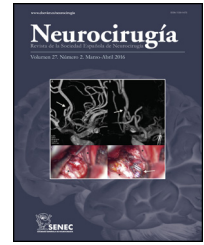




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Review article

Impact of obesity in the pathophysiology of degenerative disk disease and in the morbidity and outcome of lumbar spine surgery[☆]

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ABSTRACT

Obesity (BMI >30 kg/m²) is a pandemic with severe medical and financial implications. There is growing evidence that relates certain metabolic processes within the adipose tissue, preferentially abdominal fat, with a low-intensity chronic inflammatory state mediated by adipokines and other substances that favour disk disease and chronic low back pain. Obesity greatly conditions both the preoperative evaluation and the spinal surgical technique itself. Some meta-analyses have confirmed an increase of complications following lumbar spine surgery (mainly infections and venous thrombosis) in obese subjects. However, functional outcomes after lumbar spine surgery are favourable although inferior to the non-obese population, acknowledging that obese patients present with worse baseline function levels and the prognosis of conservatively treated obese cohorts is much worse. The impact of preoperative weight loss in spine surgery has not been prospectively studied in these patients.

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Impacto de la obesidad en la fisiopatología de la enfermedad degenerativa discal y en la morbilidad y resultados de la cirugía de columna lumbar

RESUMEN

La obesidad (IMC > 30 kg/m²) es una pandemia con graves implicaciones médicas y económicas. Existe una creciente evidencia que relaciona procesos relacionados con el metabolismo del tejido adiposo, preferentemente abdominal, con un estado inflamatorio crónico de baja intensidad mediado por adipocinas y otras sustancias que favorecen la lesión discal y el

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Cirugía de columna lumbar
Adipocinas
Complicaciones

dolor lumbar crónico. La obesidad condiciona en gran medida la evaluación preoperatoria y la técnica quirúrgica en cirugía de columna. Diversos metaanálisis confirman un aumento de complicaciones tras cirugía lumbar en el paciente obeso (especialmente infecciones y trombosis venosas). Sin embargo, los resultados funcionales de estas intervenciones son favorables aunque inferiores a los de la población no obesa, teniendo en cuenta que parten de valores basales inferiores y el pronóstico de los obesos tratados conservadoramente es mucho peor. El impacto de una reducción de peso preoperatoria no se ha estudiado de forma prospectiva en este tipo de pacientes.

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Introduction

Obesity is currently a medical, social, labour and economic problem of the first order. A person is considered to be *overweight* when their *body mass index* (BMI) is between 25 and 29.9 kg/m² and *obese* when it is greater than 30.¹ According to the World Health Organisation, obesity affects at least 10% of the world population and is a pandemic that is directly responsible for the death of 2.8 million people a year and is the grounds for 35.8 million disability adjusted life years.² Since the 1970s, the prevalence of overweight and obesity throughout the world has double and tripled, respectively, both among males and females.²

Overweight/obesity is a demonstrated risk factor for a multitude of metabolic, cardiovascular, visceral and osteoarticular diseases.³ Similarly, there is growing evidence in the literature that links obesity to an acceleration of lumbar disc degeneration and this degeneration to the presence of chronic lumbar pain.^{4,5} The specific pathophysiological mechanisms that connect the metabolic changes in adipose tissue with the degeneration of intervertebral discs are still under study.⁵ Among them, certain cellular processes induced by biochemical mediators (adipokines and others) have been observed that promote the development and maintenance of a chronic low-intensity inflammatory state that appears to contribute to disc lesions in the obese patient.⁶

Longitudinal and meta-analysis studies have confirmed that the obese population experiences a rate of complications related to lumbar spinal surgery that is significantly higher than that of the non-overweight population, essentially with regard to infections of the surgical wound and the incidence of deep vein thrombosis.⁷⁻¹¹ Similarly, the procedures performed on overweight/obese patients generally present specific difficulties related to the surgical technique *per se* because of the need for more comprehensive approaches, the longer time required in surgery, and greater blood loss or poorer healing of the wounds.^{12,13} Nonetheless, the medium and long-term functional outcomes for obese patients operated on for lumbar spinal lesions are comparable to those of subjects with normal weight.^{8,14,15} Likewise, overall mortality among the various spinal procedures does not appear to be significantly different from that of the general population.⁸

Although obesity in principle is not an absolute contraindication for lumbar spinal surgery, its presence implies assuming a higher rate of perioperative

complications compared to the general population. What measures intended to prevent or correct overweight/obesity produce a significant impact on post-operative morbidity or the functional outcomes of spinal surgery have not been studied prospectively to date. Although it is reasonable to think that those measures could have a positive effect, the use of certain medications, weight-loss diets, bariatric surgery or future gene therapy have yet to prove that their weight-loss effectiveness translates into a decrease in perioperative morbidity, maintaining functional outcomes comparable to those obtained in cohorts of obese and non-obese patients.

This study summarises the pathophysiological bases linking obesity to degenerative disc disease and their effect on maintenance of chronic lumbar pain. The literature is also reviewed with respect to the impact of obesity on patients undergoing lumbar surgery in terms of surgical complications, functional outcomes and morbidity and mortality.

Development

Obesity: concept and magnitude of the problem

Obesity is currently defined based on the BMI, which can be calculated using a simple formula that relates the weight of the individual in kilograms to their height in metres squared (BMI = kg/m²).¹ This concept was popularised starting in the 1970s based on the publication of the Keys et al. study (republished in 2014),¹⁶ which assessed various methods for measuring the relative weight of individuals at the population level. In reality, these authors revived the concept of BMI initially described by the long-forgotten 19th century Belgian statistician Adolphe Quetelet.¹⁷ Although there are other methods for estimating obesity, such as abdominal circumference or the waist-to-hip ratio, BMI has the great advantage of simplicity, objectivity and reproducibility.¹ Obesity is sub-classified according to the BMI values as shown in Table 1. These designations are used internationally and systematically according to the *Guías de Práctica Clínica* [Clinical Practice Guidelines].¹

According to the World Health Organisation, in 2014, the worldwide prevalence of overweight and obesity in males over 18 years of age was 39 and 11%, respectively, and 40 and 15% in

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