

Continuous education on diabetic patients presenting for procedural sedation: a refresher to prepare for your case

SADJ May 2017, Vol 72 no 4 p173 - p175

JA Roelofse¹, C Lapere²

ABSTRACT

The peri-operative management of diabetic patients for treatment procedures remains a notable clinical dilemma without a universally accepted solution for best management. New research indicates the advisability of continuation of basal insulin as well as certain oral hypoglycemics. The utilization of a pre-operative HBA1c-level, especially for longer procedures, is now deemed imperative.

Keywords: peri-operative glucose management, blood glucose targets, basal insulin treatment, Glycated haemoglobin (HBA1c), missed meals.

PREVALENCE AND GLOBAL BURDEN

It is expected that the worldwide prevalence of diabetes will be 592 million by the year 2035, further increasing the heavy financial burden of the disease.¹ This dramatic increase in global disease ensures that clinicians will encounter patients with diabetes in their daily practice, and therefore it is imperative for healthcare and sedation providers to have a background understanding of the pathophysiology, treatment modalities and common comorbidities associated with diabetes.²⁻⁴

Diabetes can be divided into two types: Type 1 diabetics fail to produce any or enough endogenous insulin due to a chronic autoimmune destruction of the beta cells of the pancreas. Type 2 diabetics have an altered nutrient metabolism due to insulin resistance, with a progressive insulin secretory deficit.^{3,5}

The mainstay of treatment of Type 1 diabetics is a combination of insulin. This is available as bolus, or short acting types that are usually taken around meals, with a shorter onset and peak effect. Basal, or longer acting insulins are injected once or twice daily and act on the back-ground level of glucose, especially that released from the liver.⁵ Oral therapy is the treatment of choice for Type 2 diabetics. Some Type 2 diabetics can also be treated with a combination of oral therapy and insulin.

Surgery itself, fasting and anxiety around the procedure, can trigger a stress response, resulting in higher levels of counter regulatory hormones (catecholamines, cortisol, glucagon and growth factor), causing excessive release of inflammatory substances such as cytokines.⁶

Monitoring diabetics: The diabetic patient should be managed and screened for complications by his/her treating family practitioner/physician. Complications of the disease can be categorized into: macroscopic, affecting the large blood vessels and microscopic that impacts the small blood vessels. Glycated haemoglobin (HBA1c)-level is the internationally accepted standard of measurement that reflects glycemic control in diabetes.^{2,5} As part of the pre-procedure consultation, providers need to obtain a thorough history, undertake a physical examination and request baseline laboratory investigations that include the HBA1c and blood glucose levels. Patients should report on their fasted glucose values, as well as their regular pre-meal values to obtain the level of control.⁷

New evidence suggests that all diabetic patients undergoing surgery should have a recent HBA1c-value (taken less than six weeks prior to surgery).⁸ HBA1-c levels of greater than 7% have been proven as an independent risk factor for wound complications.⁶

The Society for ambulatory anesthesia consensus statement on perioperative blood glucose management in diabetic patients undergoing ambulatory surgery suggests that the HBA1-c level, additional comorbidities and the risk of the surgery proposed should all be taken into account when planning the anaesthetic.⁹

1. **James A Roelofse:** MB.ChB, MMed, PhD, Dip NDBA (USA). Professor, University of the Western Cape, Visiting Professor, University College London.

2. **Cherese Lapere:** MB.ChB, DipPEC, DA(SA), PDD, Sedation Practitioner.

Corresponding author

James A Roelofse:

Private Bag X1, Tygerberg 7505. Tel: 021 937 3085, Cell: 083 458 2427. E-mail: jar@sun.ac.za

The ideal blood glucose target on the day of surgery remains uncertain despite extensive research. Van den Berghe *et al.* proved in their landmark research of the critically-ill patient, that hyperglycemia is harmful in the peri-operative setting, increasing morbidity and mortality in this patient group.¹⁰ However, tight glucose control has been associated with hypoglycemic episodes.¹¹ Further evidence shows that variable glucose levels in the peri-operative period itself is associated with detrimental biochemical effects and can be harmful.^{12,13} Khan *et al.* suggest that practitioners should, despite the lack of evidence of a precise target level, remain focused on general goals, such as: the avoidance of hypoglycemia, prevention of ketoacidosis or hyperosmolar states, maintenance of fluid and electrolyte balance and avoidance of marked hyperglycemia.⁷

On the day of the surgery blood glucose is typically done by point-of-care testing, and should be measured before, at least two-hourly during the procedure (in case of long procedures) and afterwards during the recovery period. Hypoglycemia should be treated promptly, according to standard guidelines.

