

MANEJO PERIOPERATO RIO DEL PACIENTE DIABÉTICO

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TEMAS

- Generalidades
- Evaluación preoperatoria
- Metas de control glucémico
- Fase perioperatoria
- Fase postoperatoria



GENERALIDADES

¿Cuál es la importancia del manejo perioperatorio en el paciente diabético?

Incremento complicaciones macro y microvasculares



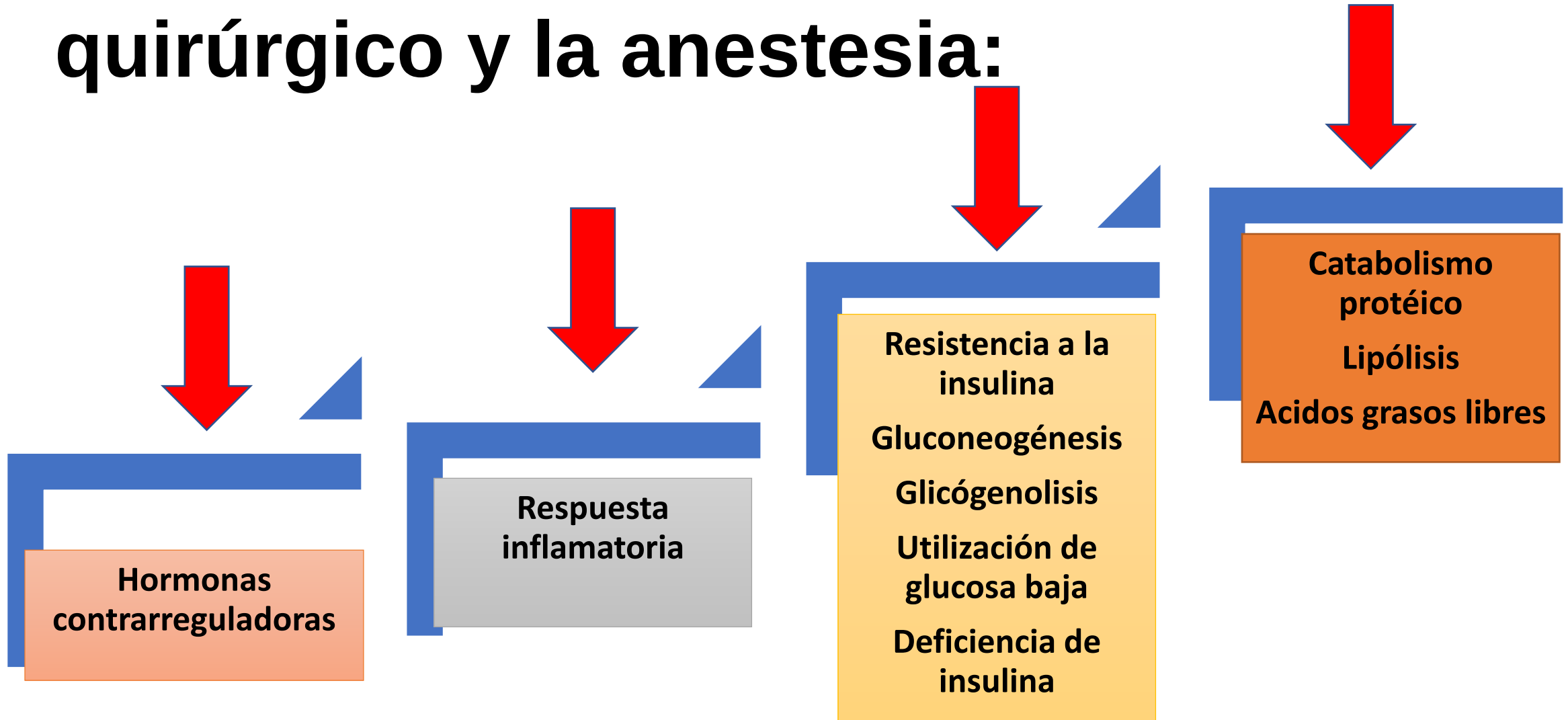
Más intervenciones quirúrgicas

Alto riesgo coronario

Alto riesgo de complicaciones - comorbilidades

Incremento estadía hospitalaria y morbi-mortalidad cardiovascular

Consecuencias metabólicas del estrés quirúrgico y la anestesia:



Tipo de anestesia/cirugía:



