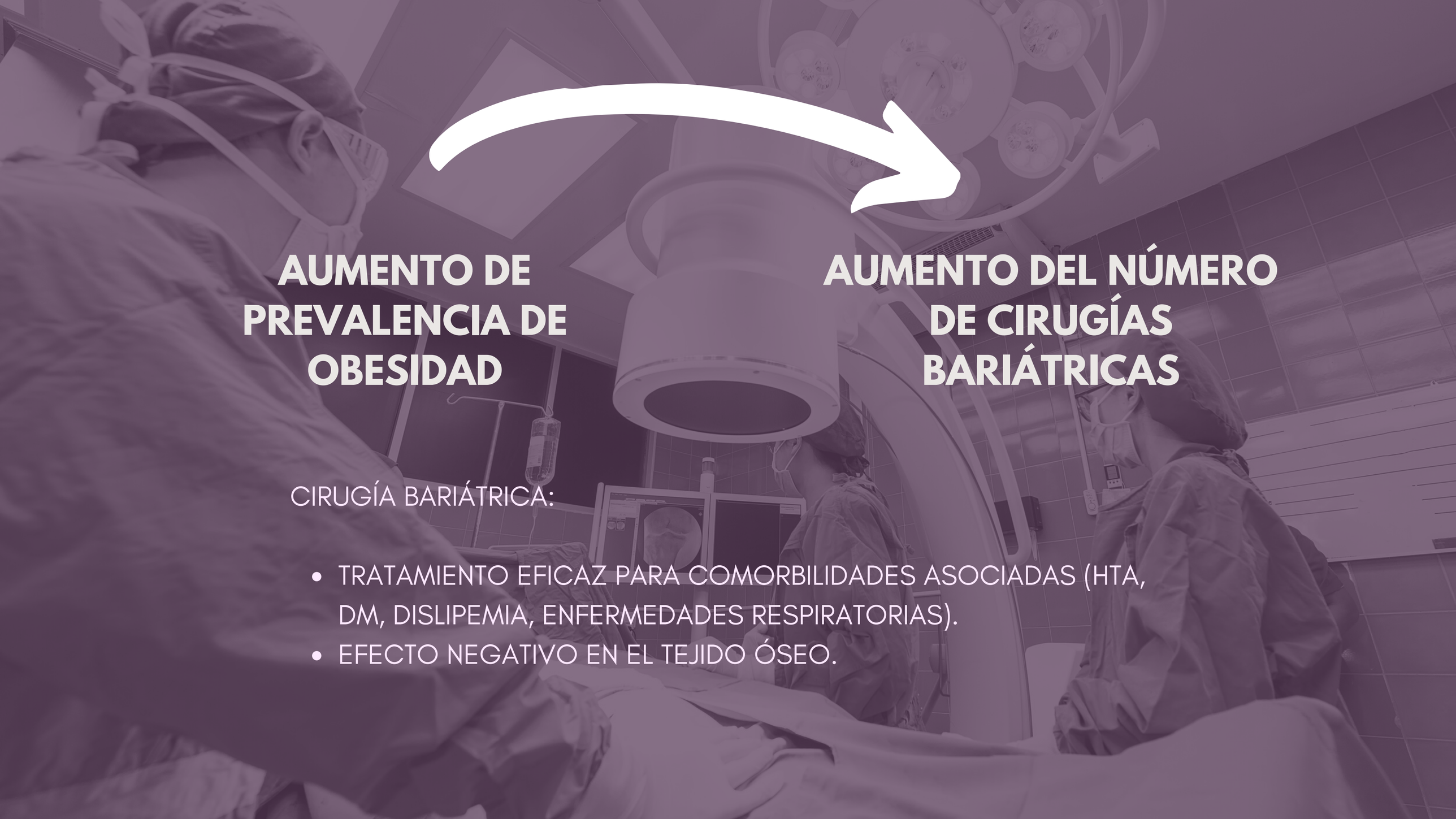
POSGRADO EN REUMATOLOGÍA

CIRUGÍA BARIÁTRICA Y SALUD ÓSEA

Margarita Chávez Palma, junio 2020



AUMENTO DE PREVALENCIA DE OBESIDAD

AUMENTO DEL NÚMERO DE CIRUGÍAS BARIÁTRICAS

CIRUGÍA BARIÁTRICA:

