been estimated as hyperglycemic response [1].

The severity of stress during surgery affects not only patient outcomes but health care system [2].

Type of surgery has an important role on the surgical stress rate. Also, women experience more surgical stress than men, resulting in hemodynamic fluctuation [3]. Blood glucose control is an important factor in improving outcome of diabetic patients undergoing various surgeries [4]. Diabetes mellitus is a common metabolic and endocrine disorder among the world population. It represents an independent risk factor for morbidity and mortality in patients undergoing various surgery [5, 6]. Cancer cells require more glucose uptake and altered glucose metabolism for providing nourishment to tumor. In breast cancer also blood sugar level disturbs or rises especially in women having diabetes mellitus. So this study aimed to evaluate the effect of general anesthesia during radical mastectomy in breast cancer patients with controlled diabetes and without diabetes.

MATERIALS AND METHODS

The study was conducted on 120 breast cancer suffering patients underwent for radical mastectomy after taking ethical consent. Out of 120, 60 were non-diabetic breast cancer patients and 60 controlled diabetic breast cancer patients. Samples were taken

from District hospital Datia and different private hospitals. Blood Glucose level measurements were analyzed 5 min preoperatively and 30 min after induction in both groups through auto analyzer by kit method. All the patients having fasting blood sugar less than 126mg/dl on the day of surgery. All patients were given general anesthesia according to a standard protocol. We have withheld insulin and antidiabetic drug midnight before surgery. We have used ringal lactate as intravenous fluid intraoperatively.

Inclusion criteria of the study

- Patients having controlled diabetes (HbA1C 5-7) with breast cancer going for radical mastectomy.
- Normal Breast cancer patients going for radical mastectomy.

Exclusion Criteria

Patients suffering from other complications like hypertension, hyperthyroidism, chronic heart disease etc.

STATISTICAL ANALYSIS

Data were analyzed by using SPSS software version 21.0. Comparison between both groups were determined by using Independent Student T Test. $p < 0.05$ were considered as significant.

RESULTS

We found no significant difference in blood glucose level in breast cancer patients with controlled diabetes in comparison to breast cancer patients having no diabetes during 5 min preoperatively. (Table 1)

Table-1: showing the comparison between breast cancer patients with controlled diabetes in comparison to breast cancer patients without diabetes during 5 min preoperatively

Groups	Subjects	Mean \pm SD	N	SE	DF	T-STATISTIC
1	Breast cancer patients with controlled Diabetes	100 \pm 3.11 ^{NS}	60	0.477	118	2.09
2	Breast cancer patients without Diabetes	99 \pm 2.00	60			

NS- Non significant

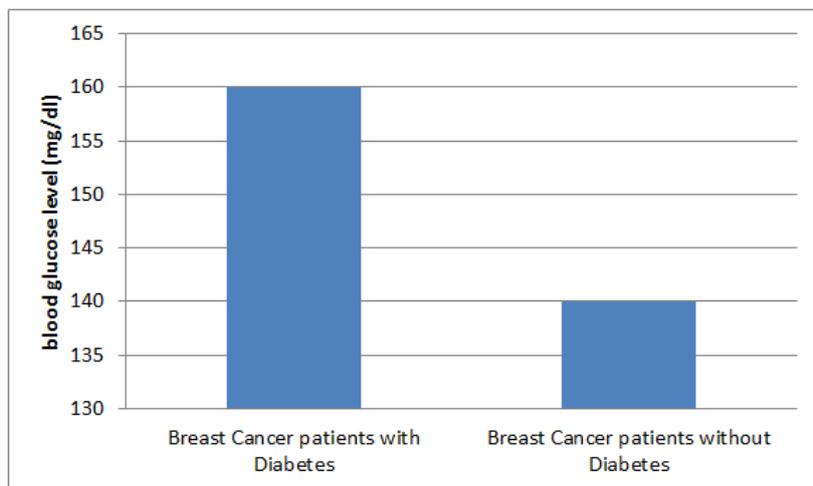
In our study blood glucose level was found increased significantly in breast cancer patients with controlled diabetes in comparison to breast cancer

patients without diabetes during 30min after induction (Table 2, Graph 2)

Table-2: Showing the comparison between breast cancer patients with controlled diabetes and without diabetes during 30min after induction:-

Groups	Subjects	Mean \pm SD	N	SE	DF	T-STATISTIC
1	Breast cancer patients with controlled Diabetes	160 \pm 2.05*	60	0.294	118	-67.920
2	Breast cancer patients without Diabetes	140 \pm 1.00	60			

* $P < 0.05$ statistically significant.



Graph-2: Showing the comparison between breast cancer patients with controlled diabetes and without diabetes during 30min after induction

DISCUSSION

The present study was performed to evaluate the effect of general anesthesia during radical mastectomy in breast cancer patients having diabetes and without diabetes. Studies showed that a fraction of non-diabetic patients were found to have glucose intolerance due to the stressful situation of anesthesia and cardiopulmonary bypass [7, 8]. We found no significant difference in blood glucose level in breast cancer patients having controlled diabetes in comparison to breast cancer patients having no diabetes during 5 min preoperatively. In our study we

also found increased levels of blood glucose (160 \pm 2.05* $p < 0.05$) in breast cancer patients with controlled diabetes in comparison to breast cancer patients without diabetes. Stress induced by surgical procedures causes increased catabolism, which in turn triggers a cascade of enhanced glycogen breakdown, gluconeogenesis, and catabolism of lipids and proteins that eventually leads to increased insulin resistance and postoperative hyperglycemia [9, 10]. Persistent postoperative hyperglycemia is a risk factor for infection and various other complications [11]. Azarfarin et al. in 2011 [12] studied the effect of blood

glucose control in non-diabetic patients undergoing CABG surgery, they found that blood glucose level is increased in these patients though they were not diabetic pre-operatively and that controlling blood glucose level in the study group between 110 and 126 mg/dl is required as it decreased the incidence of complications from 32% in the control group to 16% in the study group. While on the other hand a study conducted to investigate the effect of general versus spinal anesthesia on blood sugar level and hemodynamic changes in patients undergoing curettage surgery showed no significant difference between blood glucose level of both groups during 10 minutes before, 20 and 60 minutes after the initiation of anesthesia [13]. Egi and colleagues observed increased mortality with increasing mean BG concentrations in ICU patients without diabetes mellitus compared with those with diabetes mellitus [14]. Our study was also in accordance with high level of blood glucose in breast cancer patients with diabetes during radical mastectomy as a effect of general anesthesia.

CONCLUSION

Catabolic stress during surgery and anesthesia associated with increase in cortisol and glucogenic hormones. This may results in hyperglycemia. This should be judiciously managed by anesthetic agents such as propofol, opioids and midazolam etc to reduce surgical stress along with treatment of hyperglycemia by insulin.

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