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Perioperative Outcomes of Roux-en-Y Gastric Bypass and Sleeve Gastrectomy in Type 2 Diabetics: A MBSAQIP Analysis

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Background

- Obesity is a growing problem
- Bariatric surgery = successful treatment for obesity and associated comorbidities
- Type 2 diabetes mellitus (T2DM) is an emerging indication

- Long-term benefits well studied in diabetics
- Perioperative outcomes not as clear
- Generally more perioperative complications in those with T2DM

HYPOTHESIS: increased perioperative risks associated with performance of bariatric surgeries in type 2 diabetics

Hypothesis

Increased perioperative risks associated with performance of bariatric surgeries in type 2 diabetics

Literature Review

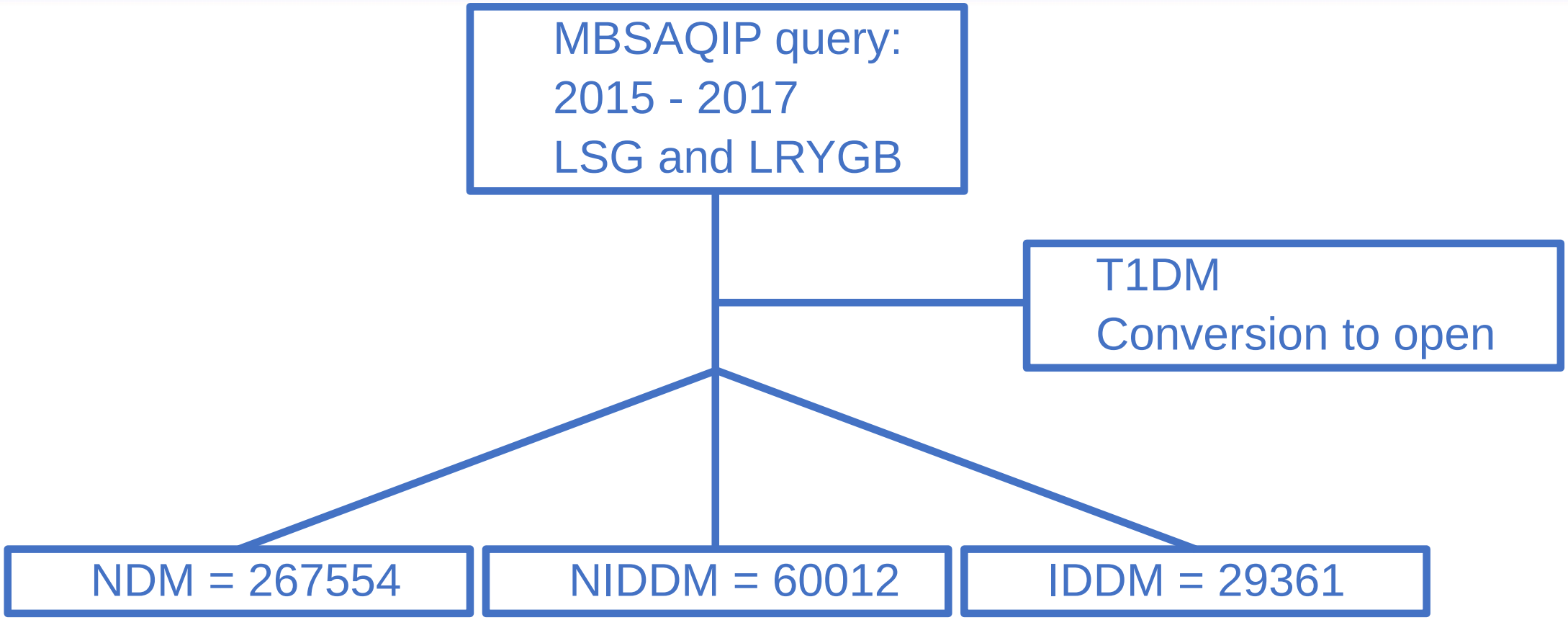
- Scheen et al. 2009 *Diabetes and Metabolism* – T2DM is a valid indication for bariatric surgery
  - Mention increased risks in short term, do not define them
- Schauer et al. 2015 *Annals of Surgery* – bariatric surgery improves lifespan in obese diabetes
  - Again, perioperative risks mentioned in passing
- Steele et al. 2019 *Surgery for Obesity and Related Diseases* – acceptable risks in obese diabetics, but increased morbidity
  - Low absolute risks, but higher in diabetic group
- Martin et al. 2010 *Infection Control and Hospital Epidemiology* – higher surgical site infection rates across surgical procedures among diabetics

Methods – Database

- MBSAQIP – national database of participating centers, 30-day perioperative data
- Included – 2015 to 2017, obese who underwent either:
  - Laparoscopic sleeve gastrectomy (LSG)
  - Laparoscopic roux-en-Y gastric bypass (LRYGB)

- Each surgical cohort separated into 3 groups based on type 2 diabetic status (type 1 diabetics excluded):
  - Non-diabetics (NDM)
  - Non-insulin dependent diabetics (NIDDM)
  - Insulin-dependent diabetics (IDDM)

