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Retrospective audit of anaesthesia practices in a new Bariatric unit in a Johannesburg academic hospital

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Background: Obesity is a significant issue in South Africa, where 27% of the population is considered obese and this is estimated to increase. Bariatric surgery is currently offered at four public institutions in South Africa. There is limited literature on the anaesthetic practice in bariatric surgery in South Africa.

Aim: To describe perioperative anaesthetic practices for bariatric surgery.

Setting: Helen Joseph Hospital.

Methods: This was a retrospective, descriptive study that included all bariatric cases performed from 01 January 2022 to 30 June 2024. The data collection sheet was designed in accordance with the perioperative recommendations of the Enhanced Recovery After Surgery (ERAS) Society for Bariatric Surgery. Pre-, intra- and postoperative variables were reviewed. Outcomes were descriptively described.

Results: Forty-three patients met the inclusion criteria; 90% were female, with a median age of 45 years and a median body mass index of 59 kg/m^2. Although all patients met the prerequisites for surgery, only 65% achieved the recommended preoperative weight loss. Opioid-sparing analgesia and multimodal postoperative nausea and vomiting (PONV) prophylaxis were administered to 55% and 78% of patients, respectively. Postoperative prophylactic oxygen was provided to 86% of patients. PONV was the most common complication (16.3%), and overall mortality was 7%.

Conclusion: This was the first public-sector audit of bariatric surgery in South Africa analysing current anaesthetic practice. Intraoperative practices had higher compliance with ERAS guidance, and postoperative practices had the lowest compliance. Multidisciplinary involvement for context-specific guidance will ensure standardised care for these patients throughout the perioperative period.

Contribution: The study provides insight into current anaesthesia practices for bariatric surgery at a single centre in South Africa. It highlights areas for improvement to align practice with international guidelines.

Keywords: bariatric surgery; obesity; perioperative outcomes; opioid sparing; enhanced recovery after surgery; anaesthesia.

Introduction

Obesity is a significant issue in South Africa, where 27% of the population is considered obese.[1] It is estimated that this will increase to 30% by 2030.[2] Bariatric surgery is considered an effective long-term treatment for patients with a body mass index (BMI) ≥ 40 kg/m^2 or ≥ 35 kg/m^2 in the presence of comorbidities.[3,4] Bariatric surgery is being performed more regularly and is currently offered at four public institutions in South Africa: three in Gauteng and one in the Western Cape.[5] Helen Joseph Hospital (HJH) initiated its bariatric surgery service in January 2022.

There are several guidelines that exist addressing aspects of bariatric surgical care. The International Federation for the Surgery of Obesity and Metabolic Disorders (IFSO), in conjunction with the American Society for Metabolic and Bariatric Surgery (AMBS), specifically address BMI thresholds and comorbidity indications.[4] The Clinical Practice Guidelines of the Association for Endoscopic Surgery (EAES) on bariatric surgery focus primarily on the surgical process and have very limited anaesthetic detail.[5] The Enhanced Recovery After Surgery (ERAS)

Note: Additional supporting information may be found in the online version of this article as Online Appendix 1.

Society released updated consensus-based guidelines for the care of bariatric patients in 2021. These guidelines are more comprehensive and encompass the pre-, intra- and postoperative period and were used in this study.[6]

Preoperatively, ERAS emphasises the involvement of a multidisciplinary team, patient education and counselling to optimise patients prior to surgery. Intraoperatively, a multimodal opioid-sparing analgesic approach, goal-directed fluid therapy, depth of anaesthesia monitoring in conjunction with intravenous anaesthesia techniques, lung-protective ventilation, neuromuscular blockade monitoring and postoperative nausea and vomiting (PONV) prophylaxis are discussed. Postoperatively, the focus is on the removal of unnecessary drains and tubes, nutritional support, thromboprophylaxis and oxygen supplementation.

There is limited literature on anaesthetic practice in bariatric surgery in South Africa.[7] At HJH, there is no institutional protocol for anaesthesia in bariatric surgery. This study was developed with the ERAS consensus recommendations in mind and seeks to assess whether current practices at HJH align with international standards.

