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For editorial comments see page 12.

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Quality of life after lung resection is not associated with functional objective measures

To the Editor:

Patient and physician perspectives about surgical risk may differ. Physicians are mostly focused on objective end-points (*i.e.* mortality and survival), whereas most patients are worried about permanent physical and emotional disability resulting from the operation [1]. Can objective clinical information be used to predict patient-reported health status?

In the attempt to respond to this question, we studied 221 consecutive patients submitted to major anatomic pulmonary resections (204 lobectomy and 17 pneumonectomy) during a 36-month period. All patients had a pre-operative measurement of maximum oxygen uptake ($V'O_2max$), as a part of their routine pre-operative functional work-up, and a complete assessment of their pre-operative and post-operative (3 months after surgery) quality of life. All patients gave their consent for inclusion of their clinical data in our institutional database for clinical and scientific purposes and the Institutional Review Board of our hospital approved the study. No formal pre-admission or post-discharge physiotherapy or psychological support programmes were administered in this series. Neurological or psychotropic personal medications, if present, were generally resumed the day after surgery.

Quality of life was assessed before and 3 months after the operation by the administration of Short Form 36v2 (SF36v2) survey [2], which is a generic instrument assessing eight physical and mental health concepts (physical functioning, role limitation caused by physical problems, bodily pain, general health perception, vitality, social functioning, role limitation caused by emotional problems and mental health). Scores were standardised to norms and weighted averages were used to create the physical component summary (PCS) and mental component summary (MCS) scores on a standard scale. Norm-based scores have a mean $\pm$ SD of 50 ± 10. Patients were divided into two groups according to their pre-operative level of $V'O_{2max}$ (low-$V'O_2$ group: $V'O_{2max} < 15$ mL·kg^{-1}·min^{-1}; high-$V'O_2$ group: $V'O_{2max} > 15$ mL·kg^{-1}·min^{-1}). The peri-operative meaningful decline (PMD) of SF36 physical and mental scores was estimated using two methods: 1) Cohen's effect size method (mean change of the variable divided by its baseline standard deviation), where an effect size >0.8 was regarded as PMD [3]; 2) standard deviation method, where a difference greater than one standard deviation (>10) is regarded as PMD.

We found that a similar proportion of patients in the low-$V'O_2$ and high-$V'O_2$ groups had pre-operative scores of PCS (27% *versus* 21%, p=0.3) and MCS (67% *versus* 70%, p=0.6) lower than 50 (norm for the general population). Likewise, a similar proportion of patients in the low-$V'O_2$ and high-$V'O_2$ groups had post-operative scores of PCS (55% *versus* 49%, p=0.5) and MCS (53% *versus* 44%, p=0.2) lower than 50 (norm for the general population).

The comparison of the standardised peri-operative changes (effect size) of the quality of life scales did not show any significant differences between low-$V'O_2$ and high-$V'O_2$ groups. Furthermore, in both groups the average effect sizes of all quality of life domains were always lower than 0.8, indicating the absence of an average PMD in any of the quality of life domains. According to the effect size method, 35 (16%) patients had a PMD of PCS and 68 (31%) had a PMD of MCS. However, the proportion of patients experiencing a PMD of PCS and MCS were similar in the low-$V'O_2$ and high-$V'O_2$ groups (PCS: 14% *versus* 17%, p=0.6; MCS: 27% *versus* 32%, p=0.6, respectively). According to the standard deviation method, 50 (23%) patients had a PMD of PCS and 40 (18%) patients had a PMD of MCS. The proportion of patients experiencing a PMD of PCS and MCS were similar in low-$V'O_2$ and high-$V'O_2$ groups (PCS: 33% *versus* 21%, p=0.5; MCS: 24% *versus* 16%, p=0.2).

The results generated by this study showed that the quality of life evolution of patients with impaired aerobic capacity was similar to the one observed in patients in better physical shape and that $V'O_{2max}$ was not a reliable parameter to predict residual self-rated quality of life. These results are in line with previous evidence showing that traditional objective risk factors (*i.e.* age, chronic obstructive lung disease, forced expiratory volume in 1 s (FEV1), diffusing capacity of the lung for carbon dioxide) are generally not associated with residual quality of life [4–8].

