

Hidden Mystery

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Case Objectives

- Appreciate the challenges of caring for morbidly obese patients.
- List specific interventions that can be implemented when caring for obese patients.
- Develop a rational approach to medication dosing in obese patients.

Case & Commentary: Part 1

A 45-year-old woman with a history of morbid obesity and diabetes mellitus was transferred to a tertiary care center for management of diffuse abdominal pain, vomiting, and subjective fevers. Upon transfer, the patient was febrile with stable vital signs. Examination revealed a diffusely tender abdomen with chronic erythematous changes extending over her abdomen including her panniculus. Empiric broad-spectrum antibiotics were started for presumed cellulitis. The consulting surgeon recommended repeat abdominal imaging, but the patient was unable to fit in the CT scanner or MRI due to her obesity. She was observed and her abdominal pain was treated with opiates.

Obesity is a major health care problem in the United States (1,2), accountable for tens of thousands of preventable deaths each year.(3) Obesity is generally defined by using the Body Mass Index (BMI), with a BMI > 25 kg/m² defining overweight, BMI > 30 kg/m² defining obese, and BMI > 40 kg/m² defining morbidly obese patients. Obesity increases the likelihood of a multitude of diseases.

This case demonstrates that obesity poses challenges for both diagnosis and treatment. Due to the high prevalence of obesity in the United States and its negative health consequences, understanding the difficulties and complexities in caring for such patients is paramount. Interventions considered routine in other patients, such as transportation, physical examination, diagnostic imaging, and nursing care, pose unique challenges in this population.

Transportation.—The simple act of moving the obese patient from one part of a hospital to another is often fraught with difficulty. Luckily, some innovative solutions have been recently developed. For example, some institutions assign extra personnel to help transport obese patients, or use multiple slider boards turned

perpendicular to the patient. Some equipment has been designed specifically and is commercially available for morbidly obese patients, including soft stretchers, patient carts, operating room tables, and hospital beds. Medical equipment supply stores are likely to have additional items such as mechanical lifts, large wheelchairs, and commodes designed for such patients.

Physical Examination.—As seen in this case, morbid obesity makes physical examination more difficult. Increased width of subcutaneous fat, particularly the abdominal panniculus, interferes with auscultation, palpation, and inspection of many organ systems. Getting the morbidly obese patient into the correct examination position may be extremely difficult. In many patients, an adequate physical examination is achievable, but often requires extra effort (sometimes supplemented by special equipment) on the part of the patient and physician to ensure this occurs. For example, an obese patient's "hypertension" is frequently "cured" by the use of a sufficiently wide and long sphygmomanometry cuff.

In my experience, pain perception may also be altered in the morbidly obese patient. When such patients have significant intra-abdominal pathology, the combination of diminished physical examination findings and an increased pain threshold may lead the physician to false diagnostic conclusions. This phenomenon may have contributed to the error in this case.

Diagnostic Imaging.—As seen in this case, medical imaging of the morbidly obese patient is challenging. Standard radiographs may not be able to visualize the entire body part, requiring multiple panoramic-type views to be taken. Computerized tomography and magnetic resonance machines often have weight and circumference restrictions, usually with upper limits in the range 300-350 pounds.⁽⁴⁾ Ultrasound images are frequently obscured by morbid obesity.⁽⁵⁻⁷⁾

Nursing Care.—Delivering routine and intensive nursing care is also more difficult in the morbidly obese patient. Cardiac and pulse oximetry monitoring, wound care, blood draws, intravenous catheter placement, skin care and prevention of pressure ulcers, respiratory and ventilator support, and correct administration of medications can all be challenging in the morbidly obese patient.^(8,9)

Airway Management.—Management of the airway in an obese patient can be extremely difficult. Morbidly obese patients develop oxygen desaturation more quickly than non-obese adults. Bag-Valve-Mask ventilation is more difficult because of reduced pulmonary compliance, increased chest wall resistance, increased airway resistance, abnormal diaphragmatic position, and increased upper airway resistance. The risk of aspiration is greater in obese patients because of a larger volume of gastric fluid, and an increased intra-abdominal pressure with higher incidence of gastroesophageal reflux.

