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The impact of obesity on postoperative results of abdominal operations

O impacto da obesidade nos resultados pós-operatórios de operações abdominais

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ABSTRACT

Introduction: Ankylosing spondylitis or radiographic axial spondylitis is an axial spondyloarthritis with male predominance, whose symptoms include low back pain associated with morning stiffness and may progress to ankylosis. Its inflammatory cause is associated with structural alteration, which may influence clinical presentation, functionality and response to treatment.

Objective: To review whether the body composition of patients with ankylosing spondylitis influences inflammatory parameters according to gender.

Method: A search was performed in PubMed to identify the available literature. The criteria included the terms "Obesity Paradox", combined with additional search criteria including the terms "general surgery, abdominal surgery and outcomes" to better define the research. The criteria were restricted to English and Portuguese languages and adult patients. Original articles, systematic reviews and meta-analyses were considered for inclusion. Eligible studies were initially identified by title and abstract.

Result: 41 articles were included.

Conclusion: Although some groups still require additional studies to prove the real effect of obesity on postoperative results, others already have well-established validity. However, it was demonstrated that obesity contributed to the increase in inflammatory activity parameters in male patients with ankylosing spondylitis.

KEYWORDS: Electrical impedance. Ankylosing spondylitis. Body mass index.

RESUMO

Introdução: Espondilite anquilosante ou espondilite axial radiográfica é uma espondiloartrite axial com predominância masculina, cujos sintomas incluem dor lombar baixa associada a rigidez matinal podendo evoluir para anquilose. Sua causa inflamatória está associada à alteração estrutural, o que pode influir na clínica, funcionalidade e resposta ao tratamento.

Objetivo: Revisar se a composição corporal de pacientes com espondilite anquilosante tem influência nos parâmetros inflamatórios de acordo com o sexo.

Método: Foi desenvolvida busca no PubMed para identificar a literatura disponível. Os critérios incluíram os termos "Paradoxo da Obesidade", combinado com critérios adicionais de busca incluindo os termos "cirurgia geral, cirurgia abdominal e resultados" para melhor definir a pesquisa. Os critérios foram restritos às línguas inglesa e portuguesa e pacientes adultos. Artigos originais, revisões sistemáticas e metanálises foram considerados para inclusão. Os estudos elegíveis foram inicialmente identificados por título e resumo.

Resultado: Foram incluídos 41 artigos.

Conclusão: Embora alguns grupos ainda necessitem estudos adicionais para comprovar o real efeito da obesidade nos resultados pós-operatórios, outros já possuem validade bem estabelecida. Contudo, ficou demonstrado que a obesidade contribuiu para o aumento dos parâmetros de atividade inflamatória em pacientes do sexo masculino com espondilite anquilosante.

PALAVRAS-CHAVE: Impedância elétrica. Espondilite anquilosante. Índice de massa corporal.

Central Message

Evidence of the impact of obesity on the postoperative period of gastrointestinal operations is conflicting. Recent studies have identified the "Obesity Paradox," in which moderate obesity has offered protection against adverse effects, while underweight may present a higher risk. However, other research has suggested that obesity is associated with an increased risk of surgical site infections and venous thromboembolism. Thus, this study sought to better clarify the role of obesity in this context.

Perspective

With the phenomenon of the "Obesity Paradox" increasingly studied, it is important to carefully evaluate its real effect and validity in different surgical populations. Although some groups still need additional studies to prove the real effect of obesity on postoperative outcomes, others already have well-established validity. This study seeks to point out which surgical situations in which this aspect is more consolidated

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INTRODUCTION

Obesity is one of the main public health problems in the world today and its prevalence has been growing in industrialized countries.[1] In Brazil, data from the Brazilian Association for the Study of Obesity and Metabolic Syndrome (ABESO) indicate that more than 50% of the population is already overweight, that is, in the overweight and obesity range. Epidemiological data showed an increase in the prevalence of obesity by 0.89% per year among Brazilians, being more significant in women and young people.[2]

Pathophysiological changes are caused by obesity, bringing several damages to the functioning of the cardiovascular, pulmonary and immune systems, and can lead to the development of diseases such as diabetes, hypertension, coronary artery and cancer. Obesity also reduces life expectancy and quality of life.[3] Due to the high number of comorbidities associated with obesity, obesity is often taken as a risk factor for postoperative complications.

Evidence regarding the impact of obesity in the postoperative period of gastrointestinal operations is conflicting. A study of more than 6,000 patients demonstrated no differences in postoperative mortality and morbidity between obese and non-obese patients.[4] Other recent studies have identified the "Obesity Paradox", in which moderate obesity has offered protection against adverse effects, while underweight may present a higher risk.[5,6] However, other studies have suggested that obesity is associated with an increased risk of surgical site infections and venous thromboembolism.[7,8]

Although there are numerous studies around the world describing the impact of obesity on gastrointestinal surgery, the results are difficult to group due to differences in procedures, surgical approaches, complications associated with specific techniques, and classifications of obesity.[9]

The objective of this study was to identify how obesity affects postoperative outcomes in abdominal surgeries in the most varied scenarios, such as emergency care, stomata, oncology, and various elective procedures.

