

PERIOPERATIVE MANAGEMENT CONSIDERATIONS OF OMFS PATIENTS WITH DIABETES

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ABSTRACT: Perioperative hyperglycemia is common and associated with increased rates of surgical wound infections, length of hospital stay, morbidity, and mortality. Improved perioperative glycemic control has the potential to improve patient outcome. Surgery and anesthesia induce a stress response with hormonal cascades that influences glucose control. In patients with diabetes and prediabetes, a focused history is necessary to create a plan that optimizes glycemic control in the perioperative setting. The goal of perioperative glycemic control is to keep glucose levels as normal as possible, while avoiding complications associated with hypoglycemia. Metabolic consequences of surgery and preoperative considerations of an inpatient with diabetes are discussed in this paper.

KEYWORDS: Diabetes, Oral and Maxillofacial Surgery, Perioperative, Hyperglycemia

INTRODUCTION

Diabetes Mellitus (DM) is an endocrine disease with higher rate of incidence. In 2015, India (50.8 million) topped the world with the highest number of people with diabetes mellitus according to International Diabetes Federation¹. Diabetes is gaining the status of a potential epidemic in India with more than 62 million diabetic individuals currently diagnosed with the disease. 30-50 % of patients with diabetes will require some surgery during their lifetime. Long-term complications, involve the eyes, kidneys, nerves, and blood vessels, resulting in hypertension, cardiac ischemia, atherosclerosis, and renal failure^{2,3}. Appropriate pre-operative evaluation and rational intraoperative and postoperative management of this complex disease in elective and emergency circumstances are essential. Recent studies have emphasized the need to maintain strict perioperative glycemic control.

Impact of diabetes on perioperative period

The length of hospital stay increases in aiming to control other systemic malfunctions occurred due to hyperglycaemic conditions. Because of deranged Leukocyte function with reduced capability for phagocytosis and chemotaxis in diabetic patients, they are more vulnerable to infections and hence strict aseptic environment should be maintained even for minor oral surgical procedures^{4,5}. Decreased collagen formation will lead to impaired wound healing^{4,6}. Non-enzyme glycosylation leads to abnormal protein formation thereby lowering wound's tensile strength and elasticity that

increases the time of healing even with minimal size of incisions⁷. Diabetes alters oxygen carrying capacity of blood thereby creating difficulty in maintaining saturation during surgical procedures. It also causes delayed bone healing in case of fractures and are more vulnerable to infections.

Metabolic consequences of surgery

Patients with facial trauma will be subjected to both traumatic and psychological stress. Furthermore, Trauma of surgery results in increased secretion of proglycemic stress hormones, particularly cortisol and catecholamines that reduce insulin sensitivity⁸. Sympathetic activity is also increased, resulting in reduced insulin secretion. The secretion of other proglycemic drugs glucagon and growth hormone are also increased during stress^{9,10}. In a diabetic patient with absolute or relative insulin deficiency, the sequence of these complex hormonal and metabolic changes in response to surgery results in a marked catabolic response by increased Gluconeogenesis, glycogenolysis, proteolysis, lipolysis, and ketogenesis which leads to a state of hyperglycemia and ketosis^{11,12}. This problem is compounded by perioperative starvation as the patients of oral and maxilla facial surgery have difficulty in having oral foods.

General principles in management

Aims of successful perioperative management of diabetes are reducing mortality and morbidity, avoiding

excessive hyperglycaemia, avoiding ketosis, and avoiding hypoglycaemia. Special emphasis should be given towards threatening trio in a diabetic patient that includes Silent Myocardial Ischemia¹³, Renal Dysfunction, and Peripheral/Autonomic neuropathy.

Silent myocardial ischemia

In this condition ECG may not show any anomaly and due to Autonomic neuropathy, angina may not be clearly evident. Cardiovascular diseases such as coronary artery disease, peripheral vascular disease, hypertension and cerebrovascular disease are common in diabetic patients. Hence these people are under risk of developing myocardial ischemia during perioperative period. It is usually necessary to perform some additional cardiovascular assessment, including ergometric tests, stress-ecardiography, etc.

