BODY MASS INDEX RECORDING RATES IN SURGICAL PATIENTS FROM A DISTRICT GENERAL HOSPITAL

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ABSTRACT

Background: Current literature reports a global increase in body mass index (BMI), particularly in developed nations, which has been shown to increase the risk of peri-operative complications. We performed a retrospective assessment of BMI in patients undergoing elective and emergency surgery in a district general hospital and reviewed the current literature pertaining to the effects of BMI on peri-operative patient management.

Methods: Demographic data, clinical parameters, operative intervention and post-operative outcomes were recorded for each patient over a 5-year period. The primary end-point was recording of BMI in clinical notes. Secondary end-point points were intra-operative complications and peri-operative morbidity and mortality rates.

Results: 565 patients (M=345) were assessed, who underwent 353 and 212 elective and emergency procedures respectively, between January 2002 and December 2007. The mean age was 55 years (range 8-89). BMI recording was complete in 235 (41.5%) patients, which was subdivided into 200 (85.1%) and 35 (14.9%) elective and emergency procedures respectively (range 18.5-40.0 kg/m²). Overall there were 18 complications recorded out of the 565 patients (elective=10, emergency=8) where 8 (44.4%) patients had an increased BMI > 25 kg/m².

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Conclusions: Following the identification of poor compliance for BMI recording in our unit, a newly implemented nurse-led pre-assessment clinic, supervised by a Consultant Anaesthetist, now records BMI as part of the operative workup. As a simplistic, easily measurable tool when estimating potential surgical risk, we would suggest that BMI recording should be considered in the patient care pathway.

KEYWORDS
Body Mass Index, Complications, Morbidity, Mortality, Outcomes, Surgery.

INTRODUCTION

Obesity is an increasing problem both in the UK and elsewhere around the world where prevalence has now reached epidemic proportions. A body mass index between 20 and 25 kg/m² is normal whilst obesity and morbid obesity are classified according to BMIs > 25 kg/m² and > 30 kg/m² respectively [1]. Currently in the UK, 1 in 4 adults are now classified as obese [1]. In Northern Ireland, it has been reported that 63% of men and 50% of women are currently overweight (BMI >25kg/m²) [2]. Recent financial reports have proposed that obesity, and its medical consequences, now costs the health service as much as smoking related co-morbidities [1].

There have been conflicting reports regarding the effects of an increased BMI (> 25kg/m²) on surgical patients. Liu et al (2008) reported a doubling of hospital stay for obese middle-aged women (mean age 56-years) undergoing cholecystectomy with a BMI > 40kg/m² compared to those with a BMI between 25 and 29.9kg/m² [3]. This was mainly related to a longer post-operative recovery time. Sauerland et al (2004) demonstrated an increased rate of recurrence following primary inguinal hernia repair in patients with an increased BMI [4]. In contrast, Dindo et al (2003) stated that an increased BMI was not a risk factor for post-operative complications following general surgical operations with no increase in post-operative stay or cardiorespiratory morbidity rates. However, they documented a significantly higher wound infection rate for the obese patients (17/431=3.9% vs. 92/3555=2.6%, p=0.03) [5]. Dostalik et al (2005) also reported similar findings following laparoscopic colorectal surgery, which was concluded to be safe and feasible in obese patients. There was no difference in post-operative course in both groups with regard to discontinuation of intravenous of analgesics (day 2), start of solid diet (day 3) and first bowel movement (day 4) [6].

We performed a retrospective assessment of BMI recording in clinical charts for patients undergoing elective and emergency surgery in a district general hospital and reviewed the current literature pertaining to the effects of BMI on peri-operative patient management.
METHODS

A retrospective review of all patients undergoing elective and emergency general surgical procedures was completed in Daisy Hill Hospital over a 5-year period. Core elective and emergency procedures were selected at the outset of the study as a representative caseload from our hospital. Elective procedures included open and laparoscopic cholecystectomies, trendelenberg procedures for varicose veins and inguinal hernia repair. Emergency procedures included appendectomies, cholecystectomies and inguinal hernia repair for incarceration.

Demographic data, clinical parameters, operative intervention and post-operative outcomes were recorded for each patient. The primary end-point was recording of body mass index in the clinical notes which was documented either in the main clinical notes or supplementary nursing chart. Height was recorded using a Seca™ wall height measuring chart and weight was recorded using Seca™ mechanical scales. Body mass index (kg/m²) was calculated as weight in kilograms (kg) divided by the height in metres squared (m²). For the purpose of this study an increased BMI was considered to be greater than 25kg/m². Secondary end-points were intra-operative complications and peri-operative morbidity and mortality rates.

RESULTS

565 patients were assessed between January 2002 and December 2007 (345 male and 220 female). The mean age was 55 years (range 8-89). The type of operative procedure for 353 elective and 212 emergency patients is detailed in Table 1. BMI recording was complete in 235 (41.5%) patients of whom 200 were elective procedures and 35 emergency procedures. The mean BMI for male and female patients was 28 kg/m² and 27 kg/m² respectively (range 18.5-40.0 kg/m²).

There were eighteen operative complications documented from the total of 565 patients (elective=10, emergency=8). For the ten elective patients who had complications, BMI was recorded for six of these patients. Five of these six patients had an increased BMI (>25kg/m²). Of the eight emergency procedures with complications, BMI was recorded for three of these patients. All three patients had an increased BMI (>25kg/m²) (Figure 1).