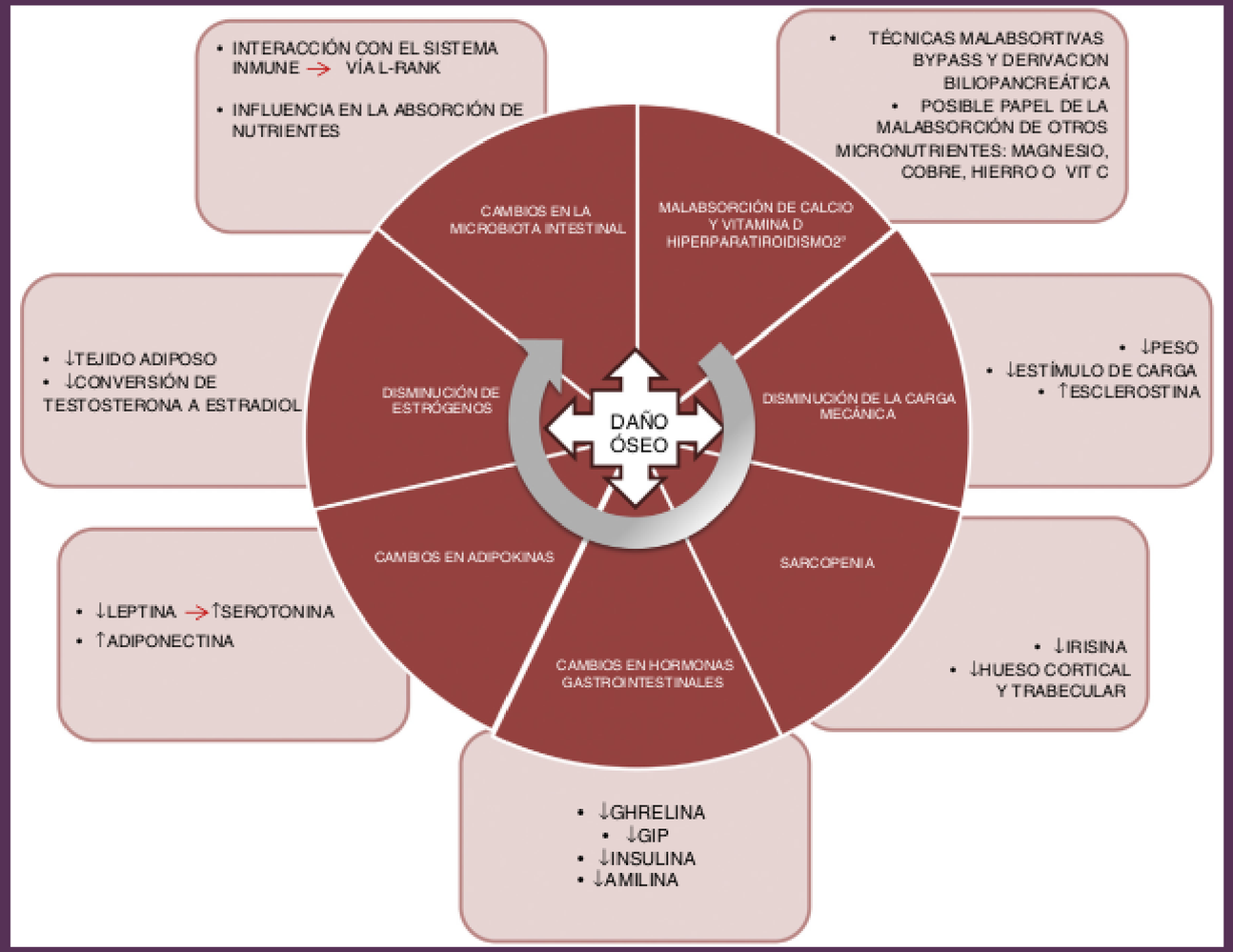
- TRATAMIENTO EFICAZ PARA COMORBILIDADES ASOCIADAS (HTA, DM, DISLIPEMIA, ENFERMEDADES RESPIRATORIAS).
- EFECTO NEGATIVO EN EL TEJIDO ÓSEO.

EFECTOS CIRUGÍA BARIÁTRICA EN EL TEJIDO ÓSEO

- ALTERACIONES EN LA DENSIDAD MINERAL ÓSEA,
- ALTERACIONES EN LA MICROARQUITECTURA ÓSEA,
- INCREMENTO SIGNIFICATIVO DEL RIESGO DE FRACTURA.

FACTORES IMPLICADOS EN EL DAÑO ÓSEO TRAS LA CIRUGÍA BARIÁTRICA

- Malabsorción,
- Disminución de la carga,
- Sarcopenia,
- Cambios en las hormonas intestinales,
- Cambios en adipocinas,
- Disminución de estrógenos,
- Cambios en la microbiota intestinal.



SALUD ÓSEA EN PACIENTES OBESOS

DÉFICIT DE VITAMINA D (PREVALENCIA 80-90%)

Se produce por:

- secuestro en tejido adiposo,
- baja exposición solar,
- baja ingesta de vitamina D a pesar de ingesta hipercalórica,
- disminución de la producción hepática de 25-hidroxi vitamina D por esteatosis.

HIPERPARATIROIDISMO SECUNDARIO (PREVALENCIA 49%)

PTH aumentada a pesar de niveles normales de vitamina D → Resistencia a la PTH por parte del hueso, debido a una masa esquelética aumentada.

TIPOS DE CIRUGÍA BARIÁTRICA

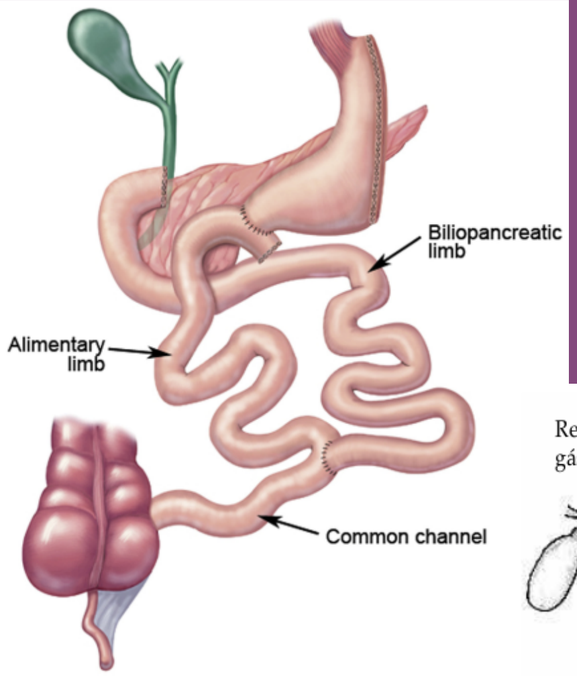


Fig. 1. Biliopancreatic diversion with duodenal switch.