As in the non-obese patient, endotracheal intubation remains the method of choice for controlling the airway. Obesity increases the risk of intubation by inhibiting the physician's view of the laryngeal structures during orotracheal intubation. In an Australian study of 85 cases of difficult intubations, obesity, limited neck mobility, and poor mouth opening accounted for two thirds of all the contributing factors.⁽¹⁰⁾ Morbidly obese patients often have short necks; this combination has been strongly correlated with difficult intubation.⁽¹¹⁾ Intubating the morbidly obese patient in the semierect position may facilitate a better view of the glottic opening. The Intubating Laryngeal Mask Airway (ILMA) and the Combitube have both been successfully utilized in the setting of failed endotracheal intubation in morbidly obese patients.

Venous Access.—Venous access in morbidly obese patients can be extremely difficult and time consuming. One study found that the extra skin punctures during catheter placement and the delayed catheter changes in obese patients led to more catheter-related infections and thrombosis.⁽¹²⁾ Careful attention and monitoring of intravenous access sites is extremely important. Central line catheters are more difficult to obtain, and a second health care worker is often needed to retract panniculus for the physician attempting central line access.

Medications.—Morbidly obese patients are likely to have markedly altered medication pharmacokinetics, resulting from variations in volume of distribution, renal clearance, hepatic metabolism, protein binding, and concomitant disease states. The volume of distribution of a drug is correlated with drug lipophilicity. Drugs with a higher affinity for adipose tissue tend to have an increased volume of distribution. However, there are some striking exceptions that complicate the medication dosing process. The complexity of drug pharmacokinetics in obese patients and limited data creates a dilemma for clinicians.

In general, drug dosing in obese patients can be based on ideal body weight (IBW), total body weight (TBW), or somewhere in the middle (IBW plus some percentage of the excess weight). An empiric formula for the "somewhere in the middle" approach is $\text{Dosing Weight} = \text{IBW} + 0.3(\text{TBW} - \text{IBW})$. A recent article provides a detailed review of medication dosing in the critically ill morbidly obese.⁽¹³⁾ Ideally, individual drug dosing is based on clinical research data in obese patients. When such data are lacking, the loading dose of a drug should be based on its hydrophilic or lipophilic properties. IBW, or IBW plus some percentage of the excess weight over IBW, should be used for hydrophilic medications, whereas TBW should be used for loading doses of lipophilic drugs. Maintenance dosing should be based on possible or observed changes in total metabolic clearance. If metabolic clearances are unknown, maintenance dosing based on IBW is advised. Careful monitoring of clinical end points, signs of toxicity, clinical response, and serum drug levels are strongly advised when giving medications to morbidly obese patients.

In summary, obesity presents significant challenges to virtually every step of the diagnostic and therapeutic process. A thoughtful, tailored approach—taking advantage of insights from research, experienced personnel, and technological and mechanical aides—must be applied to ensure safety.

Case & Commentary: Part 2

Six days later, the patient developed fevers, hypotension, and leukocytosis. Examination revealed newly identified gangrenous panniculus in the deep skin folds. The patient was taken to the operating room for presumed necrotizing fasciitis. On surgical exploration, she was found to have a colocutaneous fistula arising from perforated sigmoid diverticula. She died of multiorgan failure after a complex several-month hospital course.

Quality of Care of Obese Patients.—Morbidly obese patients have been found to experience delayed acute medical care; they are also less likely to receive preventive care services, either as a result of patient or physician factors.⁽¹⁴⁻¹⁶⁾ Although some of these problems relate to the physical fact of obesity itself, there is also an attitudinal component. Studies have demonstrated negative physician attitudes and discrimination towards morbidly obese patients.^(17,18) Obese patients report feeling misunderstood and mistreated by medical personnel, resulting in prejudicial and discriminatory attitudes and behavior.⁽¹⁹⁾

Taken together, these studies indicate that obese patients' medical care might well fall below the standard of care.