General vs epidural



Opioides

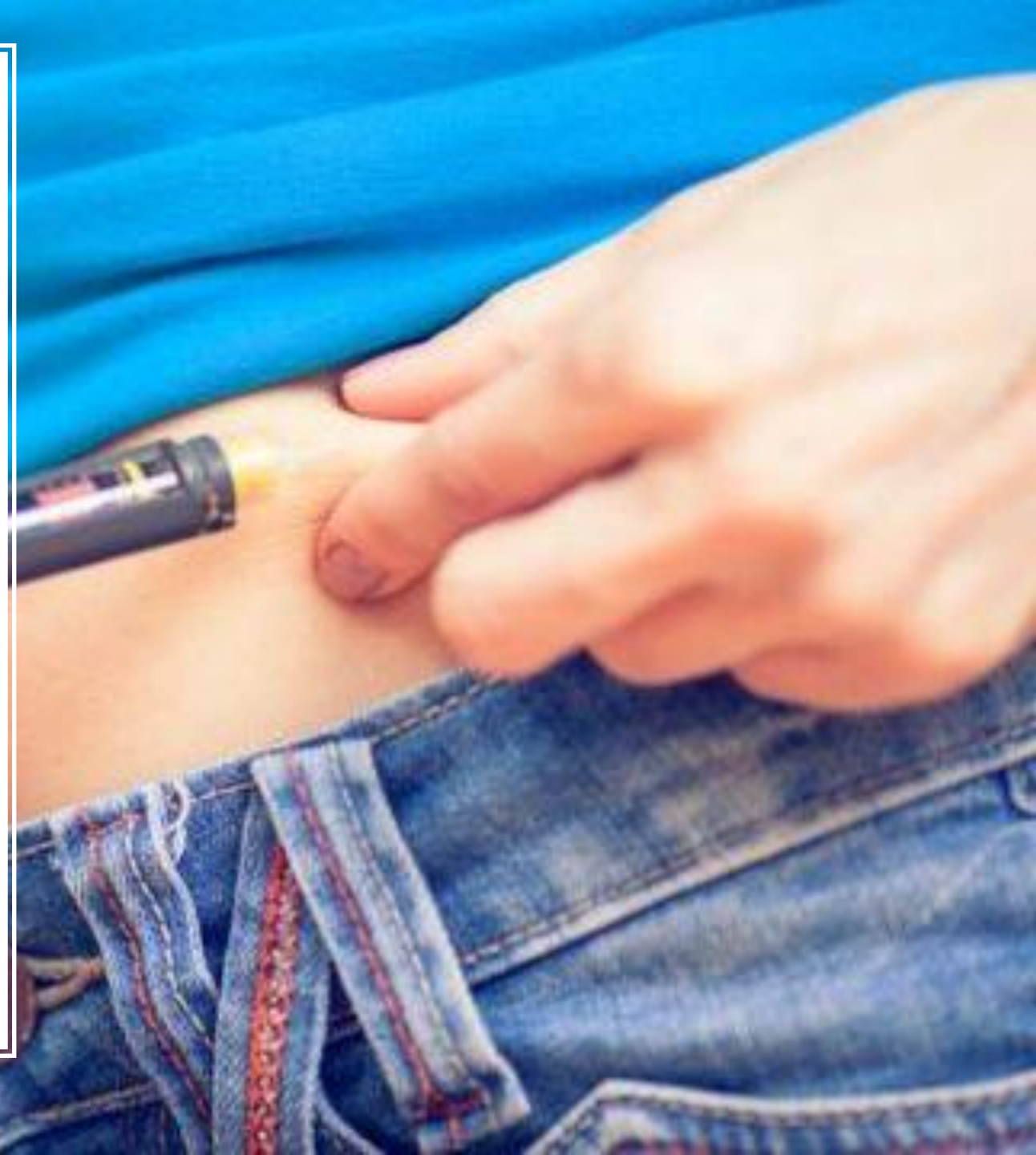


Extensión de la cirugía

EVALUACIÓN PREOPERATORIA

Evaluación clínica

- Estratificación de riesgo quirúrgico
- Tipo de diabetes
- Complicaciones micro y macrovasculares
- Control metabólico
- Hipoglucemia
- Tratamiento
- Características de la cirugía (VO, mayor/menor, hora, duración)
- Tipo de anestesia



Paraclínicos:

- EKG
- Función renal
- HbA1c – glucosa
- Pruebas cardiacas adicionales: factores de riesgo en pacientes asintomáticos



METAS DE CONTROL GLUCÉMICO

Caso clínico 1

- Odulfo
- 57 años
- DMT2 desde hace 7 años
- Complicaciones: ECV hace 1 año sin secuelas
- IMC: 29
- HTA y dislipidemia
- Tratamiento: Metformina +
Sitagliptina, Insulina Glargina 10
unidades pm
- HbA1c: 8.5%
- Colelitiasis sintomática



Para el público: manejo perioperatorio



- No suspender tratamiento
- Suspender antidiabéticos orales
- Suspender antidiabéticos orales e insulina
- Administrar sólo la dosis que recibe de insulina
- Administrar solamente “esquema de corrección” de insulina de acción corta/intermedia en el peri y post operatorio
- Esquema “basal/bolo” de insulina en el post operatorio

Objetivo en el perioperatorio:

01

80 – 180
mg/dL

02

PREVENCIÓN
CAD/EH

03

NO
HIPOGLUCEMIA

04

EQUILIBRIO
HE



¿Control más estrecho?