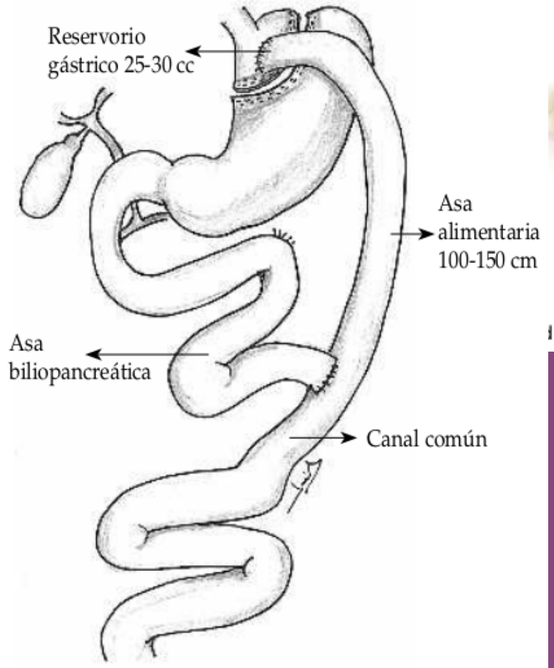
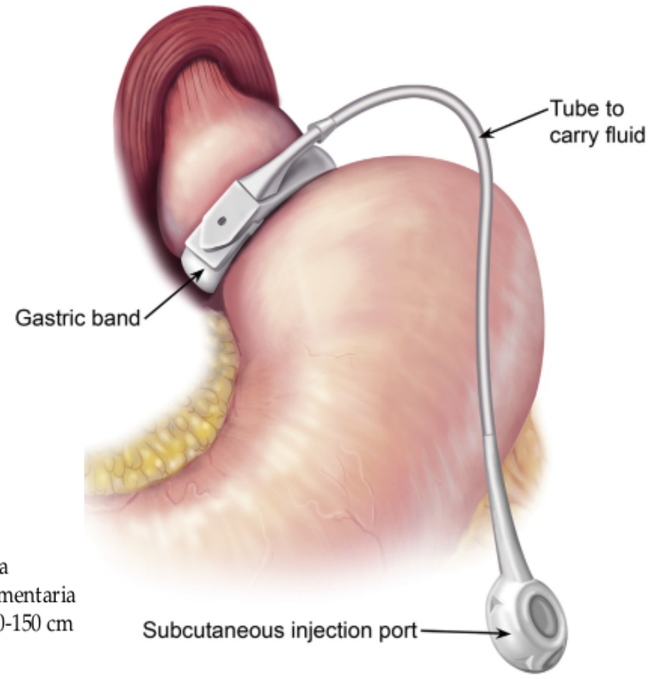


Figura 2. Bypass gástrico en "Y de Roux".



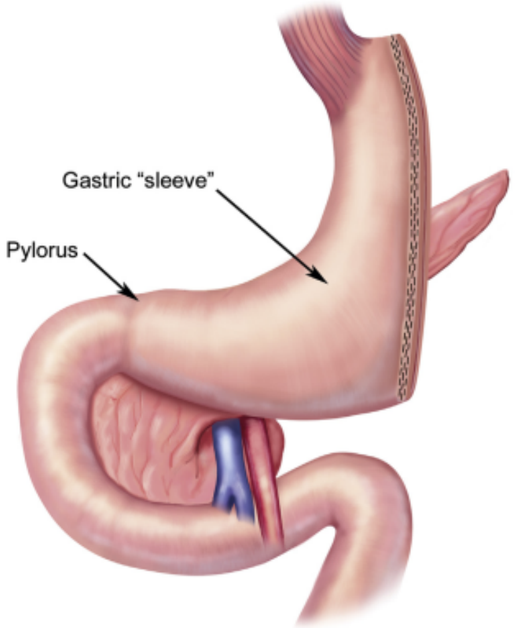


Fig. 4. SG.

POST CIRUGÍA

DEFICIT DE CALCIO Y VITAMINA D OCASIONAN HIPERPARATIROIDISMO SECUNDARIO

CAUSAS DE DEFICIENCIA DE VITAMINA D EN EL POSTOPERATORIO:

- Deficiencia de vitamina D en el preoperatorio,
- Suplementación inadecuada en el postoperatorio,
- Deficiencias de sales biliares (la absorción de vitamina D requiere de ellas),
- Malabsorción de vitamina D por sobrecrecimiento bacterial,
- Absorción de vitamina D ocurre en el yeyuno y el ileon y puede ser afectada por el contacto tardío entre los nutrientes ingeridos, con los ácidos biliares y las enzimas pancreáticas.

CAUSAS DE DÉFICIT DE CALCIO EN EL POSTOPERATORIO:

- Intolerancia a productos lácteos,
- Duodeno y yeyuno son los principales sitios de absorción del calcio por difusión pasiva y por efectos de vitamina D (circuito corto del duodeno en RYGB).

Bone Health Following Bariatric Surgery: An Update

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- Disminución de DMO 5-9% de la basal en CL en los dos primeros años luego de la cirugía (tanto en procedimientos restrictivos como mixtos),
- Disminución DMO en cadera 10 a 14% del basal, solo luego de procedimientos malabsortivos,
- Cuello de fémur DMO cayó de 1,2-1,5% a los 6 meses y de 2,3 a 9,2% a los 9-24 meses,
- A mayor pérdida de peso, mayor disminución de DMO,
- DMO comienza a disminuir a los 6 meses alcanzando un pico al año y al segundo año, con una caída más severa en los siguientes 2 años, a pesar de estabilización del peso.

Review

Comparative risk of fracture for bariatric procedures in patients with obesity: A systematic review and Bayesian network meta-analysis

Qingyu Zhang, Jinlei Dong, Dongsheng Zhou, Fanxiao Liu*

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- 12 ESTUDIOS DESDE 2010 A 2019,
- N 159.916,
- LUEGO DE LA CIRUGÍA BARIÁTRICA, AUMENTO TEMPRANO DE MARCADORES DE REABSORCIÓN ÓSEA Y DISMINUCIÓN DE LA DMO EVALUADA POR DENSITOMETRÍA O TOMOGRAFÍA COMPUTADA VOLUMÉTRICA.

RIESGO DE FRACTURA

- Riesgo de fractura aumenta en un 3% (en pacientes obesos con tratamiento no quirúrgico) a un 5% en pacientes sometidos a cirugía bariátrica.
- Procedimiento malabsortivos mostraron mayor riesgo de fractura.