This study aimed to describe the perioperative management of patients presenting for bariatric surgery at HJH. The primary objectives of this study were to describe the patient profile, preoperative workup, intraoperative anaesthetic practices and postoperative course. The secondary objective was to determine whether the current practice aligns with the recommended ERAS practice guidance.

Research methods and design

This was a retrospective, descriptive study that included all bariatric cases performed at HJH from 01 January 2022 to 30 June 2024. As this was a retrospective study, informed consent was not obtained.

Helen Joseph Hospital is a tertiary public hospital affiliated with the University of the Witwatersrand. The hospital conducted its first bariatric surgery in January 2022, and to date, 47 bariatric surgeries have been performed. The bariatric theatre team consisted of three surgeons and five anaesthetists with experience in bariatric surgery. All patients considered for surgery were assessed at the preoperative anaesthesia clinic. This was considered mandatory for a complete workup.

The sample size was determined by the number of bariatric surgeries performed during the study period. Patients who were not assessed at the preoperative anaesthesia clinic were excluded as the preoperative component of the ERAS pathway constituted significant missing data. All other patients undergoing bariatric surgery during the study period were included.

Each patient was risk-stratified and counselled regarding the surgical procedure at the preoperative anaesthesia clinic. Following risk stratification, patients were referred to the relevant specialists for optimisation and reassessed thereafter. Comorbidities and further counselling regarding the procedure were provided. Different anaesthetic registrars and anaesthetic consultants manage the clinic, resulting in heterogeneity in the investigations requested and the counselling provided.

A non-probability convenience sampling method was employed using medical records available from the bariatric surgery database. The database included preoperative clinic notes, anaesthetic charts and patient files.

The data collection sheet was designed based on the perioperative recommendations of the ERAS Society for Bariatric Surgery.[6] The data collection tool was peer-reviewed by five consultant anaesthetists experienced in bariatric surgery to ensure practical application and content validity (Online Appendix 1). Data were captured using a structured Google Form by the primary investigator (HJM).

Preoperative, intraoperative and postoperative variables were reviewed. Preoperative data consisted of patient demographics and factors related to their anaesthetic risk profile. Airway management, ventilation strategies (lung-protective ventilation: tidal volume (TV) 6 mL – 8 mL based on ideal body weight, positive end expiratory pressure (PEEP) 5 cm – 10 cm H_2O) and drugs administered for neuromuscular blockade, analgesia, PONV prophylaxis and maintenance of anaesthesia were noted in the intraoperative data. Complications, destination after surgery, oxygen supplementation and outcome were collected during the postoperative period.

The ERAS audit list included preoperative, intraoperative and postoperative categories, with all strong recommendations listed in the guideline assessed for institutional compliance.[6] Each patient record was then compared to the recommendations. The strong and weak recommendations are tabulated in Table 1.[6]

Outcomes were predominantly descriptive. Continuous data were described numerically using the median and interquartile range. Categorical data (nominal and ordinal) were reported numerically as counts and percentages. A Fisher's exact test was conducted to assess associations among morphine administration, the presence of nausea and vomiting, and the need for supplemental oxygen as an exploratory analysis. A p-value < 0.05 was considered statistically significant.

Ethical considerations

Ethical clearance to conduct this study was obtained from the University of the Witwatersrand and Human Research Ethics Committee (No. MED24-08-553).

Results

Forty-seven patients had undergone bariatric surgery during the study period; four were excluded as they did not attend

TABLE 1: Strong and weak recommendations for Enhanced Recovery After Surgery in bariatric surgery.

Preoperative	Intraoperative	Postoperative
Strong recommendations		
• Education and counselling preoperatively • Cessation of smoking and alcohol > 4 weeks • Screening and optimisation of comorbidities preoperatively • Strict fasting guidelines: solids 6 h, liquids 2 h	• Multimodal PONV prophylaxis • Multimodal analgesia that is opioid-sparing • Goal-directed fluid therapy • BIS monitoring when TIVA/TCI used • Endotracheal intubation • Lung-protective ventilation (avoid PEEP > 10 cm H_20) • Deep neuromuscular blockade • Full reversal of neuromuscular blockade • Objective qualitative monitoring of neuromuscular blockade • Laparoscopic approach • Avoidance of NGT/abdominal drains	• Prompt ambulation • Prompt intake of fluids orally • Opioid-sparing multimodal analgesia • Antiemetics • VTE prophylaxis • CPAP for patients on home CPAP therapy • Position on head up position post operatively • Thromboprophylaxis • PPI prophylaxis • Gallstone prevention ursodeoxycholic acid for 6 months
Weak recommendations		
• Rehabilitation preoperatively • 8 mg dexamethasone 90 min before induction • Initiation of statins perioperatively in statin naïve patients • Preoperative carbohydrate loading	• Use of colloid • Use of specific anaesthetic agents or techniques • Regional anaesthesia • Positioning in reverse Trendelenburg position in the presence of pneumoperitoneum	• PPI prophylaxis for sleeve gastrectomy patients

