

POSTOPERATIVE HYPERGLYCAEMIA IN NON-DIABETIC INDIAN CANCER PATIENTS

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ABSTRACT

There is limited data available in the literature about the hyperglycaemic response in cancer patients in the postoperative period. Hyperglycaemia resulting from insulin resistance is common in critically ill patients including those who have not previously been diagnosed with diabetes. We tried to analyse the glycaemic response in different cancer patients in the postoperative period, so that this information can be analysed to look for any correlation between the glycaemic response and the surgical outcome, in particular cancer patients. Prospectively, the postoperative blood glucose level was measured at different intervals. Hyperglycaemic response was more at 6th hour and gradually declined over next 72 hours. Hyperglycaemic response was more in carcinoma oesophagus patients and least in thyroid patients. The stress of surgery itself results in metabolic perturbations that alter glucose homeostasis. Persistent hyperglycaemia is a risk factor for endothelial dysfunction, impaired phagocytosis and immunity, oxidative stress, abnormal lipid metabolism, decreased vascular contractility, increased platelet adhesiveness and increased C-reactive protein levels, consequently resulting in cardiovascular morbidity, postoperative sepsis and impaired wound healing. Patients with cancer respond differently to stress and this knowledge might help in the future to develop strategies to reduce and treat during the postoperative period.

OBJECTIVE

To study the pattern of glycaemic variation in patients with different Cancers during the postoperative period.

KEYWORDS

Postoperative Hyperglycaemia, Non-Diabetic Cancer Patients, Glycaemic Stress Response.

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INTRODUCTION

Stress is a well-established risk factor for postoperative hyperglycaemia. Hyperglycaemia is associated with increased morbidity and mortality. It is not well known about the level and pattern of postoperative glycaemic variation in different patients with cancer. Patients with cancer have altered host tissue carbohydrate metabolism, defects in the enzymes of carbohydrate metabolism and have relatively increased insulin resistance compared to non-neoplastic surgical patients.

MATERIAL AND METHODS

It is a prospective study including thirty patients with different cancers. Inclusion criteria- Non-diabetic patients requiring >72 hrs. of in-hospital care and who undergoes elective surgery for the proven malignancy. Exclusion criteria- Diabetic, requiring more than one surgical intervention within the first 72 hrs. and who requires <72 hrs. of in-hospital care. All the patients had along with FBS (Fasting blood sugar) blood glucose level measured at 6th, 12th, 24th, 48th and 72nd hr. postoperatively. Primary predictor of interest- Blood glucose levels at different periods. Multivariate analysis determined the pattern and level of hyperglycaemic response in different cancers.

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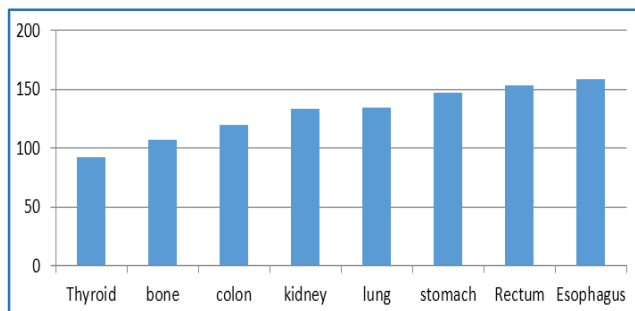
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Malignancy	No of Patients	Age (mean)	Male	Female	Co morbid Diseases (No. of Pts)	ASA Score (No. of Pts)	Surgery Done (No. of pts)
Esophagus	7	55	5	2	HTN (1) Asthma (2)	II (5) III (2)	THE (5) TTE (2)
Rectum	6	54	2	4	HTN (1)	III (1) II (5)	APR (4), antr exntrn (1), LAR(1)
Stomach	8	50	6	2	HTN (2)	III (1) II (7)	Subtotal Gastr (1), distal gastr (7)
Thyroid	3	31	0	3	Nil	II (3)	Total Thyroidectomy
Kidney	3	54	1	2	Nil	II (3)	Radical nephrectomy
Colon	1	43	1	0	Nil	II (1)	Sigmoidectomy
Lung	1	67	1	0	HTN (1)	III (1)	Lobectomy
GCT	1	32	0	1	Nil	II (1)	LSS

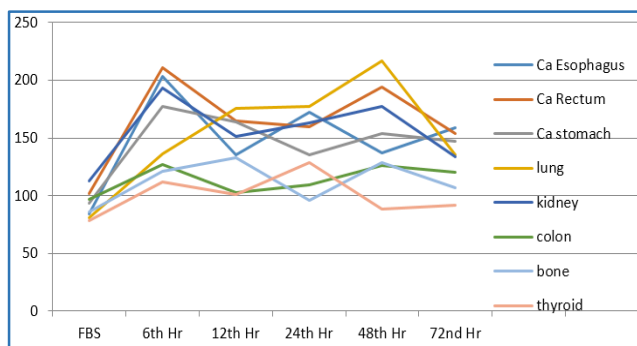
Demography of patients. (THE–transhiatal esophagectomy, TTE–Transthoracic esophagectomy, APR–Abdominoperineal resection, LAR–Low Anterior Resection, Antr exntrn–Anterior exenteration, Gastr–Gastrectomy, LSS–Limb Salvage Surgery).