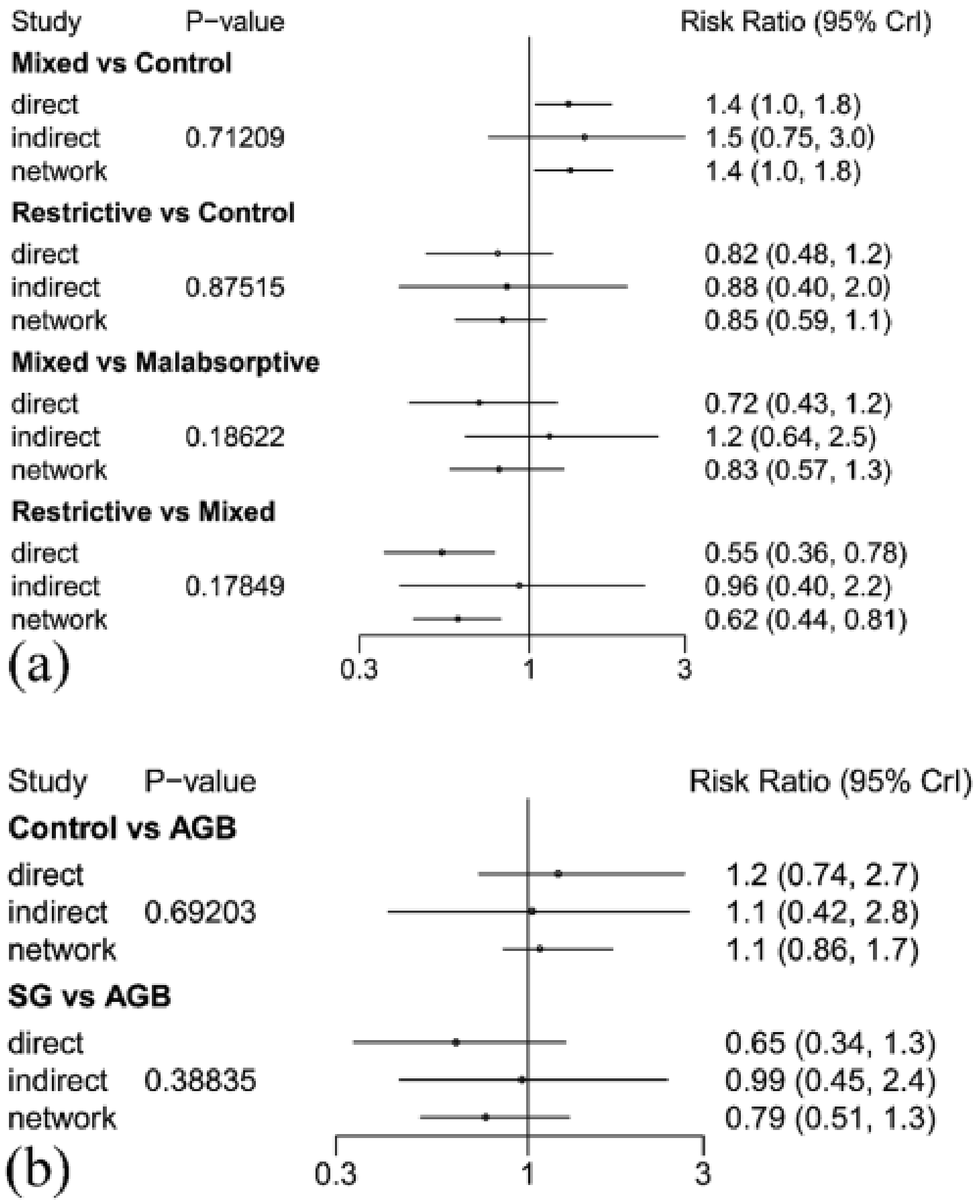


Fig. 5. Node splitting plot of different bariatric procedures (a) and types (b) on postoperative risk of fracture in patients with obesity.

RIESGO DE FRACTURA

- El tiempo promedio de seguimiento fue de 2 a 8,2 años,
- Riesgo de fractura más evidente luego de los 5 años del postoperatorio,
- Riesgo de fractura es sitio dependiente,
- Fractura relacionada a la obesidad afecta más a MMII,
- Fractura osteoporótica es más frecuente en columna, cadera y MMSS.
- Riesgo de caída sin fractura aumenta un 24% luego de la cirugía bariátrica.