Source: Adapted from Stenberg E, Dos Reis Falcão LF, O'Kane M, et al. Guidelines for perioperative care in bariatric surgery: Enhanced Recovery After Surgery (ERAS) society recommendations: A 2021 update. World J Surg. 2022;46(4):729–751. https://doi.org/10.1007/s00268-021-06394-9

PONV, postoperative nausea and vomiting; BIS, bispectral index; TIVA, total intravenous anaesthesia; TCI, target-controlled infusion; PEEP, positive end expiratory pressure; NGT, nasogastric tube; VTE, venous thromboembolism; CPAP, continuous positive airway pressure; PPI, proton pump inhibitor.

TABLE 2: Preoperative data.

Category	*n*	%	Median	IQR
Demographics				
Female	39	90.7	-	-
Age (years)	-	-	45	17–62
BMI (kg/m^2)	-	-	59	43–94
Target weight loss achieved (5% – 10%)	28	65.1	-	-
Smoking at the time of surgery	8	18.6	-	-
Comorbidities†				
Hypertension	29	67.4	-	-
GORD	18	41.8	-	-
Diagnosed OSA	7	16.2	-	-
PTE risk	7	16.2	-	-
Diabetes mellitus	6	14.0	-	-
Cardiovascular disease	3	7.0	-	-
Asthma/COPD	1	2.3	-	-
Cerebrovascular disease	0	0.0	-	-
> 4 comorbidities	4	9.3	-	-
OSA risk				
Low	4	9.3	-	-
Intermediate	27	62.8	-	-
High	11	25.6	-	-

BMI, body mass index; GORD, gastro-oesophageal reflux disease; OSA, obstructive sleep apnoea; PTE, pulmonary thromboembolism; COPD, chronic obstructive pulmonary disease; IQR, interquartile range.

†, Could total more than 100% as patients may have more than one comorbidity.

the preoperative clinic. The final sample size included 43 patient records.

Table 2 summarises the preoperative data.

Weight loss was achieved through dietary strategies, but no standard exercise plan was implemented. A specific weight-loss target was not set, contrary to the guideline recommendation of 5% – 10%, but the percentage of weight loss was recorded at the follow-up visit. The average weight loss achieved was 6.7%. There was heterogeneity in patient referrals to the bariatrics programme; all patients were referred to the surgical department, but by a variety of referees, namely, orthopaedics, internal medicine and other specialities.

Nearly all patients (97.6%, *n* = 42) underwent blood tests, a chest X-ray and an electrocardiogram. Other standard procedures included lung function tests (72.1%, *n* = 31) and referrals to dietitians (72.1%, *n* = 31). Referrals to endocrinologists (20.9%, *n* = 9) and for liver ultrasounds (18.6%, *n* = 8) were less common.

Table 3 summarises the intraoperative data.

South African Society of Anaesthesiologists standard monitoring was used on all patients. No patient needed a central venous catheter. Guideline recommendations of 6 mL/kg – 8 mL/kg of ideal body weight for TV could not be analysed because heights were not recorded on the charts and this data was missing for all patients. The mean duration of surgery was 150 min (interquartile range 108–198 min).

The most common two-drug combination for opioids was: remifentanil + fentanyl, *n* = 10 (23.2%), remifentanil + morphine, *n* = 10 (23.2%). The most common three-drug combination of opioids was remifentanil + fentanyl + morphine, *n* = 6 (14.0%). The median intraoperative dose of morphine was 3.5 mg (interquartile range 1 mg – 10 mg).