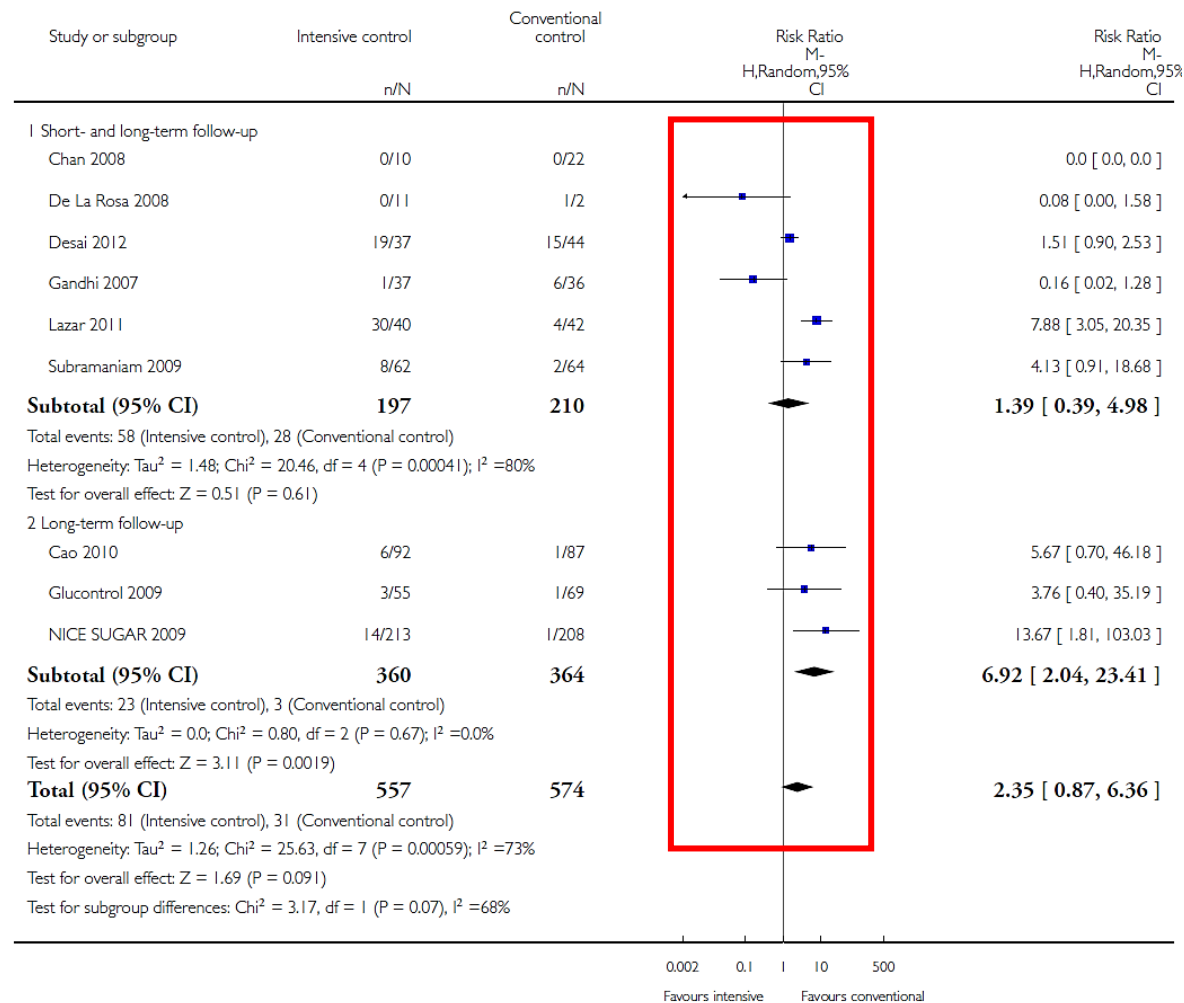
Perioperative glycaemic control for diabetic patients undergoing surgery (Review)

Buchleitner AM, Martínez-Alonso M, Hernández M, Solà I, Mauricio D

Buchleitner AM, Martínez-Alonso M, Hernández M, Solà I, Mauricio D. Cochrane Database Syst Rev 2012;9: CD007315.

¿Control más estrecho?

