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The association between obesity and disability in survivors of joint surgery: analysis of the health and retirement study

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Abstract

Background: Obesity is associated with osteoarthritis and the need for joint surgery. Obese patients who undergo joint surgery may have a higher risk of morbidity compared with normal or overweight patients but less is known about their risk of postoperative disability. The primary objective of our study was to determine the association between obesity and the development of new dependence in activities of daily living within 2 years after joint surgery.
Methods: We obtained data from the Health and Retirement Study, a longitudinal survey of older Americans. We included participants who indicated having joint surgery for arthritis. We defined obesity as a BMI $\geq$30 kg m^{-2}. Our outcome was a new or increased dependence in one or more activities of daily living after surgery.
Results: We analysed data on 2519 respondents who underwent joint surgery for arthritis. Respondents had a median age of 69yr, 65.5% were female, 66.6% had joint replacement surgery and 45.3% were obese. The overall incidence of a new dependence within 2years was 22.1%. Obese respondents had a higher incidence of new dependence compared with non-obese respondents (25.4% *vs* 19.4%, P<0.001). In adjusted analysis, obese respondents had increased odds of developing dependence [odds ratio 1.35 (95% CI 1.09-1.68), P=0.007].
Conclusions: Obesity is associated with an increased risk of developing dependence in the 2 years after joint surgery. Our study findings identify a high-risk group that may benefit from targeted interventions and allocation of perioperative resources to optimize recovery and minimize longer-term disability.

Key words: activities of daily living; obesity; orthopaedic procedures

Obesity is a worldwide epidemic with a prevalence exceeding one-quarter of the population in developed countries.[1] Patients with an obese BMI are more likely to undergo joint surgery because of a higher prevalence of arthritis compared with patients with a normal or overweight BMI.[2–4] Prior research has shown that obese patients have higher rates of postoperative complications after joint surgery, such as infection, poor wound healing and implant failure.[5–7] Obese patients also appear to have worse joint function and mobility.[8,9] Less is known about the effect of obesity on postoperative disability as defined by a dependence in an activity of daily living (ADL). Obese patients may be vulnerable to

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Editor's key points

- Obesity is associated with increased risk of post-operative complications, and this may exacerbate ongoing disability
- Hip surgery had higher rates of longer-term disability when compared with knee surgery in obese patients

developing new or worsening disability after surgery for several reasons. Obesity is associated with increased dependence and restricted function at baseline and has become one of the biggest contributors to the burden of disease and lost quality-adjusted life years.[10] Relatedly, there is a high co-prevalence of conditions such as depression and chronic pain that are themselves detrimental to recovery. This elevated incidence of postoperative complications may further impair recovery and independence. Finally, post-operative services including physical therapy, home care and rehabilitation facilities that are fundamental parts of effective recovery from joint surgery may be underequipped and underprepared to deal with the increasing number of obese patients who are undergoing joint surgery.[11]

Understanding how obesity effects postoperative disability would allow for more informed surgical decision making and let obese patients better gauge how surgery would change their quality of life. This is especially important for caregivers of elderly obese patients where the decision to undergo surgery is difficult and information to guide decisions is scarce. As there is increasing focus on disability as a patient-centred outcome, identifying subgroups of patients that are at higher risk is an important component to improving the overall value of healthcare. Furthermore, it would facilitate appropriate allocation of postoperative resources in a healthcare system with increasing focus on cost. With the proliferation of bundle payments for joint surgery, the value of different forms of post-acute care has become an area of intense scrutiny. Therefore, the research would aim attention to a high-risk group that would require more research directed to understanding the influence of medical comorbidities on return to function and interventions to optimize care.

The University of Michigan Health and Retirement Study (HRS) is a longitudinal survey of health and ageing conducted in over 20 000 adults in the USA since 1992. The HRS offers a unique opportunity to explore how obesity affects post-operative disability, particularly in an ageing surgical population. The primary aim of our study was to define the association between obesity and the development of ADL dependence after joint surgery.

Methods

Data were obtained from HRS, which is sponsored by the National Institute on Aging and is conducted by the University of Michigan. HRS is a longitudinal panel study that surveys approximately 20 000 people in the USA over the age of 50.[12] Respondents are interviewed in clusters approximately every 2 years on a wide array of topics including health status and disability. When a respondent is unable to be interviewed, often because of cognitive or medical problems, a proxy is contacted to answer questions for that respondent. We used the RAND HRS Data file, an easy to use longitudinal data set based on the HRS data (available at http://www.rand.org/labor/aging/dataprod/hrs-data.html). It was developed at RAND with funding from the National Institute on Aging and the Social Security Administration.[13] Respondents provided informed consent at the time of enrolment into HRS. Our analysis of public HRS data was deemed exempt from human subjects review by the University of Pennsylvania institutional review board.

We obtained data from the 2004, 2006, 2008, 2010, 2012 and 2014 HRS interview clusters. We included subjects in our sample if they responded yes to the following question in HRS indicating receipt of joint surgery: 'in the last two years, have you had surgery or any joint replacement because of arthritis?' (Fig. 1). Respondents were excluded if they did not have a BMI reported in the interview cluster preceding the interview in which the patient reported having surgery. Our primary analysis excluded respondents who had an underweight BMI (<18.5 kg m^{-2}) given that underweight patients have high rates of disability and their inclusion into the reference group might underestimate the effect of obesity;[14] however, these respondents were included in secondary analyses to determine the effect of their inclusion on the primary outcome in a sensitivity analysis. Additionally, as the primary outcome is a new or increased dependence in an ADL, we excluded patients who had complete dependence on all ADLs at baseline and therefore were unable to have the primary outcome. If respondents indicated having surgery more than once, only the first episode of surgery was used in the analysis.

We restricted our study sample to HRS respondents who were alive at the time of the post-surgical interview and

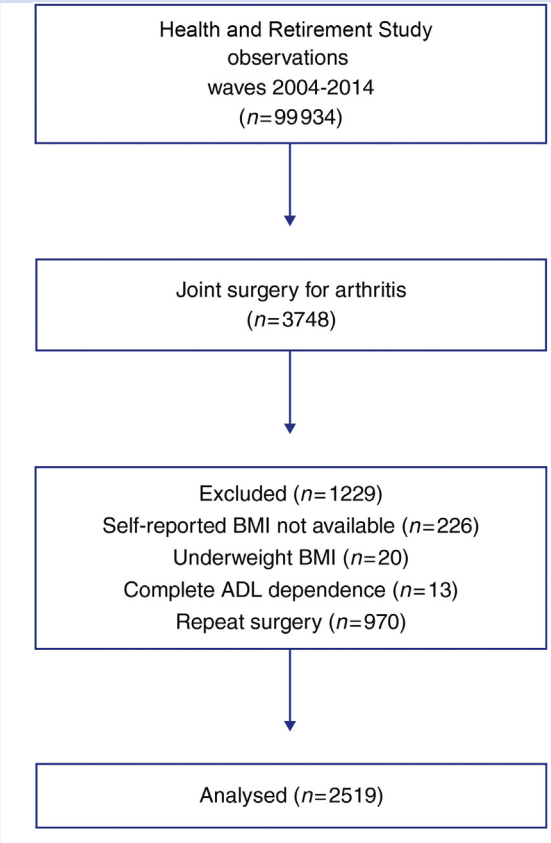

Fig 1. Creation of analytical dataset. HRS, Health and Retirement Study.