

Case Report



Positioning the Bariatric Amputee: A Case Report

OPEN ACCESS

Received: Feb 1, 2024

Revised: Apr 20, 2024

Accepted: Jun 10, 2024

Published online: Jun 18, 2024

Corresponding author:

Xavier Field

Department of General Surgery, Taranaki Base Hospital, David Street, New Plymouth 4310, New Zealand.

Tel: +64 6 753 6139

Email: xaviergkfield@gmail.com

Copyright © 2024, The Korean Society for Metabolic and Bariatric Surgery

This is an open access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<https://creativecommons.org/licenses/by-nc/4.0/>) which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ORCID iDs

Xavier Field

<https://orcid.org/0000-0001-9012-5998>

Funding

No funding was obtained for this study.

Conflict of Interest

None of the authors have any conflict of interest.

Author Contributions

Conceptualization: French R, Field X;
Formal analysis: Field X; Investigation:
Field X; Methodology: Field X; Project
administration: French R; Supervision:
French R; Writing - original draft: Field X;
Writing - review & editing: Field X.

Xavier Field ,¹ Rowan French²

¹Department of General Surgery, Taranaki Base Hospital, New Plymouth, New Zealand

²Department of General Surgery, Waikato Hospital, Hamilton, New Zealand

ABSTRACT

Traumatic lower limb amputation has been identified as a major risk factor for obesity and metabolic diseases. Surgery in amputees with obesity poses significant complexities with physical and logistical issues of positioning and ergonomics. A 64-year-old gentleman with a history bilateral above knee amputation, obesity, type 2 diabetes mellitus, and obstructive sleep apnea was worked up for bariatric surgery. Due to his amputations, it was unknown whether this would be safe or feasible. In order to ensure this, the patient was brought to the operating room more than a week in advance to trial positioning. The patient was able to be positioned in reverse Trendelenburg with straps across his lower chest and his proximal thighs. Despite obesity being a prevalent and increasing issue facing lower limb amputees, there was relative paucity of literature on the topic. The successful use of this strategy to position a bilateral amputee could be mirrored in future cases.

Keywords: Amputee; Amputation; Bariatric surgeries; Metabolic syndrome

INTRODUCTION

Traumatic lower limb amputation has been identified as a major risk factor for obesity and metabolic diseases including type 2 diabetes mellitus (T2DM) and hypertension [1-3]. Despite the increasing prevalence of medical treatment for diabetes, surgery remains the most effective treatment for obesity and metabolic syndrome [4]. Surgery in amputees with obesity poses significant complexities in terms of specific physiological changes that are seen as well as the physical and logistical issues of positioning and surgical ergonomics. There are no/few described accounts of bariatric surgery in patients with bilateral above knee/high amputations in the literature. Herein we describe the specific and unique issues related to obesity surgery in patients with lower limb amputations, review the current literature of obesity surgery in amputees, and present a specific case of a patient with a history of traumatic bilateral proximal above knee amputations (AKAs) undergoing a one anastomosis gastric bypass (OAGB) for obesity and metabolic syndrome.

CASE REPORT

The patient is a 64-year-old male who was left with bilateral proximal AKAs after a train accident at age 9. The left side was very proximal and close to being a hindquarter amputation. The right sided stump was slightly longer. He was previously very physically active having competed at the Paralympics, but his weight had increased steadily over a number of years. His comorbidities included T2DM for 20 years controlled on empagliflozin, vildagliptin, and insulin. His most recent HbA1c was 64 mmol/mol. Other comorbidities included coronary artery disease for which he had percutaneous coronary intervention with stents. He had non-alcoholic fatty liver disease and obstructive sleep apnea for which he used a continuous positive airway pressure (CPAP) device.

Due to his non-optimally controlled T2DM, a decision was made to proceed with laparoscopic OAGB.

Preoperatively, a challenge was identified due to the patient's bilateral AKA, particularly with respect to safe patient positioning. Neither a split straight leg position, nor a lithotomy position were feasible due to his proximal bilateral AKAs. For planning purposes, the patient was brought to the operating theatre more than a week in advance for a "dry run" in order to plan proper positioning. With the foot of the operating table removed it was found that the bottom of the bed could be used as a footplate to support the patient's legs (**Fig. 1**). From here a strap was placed across his proximal thighs with a second strap placed across the inferior chest (**Figs. 2 and 3**). In this way, he was able to be positioned securely in steep reverse Trendelenburg. Two weeks later a standard OAGB was performed uneventfully, and the patient discharged on day 2. Recovery at 3 months was uneventful with weight loss and comorbidity resolution occurring as expected.