- El control glucémico perioperatorio más estrecho que el rango de 80-180 mg/dL no mejoró los desenlaces y se asoció a mayor hipoglucemia



FASE PERIOPERATORIA

DMT2 – cirugía menor – sin insulina

I) Minor surgery in DM2 patients not treated with insulin

- Hold oral agents the day of surgery
- Patients with “fair” metabolic control (fasting blood glucose < 180 mg/dL)—cover with regular insulin or rapid-acting (lispro, aspart, glulisine) insulin as needed (see Table 3)
- Patients with “poor” metabolic control (fasting blood glucose > 180 mg/dL)—start continuous insulin infusion.
- Goals: avoid excessive hyperglycemia (blood glucose > 180 mg/dL) and hypoglycemia (blood glucose < 80 mg/dL)

DMT1 y DMT2 – cirugía menor – con insulina

II) Minor surgery in DM1 and DM2 patients treated with insulin

- Hold oral agents (if treated with combination therapy) the day of surgery
- Patients in “fair” metabolic control (fasting blood glucose < 180 mg/dL):
 - Give half of intermediate-acting insulin (NPH) the morning of the surgery
 - While NPO, infuse dextrose 5% saline plus KCl (10-20 mEq/L) at 100 mL/hour
 - Check blood glucose every 4 to 6 hours while NPO and supplement with short-acting insulin (see Table 3)
 - Patient treated with basal (glargine) insulin should receive their usual basal insulin dose. Similarly, patients treated with continuous insulin infusion therapy (insulin pump) should receive their usual basal infusion rate
 - Restart preadmission insulin therapy once food intake is tolerated
- Patients in “poor” control (fasting blood glucose > 180 mg/dL)—start continuous insulin infusion

Esquema bolos preprandiales

Table 2. Supplemental sliding scale insulin

- Type of insulin: regular or rapid-acting insulin (lispro, aspart, glulisine) to be given before each meal and at bedtime.
- Each column represents the number of units of insulin to be added to scheduled insulin dose.
 - “Sensitive” column: elderly, cachectic, renal and liver failure, and patients with poor oral intake or NPO.
 - “Usual” column: for most patients who are expected to eat all or most of their meals.
 - “Insulin Resistant” column: for patients not controlled with “usual” column dose, or receiving glucocorticoids, obesity (BMI > 30 kg/m²), or patients with diabetes receiving >80 units/day of insulin.

Blood Glucose (mg/dL)	☐ Insulin Sensitive	☐ Usual	☐ Insulin Resistant
< 150	0	0	0
151-180	1	2	4
181-220	2	3	4
221-260	3	4	5
261-300	4	5	6
301-340	5	6	7
341-380	6	7	8
380-420	7	8	9
> 420	8	9	10

DMT1 y DMT2 – cirugía mayor – con insulina

III) Major surgery in DM1 and DM2 patients treated with insulin

- Hold oral agents the day of surgery
- Start continuous insulin infusion prior to surgery and continue during perioperative period (Table 3)
- Goals: Maintain blood glucose < 180 mg/dL during surgery, and blood glucose between 80 to 120 mg/dL during the perioperative period in the surgical intensive care unit. Start subcutaneous insulin two hours prior to discontinuation of insulin infusion. In non-ICU settings, avoid excessive hyperglycemia (blood glucose > 180 mg/dL) and hypoglycemia (blood glucose < 80 mg/dL)

Protocolo de infusión de insulina

Table 3. Continuous insulin infusion (CII) protocol

I) Initiating continuous insulin infusion (CII):

- Prepare solution: 1 unit (U) per 1 mL of 0.9% normal saline.
- Start continuous insulin infusion (CII) when blood glucose level > 140 mg/dL (x 2). Patients with known diabetes treated with insulin can start CII when blood glucose ≥ 70 mg/dL.
- Initial rate: divide blood glucose level (mg/dL) by 100, then round to nearest 0.5 U

II) Insulin infusion rate change:

Blood

Glucose (mg/dL) instructions:

> 200	↑ rate by 2 U/h
$> 160-200$	↑ rate by 1.0 U/h
$> 120-160$	↑ rate by 0.5 U/h
80–120	No change in rate
60–80	If $< 10\%$ lower blood glucose, ↓ rate by 1 U/h, ✓ BG within 30 min
	If $> 10\%$ lower blood glucose, ↓ rate by 50%, ✓ BG within 30 min
< 60	Stop infusion (give IV dextrose 12.5 g IV bolus), ✓ blood glucose within 30 min. When blood glucose > 100 mg/dL, restart infusion at 50% of previous rate

III) Patient monitoring:

- Check capillary blood glucose every hour until it is within goal range for 2 hours, and then decrease to every 2 hours.
- Hourly monitoring may be indicated for critically ill patients even if they have stable blood glucose. If a patient is eating, hourly blood glucose monitoring is necessary for at least 3 hours after eating.
- Decrease insulin infusion rate by 50% if nutritional therapy (e.g. total parenteral nutrition or tube feeds) are discontinued or significantly reduced.