Methods – Database



Methods – Analysis/Outcomes

- Demographic analysis
- Primary outcomes:
  - Serious adverse events (major organ dysfunction, higher level of care)
  - Readmission
  - Reoperation
  - Mortality
- Secondary outcomes: length of stay, SSI, DVT, etc.
- Univariate and multivariable analysis
  - Adjusted odds ratios (AOR) reported
  - Multivariable analysis = adjusted for age/sex/race/ASA class/BMI

Results – Demographics

- Total of 336927 patients
  - NDM = 247554
  - NIDDM = 60012
  - IDDM = 29361
- Trend of rates = NDM < NIDDM < IDDM
  - ASA
  - CAD, HTN, HLD, COPD, O2 dependent, CKD, DVT/PE, chronic steroids, GERD, more dependent status
- Fraction of LRYGB/LSG for each group = same trend (LSG more often in NDM, LRYGB more often in IDDM)

Results – LSG Outcomes

	Adjusted Odds Ratio (95% confidence interval)		P-Value
Primary Outcomes			
Serious adverse events	No DM (ref)	1 (ref)	
	Non-IDDM	1.15 (1.08 – 1.23)	<0.001
	IDDM	1.58 (1.46 – 1.71)	<0.001
30-day readmission	No DM (ref)	1 (ref)	
	Non-IDDM	1.00 (0.94 – 1.07)	0.989
	IDDM	1.69 (1.56 – 1.83)	<0.001
30-day reoperation	No DM (ref)	1 (ref)	
	Non-IDDM	1.11 (0.99 – 1.25)	0.072
	IDDM	1.40 (1.20 – 1.63)	<0.001
30-day mortality	No DM (ref)	1 (ref)	
	Non-IDDM	1.52 (1.01 – 2.28)	0.043
	IDDM	1.91 (1.19 – 3.07)	0.007

Table 1. The results summary based on multivariable regression model for each primary outcome adjusting for patient characteristics in patients undergoing laparoscopic sleeve gastrectomy (n=244840).

Results – LRYGB Outcomes

	Adjusted Odds Ratio (95% confidence interval)		P-Value
Primary Outcomes			
Serious adverse events	No DM (ref)	1 (ref)	
	Non-IDDM	1.09 (1.02 – 1.16)	0.014
	IDDM	1.43 (1.33 – 1.54)	<0.001
30-day readmission	No DM (ref)	1 (ref)	
	Non-IDDM	0.97 (0.90 – 1.04)	0.421
	IDDM	1.26 (1.16 – 1.36)	<0.001
30-day reoperation	No DM (ref)	1 (ref)	
	Non-IDDM	0.91 (0.82 – 1.02)	0.116
	IDDM	0.88 (0.77 – 1.01)	0.070
30-day mortality	No DM (ref)	1 (ref)	
	Non-IDDM	0.98 (0.61 – 1.55)	0.918
	IDDM	1.32 (0.83 – 2.09)	0.243

Table 2. The results summary based on multivariable regression model for each primary outcome adjusting for patient characteristics in patients undergoing laparoscopic RYGB (n=92087).

Results – IDDM versus NIDDM

	LSG		RYGB	
	AOR (95% CI)	P-value	AOR (95% CI)	P-Value
Primary Outcomes				
Serious adverse events	1.38 (1.26 – 1.51)	< 0.001	1.32 (1.21 – 1.44)	< 0.001
30-day readmission	1.68 (1.53 – 1.85)	< 0.001	1.30 (1.18 – 1.43)	< 0.001
30-day reoperation	1.25 (1.05 – 1.49)	0.013	0.97 (0.83 – 1.13)	0.660
30-day mortality	1.23 (0.73 – 2.08)	0.432	1.33 (0.78 – 2.25)	0.295

Results – IDDM versus NIDDM

Secondary Outcomes				
Length of stay > 2 days	1.45 (1.36 – 1.53)	< 0.001	1.39 (1.32 – 1.47)	< 0.001
Renal events	2.24 (1.55 – 3.24)	< 0.001	2.25 (1.55 – 3.26)	< 0.001
Cardiac events	2.42 (1.43 – 4.07)	0.001	2.05 (1.16 – 3.62)	0.013
Respiratory complications	1.41 (1.07 – 1.87)	0.014	1.17 (0.91 – 1.50)	0.216
SSI	1.35 (1.04 – 1.73)	0.022	1.45 (1.22 – 1.71)	< 0.001
Septic events	1.47 (0.91 – 2.37)	0.119	1.25 (0.82 – 1.88)	0.296
UTI	1.47 (1.09 – 1.98)	0.012	1.33 (0.98 – 1.81)	0.063
VTE events	0.96 (0.75 – 1.24)	0.771	0.87 (0.65 – 1.18)	0.371
Transfusion intra-op/post-op (72hrs)	1.30 (1.05 – 1.60)	0.016	1.16 (0.96 – 1.40)	0.133
Reinterventions	1.26 (1.06 – 1.51)	0.011	1.27 (1.10 – 1.47)	0.001

Discussion/Conclusions

- Higher rate of most primary/secondary outcomes in the following order:
  - NDM < NIDDM < IDDM
- IDDM group had significantly higher rates of outcomes than NIDDM group
- Absolute rate of complications still relatively low

- Still overall benefit to bariatric surgery – one of few proven treatments for T2DM in the obese
- More intensive preoperative optimization (when possible) may have utility
- Easier to prevent progression of outcomes in 30 day period from becoming long-term sequela if they are more expected