Fig. 1. Pre-operative evaluation of positioning.

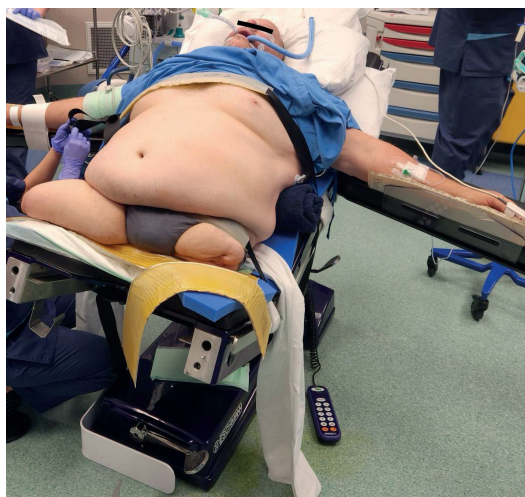


Fig. 2. Final operative position of patient once anaesthetised.



Fig. 3. Final operative position of patient once anaesthetised.

DISCUSSION

Lower limb amputation is grouped in those related to peripheral vascular disease (PVD) and those related to traumatic injury. In those patients with PVD, undergoing a major limb amputation is a sign of significant end organ dysfunction and mortality rates near 50% at 1 year [5]. However, those who have had a traumatic lower limb amputation are a drastically different patient population who are often physiologically normal preceding their injury. Post-injury however their physiology changes significantly. In a study of veterans, those with traumatic lower limb amputation had significantly higher rates of metabolic syndrome compared to those with lower limb injury without amputation [6]. Rates of insulin resistance were significantly increased in those with traumatic amputations [7]. Furthermore, the prevalence of overweight/obesity in those with lower limb amputation has been found to be as high as 82.8% [8]. Despite the prevalence of obesity in amputees there is a paucity of literature surrounding bariatric surgery in this population.

The combination of a lower limb amputation and obesity adds significant complexity during the perioperative period. It is known that patients with obesity face increased risks of adverse events during surgery [9,10]. These patients are at increased risk of pressure injury, nerve injury, and serious falls from the operating table.

Anaesthesia has detrimental effects on patients' cardiorespiratory function, and these effects are exacerbated in those patients with obesity. In particular, anaesthesia causes a reduction in oxygenation index and functional residual capacity which is reversely proportional to body mass index [11]. Traditional positioning for laparoscopic bariatric surgery is in reverse Trendelenburg position. This position has 2 major benefits. Firstly, the small bowel and omentum is kept away from the operative field in the upper abdomen. Furthermore, this confers a cardiorespiratory advantage in patients with obesity as the weight of the abdominal contents is kept away from the diaphragm [12]. It is imperative however, that the patient be securely fastened to the table so that they do not fall from this position. The lower limbs play an important role in standard bariatric positioning, a factor which obviously needs to be compensated for in the amputee population. A fall from the operating table during surgery has potentially catastrophic consequences.

A review of cases where patients fell from operating tables during surgeries in the United States by Prielipp et al. [13] commented on the root causes of these falls. Of note, they found body habitus to be an attribute that contributed significantly to increased risk of falls. This was seen as being due to the difficulty in staff stopping unexpected movement of these patients that often occur during the administration of anaesthesia.

To determine the current availability of literature on the topic of obesity surgery on lower limb amputees, a literature review was carried out. A search of Medline was completed using the MeSH terms "amputee," "amputation," "bariatric surgery," "obesity" were used to find relevant articles. Only 2 relevant pieces of literature were discovered, both case reports. Williamson and Mahon [14] described the use of a shoulder support as a bolster for the stump of a patient with a single limb right lower limb amputation who was undergoing bariatric surgery. Zafar et al. [15] described a case of a laparoscopic sleeve gastrectomy in a patient with traumatic bilateral lower limb amputations. It was not documented if the authors needed to modify their approach to the operation or if there were challenges faced with the positioning of the patient.