IV) Treatment of Hypoglycemia (BG < 60 mg/dL)

- Turn off insulin infusion.
- Blood glucose level 40–60 mg/dL: give 12.5 g (25 mL) IV bolus of dextrose 50% solution. For blood glucose < 40 mg/dL, or if a patient is not awake, give 25 g (50 mL) IV bolus of dextrose 50% solution.
- Recheck BG every 20 minutes, repeat 25 mL of 50% dextrose IV if BG < 60 mg/dL.
- Restart infusion once BG is > 80 mg/dL.

V) Notify the physician:

- For any blood glucose change greater than 100 mg/dL in one hour.
- For blood glucose < 40 mg or > 360 mg/dL.
- For hypoglycemia which has not resolved within 20 min of administering 50 mL of 50% dextrose.

Para el público: dosis de insulina basal

- El 100% de la dosis
- El 30% de la dosis
- El 50% de la dosis
- El 70% de la dosis



¿Qué dosis administrar de insulina basal?

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Original contribution

Effect of basal insulin dosage on blood glucose concentration in ambulatory surgery patients with type 2 diabetes☆



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Measurements: To conduct the analysis, patients were divided into four groups based on the percentage of normal evening glargine dose taken. Group 1 took no glargine. Group 2 took 33%-57%. Group 3 took 60%-87% and Group 4 took 100% of their normal dose. The primary outcome was the proportion of patients in each group with blood glucose in the target range (100-180 mg/dL), and the incidence of hypoglycemia (defined as BG <70 mg/dL or symptomatic, requiring glucose).

Table 1

Demographic characteristics and blood glucose values by groups: mean pre- and postoperative blood glucose values (BG1 and BG2, respectively), percent patients with BG1 and BG2 in target (100-180 mg/dL), and percent of patients with hypoglycemia (≤ 70 mg/dL) on BG1 or BG2.

	Group 1 N = 5	Group 2 N = 23	Group 3 N = 49	Group 4 N = 73	P
Weight (kg), mean $\pm$ SD	93 $\pm$ 19	93 $\pm$ 22	94 $\pm$ 21	94 $\pm$ 19	.99
BMI (kg/m ²), mean $\pm$ SD	31 $\pm$ 7	33 $\pm$ 7	33 $\pm$ 7	32 $\pm$ 6	.89
Male, N (%)	4 (80%)	8 (35%)	25 (51%)	41 (56%)	.19
Mean percent of normal insulin dose taken (range)	0	49% (33-57)	73% (60-87)	100%	
BG1, mean $\pm$ SD	274 $\pm$ 60	154 $\pm$ 44	137 $\pm$ 39	131 $\pm$ 50	.001
BG1 100-180 (% within target)	0	16 (70%)	38 (78%)	36 (49%)	
BG1 ≤ 70 and or symptomatic hypoglycemia	0	0	0	4	
BG2, mean $\pm$ SD	252 $\pm$ 46	155 $\pm$ 39	140 $\pm$ 37	127 $\pm$ 51	<.001
BG2 100-180 (% within target)	1 (20%)	13 (65%)	31 (94%)	32 (50%)	.002
BG2 ≤ 70 and or symptomatic hypoglycemia	0	1	1	8	

¿Qué dosis administrar de insulina basal?