Stepwise strategies should be adapted into regular practice to minimize fluctuations of blood glucose levels, and to avoid episodes of hypoglycemia, hyperglycemia and other complications that hinder patients from returning to their normal treatment strategies.³

Steps suggested by Vann *et al.*¹⁰ include:

Step 1: Assessing the patient's diabetes: type, medication and degree of control. The patient's ability to manage their diabetes as well as their motivation to maintain good control should guide the treatment goals.

- All information on treatment type, dosages, recent HBA1c as well as fasting and pre-meal values
- Occurrence and frequency of hypoglycemic episodes as well as the symptoms experienced, or the lack thereof.

Step 2: Carefully explained instructions to the patient:

The treatment plan should involve clear instructions on the dosing of their medication the evening before, as well as on the day of surgery, as well as fasting guidelines.

- New evidence suggests the importance of continuation of basal insulin, with the dose depending on the type and duration of surgery, as well as the time of day and amount of missed meals:
 - The Society for Ambulatory Anesthesia Consensus suggests preoperative long-acting insulin levels should be adjusted according to the type of insulin, for example 75-100% of normal dosage for long-acting, peak-less insulins and 50-75% of the dose to be taken in the case of intermediate-acting insulin,⁹ although the ideal dose for basal insulin continuation still needs to be validated.
- Up to now, all oral hypoglycemic drugs have been stopped peri-operatively. Recent literature suggests careful continuation of certain oral agents, for example a patient treated with metformin undergoing a short starvation period (one missed meal only):
 - However, metformin should be withheld in patients with pre-existing renal impairment or with the use of nephrotoxic agents, such as contrast media.

- Evidence also suggests that the incretin family (dipeptidyl peptidase-4 [DPP-4]) may be taken on the day of surgery.^{6,14}
- Beware of caveats for certain oral hypoglycemic drugs
- Patients should follow routine fasting guidelines, but may be encouraged to take clear fluids, such as apple juice, until two hours before the scheduled procedure
- Patients should be asked to bring their insulin, as well as normal treatment options for hypoglycemia (glucose gels) to the office on the day.

Step 3: The day of surgery:

- Diabetic patients benefit from early morning scheduling, whereby fasting time is limited and continuation of treatment can be resumed as soon as possible.
- The avoidance of nausea and vomiting that further extend the time of missed meals is paramount and prompt treatment thereof is advised.
- Patients on insulin may resume their home regime upon leaving the office, and oral therapy can be restarted as soon as the patient eats and drinks normally

It is important to know when to refer a patient to a secondary facility/ in-hospital care rather than attempting an office-based procedure in patients that are poorly controlled. Sedation clinicians should classify diabetics according to the ASA (American Society of Anaesthesiologists) classification to determine their status. It is advisable to refer ASA 3 (poorly controlled patients with other co-morbidities) patients to secondary facilities which have the potential for multi-disciplinary care.

Collaboration of multi-disciplinary teams and updated guidelines: Updated, written guidelines are needed to best manage these complicated patients pre-operatively, intra-operatively as well as their transitioning back to their normal therapy after the procedure.^{13,15} Implementation of such validated guidelines will strengthen diabetes care, especially when combined as a multi-disciplinary collaborative effort.²

CONCLUSION

Ambulatory surgery provides a good environment of the care for diabetic patients when there is minimal disruption of treatment regimens as well as collaboration that involves a multi-disciplinary approach. Referral of poorly controlled patients presenting for long, complex procedures is advisable. New research points to the continuation of basal insulin and certain oral agents as well as the determination of a pre-operative HBA1c-level.