Despite obesity being a prevalent and potentially increasing issue facing lower limb amputees there is a relative paucity of literature on the topic, particularly with regard to the potential technical and physiologic challenges faced. The authors experience with the logistics and positioning of a case of bariatric surgery in a patient with bilateral lower limb amputation, which was carried out successfully, could be mirrored in future similar cases.

REFERENCES

1. Shahriar SH, Masumi M, Edjehadi F, Soroush MR, Soveid M, Mousavi B. Cardiovascular risk factors among males with war-related bilateral lower limb amputation. *Mil Med* 2009;174:1108-12. [PUBMED](#) | [CROSSREF](#)
2. Naschitz JE, Lenger R. Why traumatic leg amputees are at increased risk for cardiovascular diseases. *QJM* 2008;101:251-9. [PUBMED](#) | [CROSSREF](#)
3. Rose HG, Schweitzer P, Charoenkul V, Schwartz E. Cardiovascular disease risk factors in combat veterans after traumatic leg amputations. *Arch Phys Med Rehabil* 1987;68:20-3. [PUBMED](#)

4. Courcoulas AP, Goodpaster BH, Eagleton JK, Belle SH, Kalarchian MA, Lang W, et al. Surgical vs medical treatments for type 2 diabetes mellitus: a randomized clinical trial. *JAMA Surg* 2014;149:707-15. [PUBMED](#) | [CROSSREF](#)
5. Fortington LV, Geertzen JH, van Netten JJ, Postema K, Rommers GM, Dijkstra PU. Short and long term mortality rates after a lower limb amputation. *Eur J Vasc Endovasc Surg* 2013;46:124-31. [PUBMED](#) | [CROSSREF](#)
6. Bhatnagar V, Richard E, Melcer T, Walker J, Galarneau M. Retrospective study of cardiovascular disease risk factors among a cohort of combat veterans with lower limb amputation. *Vasc Health Risk Manag* 2019;15:409-18. [PUBMED](#) | [CROSSREF](#)
7. Perkins ZB, De'Ath HD, Sharp G, Tai NR. Factors affecting outcome after traumatic limb amputation. *Br J Surg* 2012;99 Suppl 1:75-86. [PUBMED](#) | [CROSSREF](#)
8. Westerkamp EA, Strike SC, Patterson M. Dietary intakes and prevalence of overweight/obesity in male non-dysvascular lower limb amputees. *Prosthet Orthot Int* 2019;43:284-92. [PUBMED](#) | [CROSSREF](#)
9. Brodsky JB. Positioning the morbidly obese patient for anesthesia. *Obes Surg* 2002;12:751-8. [PUBMED](#) | [CROSSREF](#)
10. Kaye AD, Lingle BD, Brothers JC, Rodriguez JR, Morris AG, Greeson EM, et al. The patient with obesity and super-super obesity: perioperative anesthetic considerations. *Saudi J Anaesth* 2022;16:332-8. [PUBMED](#) | [CROSSREF](#)
11. Pelosi P, Croci M, Ravagnan I, Tredici S, Pedoto A, Lissoni A, et al. The effects of body mass on lung volumes, respiratory mechanics, and gas exchange during general anesthesia. *Anesth Analg* 1998;87:654-60. [PUBMED](#) | [CROSSREF](#)
12. Perilli V, Sollazzi L, Bozza P, Modesti C, Chierichini A, Tacchino RM, et al. The effects of the reverse trendelenburg position on respiratory mechanics and blood gases in morbidly obese patients during bariatric surgery. *Anesth Analg* 2000;91:1520-5. [PUBMED](#) | [CROSSREF](#)
13. Prielipp RC, Weinkauff JL, Esser TM, Thomas BJ, Warner MA. Falls from the O.R. or procedure table. *Anesth Analg* 2017;125:846-51. [PUBMED](#) | [CROSSREF](#)
14. Williamson JML, Mahon D. Shouldering responsibility for intraoperative bariatric amputees. *Ann R Coll Surg Engl* 2016;98:71. [PUBMED](#) | [CROSSREF](#)
15. Zafar A, Rajeswaran C, Abdul Jameel JK. Laparoscopic sleeve gastrectomy in a bilateral lower limb amputee: why is it worth doing? *Surg Obes Relat Dis* 2014;10:e11-2. [PUBMED](#) | [CROSSREF](#)