As a result of the unanticipated utilisation of morphine, an exploratory analysis for any association between the administration of morphine and the occurrence of PONV and the need for postoperative oxygen supplementation was conducted. This was not one of the primary outcomes of the study. There were very few patients on whom the statistical analysis was conducted, so these results should be interpreted with caution, and further studies are needed to better delineate the effects of morphine in this patient cohort. No statistically significant association was found between the administration of morphine and either PONV or need for oxygen supplementation (Table 4).

TABLE 3: Intraoperative management.

Category	*n*	%	Median	IQR
Airway management				
Elective sequence induction	25	58.1	-	-
Modified rapid sequence induction	9	20.9	-	-
Rapid sequence induction	7	16.3	-	-
Ramped-up position	13	30.2	-	-
Ventilation strategy				
Tidal volume 6 mL/kg – 8 mL/kg IBW	Data missing	Data missing	-	-
Avoidance of high PEEP (< 5 cm – 10 cm H_2O)	34	79.1	-	-
Neuromuscular blockade				
Rocuronium used	38	88.4	-	-
Suxamethonium + rocuronium	1	2.3	-	-
Suxamethonium only	2	4.7	-	-
No muscle relaxant	2	4.7	-	-
Sugammadex for reversal (patients who received rocuronium)	32/38	84.2	-	-
Neostigmine and Glycopyrolate for reversal (patients who received rocuronium)	6/38	15.8	-	-
Neuromuscular monitoring (TOF)	1	2.3	-	-
Maintenance of anaesthesia				
TCI	31	72.1	-	-
Depth of anaesthesia monitoring during TCI	25	58.1	-	-
Monitoring				
Invasive blood pressure monitoring	11	25.6	-	-
Fluid management				
Crystalloids	39	90.7	-	-
Colloids (received only colloids)	4	9.3	-	-
Volume of crystalloids (mL)	-	-	1000	1000–2000
Volume of colloids (mL)	-	-	500	300–600
Analgesia				
Opioids	43	100.0	-	-
Lignocaine	36	83.7	-	-
Ketamine (NMDA receptor antagonists)	34	79.1	-	-
Dexmedetomidine (alpha-2 agonist)	32	74.4	-	-
Paracetamol	31	72.1	-	-
Non-steroidal anti-inflammatory drugs	10	23.2	-	-
Opioid used				
Remifentanil	33	76.7	-	-
Fentanyl	26	60.5	-	-
Morphine (intraoperative)	19	44.2	-	-
Alfentanil	2	4.7	-	-
Patients receiving 2 opioids	25	58.1	-	-
Patients receiving 3 opioids	6	14.0	-	-
Postoperative morphine	18	41.9	-	-
Postoperative nausea and vomiting prophylaxis				
Dexamethasone + Ondansetron	23	53.5	-	-
Dexamethasone + Ondansetron + Metoclopramide	9	20.9	-	-
Metoclopramide only	2	4.7	-	-
Dexamethasone only	9	20.9	-	-
Postoperative oxygen supplementation (CPAP, nasal prongs/facemask)	37	86.0	-	-
Postoperative destination				
Ward	22	51.2	-	-
High care	12	27.9	-	-
ICU	9	20.9	-	-

IBW, ideal body weight; PEEP, positive end expiratory pressure; TOF, train-of-four; TCI, target-controlled infusion; NMDA, N-methyl-D-aspartate; ICU, intensive care unit; CPAP, continuous positive airway pressure; IQR, interquartile range.

Patients were sent to the ward, high-care or intensive care unit (ICU), depending on their obesity surgery risk mortality score (OS-MRS).[8] The score was calculated at the preoperative clinic assessment. Patients who scored 0–1 (predicted postoperative mortality of 0.3%) were sent to the ward. Those who were at moderate risk, scoring 2–3 (predicted postoperative mortality of 1.7%), were sent to high care. Patients who were high risk 4–5 (predicted postoperative mortality of 3.2%) were sent to the ICU.

Patients generally had favourable outcomes in the early postoperative period, with n = 28 (65.1%) experiencing uncomplicated recoveries during their hospital stay.

TABLE 4: Associations between morphine administration, PONV and oxygen supplementation.