References

1. Rahimi M, Khalighinejad P, Naghibi K, Niknam N. Changes in blood glucose level during and after light sedations using propofol-fentanyl and midazolam-fentanyl in diabetic patients who underwent cataract surgery. *Adv Biomed Res* [Internet]. 2015 [cited 2017 Apr 5]; Available from: http://www.advbiores.net/temp/AdvBiomedRes41222-8022623_221706.pdf
2. Organization WH, Tareque MI, Koshio A, Tiedt AD, Hasegawa T, Obirikorang Y, *et al.* Global Report on Diabetes. *Curr Med Res Opin* [Internet]. 2014;56(1):1051–62. Available from: http://www.ncbi.nlm.nih.gov/pubmed/27457072%5Cnhttp://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=PMC4960830%5Cnhttp://apps.who.int/iris/bitstream/10665/204871/1/9789241565257_eng.pdf

3. Vann MA. Perioperative management of ambulatory surgical patients with diabetes mellitus. *Curr Opin Anaesthesiol*. 2009;22(6):718–24.
4. Cornelius BW. Patients with Type 2 Diabetes: Anesthetic management in the ambulatory setting. Part 1: Pathophysiology and associated disease states. *Anesth Prog* [Internet]. 2016 Dec [cited 2017 Apr 5];63(4):208–15. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/27973934>
5. Wray L. The diabetic patient and dental treatment: an update. 2011 [cited 2017 Apr 5]; Available from: <http://www.nature.com/login.ezproxy.library.ualberta.ca/bdj/journal/v211/n5/pdf/sj.bdj.2011.724.pdf>
6. Duggan E, Carlson K, Umpierrez G. Metabolic consequences of surgical stress. *Anesthesiology*. 2017;126(March):1–14.
7. Khan N, Ghali W, Cagliero E. Perioperative management of blood glucose in adults with diabetes mellitus - UpToDate [Internet]. UpToDate. [cited 2017 Mar 28]. Available from: https://www.uptodate.com/contents/perioperative-management-of-blood-glucose-in-adults-with-diabetes-mellitus?source=search_result&search=peri-operative-diabetes-management&selectedTitle=4~150#H159435611
8. Aldam P, Levy N, Hall GM. Perioperative management of diabetic patients: new controversies. *Br J Anaesth*. 2014;113(6):906–9.
9. Joshi GP, Chung F, Vann MA, Ahmad S, Gan TJ, Goulson DT, *et al*. Society for Ambulatory Anesthesia consensus statement on perioperative blood glucose management in diabetic patients undergoing ambulatory surgery. *Anesth Analg*. 2010;111(6):1378–87.
10. Van den Berghe G, Wouters P, Weekers F, Verwaest C, Bruyninckx F, Schetz M. *Journal Medicine* ©. *N Engl J Med*. 2001;345(19):785–91.
11. Buchleitner AM, Martínez-Alonso M, Hernández M, Solà I, Mauricio D. Perioperative glycaemic control for diabetic patients undergoing surgery. In: Mauricio D, editor. *Cochrane Database of Systematic Reviews* [Internet]. Chichester, UK: John Wiley & Sons, Ltd; 2012 [cited 2017 Feb 22]. p. CD007315. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/22972106>
12. Egi M, Bellomo R, Stachowski E, French CJ, Hart G. Variability of blood glucose concentration and short-term mortality in critically ill patients. *Anesthesiology* [Internet]. 2006 Aug [cited 2017 Feb 28];105(2):244–52. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/16871057>
13. Lipshutz A, Gropper M. Review articles : Perioperative glycemic control. *Anesthesiology*. 2009;110(2):408–21.
14. Barker P, Creasey PE, Dhatariya K, Levy N, Lipp A, Nathanson MH, *et al*. Peri-operative management of the surgical patient with diabetes 2015: Association of Anaesthetists of Great Britain and Ireland. *Anaesthesia*. 2015;70(12):1427–40.
15. Diabetes care in the hospital. *Diabetes Care*. 2016;39:S99–104.

JOIN US IN NEW ZEALAND AND HAVE A
LIFESTYLE TO ENVY

Lumino
The Dentists
love your smile

NEW ZEALAND PASSENGER ARRIVAL CARD

Rated in the top ten safest countries in the world – New Zealand is the place where you can enjoy beaches, parks, award-winning wine, world-class restaurants and a range of cultures right on your doorstep – literally.

New Zealand has that perfect combination of big city and country town all rolled into one. With a great community feel, excellent schooling and a thriving economy – New Zealand really is a place that you can call home.

With 91 practices nationwide there are opportunities everywhere to enjoy the lifestyle you want, plus enjoy:

- ✓ Excellent salary, standard of living and work/life balance
- ✓ Lucrative earning potential in smaller towns
- ✓ Career advancement and development within the Lumino Group

1 We need talented

to start

D E N T A L C L I N I C I A N S

A S A P

2 For further information:

C A R E E R S . L U M I N O . C O . N Z