FASE POSTOPERATORIA

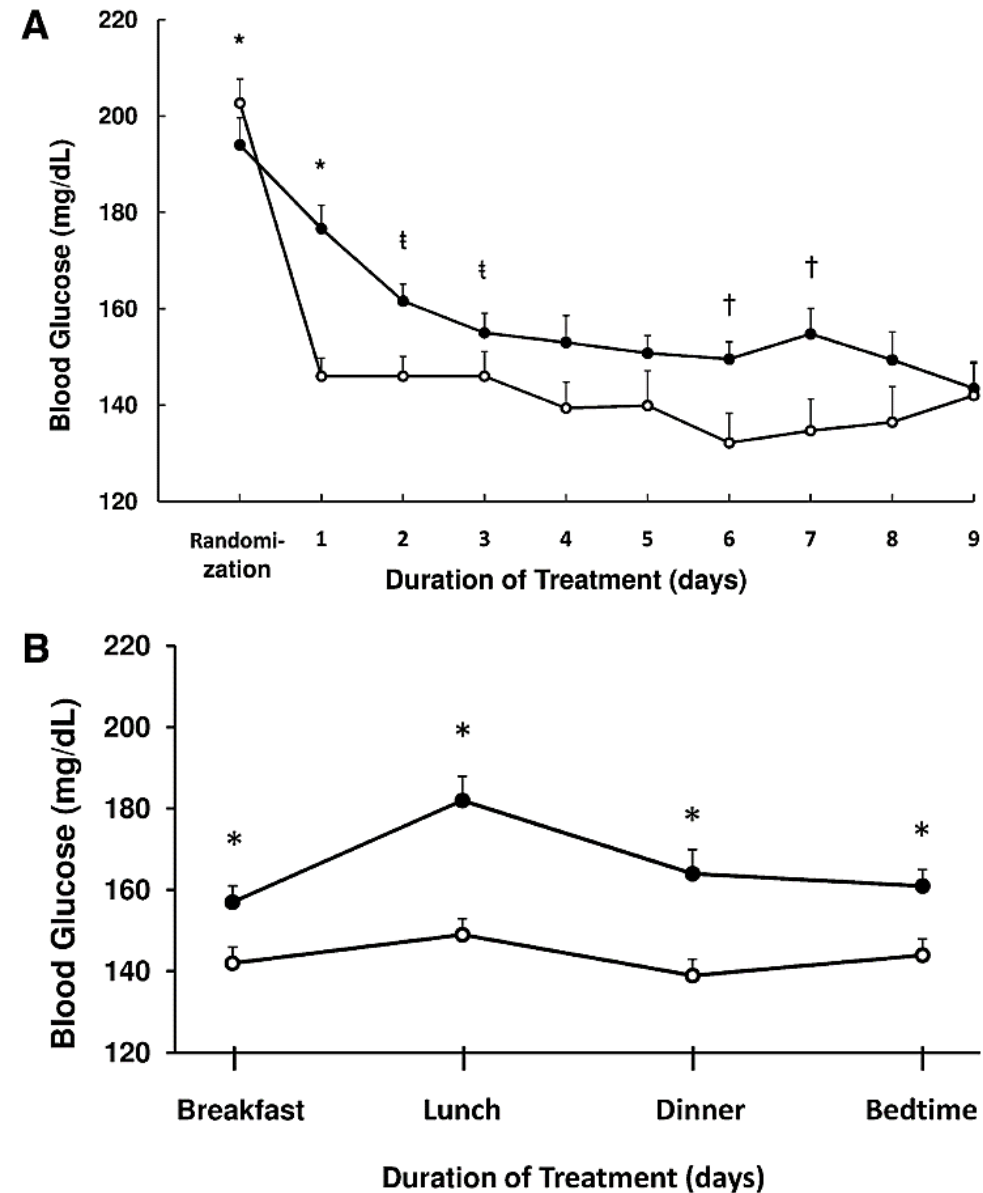
Insulinización

- En pacientes sometidos a cirugía general no cardíaca, el cubrimiento con un esquema de insulina basal-bolo se ha asociado con mejoría del control glucémico y bajas tasas de complicaciones periooperatorias, comparado con los esquemas de corrección con insulina regular o de corta acción sin insulinización basal

Randomized Study of Basal-Bolus Insulin Therapy in the Inpatient Management of Patients With Type 2 Diabetes Undergoing General Surgery (RABBIT 2 Surgery)

RESEARCH DESIGN AND METHODS—This randomized multicenter trial compared the safety and efficacy of a basal-bolus insulin regimen with glargine once daily and glulisine before meals ($n = 104$) to sliding scale regular insulin (SSI) four times daily ($n = 107$) in patients with type 2 diabetes mellitus undergoing general surgery. Outcomes included differences in daily blood glucose (BG) and a composite of postoperative complications including wound infection, pneumonia, bacteremia, and respiratory and acute renal failure.

Insulinización basal-bolo



Insulinización basal-bolo

Table 2—Composite hospital complications and outcomes composite hospital complications

	All	SSI	Basal-bolus insulin	P value
Wound infections	14	11	3	0.050
Pneumonia	3	3	0	0.247
Acute respiratory failure	6	5	1	0.213
Acute renal failure	15	11	4	0.106
Bacteremia	3	2	1	0.999
Number of patients with complications	35	26	9	0.003
Mortality	2	1	1	NS
Postsurgery ICU admission (%)	16	19.6	12.5	NS
Length of stay (days)				
ICU	2.51 ± 1.90	3.19 ± 2.14	1.23 ± 0.60	0.003
Hospital	6.8 ± 8.9	6.3 ± 5.6	7.23 ± 11.39	NS