Renal Dysfunction

Diabetic nephropathy is important since majority of drugs are being excreted by the kidney. Presence (and degree) of albuminuria in 24-hour urine are diagnostic for severe diabetic nephropathy. Therefore, renal function test and urine albumin, serum creatinine level and BUN should be assessed in all diabetic patients.

Peripheral/autonomic neuropathy

Diabetic autonomic neuropathy (DAN) is a common feature of diabetes, present in more than 50% of patients with type 1 DM and 20% with type 2 DM. It can be asymptomatic or accompanied by diarrhoea, sweating or postural hypotension. DAN results in gastroparesis and delay in gastric emptying, which leads to increased risk of regurgitation and acid aspiration during the induction of anaesthesia¹³. Loss of heart rate resulting from DAN, are at risk for ventricular arrhythmias and sudden postoperative death¹⁴.

Pre and Intra operative considerations

Because of delayed gastric emptying due to gastric paresis, pre operative fasting should be kept for 12 hours. Oral hypoglycaemic are generally administered on the day before surgery and withheld on the day of surgery as the patients are kept on fasting. Hyperglycaemia in such cases is treated with supplemental short-acting insulin, usually administered subcutaneously. However, if the glycemic control is poor i.e., a fasting blood glucose of greater than 180 mg/dl, they should be treated with standard GIK (glucose-insulin-potassium)¹⁵. Standard GIK regimen consists of 500 ml saline solution containing, 10% dextrose solution, 15 units short-acting insulin and 10 mmol KCl. Infusion should be done for over 5 hours (100ml/h). Other forms are 5% dextrose with 0.32 U of insulin/g of glucose¹⁶. Blood glucose is to be assessed every 2 hourly for evaluation and change in doses of

insulin and other hypoglycaemic drugs. Nephrotoxic drugs should be avoided. Hartmann's solution (Ringers lactate) should be avoided in diabetic patients, as infused lactate is rapidly converted to glucose with resulting hyperglycaemia¹⁷. Steroids are not administered in case of diabetics as they cause hyperglycaemia.

Post operative considerations

As the patients with facial trauma or resections in immediate post operative period GIK is to be continued till they take oral food. Generally the preoperative diabetes treatment regimen (oral or oral plus insulin) may be reinstated once the patient is eating well. Metformin should not be restarted in patients with renal insufficiency, significant hepatic impairment, or congestive heart failure¹⁸. Sulfonylurea's stimulate insulin secretion and may cause hypoglycaemia; they should be started only after eating has been well established and serum glucose levels have been checked and are in the appropriate range. step-up approach can be used for patients on high dose sulfonylureas, starting at low doses and adjusting them until the usual dose is reached¹⁹. Blood glucose is to be assessed every 2 hourly for evaluation and change in doses of insulin and other hypoglycaemic drugs.

Sliding scale of insulin

It is one of the methods of calculating the dose and type of insulin to be administered to control hyperglycaemia. The typical "sliding scale" is destined to fail because it involves the administration of a fixed dose after documentation of hyperglycaemia^{20, 21}.

CONCLUSION

Ensure satisfactory pre-operative control of blood glucose. Stop insulin or oral hypoglycaemic on the day of surgery. Patients not treated with insulin, having minor surgery, need observation only. GIK is used in all other cases like patients using insulin undergoing minor oral surgery and the other patients using either oral hypoglycemics or insulin undergoing major surgeries. Check blood glucose 2-hourly initially and aim for 6-11 mmol/l. if more than 11mmol/l of glucose levels are present change to GIK with 20 units insulin, if less than 6mmol/l, change to GIK with 10 units insulin based on the rule of 1500²².

Infusion of GIK should be continued until patients take food orally, then revert to oral hypoglycaemic drugs with the first meal, in case of patients not treated with insulin. Patients on insulin should be continued on GIK for 2-3 hours after the first dose of subcutaneous insulin, which is given before the first meal.

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