Surgery in the obese patient presents special challenges. In part owing to longer operative times, morbidly obese patients experience more surgical wound infections and have a higher rate of sepsis.(20,21,22) One study of 23,056 patients found that 23%, 31%, and 38% of normal weight, obese, and extremely obese patients, respectively, had perioperative events and complications.(23) Given the surgical technical difficulty and postoperative complication rates in morbidly obese patients, it is possible that surgeons are more reluctant to operate on these patients as promptly and for the same indications as in non-obese patients.

What Can Be Done to Improve Quality and Safety in the Care of the Obese Patient?

It appears that physicians are not being adequately trained and prepared to identify and treat morbidly obese patients.(24,25) Given the prevalence of obesity in our society today, it is very important for medical schools and residency training programs to provide education specific to the care of the morbidly obese patient. Medical students' knowledge has been significantly improved by rotating on a bariatric surgical service.(26) Specific medical school intervention using video, audio, and written components has led to improved attitudes by medical students of obese patients one year after the intervention.(27)

By increasing individual physician awareness of the specific challenges related to the examination, diagnosis, and treatment of morbidly obese patients and by educating providers about the tools and interventions available, we may improve the care delivered to this population.

Take-Home Points

- Given the increased prevalence of obesity in our society, and the risks posed by obesity to health, clinicians and institutions will be caring for more obese patients in the coming years.
- Research has demonstrated that obese patients often receive suboptimal care, due to mechanical and physical challenges, and perhaps bias on the part of caregivers and institutions.
- Providers should understand the extensive health problems associated with obesity, and be proactive in discussions with patients regarding this issue. In addition, providers should:
 - Get help. Transportation, physical examination, and medical invasive procedures frequently require extra help, which should be available and sought.
 - Know the weight restrictions of local CT and MRI scanners.
 - Expect that airway management in a morbidly obese patient is going to be difficult, and be prepared to utilize rescue airway techniques.
 - Understand the differences in medication dosing in obese patients. Memorize the dosing of the time-critical medications (e.g., succinylcholine). Have a handy reference material for all other medications.
 - Acknowledge the potential negative impact of biases harbored by medical personnel against the morbidly obese.
 - Take efforts in your personal practice to be sure care is the highest standard.
- Organizations that care for obese patients must approach this population in an organized, thoughtful, and systematic manner. High quality care often requires a combination of education, equipment, and

teamwork that will not materialize without a focused approach.

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References

1. Flegal KM, Carroll MD, Kuczmarski RJ, Johnson CL. Overweight and obesity in the United States: prevalence and trends, 1960-1994. *Int J Obes Relat Metab Disord.* 1998;22:39-47.[[go to PubMed](#)]
2. Clinical guidelines on the identification, evaluation, and treatment of overweight and obesity in adults--the evidence report. National Institutes of Health. *Obes Res.* 1998;6 Suppl 2:51S-209S.[[go to PubMed](#)]
3. Allison DB, Fontaine KR, Manson JE, Stevens J, VanItallie TB. Annual deaths attributable to obesity in the United States. *JAMA.* 1999;282:1530-8.[[go to PubMed](#)]
4. Varon J, Marik P. Management of the obese critically ill patient. *Crit Care Clin.* 2001;17:187-200.[[go to PubMed](#)]
5. Boulanger BR, Brenneman FD, Kirkpatrick AW, McLellan BA, Nathens AB. The indeterminate abdominal sonogram in multisystem blunt trauma. *J Trauma.* 1998;45:52-6.[[go to PubMed](#)]
6. Melanson SW, Heller M. The emerging role of bedside ultrasonography in trauma care. *Emerg Med Clin North Am.* 1998;16:165-89.[[go to PubMed](#)]
7. McKenney KL. Ultrasound of blunt abdominal trauma. *Radiol Clin North Am.* 1999;37:879-93.[[go to PubMed](#)]
8. Hahler B. Morbid obesity: a nursing care challenge. *Medsurg Nurs.* 2002;11:85-90.[[go to PubMed](#)]
9. Davidson JE, Kruse MW, Cox DH, Duncan R. Critical care of the morbidly obese. *Crit Care Nurs Q.* 2003;26:105-16; quiz 117-8.[[go to PubMed](#)]
10. Williamson JA, Webb RK, Szekely S, Gillies ER, Dreosti AV. The Australian Incident Monitoring Study. Difficult intubation: an analysis of 2000 incident reports. *Anaesth Intensive Care.* 1993;21:602-7.[[go to PubMed](#)]
11. Rocke DA, Murray WB, Rout CC, Gouws E. Relative risk analysis of factors associated with difficult intubation in obstetric anesthesia. *Anesthesiology.* 1992;77:67-73.[[go to PubMed](#)]
12. Boulanger BR, Milzman DP, Rodriguez A. Obesity. *Crit Care Clin.* 1994;10:613-22.[[go to PubMed](#)]