Insulinización basal-bolo

Table 3—Hypoglycemic events

Variable	All	SSI	Basal-bolus insulin	P value
Number of patients	211	107	104	
Number of BG tests	3,778	1,826	1,952	
BG <40 mg/dL				
Number of patients (%)	4 (3.8)	0 (0)	4 (3.8)	0.057
Number of events	4	0	4	
Number of readings (%)	0.10	0	0.20	
BG <60 mg/dL				
Number of patients (%)	14 (6.6)	2 (1.9)	12 (11.5)	0.005
Number of events	17	2	15	
Number of readings (%)	0.45	0.11	0.77	
BG <70 mg/dL				
Number of patients (%)	29 (0.8)	5 (4.7)	24 (23)	<0.001
Number of events	44	6	38	
Number of readings (%)	1.16	0.33	1.95	

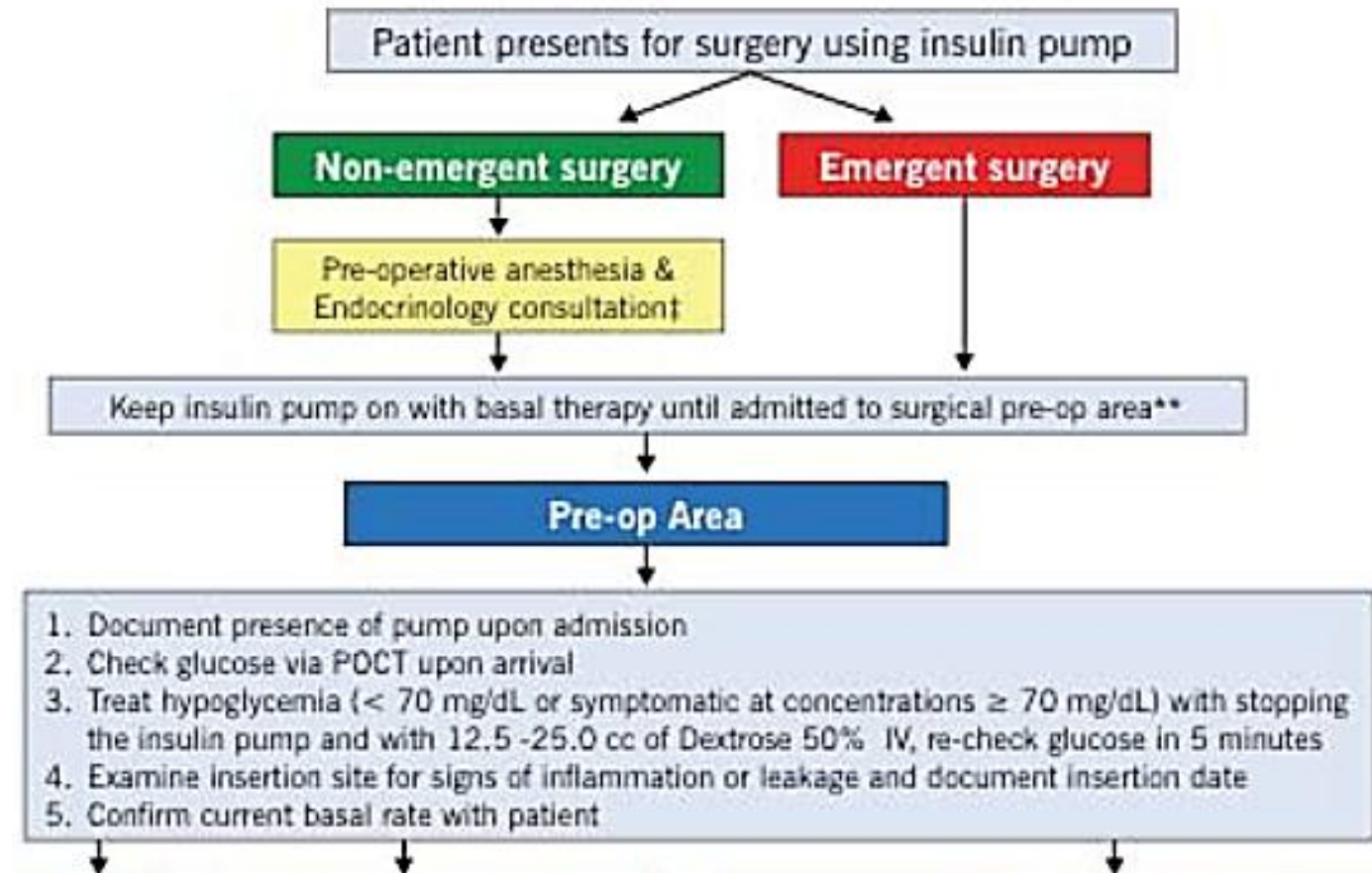
Caso clínico 2

- Stacy
- 25 años
- DMT1 desde los 7 años
- CSII desde hace 5 años
- Mamoplastia de aumento