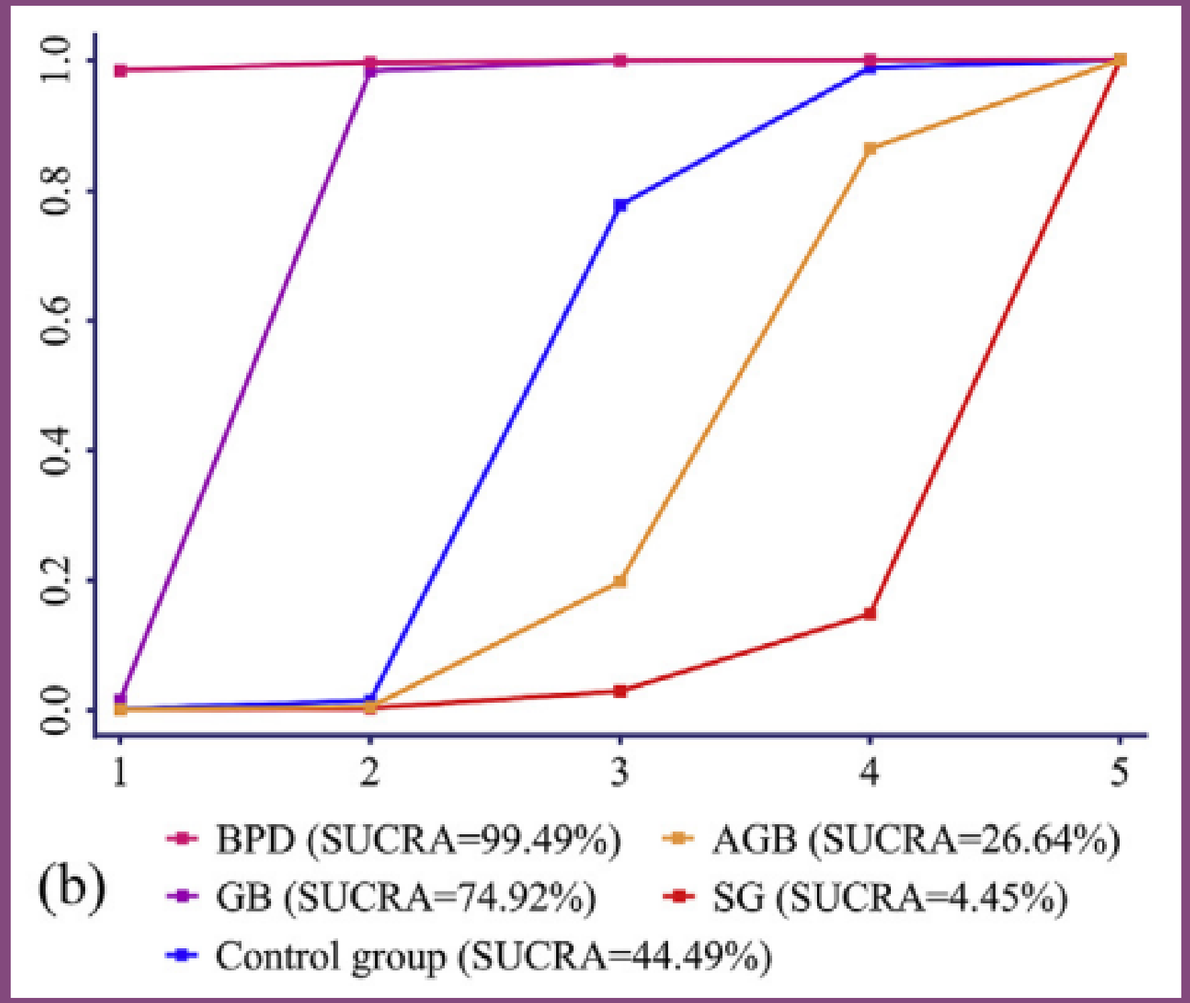


Fig. 6. The types (b) on the postoperative risk of fracture in patients with obesity.

OPEN ACCESS

Change in fracture risk and fracture pattern after bariatric surgery: nested case-control study

Catherine Rousseau,[1,2] Sonia Jean,[2,3] Philippe Gamache,[3] Stéfane Lebel,[4] Fabrice Mac-Way,[1,2] Laurent Biertho,[4] Laëtitia Michou,[1,2] Claudia Gagnon[1,2,5]

- Estudio casos y controles retrospectivo Investiga incidencia de fracturas en pacientes con cirugía bariátrica, en Quebec, Canadá, entre 2001 y 2014, se compara con controles de pacientes obesos con tratamiento médico y pacientes no obesos.
- 12676 pacientes con cirugía bariátrica,
- 38028 obesos controles,
- 126760 No obesos controles,
- Se evalúo efecto de la obesidad y cirugía bariátrica en el riesgo y sitio de fractura.

Table 2 | Relative risks of fracture between groups by period

	Period before surgery (or index date)			Period after surgery (or index date)		
Groups	No (%) with fractures	Unadjusted RR (95% CI)	Adjusted RR* (95% CI)	No (%) with fractures	Unadjusted RR (95% CI)	Adjusted RR* (95% CI)
Bariatric group (n=12 676)	1326 (10.5)	1.65 (1.55 to 1.76)	1.30 (1.21 to 1.39)	514 (4.1)	1.85 (1.68 to 2.04)	1.44 (1.29 to 1.59)
Obese group (n=38 028)	3065 (8.1)	1.22 (1.17 to 1.27)	1.18 (1.13 to 1.23)	1013 (2.7)	1.13 (1.04 to 1.21)	1.04 (0.96 to 1.12)
Non-obese group (n=126 760)	8329 (6.6)	Reference	Reference	3008 (2.4)	Reference	Reference
P value†	-	<0.001	<0.001	-	<0.001	<0.001

RR=relative risk.
*Adjusted for duration of follow-up, material and social deprivation, area of residence, history of fractures (analysis for period after index date only), and number of comorbidities in previous five years, using multivariate conditional Poisson regression model.
†Type III P value for group variable.

Table 3 | Distribution of fracture sites between groups by period. Values are numbers (percentages)

Fracture sites	Period before surgery (or index date)			Period after surgery (or index date)		
	Bariatric (n=12 676)	Obese (n=38 028)	Non-obese (n=126 760)	Bariatric (n=12 676)	Obese (n=38 028)	Non-obese (n=126 760)
All fractures	1639	3630	9760	621	1145	3375
Distal lower limb (knee, foot, ankle, and tibia/fibula)	1053 (64.2)	2149 (59.2)	4800 (49.2)	233 (37.5)	625 (54.6)	1585 (47.0)
Clinical spine	49 (3.0)	107 (2.9)	367 (3.8)	26 (4.2)	39 (3.4)	124 (3.7)
Pelvis, hip, and femur	73 (4.5)	151 (4.2)	426 (4.4)	76 (12.2)	83 (7.2)	247 (7.3)
Upper limb (shoulder, humerus, elbow, forearm, and wrist)	464 (28.3)	1223 (33.7)	4167 (42.7)	286 (46.1)	398 (34.8)	1419 (42.0)

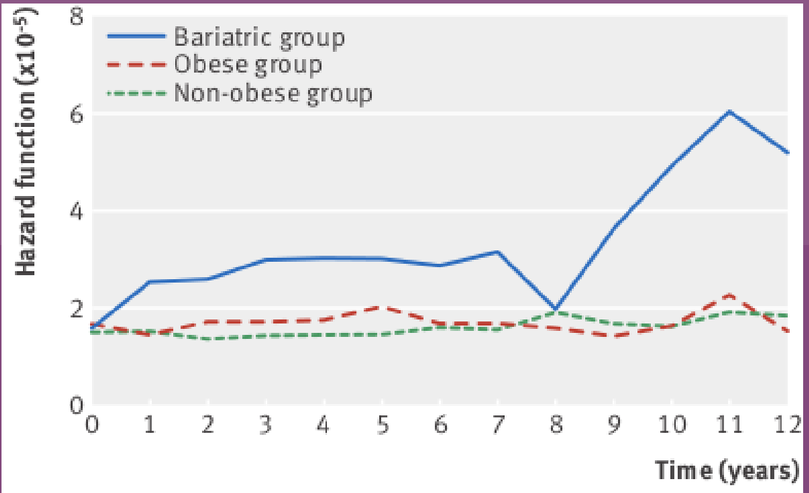


Fig 1 | Hazard function representing non-adjusted fracture risk over time for each group