METHOD

A search was developed in PubMed to identify the available literature. The search criteria included the terms "Obesity Paradox", combined with additional search criteria including the terms "general surgery, abdominal surgery and outcomes" to better define the search. The criteria were restricted to English and Portuguese and adult patients (over 18 years of age). Original articles (observational, cohort, case-control, longitudinal, and experimental), systematic reviews, and meta-analyses were considered for inclusion. Eligible studies were initially identified by title and abstract. In the end, 41 articles were included

DISCUSSION

The "Obesity Paradox"

The phenomenon in which obesity provides an advantage in terms of postoperative survival is known as the "Obesity Paradox" and has been widely described.[10]

Several studies have pointed to this trend, especially in the area of digestive system surgery.[5,6,8,9] In a study evaluating 2,258 cases undergoing various gastroenterological surgical procedures, morbidity was higher in patients with BMI >30, but mortality was still significantly lower in this group than in those with normal weight who underwent the same procedures. In contrast, mortality was higher in patients with a BMI <18.[5] or greater than 40.[5]

In a study evaluating patients undergoing emergency abdominal surgery, both morbidity and mortality were more favorable to obese patients than to normal-weight patients.[11] A similar paradox of obesity has been observed in some studies by organ, in stomach and colon operations.[9]

However, the concept should not be generalized. In a large sample, Yasunaga et al.[8] evaluated 30,765 patients in Japan who underwent gastric and colonic resection in 2010, and concluded that, unlike American studies, both underweight and overweight patients had higher rates of postoperative complications and higher mortality compared to normal-weight patients.[8]

In addition, most studies examining the effects of BMI on postoperative outcomes have only assessed short-term mortality. The studies that evaluated it in the long term showed conflicting data regarding the type of procedure to which they were submitted.[12-14]

Paradox theories

Since the first observations of the Obesity Paradox, several theories have been formulated to try to explain the unexpected mortality rate among obese and overweight patients.

One of the theories is that the WHO criteria for defining obesity are flawed, should be revised and include overweight patients in the category of normal BMI.[15]

It is important to note that the WHO criteria do not discriminate between fat mass and lean mass, and consequently, do not adequately reflect adiposity. Consequently, it has been suggested that BMI be replaced by more accurate indices, such as waist circumference and tomographic measurement of intra-abdominal fat.[16-18]

Adipose tissue is an endocrine organ capable of secreting a wide variety of cytokines with opposite actions.[19] Adipocytes secrete soluble TNF-alpha receptors, which can counteract the damaging effects of TNF-alpha, endothelial injury and induction of apoptosis in various inflammatory states.[20] Visceral obesity is particularly linked to chronic inflammation, insulin resistance, and accelerated progression of atherosclerosis.[19] Peripheral fat, on the other hand,

has protective effects. These differences, between visceral and peripheral adiposity, do not depend on gender.[21] Since BMI cannot distinguish between these 2 types of fat, this may offer explanation for the survival benefit of the obese population.

Genetic factors may provide a different explanation for the survival advantage of obese and overweight patients. The theory of the sparing genotype is an old theory explaining obesity. This genotype emerged as result of adaptive and selective interaction in times of famine, and led to obesity, when hunger ceased to exist for many individuals in the modern era.[22] However, this theory lacks substantial scientific evidence.[23]

The Paradox of Obesity in abdominal surgery

Elective non-oncological surgery (laparotomic and laroscopic)

The first studies that sought to evaluate the impact of obesity on the postoperative results of obese patients undergoing elective abdominal surgeries showed no statistically significant relationship between most complications and BMI.[24] In a study on the surgical treatment of ulcer disease, only the incidence of surgical wound infection was higher in obese patients, with statistical significance. There was a trend towards a higher occurrence of thrombophlebitis and mortality in obese patients, but this difference was not statistically significant.[24]

More recently, in a cohort of 6,336 patients undergoing elective surgery, where vast majority of procedures performed were abdominal, with exception of surgical site infection, there were no significant differences between the complication rates between obese and non-obese patients.[4]

In laparoscopy in elective surgery, most authors do not believe that obesity, even morbid obesity, is a contraindication for laparoscopic cholecystectomy,4,25 with some of them even indicating laparoscopy as the technique of choice for obese patients.[4]

In Japan, Toru Obushi et al.[25,] found no adverse impact on the operative difficulty and postoperative results of 237 patients who underwent laparoscopic cholecystectomy by single incision.[25]

As for hernia repair, laparoscopic surgery has also been increasingly indicated for obese patients with satisfactory results. Novitski et al.[26] suggest that in experienced hands, laparoscopy may already be the approach of choice for ventral hernia repair in patients with a BMI above 30.[26] In another study conducted with 163 obese patients, there was a success rate of 94.[5%,] with no mortality, minimal postoperative morbidity, and low conversion rate.[27]

Oncological surgery

In attempt to broaden the scope of the concept of Obesity Paradox in oncological surgery, there was greater controversy, and it became necessary to stratify the procedures.