Outcome	Received morphine		Did not receive morphine		*p*-value
	n	%	*n*	%	
PONV					0.680
Yes	2	4.7	5	11.6	-
No	16	37.2	20	46.5	-
Oxygen supplementation					0.68
Yes	15	34.9	22	51.1	-
No	3	7.0	3	7.0	-

PONV, postoperative nausea and vomiting.

The majority of complications were minor, and most included PONV (n = 7, 16.3%). Four patients reported pain; no other complications were noted. Serious events occurred less frequently, including venous thromboembolism (VTE) (n = 2, 4.7%), a case of intraoperative awareness (n = 1, 2.3%) (target-controlled infusion [TCI], neuromuscular blocking agent used, and depth of anaesthesia monitoring used) and an anastomotic leak (n = 1, 2.3%). The majority of patients required some form of postoperative oxygen support (n = 37, 86.0%).

Three patients died postoperatively. On further exploration, the OS-MRS were determined for those who demised. One patient developed VTE, with subsequent disseminated intravascular coagulopathy and renal failure (OS-MRS:4), this patient also had the highest BMI of the cohort at 70.45 kg/m^2. A second patient died of unknown causes (OS-MRS:3), and the third patient died from an anastomotic leak (OS-MRS:3).

Table 5 summarises the audit of current practice with recommended guidelines. As a result of the study design, many pertinent postoperative ERAS recommendations could not be assessed. This study was limited to the perioperative and early postoperative period. Consequently, long-term ERAS outcomes such as nutritional status, prolonged opioid use, functional recovery and weight-loss sustainability could not be evaluated, as this was not documented in the patients' records and presumably not done.

Discussion

This study aimed to evaluate current perioperative practices in a bariatric unit in a South African public-sector setting and to determine whether these practices align with the ERAS recommendations. The main finding was that preoperatively, patients had a significantly higher BMI than the global average. There was also heterogeneity in current practices compared with the ERAS protocol. Preoperatively, there was high compliance with patient optimisation. However, intraoperatively, while there was high compliance with airway management, PONV prophylaxis and neuromuscular blockade, adherence to opioid-sparing analgesia, neuromuscular blockade monitoring, and depth-of-analgesia monitoring was suboptimal during total intravenous anaesthesia (TIVA)/TCI. The mortality rate was 6.9%, higher than global averages.[9] Other complications, such as PONV, were lower than those reported internationally.[10] There was a paucity of data pertaining to postoperative recommendations.

TABLE 5: Enhanced recovery after surgery audit.

Category	Compliance (%)
Preoperative	
Education and counselling	72
Meets surgical criteria	100
Smoking cessation > 4 weeks	83
Alcohol abstinence	86
Target operative weight loss (5% – 10%)	65
Fasting solids > 6 h	100
Fasting clear fluids < 2 h	0
Intraoperative	
Opioid-sparing analgesia	55
Regional anaesthesia	0
Nasogastric tube placement intraoperatively and removed postoperatively	72
No routine drains	0
No routine catheter	0
Goal-directed fluid therapy	90
Lung-protective ventilation	
TV 6 mL/kg – 8 mL/kg	Not documented
Avoidance of high PEEP	79
Endotracheal intubation	100
Neuromuscular blockade	95
Neuromuscular blockade monitoring	2
Multimodal PONV prophylaxis	78
Minimally invasive approach	100
Postoperative	
Prophylactic oxygen (nasal prongs/ 40% face mask)	86
CPAP resumed if OSA	100
Early oral intake	Not documented
Diet progression protocol	Not documented
Vitamin/mineral supplementation	Not documented
Nutritional monitoring	Not documented
Pharmacological thromboprophylaxis	100
Mechanical thromboprophylaxis	Not documented
Early mobilisation	Not documented

PONV, postoperative nausea and vomiting; CPAP, continuous positive airway pressure; OSA, obstructive sleep apnoea; PEEP, positive end expiratory pressure; TV, tidal volume.

Preoperative findings

Preoperatively, all patients met the criteria for bariatric surgery. According to the South African Society for Surgery, Obesity and Metabolism guidelines, patients may be referred for surgical management only after assessment by a specialist weight management service.[11] Patients who meet the criteria for bariatric surgery are individuals who fit the following criteria: individuals without any clinical or psychological contraindications; patients with a BMI above 40 kg/m^2; patients with a BMI above 35 kg/m^2 with comorbid disease where conventional treatment has failed; and patients with a BMI > 30 kg/m^2 with poorly controlled diabetes mellitus.[12] In our study, the median BMI was 59, and based on this criterion alone, all patients qualified for surgery.

