

Preoperative Evaluation of Patients with Diabetes Mellitus



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KEYWORDS

- Diabetes • Glycemic control • Hyperglycemia • Hemoglobin A1c • Insulin pump
- Preoperative evaluation

KEY POINTS

- Diabetes is a chronic secondary diagnosis affecting more than 9% of the population.
- Uncontrolled diabetes can result in poor short- and long-term surgical outcomes.
- Complications from the disease affect nearly every organ system and can greatly impact perioperative risk.
- Careful consideration should be given to patients with diabetes undergoing surgery in order to ensure best possible outcomes.

INTRODUCTION

There are more than 29 million people in the United States with diabetes; it is estimated that by 2050, one in 3 individuals will have the disease.^{1,2} Of those with diabetes, 90% to 95% have type 2, with the remainder having type 1 or other secondary forms. Total costs from diabetes have been estimated at \$245 billion with \$176 billion in direct medical costs.¹ Interestingly, the annual number of newly diagnosed cases has leveled off in the last 5 years after a steady increase since 1980, which saw the number of new cases in the United States triple from 493,000 in 1980 to 1.4 million in 2013.³ This is despite a persistent increase in obesity, to which the high prevalence of type 2 diabetes (T2DM) has been attributed. After circulatory diseases, diabetes is the second most common diagnosis at time of hospital discharge.⁴

At least 50% of patients with diabetes are expected to undergo surgery in their lifetime, and 28% of patients with diabetes will have coronary artery bypass graft (CABG)/surgery.⁵ Diabetes is associated with prolonged recovery following surgery as well as

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increases in hospital length of stay, morbidity, and mortality.^{6,7} Complications from uncontrolled diabetes can impact multiple organ systems and affect perioperative risk. This review helps the clinician gain an understanding of principles in diabetes assessment and management in patients undergoing surgery.

PATIENT EVALUATION OVERVIEW

History and physical examination are key. Patients should be asked if they have ever been told that they have diabetes or high blood sugar. Patients should also be screened for risk factors for undiagnosed diabetes like obesity, metabolic syndrome, diabetogenic medications, and family history of diabetes. Preoperative evaluation should begin with a detailed history of disease type, chronicity, known complications, and understanding of glycemic control and self-management (**Box 1**). This evaluation in turn will inform perioperative management decisions regarding risk stratification and pharmacologic management.

Classification

Type 1 diabetes (T1DM) results from autoimmune pancreatic beta cell destruction with insulin deficiency (**Table 1**). Although the disease was previously thought to only affect pediatric patients, it is now also frequently diagnosed in adults. Coexisting autoimmune disease exists in as many as 8% of patients with T1DM (adrenal insufficiency, autoimmune thyroid disease, or myasthenia gravis).⁸ Patients with T1DM are managed almost exclusively with exogenous insulin administered in a manner so as to mimic normal physiologic pancreatic insulin secretion (basal/bolus), either by subcutaneous injection (multiple daily insulin injections) or by continuous subcutaneous insulin infusion (insulin pump). Importantly, basal insulin should never be withheld in patients with T1DM as this can precipitate ketosis.

T2DM is multifactorial in cause, owing to the effects of obesity on insulin resistance, the inability of pancreatic insulin secretion to maintain euglycemia, inappropriate counter-regulatory glucagon production, and unchecked hepatic gluconeogenesis. Factors associated with development of T2DM occur along a continuum. Therefore, patients with prediabetes can also experience similar adverse perioperative outcomes.⁹

Box 1

Elements of preoperative diabetes risk assessment

1. Diabetes type
2. Disease duration/context of initial diagnosis
3. If type 1 diabetes: coexisting autoimmune diseases, history of DKA
4. Known complications
5. Associated comorbidities
6. Home diabetes regimen (oral agents, insulin type/frequency, last medication adjustment)
7. Frequency/severity of hypoglycemia
8. Hemoglobin A1c (if known)
9. Renal function
10. If insulin pump use, obtain settings from patient or primary endocrinologist

Abbreviation: DKA, diabetic ketoacidosis.

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