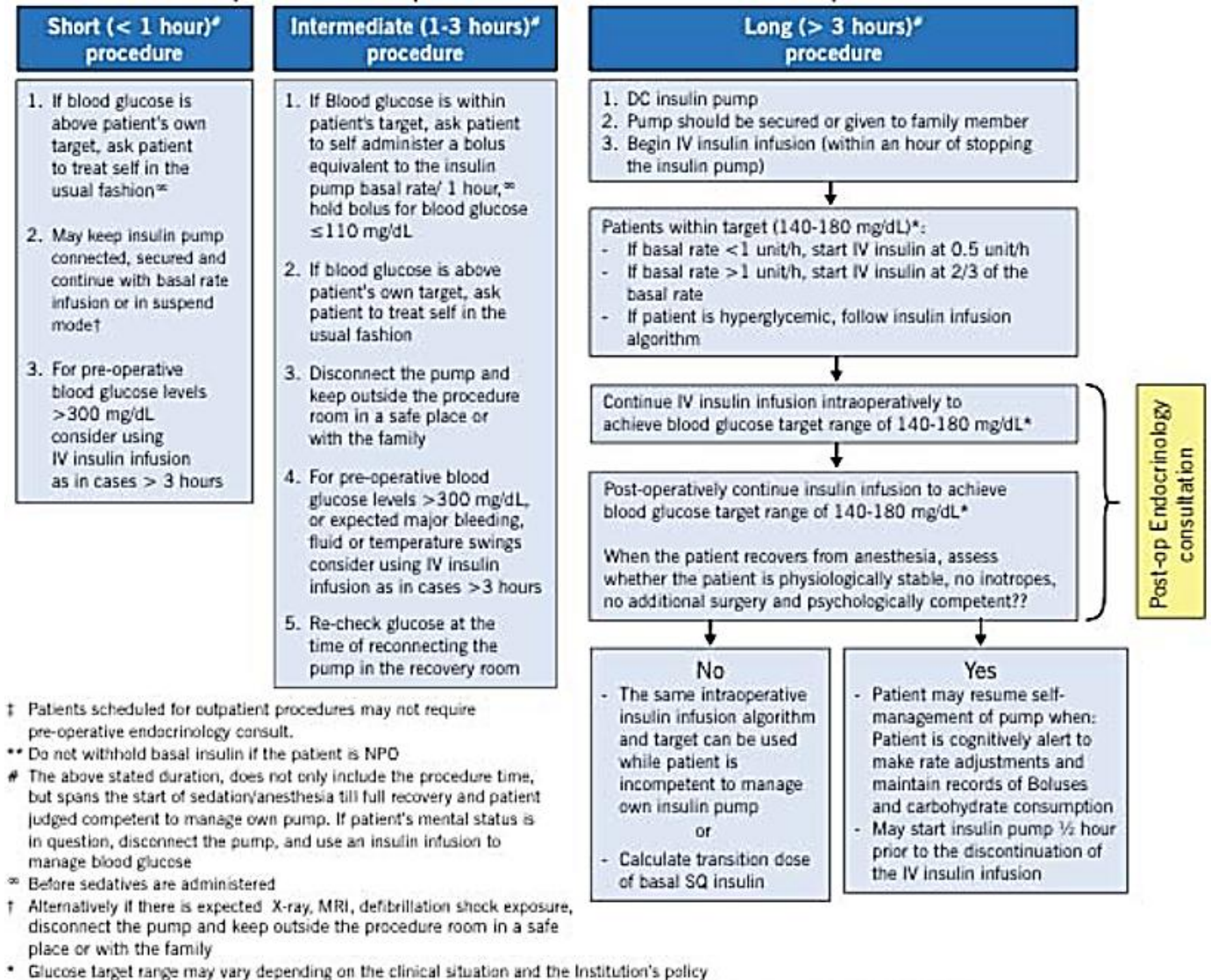


Pacientes con bomba de insulina

Perioperative Glycemic Management in Insulin Pump Adult Patients Undergoing Noncardiac Surgery



Pacientes con bomba de insulina



Frequent blood glucose measurement is the key to successful perioperative glycemic management.

Hasta aquí qué podemos concluir:

- Control glucémico
- Paciente con DMT2 y sólo ADO
- Paciente previamente insulinizados
- Esquema basal-bolo



¡GRACIAS!

Cartas a Simón

(1950 - 1959)

¿Cómo vas? ¿Se te hace monótono ese trabajo? Recuerda que a la larga todo trabajo es monótono si uno no lo hace progresar para que cada día sea nuevo. La vida es continuidad, movimiento continuo. Crea cosas allá. Ten interés. Educa. Enseña. Innova para el mejoramiento, etc.

.....

Fernando González



corporación
Otraparte
¡15 años!



Fernando, Álvaro, Ramiro y Simón González
con la gata Salomé (Marsella, Francia, 1933)