This figure is significantly higher than the global average for patients presenting for bariatric surgery.[9] Since 2014, the IFSO

has produced an annual report detailing all bariatric surgeries submitted to a global registry. In its 2024 report, which marked the eighth yearly publication, results from 5 million surgeries performed in 19 countries worldwide were tabulated. South Africa had the highest BMI for males at 47.7, based on 362 surgeries performed in 2024 (across both public and private settings).[9] This contrasts with the global average BMI of 40 kg/m^2 – 45 kg/m^2. However, in keeping with international trends, our cohort was over 90% female.[9]

Specialist services included in our cohort were a dietitian and a psychologist to aid weight loss, but these were provided in only 72% of cases. All patients achieved some weight loss; the average was 6.7% of their initial weight. However, only 65.1% achieved the 5% – 10% preoperative weight loss, which ERAS recommends.[6]

Surgical optimisation encompasses education and counselling, smoking cessation, alcohol abstinence and preoperative weight loss. Preoperative education was well provided by the surgical team and the psychologists. This was not formally assessed in terms of patient understanding.

During the audit, it was found that specific preoperative recommendations were suboptimal in accordance with ERAS guidelines.[6] Improved outcomes and adherence to the ERAS protocol have been observed in other lower- and middle-income countries that adopt a multidisciplinary team approach.[13,14] In a study published in Brazil by Chaim et al.,[13] the adoption of a multidisciplinary team approach in the preoperative period resulted in greater weight loss, reversal of patient comorbidities and fewer postoperative complications. Currently at HJH, all units involved in bariatric surgery operate in isolation: dietetics, surgery, endocrinology, psychology and anaesthesia. A holistic multidisciplinary approach for patients at HJH may improve perioperative outcomes.

Intraoperatively

Airway management was ubiquitously performed via endotracheal intubation. This is in keeping with ERAS guidelines, as these patients are at an increased risk of aspiration due to surgical and patient factors.[15] However, ERAS recommendations advocate ramping the patient to improve laryngeal view and oxygenation on induction[6]; this was done in only 30.2% of patients. The low implementation of a ramped-up position in the cohort may reflect limited access to ramping pillow devices, a lack of bariatric airway protocols, and variability in familiarity with bariatric airway optimisation techniques. Neuromuscular blockade was used in 95% of patients; however, train-of-four (TOF) monitoring was performed in only one patient. The guidelines recommend deep neuromuscular blockade intraoperatively, but this was not monitored. This is problematic, as the protocol advocates objective neuromuscular monitoring, in which a TOF > 0.9 is achieved before extubation.[6] Residual neuromuscular blockade increases the risk of airway obstruction and pulmonary complications.[6] The low utilisation of TOF monitoring observed in our study likely reflects a combination of equipment limitations, gaps in training, absence of a standardised anaesthetic protocol and reliance on subjective clinical assessment rather than objective neuromuscular monitoring.

In terms of analgesia, ERAS recommendations strongly suggest multimodal analgesia incorporating non-opioid agents, such as non-steroidal anti-inflammatories (NSAIDs), acetaminophen and regional techniques to minimise opioid side effects and improve recovery.[6] Common adjuncts include lignocaine, dexmedetomidine, ketamine and magnesium sulphate.[6] Opioids should only be administered as a rescue protocol at the lowest effective dose and should be short-acting agents like fentanyl.[6] In our study, patients received at least one opioid, the most common opioid being remifentanil (76.7%; n = 33/43), followed by fentanyl (60.5%; n = 26/43), and morphine (44.2%; n = 19/43). Importantly, 55% of the patients had opioid-sparing regimes. These regimens consisted of ERAS-recommended drugs. A multimodal approach was used in most patients. Ketamine, an N-methyl-D-aspartate (NMDA) receptor antagonist, was administered to 34 patients (79.1%). Lignocaine was used in 36 patients (83.7%). An alpha-2 agonist, dexmedetomidine, was used in 32 patients (74.4%). Paracetamol was administered in 31 patients (72.1%), whereas NSAIDs were used less frequently, in 10 patients (23.2%).