13. Brunette DD. Resuscitation of the morbidly obese patient. *Am J Emerg Med.* 2004;22:40-7.[[go to PubMed](#)]
14. Olson CL, Schumaker HD, Yawn BP. Overweight women delay medical care. *Arch Fam Med.* 1994;3:888-92.[[go to PubMed](#)]
15. Wee CC, McCarthy EP, Davis RB, Phillips RS. Screening for cervical and breast cancer: is obesity an unrecognized barrier to preventive care? *Ann Intern Med.* 2000;132:697-704.[[go to PubMed](#)]
16. Adams CH, Smith NJ, Wilbur DC, Grady KE. The relationship of obesity to the frequency of pelvic examinations: do physician and patient attitudes make a difference? *Women Health.* 1993;20:45-57.[[go to PubMed](#)]
17. Hebl MR, Xu J. Weighing the care: physicians' reactions to the size of a patient. *Int J Obes Relat Metab Disord.* 2001;25:1246-52.[[go to PubMed](#)]
18. Foster GD, Wadden TA, Makris AP, et al. Primary care physicians' attitudes about obesity and its treatment. *Obes Res.* 2003;11:1168-77.[[go to PubMed](#)]
19. Kaminsky J, Gadaleta D. A study of discrimination within the medical community as viewed by obese patients. *Obes Surg.* 2002;12:14-8.[[go to PubMed](#)]
20. Cruse PJ, Foord R. The epidemiology of wound infection. A 10-year prospective study of 62,939 wounds. *Surg Clin North Am.* 1980;60:27-40.[[go to PubMed](#)]
21. B'erard F, Gandon J. National Academy of Science-National Research Council, Division of Medical Sciences, Ad Hoc Committee on Trauma. Postoperative wound infections: the influence of ultraviolet irradiation of the operating room and of various other factors. *Ann Surg.* 1964;160:suppl 1:1-192.[[go to PubMed](#)]
22. Heinzelmann M, Scott M, Lam T. Factors predisposing to bacterial invasion and infection. *Am J Surg.* 2002;183:179-90.[[go to PubMed](#)]
23. Schwilk B, Muche R, Bothner U, Brinkmann A, Bartels F, Georgieff M. Incidents, events and complications in the perioperative period in normal and malnourished patients--results of 23,056 patients. *Anesthesiol Intensivmed Notfallmed Schmerzther.* 1995;30:99-107. [Article in German]. [[go to PubMed](#)]
24. Block JP, DeSalvo KB, Fisher WP. Are physicians equipped to address the obesity epidemic? Knowledge and attitudes of internal medicine residents. *Prev Med.* 2003;36:669-75.[[go to PubMed](#)]
25. McArtor RE, Iverson DC, Benken D, Dennis LK. Family practice residents' identification and management of obesity. *Int J Obes Relat Metab Disord.* 1992;16:335-40.[[go to PubMed](#)]
26. Banasiak M, Murr MM. Medical school curricula do not address obesity as a disease. *Obes Surg.* 2001;11:677-9.[[go to PubMed](#)]
27. Wiese HJ, Wilson JF, Jones RA, Neises M. Obesity stigma reduction in medical students. *Int J Obes Relat Metab Disord.* 1992;16:859-68.[[go to PubMed](#)]

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