Why do objective data not predict patient-reported health status? Self-rated health is an active cognitive process in which numerous aspects of health, both subjective and objective, are summarised within the perceptual framework of the individual (social, cultural, demographic, reference groups, health expectations, previous experience with health, mental disposition, *etc.*) [9]. For this reason, individual objective components of health, when they are extrapolated from the patient contextual framework, may constitute only the basis of self-rating, which can be subsequently modified by the context of the evaluation.

How can we use this information in clinical practice? The fact that we are not able to predict how the patient will feel months after surgery questions the entire process of surgical patient selection, currently based on objective parameters. What is the real meaning of predicted post-operative FEV1, $V'O_{2max}$, *etc.* if these parameters will not be associated with the residual patient-perceived health status, which is what counts the most for the patient? How can we appropriately define surgical risk? Mortality is not sufficiently comprehensive to be used as the sole end-point for risk stratification. How can we account for other patient-centred outcomes (*i.e.* quality of life, pain, dyspnoea, satisfaction with care) and what should be their relative weight during the surgical decision process?

Unfortunately, our knowledge of the body-mind interaction is still too limited to find adequate answers. More research is needed to better understand the biological basis of health-related quality of life and its association with different genetic, inflammatory, psychoendocrinological and psychoneuroimmunological biomarkers, which may more accurately explain its peri-operative evolution.

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Maximum oxygen uptake is not a reliable parameter to predict residual self-rated quality of life after lung resection http://ow.ly/ksjWr

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Inhalational anthrax in a vaccinated soldier

To the Editor:

The spore-forming bacterium, *Bacillus anthracis*, primarily affects herbivores but can manifest as cutaneous (>95% of cases), gastrointestinal or pulmonary infection in humans. Pulmonary anthrax, resulting from inhalation of anthrax spores, is rapidly progressive and historically was considered to be invariably fatal. Clinical features include haemorrhagic thoracic lymphadenitis, pulmonary oedema, pleural effusions, leptomeningeal involvement, septic shock and respiratory distress, with death often following within 24 h [1, 2].

Due to the high mortality and potential for use as a biological agent, anthrax vaccines were developed in the 1950s [3]. *B. anthracis* is composed of three proteins known as protective antigen (PA), oedema factor and lethal factor (LF), with PA named after its ability to provide experimental immunity. Anthrax vaccines demonstrated protection against cutaneous anthrax in tannery workers [3] and vaccination protected rhesus monkeys from inhalational anthrax for up to 2 years [4]. No adequately powered studies exist that demonstrate protection by the vaccine against inhalational anthrax in humans. Despite this, widespread vaccination of military personnel was undertaken by allied forces during the recent Gulf Wars [5].

We present a case of initially unrecognised, inhalational anthrax in a vaccinated member of the armed forces.

A 38-year-old male presented with severe, sudden-onset central chest pain at rest, which was associated with nausea and dizziness. He denied shortness of breath. His past medical history included a ''supraclavicular lymph node infection'' aged 18 years. He was previously fit and well, apart from an undiagnosed painful right knee sustained in the previous year, which resolved with diclofenac. He had no respiratory problems and no family history of note, was married with one daughter, was a nonsmoker and drank <4 units alcohol per week. He was a member of the armed forces and had been deployed on operational tours in the Falklands, Kosovo, Germany, Croatia, Cyprus and, most recently, Iraq 4 years earlier. He had travelled to Disneyland, FL, USA, 2 weeks before admission.

On admission he developed haematemesis and an urgent oesophagogastroduodenoscopy (OGD) demonstrated three chronic gastric ulcers. Whilst recovering from the OGD he developed haemoptysis, fever and respiratory compromise and was admitted to the intensive therapy unit, where he was treated empirically with Tazocin and metronidazole. A chest radiograph demonstrated a markedly widened