Specific analgesic vary by institution. In a systematic review looking at the efficacy of non-opioid analgesics and adjuvants in multimodal analgesia for reducing postoperative opioid consumption and complications in obesity, it was found that the use of dexmedetomidine, ketamine, lignocaine, magnesium and gabapentin significantly reduced the use of postoperative opioids, PONV and length of hospital stay.[16] In a speciality bariatric hospital in Hong Kong, a protocol was instituted enlisting opioid-sparing analgesia strategies.[17] Preoperatively, paracetamol and pregabalin were given. After induction, a dexmedetomidine infusion using lean body weight and fentanyl was administered. Maintenance included a dexmedetomidine infusion, a ketamine bolus, parecoxib, tramadol and local infiltration of the wound. Postoperative analgesia included paracetamol, etoricoxib and pregabalin. Rescue analgesia was pethidine. The study noted, however, that 46% of patients required pethidine in the postoperative period.[17]

Opioid minimisation has been shown to reduce PONV, improve recovery times and shorten hospital stays.[6] Notably, all of the patients in the study received at least one opioid. Morphine was administered to 44.2% of patients. Morphine is not recommended as a first-line treatment in bariatric surgery because of the risk of respiratory and gastrointestinal complications, slower recovery, and a higher potential for long-term opioid dependence.[18] In this study population, 18% of the group were diagnosed with obstructive sleep apnoea (OSA), and the majority had significant risk factors

for OSA. Therefore, the use of morphine can be problematic because of the risk of respiratory depression.[19]

The significant use of morphine in these patients could be attributed to the lack of analgesia protocols in the unit and the limited availability of drugs. However, morphine has been used safely after bariatric surgery. In a prospective randomised controlled study, the use of morphine in an intrathecal route using 0.3 mg added to bupivacaine 0.5%, with a multimodal analgesic plan, was reported to be effective in reducing postoperative pain scores in patients who underwent bariatric surgery.[20] There were no statistically significant respiratory depression or respiratory complications secondary to opioid use found in this study.

The ERAS guidelines for bariatric surgery recommend multimodal prophylaxis against PONV. All patients should receive two or more antiemetics, including a steroid and a serotonin receptor antagonist, and consider a third agent in patients who have a very high risk for PONV. The Apfel score can be inadequate for guiding practitioners in determining which patients are at very high risk.[21] There was a high adherence to this recommendation in this study, with 78% of patients receiving at least two agents. Monotherapy was used in 25.6% of patients.

In a prospective study that analysed more than 8000 patients, it was found that patients who were at very high risk for PONV were more likely to be younger, female and undergoing laparoscopic sleeve gastrectomy with moderate to severe pain postoperatively.[22] Recommended additional agents include a neurokinin-1 receptor antagonist or a transdermal scopolamine patch.[6] Neither of these agents is available at HJH.

Target-controlled infusion was used in 72.1% of patients; however, the model used was not noted. Only 58.1% were monitored for depth of anaesthesia. There was one case of postoperative awareness, which may be attributable to the above. The use of TCI should be standardised, as the incidence of PONV has been shown to decrease in propofol-based TCI regimes.[23] Target-controlled infusion has been well corroborated in the benefits of PONV in this population; however, in a systematic review and meta-analysis, there was no difference in postoperative pain scores, postoperative opioid use and perioperative complications compared to their volatile counterparts.[24] However, as a result of the altered pharmacodynamics in obese individuals, the need for accurate dosing and the potential for infusion interruptions, it should be mandatory that depth of anaesthesia monitoring be used to minimise the risk of awareness.[25]

There are no specific ERAS protocols for the use of TIVA/TCI in bariatric surgery, nor does it mandate its use over volatile anaesthesia.[6] However, it indirectly supports the use of TIVA/TCI to prevent PONV. In the demographic of obese individuals, the Eleveld model for propofol should be used as it has the strongest validation across BMI ranges.[26] This model has been shown to accurately estimate the clearance in obese patients, which is essential for precise dosing in this population.[27] When the Eleveld model is unavailable, the Marsh or Schneider method can be used. The input weight should be the adjusted body weight for the Marsh model or fat-free mass for the Schneider model.[28] These models should be used in conjunction with depth of anaesthesia monitoring to reduce the risk of under- or overdosing.[28] Unfortunately, in our cohort, the model and weight used for the patients were not recorded.

