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Preoperative Prediction of Chronic Postsurgical Pain after Thoracotomy: Need for Adequately Sized Population-based Samples

To the Editor:

The article by Bayman *et al.*,[1] evaluating predictors of chronic pain 6 months after thoracic surgery, provides important evidence of the high incidence and severity of chronic postsurgical pain (CPSP) after both thoracotomy and video-assisted thoracic surgery. However, we are surprised the authors found that none of the preoperative factors studied (demographics, psychosocial variables, pain, or quantitative sensory testing) were associated with the emergence of CPSP in this setting, unlike other postsurgical settings.

In a prospective multicenter cohort study published in this journal in 2015,[2] we enrolled 503 patients scheduled for thoracotomy (part of a mixed surgical cohort of 2,929) and confirmed CPSP by physical examination at 4 months. We found an incidence of CPSP at 6 months that was similar to the rate of 33% reported by Bayman *et al.*,[1] and we were able to build a preoperative risk model that identified more than 73% of the CPSP cases. Risk was based on six preoperative variables: (1) surgical procedure, (2) age, (3) physical health (Short Form Health Survey-12), (4) mental health (Short Form Health Survey-12), (5) preoperative pain in the surgical field, and (6) preoperative pain in another area. Moderate or intense postoperative pain at 24 h did not substantially improve the model's predictive value (unpublished analysis).

Earlier, Althaus *et al.*[3] were also able to model preoperative risk for CPSP at 6 months using data from 150 patients who underwent different types of surgery, including thoracic surgery. Their model identified four preoperative predictors: (1) capacity overload, (2) preoperative pain in the operating field, (3) other chronic preoperative pain, and (4) comorbid stress symptoms. In contrast to our findings, their data yielded one postoperative predictor: acute postsurgical pain, although that predictor improved the performance of the model only slightly.

Considering the results of these two studies, we emphasize the importance of the limitation that Bayman *et al.*[1] mention in their discussion: "the small sample size...and the large number of associations tested." Their cohort, drawn from two hospitals, included only 107 patients at 3 days and 99 evaluable cases at 6 months, ultimately yielding 27 cases of CPSP at 6 months. Current analysis on the appropriate planning of a frequentist approach for this type of study recommends that there be a minimum of 10 events per variable to avoid overfitting of the model and to support confidence in a predictive model's reliability.[4,5] We know that a Bayesian approach may offer advantages over the conventional frequency-based methods, especially in small samples with many predictors, but we still think that the statistical power in small studies like this one[1] will be insufficient to address the main research question. Therefore, we stress the need for larger prospective observational studies to confirm the prevalence of CPSP in settings like thoracic surgery by thoracotomy and video-assisted thoracic surgery. We need such studies so that we can better understand the preoperative factors that may be modifiable.[6] Furthermore, when planning larger prospective observational studies, it is also useful to have information from population-based studies of events after surgery on which to base power analyses.

Competing Interests

The authors declare no competing interests.

Antonio Montes, M.D., Ph.D., Sergi Sabate, M.D., Ph.D., Gisela Roca, M.D., Ph.D., Jaume Canet, M.D. Parc de Salut MAR, Institut Municipal d'Investigació Mèdica, Universitat Autònoma de Barcelona, Barcelona, Spain (A.M.). amontes@parcdesalutmar.cat

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