Cirugía Bariática y Enfermedades Reumáticas

Table 1 Basic characteristic and rheumatic disease outcomes after bariatric surgery in selected studies with their main limitations

Authors	Patients/bariatric surgery/follow-up	Rheumatic diseases	Outcomes	Main limitations
Lalmohamed et al. [6]	*n* = 2079 pts *n* = 10,442 controls 60% LAGB, 29% RYGB 2.2 years	Osteoporosis	No increase in OP fracture rate	Retrospective design Limited follow-up duration
Zhang et al. [7] *(meta-analysis)*	Five observational trials and one RCT but in pts with T2DM ≠ BS 2.2 to 4.8 years	Osteoporosis	Higher risk for any type of fracture in the surgical group Fracture risk in non-vertebral sites: 1.42; 1.68 in the upper limbs	Mainly retrospective and observational studies Comparison between only mixed and restrictive procedures
Rousseau et al. [8]	*n* = 9300 pts *n* = 38,028 sex-matched obese pts *n* = 126,760 non-obese controls 41% LAGB, 27% SG, 9% RYGB, 21% BD 4.4 years	Osteoporosis	Postoperative adjusted fracture risk higher in the bariatric group aRR: 1.38 A site-specific effect is suggested	Retrospective nested case control study Bariatric and obese groups not matched for BMI
Lu et al. [9] *(nationwide cohort study)*	*n* = 2064 pts *n* = 5027 propensity score-matched subjects 14% malabsorptive procedures, 86% restrictive procedures 4.8 years	Osteoporosis	Increased risk of fracture adjusted HR 1.21; malabsorptive procedures aHR 1.48	Retrospective design Data on BMI pre-surgery and post-surgery were not available.
Nakamura et al. [10]	*n* = 258 pts 94% RYGB 7.7 years	Osteoporosis	A twofold increased risk of OP fracture	Retrospective uncontrolled design on review of medical records Non-standardized data
Groen et al. [13] *(systematic review)*	13 studies *n* = 2286 pts *n* = 1551 non-surgical pts RYGB and LAGB 3 months to 6 years	Knee complaints in knee osteoarthritis	Overall significant improvement in knee pain was seen in 73% out of the used assessments	Mainly uncontrolled prospective studies No RCTs Limited follow-up duration
Gill et al. [14] *(systematic review)*	6 studies *n* = 2008 pts *n* = 1531 controls RYGB and LAGB 0.5 to 8 years	Knee and hip osteoarthritis	BS may benefit obese pts with hip or knee OA. Evidence that standardization of outcome is lacking	Inability to perform a pooled analysis or a meta-analysis due to lack of randomized controlled study
Sparks et al. [20]	*n* = 53 pts 81% RYGB 12 months and most recent follow-up	Rheumatoid arthritis	Decrease in disease activity and serum inflammatory markers Less RA-related medication use At 12 months, 6% of pts had moderate/high disease activity vs 57% at baseline	RUD SSS Validated measures not collected consistently
Sethi et al. [27]	*n* = 21 pts 91% LAGB 6.1 years	Psoriatic arthritis	Decrease in disease severity rating	Retrospective uncontrolled database analysis SSS Validated measurement not collected consistently Abstract
Nielsen et al. [31]	*n* = 132 pts ≠ BS 6 to 13 months	Gout	Low-quality evidence for gout attacks and achieving serum uric acid targets	A meta-analysis was not possible. The majorities of included studies were uncontrolled. The lack of rigorous studies is underlined.
Corcelles et al. [32]	*n* = 31 pts 74% RYGB 3 years	Systemic lupus erythematosus	Decrease in SLE immunosuppression medication requirement	RUD SSS
Saber et al. [36]	*n* = 10 pts RYGB 24.5 months	Fibromyalgia	Decrease in median of pain score and points of tenderness	RUD SSS Phone interview
Khoueir et al. [43]	*n* = 58 pts 62% RYGB 12 months	Low back pain	44% decrease in axial back pain (VAS)	38 pts completed pre and post-op questionnaire SSS Limited follow-up duration Uncontrolled study
Lidar et al. [44]	*n* = 30 pts ≠ BS 12 months	Low back pain	Axial and radicular back pain decreased after surgery (VAS)	SSS Uncontrolled study
Vincent et al. [33]	*n* = 25 pts 72% RYGB 28% LAGB 3 months	Low back pain	54% reduction in mean score change in numeric pain rating scale	SSS Limited follow-up duration
Melissas et al. [42]	*n* = 29 pts VBG 24 years	Low back pain	Improved functional disability scores	SSS Uncontrolled study