Postoperatively

Postoperative care, according to the ERAS guidelines, includes early oral intake, diet progression protocol, vitamin and mineral supplementation, nutritional monitoring, pharmacological and mechanical thromboprophylaxis, and early mobilisation. As our study examined only immediate postoperative complications and outcomes, we did not assess these aspects of postoperative care. The long-term efficacy of the procedure was also not investigated, namely, long-term weight loss, effect on comorbid diseases and long-term complications.

The mortality in this group was almost 7%. In 2024, the IFSO reported overall mortality rates after bariatric surgery ranging from 0% to 0.25% globally. South Africa had a mortality rate of 0.25% (1 in 394 cases).[9] The risk factors for higher mortality include age above 65 years, BMI > 60 kg/m², severe comorbidities, revisional bariatric surgery and delayed recognition of complications such as anastomotic leak or pulmonary embolism.[29,30] Of the patients who died, high BMI, VTE and anastomotic leak were contributing factors. These deaths emphasise the requirement for vigilant postoperative monitoring, strict thromboprophylaxis and early recognition of surgical complications, which can be challenging in this cohort. The disproportionately high mortality rate in our cohort reinforces the need for strengthened preoperative optimisation and postoperative care measures that must form part of future bariatric surgery programmes.

Limitations

Several limitations of our study need to be acknowledged. This was a retrospective audit, and the analysis depended on the completeness and accuracy of the records. There may be poor documentation of certain practices and under-reporting of side effects such as PONV. Some eligible patients had to be excluded because no preoperative clinic information was available, potentially introducing selection bias. As this study was conducted as an audit rather than a formal quality improvement project, many relevant stakeholders were not engaged in the review, progression and analysis of the process, thereby limiting multidisciplinary insight. The small sample size reflects the single bariatric unit in which the study was conducted, and caution should be exercised when generalising these results to larger or differently resourced centres. Lastly, compliance with ERAS recommendations was assessed using retrospective data rather than direct

observation, and patient-centred postoperative efficacy was not analysed, making it difficult to determine the intervention's long-term clinical impact.

Conclusion

This was, to our knowledge, the first public-sector audit of bariatric surgery in South Africa, analysing current practice. The patients in this study have a higher BMI and overall higher mortality than international standards. Multidisciplinary input was limited. Standardised analgesia protocols were lacking, but the majority of patients had opioid-sparing strategies and a multimodal analgesic approach. Intraoperative practices had higher compliance with ERAS guidance, whereas postoperative practices had the lowest compliance. Multidisciplinary involvement for context-specific guidance will ensure standardised care for these patients throughout the perioperative period.

Future recommendations

Future endeavours include establishing an institution-specific ERAS protocol that involves multidisciplinary coordination among anaesthesia, surgery, nursing staff, dietitians, psychology and physiotherapy. This would allow a standardised framework for perioperative management. Once this protocol is implemented, a reaudit should be conducted to assess improvements in compliance and ensure continuity of changes in practice. Lastly, there should be ongoing evaluation analysing the efficacy of the procedure in terms of sustained weight loss, reversal of organ dysfunction and long-term complications in addition to immediate complications and mortality. The incorporation of weight-loss drugs into the optimisation has not yet been delineated. The criteria for bariatric surgery may change over time, considering the advancement of care for obese patients.

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Competing interests

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CRediT authorship contribution

Harshal J. Mistry: Conceptualisation, Data curation, Formal analysis, Methodology, Writing – original draft. Shafeeqa Mayet: Conceptualisation, Methodology, Supervision, Writing – review & editing. Tahlia Jeggo: Conceptualisation, Methodology, Supervision, Writing – review & editing. Zainub Jooma: Methodology, Supervision, Writing – review & editing. All authors reviewed the article, contributed to the discussion of results, approved the final version for submission and publication, and take responsibility for the integrity of its findings.

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Data availability

Data sharing is not applicable to this article as no new data were created or analysed in this study.

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