For elective procedures, four (1.4%) of 280 patients undergoing elective laparoscopic cholecystectomy developed complications which included bile leak (n=1), bleeding (n=2) and pancreatitis (n=1). All of these patients had a BMI > 25kg/m². Elective hernia repairs accounted for 49 procedures with a total of four complications (8.1%) including wound infection (n=3) and bleeding (n=1). No BMI was recorded for these patients. Trendelenberg procedures (n=24) had a complication rate of 8.3% (n=2) relating mainly to wound site bleeding. One of these patients had an increased BMI (28kg/m²).
In the emergency group, surgical complications occurred in six out of 181 patients undergoing appendicectomy (n=181). All patients had wound infections and only three of these patients had an increased BMI. Two patients developed wound haematomas following emergency hernia repair (n=20) and cholecystectomy (n=11) respectively. No BMI was recorded for either patient.

There were no peri-operative mortalities for either elective or emergency patients assessed during the study period.

**DISCUSSION**

General worldwide trends for increased BMIs are rising particularly in developed nations such as the United Kingdom and United States [1]. Our study reported a mean age of 55-years and a mean BMI of 27.5kg/m² where 15% of male and 18% of female patients had a BMI >25 Kg/m². This concurs with the recent Northern Ireland Health and Social Well-Being Survey which reported that 20% of women in Northern Ireland were obese, as defined by a BMI > 25 Kg/m², in comparison to 17% of men. [2] Leff and Heath (2009) reported an association between morbid obesity and subsequent serious morbidity and early mortality rates. Their recent systematic review of over 890 participants identified a 30% increase in overall mortality for every 5 point increase in body mass index over 25kg/m² [7].

Pre-operative assessment has been reported as a key component in the estimation and management of peri-operative risk, particularly in patients with an increased BMI. [8]. There are often difficulties during intubation due to presence of a fat pad at the back of the neck combined with a reduction in functional residual capacity, which can result in both airway closure and an impaired ability to tolerate oxygen desaturation. Cardiovascular disease including hypertension and ischaemic heart disease is more common in obese patients [8]. Morbidly obese patients also have an increased incidence of diabetes and are at a higher risk of venous thromboembolism [8]. Accordingly surgical management of obese patients often requires the additional consideration of factors such as pre-operative echocardiograms and respiratory function tests in order to facilitate an optimal pre- and post-operative pathway. Body mass index should be considered as a mandatory requirement in all patients attending for surgical procedures. However, in the emergency environment, BMI recording through normal assessment protocols are often superseded by clinical and therapeutic priority.

Obese patients also pose technical challenges due to a need for special beds and bariatric moving device equipment. Surgical patient selection must consider these potential factors during both the anaesthetic and surgical work-up of such patients to optimise peri-operative care [8]. The Association of Anaesthetists of Great Britain and Ireland recommend that only those clinicians with the technical expertise should operate on such patients [8].

Whilst we have tried to assess a possible association between complication rates and increased BMI, we believe our study remains
underpowered to investigate or report this relationship. Post-operative complications are related to a multitude of co-factors, not just BMI. Indeed Chang et al (2007) previously reported that acute cholecystitis was a more important predictor of complication rate rather than the modality of intervention (laparoscopic vs. open) or actual patient BMI [9].

The relationship between complication rates and the mode of surgical intervention in patients with raised BMI has also been investigated extensively. Simopoulos et al (2005) demonstrated that laparoscopic cholecystectomy was an effective and safe procedure in patients with morbid obesity with a low risk of open conversion and peri-operative complication rate [10]. Enochsson et al (2001) reported the advantages of laparoscopic appendicectomy over open appendicectomy in obese patients with a BMI >26.4 kg/m². They reported less post-operative pain and faster recovery in overweight patients who underwent a laparoscopic appendicectomy as compared to an open procedure [11]. Although laparoscopic appendicectomy appeared to minimise length of hospital stay and sick leave compared to standard open appendicectomy, anaesthesia and operating times were reported to be significantly longer [11]. Although our study found no association between BMI and complication rates for open appendicectomy, current literature would recommend laparoscopic rather than open appendicectomy as the operation of choice if the BMI >25 kg/m² [11].

Our study has highlighted a poor compliance for BMI recording within our unit. A nurse-led pre-assessment clinic supervised by a Consultant Anaesthetist has now been implemented within the unit. Although BMI is not the most optimal measure of operative risk, it remains a simplistic, easily measurable tool when estimating potential surgical risk. We would suggest that BMI recording should be considered a mandatory component in a patient’s admission pathway. Further documentation of BMI could also be considered for the routine anaesthetic pre-assessment checklist or for inclusion on the operating lists, similar to current cardiac practice, in an effort to improve patient management logistics [7]. In our hospital, we have now endeavoured to optimise these opportunities to record patient height, weight and BMI both in the pre-assessment elective surgical clinics and within our out-of-hours emergency service.

CONCLUSION

As a simplistic, easily measurable tool when estimating potential surgical risk, we would suggest that BMI recording should be considered in the patient care pathway. Clinicians should also consider logistical factors during the treatment of obese patients.
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COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS CONTRIBUTION

All authors have read and approved the final manuscript.
SS: Involved in the data collection, manuscript preparation and literature review.
KK: Involved in data collection and manuscript preparation.
GD: Involved in manuscript preparation and editing.
RB: Involved in manuscript preparation and editing.
MOD: Involved in the conception of the report, literature review, manuscript preparation, manuscript editing and manuscript submission.

REFERENCES


**FIGURE LEGENDS**

<table>
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<tr>
<th>Table 1</th>
<th>Breakdown of elective and emergency operative procedures.</th>
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<tr>
<td></td>
<td><strong>ELECTIVE SURGERY</strong></td>
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<tr>
<td></td>
<td>Gall Bladder (n=280)</td>
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<tr>
<td>BMI Recorded</td>
<td>120/280 (43%)</td>
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<td>Total Complications</td>
<td>4</td>
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**Figure 1**
Body mass index demographics for peri-operative complications.