AR

- Mayor tasa de remisión

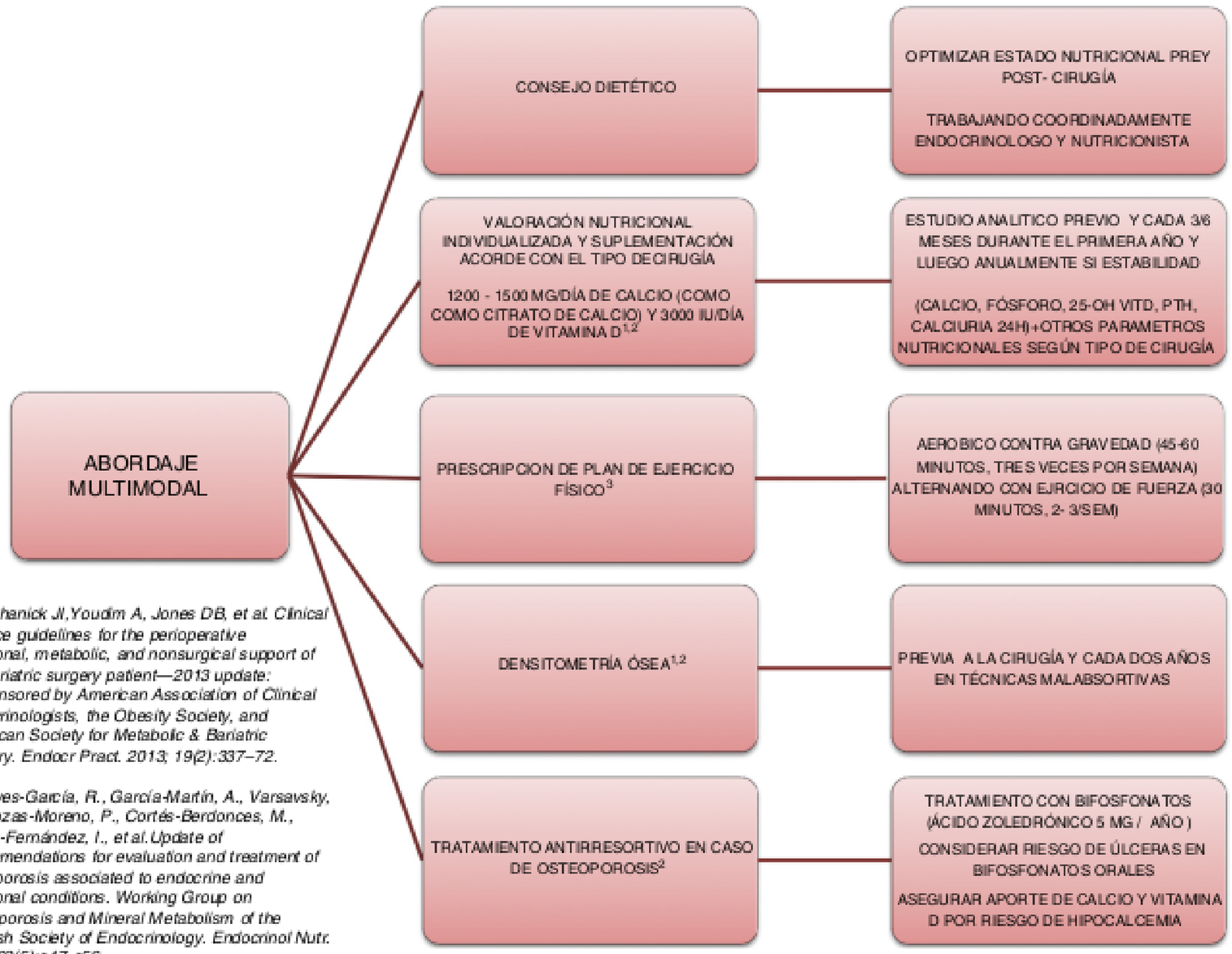
ARTRITIS PSORIÁSICA

- Menor tasa de actividad

LES

- Menor necesidad de uso de glucocorticoides e inmunosupresores

IMPACTO DE LA CIRUGÍA BARIÁTRICA EN EL TEJIDO ÓSEO



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2. Reyes-García, R., García-Martín, A., Varsavsky, M., Rozas-Moreno, P., Cortés-Berdonces, M., Luque-Fernández, I., et al. Update of recommendations for evaluation and treatment of osteoporosis associated to endocrine and nutritional conditions. Working Group on Osteoporosis and Mineral Metabolism of the Spanish Society of Endocrinology. Endocrinol Nutr. 2015;62(5):e47-e56.

3.NOF. Clinician's Guide to Prevention and Treatment of Osteoporosis. Washington, DC: National Osteoporosis Foundation. 2013

Figura 2 Estrategia de abordaje terapéutico.

Table 3A
Guidelines for Serum Calcium, 25 (OH) D, PTH and BMD Screening and Monitoring Postbariatric Surgery

CPG	Calcium	25 OH vitamin D	PTH	BMD
ES 2010 *(113)*	Baseline: All Follow up: RYGB, BPD, BPD/DS at 6, 12, 18, 24 mo then annually	Baseline: All Follow up: RYGB, BPD, BPD/DS at 6, 12, 18, 24 mo and then annually	Baseline: All Follow up: RYGB, BPD, BPD/DS at 6, 12, 18, 24 mo and then annually	Baseline: NA Follow up: malabsorptive surgery (RYGB, GS, BPD) yearly until stable
AACE/TOS/ ASMBS 2013 *(114)*	Baseline: All [a] Follow up: All at each visit[b]	Baseline: All Follow up: RYGB and BPD/DS at 1, 3 and 6–12 mo thereafter	Baseline: NA Follow up: RYGB and BPD/DS at 1, 3 and 6–12 mo thereafter	Baseline: Same as the NOF indications Follow up: All at 2 yr
BOMSS[c] 2014 *(116,120)*	Baseline: All Follow up: SG, RYGB, BPD/DS at 3, 6 and 12 mo then annually	Baseline: All Follow up: SG, RYGB, BPD/DS at 3, 6 and 12 mo then annually [d]	Baseline: All Follow up: SG, RYGB, BPD/DS at 3, 6 and 12 mo then annually	Baseline BPD/DS: Consider in specific patient groups [e] Follow up: NA
IDE 2014 *(115)*	Baseline: NA[f] Follow up RYGB: annually BPD: at 1, 4 and 12 mo then annually	Baseline: NA[f] Follow up RYGB: annually BPD: at 1, 4 and 12 mo then annually	Baseline: NA[f] Follow up RYGB: annually BPD: at 1, 4 and 12 mo then annually[f]	Baseline: All Follow up: NA
OBN 2016 *(119)*	Baseline: All Follow up: All at 6, 12 mo and then annually up to 5 yr	Baseline: All Follow up: All at 3, 6, 12 mo and then annually up to 5 yr	Baseline: All Follow up: All at 6, 12 mo and then annually up to 5 yr	NA
ASMBS 2014/2016 *(117,118)*	Baseline: All Follow up: NA[h]	Baseline: All Follow up: All every 3–6 mo in the first year and then annually [i]	Baseline: All Follow up: All at 2 yr or as indicated after surgery [g,h,i,j]	Baseline: pre and postmenopausal women Follow up: All every 2 yr[k]

BONE HEALTH FOLLOWING BARIATRIC SURGERY: AN UPDATE

Monitorización en el pre y postoperatorio

1

PREOPERATORIO

- Medición basal de calcio, fósforo ,Vit D, PTH.