RESULTS

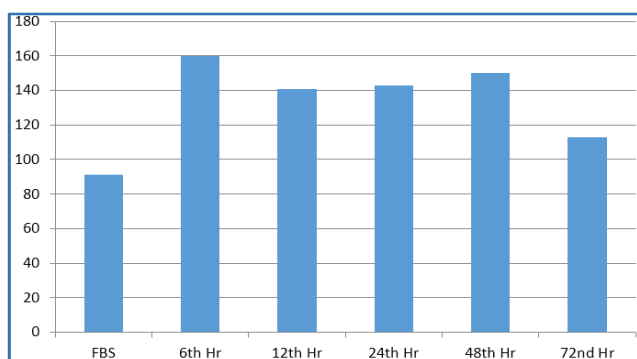
Male:Female–4:3, Mean age group–48 yrs. Comorbid diseases–HTN–4 pts., Asthma–2 pts. ASA physical status–II–25 pts., III–5 pts. Maximum hyperglycaemic response observed in Ca oesophagus patients and least hyperglycaemic response noted in Ca thyroid patients. Significant elevation of RBS seen at 6th hr. and it remained elevated till 72nd hr. with slight decline.



Mean GRBS Levels at 72 hrs. Postoperative Period



Hyperglycaemic Response in the Postoperative Period



Mean GRBS Levels at Different Periods

DISCUSSION

The link between hyperglycaemia and adverse hospital outcomes is multifactorial.

Reasons for Postop Hyperglycaemia

Activation of neuroendocrine system resulting in release of Cortisol, Catecholamines, Glucagon and Growth Hormone into the circulation. Subsequently, this causes the insulin resistance and hyperglycaemia.

Factors Influencing postop Hyperglycaemic Response: Are Type of surgery, American society of anaesthesiology grade, Physical status classification, Body mass index, Age of the patient, Duration of surgery, Emergency status and Epidural analgesia.

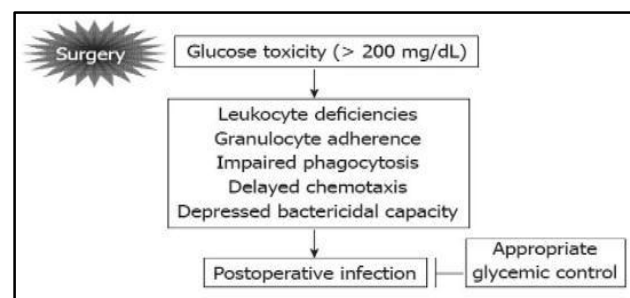
Cancer Patients vs Non-Neoplastic Surgical Patients

Altered host tissue carbohydrate metabolism and defects in the enzymes involved in the carbohydrate metabolism are observed in cancer patients. They will have relatively increased insulin resistance compared to patients without the cancer.⁽¹⁾

EFFECTS OF HYPERGLYCAEMIA

Hyperglycaemia is Associated with Abnormalities in Leukocyte Function.⁽²⁾

- Granulocyte adherence,
- Impaired phagocytosis,
- Delayed chemotaxis,
- Depressed bactericidal capacity,
- Decreased microvascular reactivity to dilator agents,
- Increased expression of adhesion molecules,
- Increased oxidative stress, resulting in endothelial dysfunction.
- Induces pro-inflammatory cytokines- TNF-a, IL-1, IL-6, this in turn produces insulin resistance.
- Leads to increased postop surgical infections, cardiovascular complications and longer hospital stay.⁽³⁾ Improved glucose control results in reduced morbidity and mortality.⁽⁴⁾



CONCLUSION

Degree of hyperglycaemia seen in the postoperative period in different cancers varies. Postoperative hyperglycaemia is a significant independent risk factor for increased morbidity.^(5,6) It needs further evaluation to decide whether managing postoperative hyperglycaemia requires different strategy for each cancer. Still the optimum postoperative glucose range is not determined. Studies are necessary to decide the optimum level of glucose to be maintained in the postoperative period and which in turn transform into reduced postoperative morbidity and mortality.

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