Motonari et al.[9] In a recent review, they evaluated a wide range of studies in the area, starting in 2010, carrying out an adequate evaluation by agencies, and obtained different results.[9]

In gastric cancer, most studies evaluated suggest that obesity may have a negative influence on the rate of postoperative complications and mortality.[28,29] However, it is prudent to highlight that these findings took into account the vast majority of Asian studies, and contrast with North American data that indicated lower mortality in obese patients.[5,6]

This discrepancy between the North American and Asian populations can be explained by differences in the relationship between BMI and fat percentage in different ethnic groups. BMI measurement is easy to obtain and serves as an acceptable approximation for measuring obesity and underweight in all populations. However, Asians generally have a higher percentage of fat compared to Caucasians of the same age, sex, and BMI.[30,31]

The impact of obesity on colonic surgery has been studied more than on any other organ. Postoperative morbidity appears to be higher in obese patients undergoing colonic surgery. However, the phenomenon of the Obesity Paradox is reflected by the fact that mildly obese people have the lowest mortality rates, while the highest mortality is in those with extreme obesity.[32]

Thingan Yang et al.[33,] in a literature review involving the impact of obesity only on laparoscopic colonic surgeries, obtained results that reinforce these data. Obese patients had longer operative time, higher conversion rate to open procedure, higher rates of anastomotic dehiscence and surgical site infection, with fewer lymph nodes removed in the specimens.[33]

There are few large-scale reviews focusing on the influences of obesity on liver surgery. The main diseases evaluated were hepatocellular carcinoma and liver metastases from colorectal cancer. Based on these studies, obesity was found to be associated with certain complications but did not affect survival rates, and therefore had no significant effects on mortality.[34,35] The same findings were consistent with studies evaluating pancreatic procedures, and obesity was mainly associated with the risk of developing pancreatic fistula.[36-38]

Emergency surgery

Recent literature has suggested that obesity may be protective in emergency operations.

Benjamin et al.[39] evaluated 106,260 patients undergoing emergency abdominal surgery and concluded that underweight patients had significantly higher mortality and morbidity. Those with class I obesity and overweight had benefits in terms of mortality and morbidity, while those with class III obesity had only higher morbidity, reflected in most cases by surgical site infection.[39]

The Obesity Paradox does not seem to apply to trauma surgery in the same way as to most other

procedures. Further studies are needed to clearly define how obesity interferes with the operative outcomes of trauma victims. Neville et al.[40], in a study evaluating 242 patients who were victims of blunt trauma, reported a significant increase in mortality in obese patients (32% vs. 16%), in patients stratified into similar groups of age and severity of injuries.[40]

Making stomata

The making of stomas in obese patients presents difficulties not found in those of normal weight. Traditional sites may not be available due to skin folds and the thickness of the subcutaneous tissue. In addition, many obese patients cannot visualize the lower abdomen, making care difficult.

In those who will undergo elective procedures, adequate preoperative evaluation should be valued. Generally, tomography with measurement of the subcutaneous tissue can help in choosing the best site, which, in obese patients, can be the infraumbilical region, escaping the traditional triangle delimited by the anterosuperior iliac spine, pubic symphysis and umbilical scar.[41]

Although it has great practical implications, there are not many studies stratifying postoperative complications in obese patients who require ostomies.

Surgical populations	Paradox	Consider
Conventional elective surgery	+	
Videolaparoscopic surgery	+	
Oncological surgery	?	Race and procedure
Emergency surgery	?	Acute abdomen and trauma
Making stomata	?	Place of manufacture

TABLE — Abdominal operations where the paradox has shown validity

As can be seen in the Table, elective abdominal surgeries were where the paradox presented greater validity, both for conventional and videolaparoscopic procedures. In oncology studies, despite the large number of studies, differences in race, as well as in the procedure adopted, seem to have different effects on postoperative outcomes in obese patients, not allowing the generalization of the concept of Obesity Paradox. Finally, but still in need of further study, are obese patients undergoing emergency abdominal operations. In this group, it is necessary to separate between those with acute abdomen, in whom the paradox seems applicable, and patients who are victims of trauma, where obesity has been shown to be a very important risk factor for mortality.

CONCLUSION

With the phenomenon of the Obesity Paradox increasingly studied, it is important to carefully evaluate its real effect and validity in different surgical populations. Although some groups still need additional studies to prove the real effect of obesity on postoperative outcomes, others already have well-established validity.

Authors' contributions

Conceptualization: All authors
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