2

POSTOPERATORIO

- Medición basal de calcio, fósforo ,Vit D, PTH (lapsos entre controles variables entre diferentes tipo de cirugía),
- Calcio en orina,
- Marcadores de reabsorción ósea.

3

DENSITOMETRÍA

- DMO: en el preoperatorio (indicación controversial), en el postoperatorio a los 2 años

Recomendaciones en el postoperatorio

CITRATO DE CALCIO

- Suplementos con citrato de calcio, a una dósis desde 800 a 2400 mg/ día según el tipo de cirugía bariátrica (recomendaciones basadas en pocos estudios).

VITAMINA D

- Vitamina D: desde 800 UI para procedimientos restrictivos y 3000 Ui para procedimientos malabsortivos.
- Puede alcanzar dósis hasta 50000 UI diarias o 1-3 veces/ semana (recomendaciones de expertos).

BIFOSFONATOS

- AACE/ASMBS/TOS considera bifosfonatos en aquellos pacientes con osteoporosis (luego de una suplementación adecuada con vitamina D y calcio).
- **Se deben realizar i/v** (preparados orales aumentan el riesgo de ulceración de la boca anastomótica y de problemas de absorción) , zoledronato 5 mg 1 v/ año o Ibandronato 3 mg c/ 3 meses.

PROTEÍNAS

- Ingesta de proteínas de 60 a 120 g/ día para la Sociedad de Endocrinología y 80-90 g/día por AACE/ASMBS/TOS para todos los tipos de Cirugía Bariátrica.
- Se recomienda ejercicio moderado de al menos 150 minutos/semana.

ELSEVIER

Surgery for Obesity and Related Diseases 16 (2020) 175–247

SURGERY FOR OBESITY AND RELATED DISEASES

Guidelines

Clinical practice guidelines for the perioperative nutrition, metabolic, and nonsurgical support of patients undergoing bariatric procedures – 2019 update: cosponsored by American Association of Clinical Endocrinologists/American College of Endocrinology, The Obesity Society, American Society for Metabolic & Bariatric Surgery, Obesity Medicine Association, and American Society of Anesthesiologists

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These Guidelines are endorsed by The American Society for Nutrition (ASN), the Obesity Action Coalition (OAC), International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO), International Society for the Perioperative Care of the Obese Patient (ISPCOP), and the American Society for Parenteral and Enteral Nutrition (ASPEN).

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Jeffrey I. Mechanick et al. Surgery for Obesity and Related Diseases.

No hay datos suficientes para garantizar Evaluación del procedimiento de densidad mineral ósea con doble absorciometría de rayos X de energía o suero o giro urinario óseo sobre marcadores fuera de las recomendaciones formales de la Fundación Nacional de Osteoporosis

R29. (2008*). There are insufficient data to warrant pre-procedure assessment of bone mineral density with dual-energy x-ray absorptiometry or serum or urinary bone turnover markers outside formal recommendations by the National Osteoporosis Foundation (http://www.iscd.org/documents/2014/10/nof-clin-guidelines.pdf/) (Grade D).

- **CALCIO: 1200–1500 MG/DÍA PARA SG Y RYGB Y 1800–2400 MG/DÍA PARA BPD,**
- **VITAMINA D: 2000 A 3000 UI/ DÍA AJUSTANDO SEGÚN DOSIFICACIÓN Y TIPO DE CIRUGÍA**

RYGB, and SG should be in chewable form initially and then as 2 adult multivitamins plus minerals (each containing iron, folic acid, and thiamine) (Grade B, BEL 2), elemental calcium (1200–1500 mg/d for SG and RYGB and 1800–2400 mg/d for BPD/DS in diet and as citrated supplement in divided doses) (Grade B, BEL 2), at least 2000 to 3000 IU of vitamin D (titrated to therapeutic 25-hydroxyvitamin D levels >30 ng/mL) (Grade A, BEL 1), total iron as 18

Vitamina D y Calcio

Table 14
Nutrient supplementation and repletion after bariatric surgery

Micronutrient	Supplementation to prevent deficiency	Repletion for patients with deficiency
Vitamin D and calcium	Appropriate dose of daily calcium from all sources varies by surgical procedure: • BPD/DS: 1800–2400 mg/d • LAGB, SG, RYGB: 1200–1500 mg/d To enhance calcium absorption in post-WLS patients • Calcium should be given in divided doses • Calcium carbonate should be taken with meals • Calcium citrate may be taken with or without meals Recommended preventative dose of vitamin D should be based on serum vitamin D levels: • Recommended vitamin D_3 dose is 3000 IU daily, until blood levels of 25 (OH) D are greater than sufficient (30 ng/mL) • 7%–90% lower vitamin D_3 bolus is needed (compared to vitamin D_2) to achieve the same effects as those produced in healthy nonbariatric surgical patients	All bariatric patients with vitamin D deficiency or insufficiency should be repleted as follows: • Vitamin D_3 at least 3000 IU/d and as high as 6000 IU/d, or 50,000 IU vitamin D_2 1–3 times weekly • Vitamin D_3 is recommended over vitamin D_2 as a more potent treatment when comparing frequency and amount needed for repletion. Repletion of calcium deficiency varies by surgical procedure: • BPD/DS: 1800–2400 mg/d • LAGB, SG, RYGB: 1200–1500 mg/d

EN SUMA

CIRUGÍA BARIÁTRICA

- Repercusión en salud ósea:

Hipocalcemia
Hipovitaminosis D
Hiperparatiroidismo secundario

↓ DMO ↑ Riesgo de fractura

- Importante valoración preoperatoria y postoperatoria, con correcta suplementación de vitamina D y calcio (ajustando según tipo de cirugía).

- Bifosfonatos: si se requieren se deben de administrar en forma i/v.

GRACIAS, ESPERO SUS COMENTARIOS

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