Surgeon experience: Nothing learned! Or nothing to learn?

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See related article on pages 998-1004 in the April issue.

Education is an admirable thing, but it is well to remember from time to time that nothing that is worth knowing can be taught.

—Oscar Wilde (1854-1900)

Scheel and colleagues¹ hypothesize that increased surgeon experience results in lower morbidity and mortality and better survival in patients with pathologic stage I non-small cell lung cancer (NSCLC) undergoing resection. After an unusual analysis of retrospective data, they conclude “Our main findings in this study are that experience after fellowship training does not affect short-term outcomes after resection for lung cancer.” Are we to believe that no experience was gained by the surgical team during care of 800 patients with lung cancer? Perhaps there may be something to learn from this experience!

ANALYSES

The authors examine pathologic stage I NSCLC treatment outcomes of 8 surgeons over a 13-year period. However, this is an inbred practice; all 7 surgeons were trained by the eighth senior surgeon, thus blurring the shift from fellow to staff and eliminating experience gained from moving to a new institution. The authors arbitrarily trifurcate surgeon experience into low (<5 years of practice after fellowship), moderate (5 to 10 years), and high (>15 years). This study design led to an unbalanced experience distribution with an exponential increase of surgical volume with experience, such that 6 surgeons with low experience performed 22% of the resections, 5 surgeons with moderate experience performed 28% of the resections, and 2 surgeons with high experience performed 50% of the resections. The passage from experience group to experience group is abrupt and not a reflection of possible gradual acquisition of experience at these transitions. The

low experience cutoff may be too crude to capture early gains in experience and nonlinear increases in early experience. The unlimited high experience period assumes there is nothing to learn after 15 years of practice and no degradation or loss of surgical ability over time.

Time and acquisition of experience are continuous and should be analyzed as such. A longitudinal analysis of each surgeon's outcomes is necessary to test the authors' hypothesis. This statistical approach would permit discovery of experience gained by each surgeon over time, because this is likely to differ among 8 surgeons. Collaboration with statisticians experienced in longitudinal analysis would have allowed abandonment of arbitrary division of continuous study variables and use of analytic techniques more appropriate for assessing change over time.

OPERATIONS

Experience is one thing you can't get for nothing.

—Oscar Wilde

Measurement of experience is confounded by the introduction of video-assisted thoracoscopic surgery (VATS) resections in the middle of the study period. This is not only a so-called time-varying covariable, but one whose effect may be different among different surgeons. The learning process and experience acquired during adoption of VATS techniques by practicing surgeons were not accounted for. The authors noted the greatest use of VATS by surgeons with moderate experience rather than those with low or high experience. These findings may be the best measure of experience acquired during the study period. Surgeons with low experience gained a facility with VATS resection such that when they passed into the moderate experience category, this experience resulted in increased VATS use. Similarly for surgeons with high experience, their learning period was confined to the high experience category, accounting for less use than by surgeons with moderate experience, who had relatively more VATS experience.

PATIENTS

Inability of this retrospective analysis to identify an effect of surgeon experience on patient outcome may be the result of many factors beyond experience, including selection of patients. This negative study could be explained by an inadequate analysis of retrospective data.^{2,3} The

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authors used 89 pairwise comparisons to test for differences in composition of the study groups. They ignored statistical differences; surgeons with low experience were more likely to resect higher-risk male and nonwhite patients.^{1,4,5} Retrospective studies mandate use of matching analysis, such as by propensity scores, to minimize bias and best ensure comparisons of similar patients undergoing resection. Without this addition to the analyses, slight differences may be explained by referral or selection bias.

CANCERS

Nothing is so good as it seems beforehand.

—George Eliot (1819-1890)

The authors assume homogeneous survival in pathologic stage I NSCLC and explain survival difference by experience. However, the largest survival difference between stage-contiguous groups or subgroups in the 7th edition American Joint Committee on Cancer lung cancer staging is between stage IA (73% at 5 years) and IB (58% at 5 years).⁶ This survival variability is accentuated in stage IA, in which cancer diameters vary from subcentimeter to 2 cm. Other cancer characteristics, such as adenocarcinoma subtypes, extent of invasion, and number of pure ground-glass opacity cancers resected, are ignored, and no data concerning cancer characteristics are given. Variability in cancer characteristics and thus study group compositions may explain small survival differences among study groups.

ERRORS AND MISTAKES

Failure to identify an association is not the same as finding it does not exist. The authors' inability to prove their hypothesis may be accounted for by type II error. We believe something was learned by all surgeon groups, but the statistical methodology and use of incomplete, retrospective data were inadequate to test the hypothesis. We also believe there is much to be learned from this experience in constructing and conducting clinical studies.

The only real mistake is the one from which we learn nothing.

—Henry Ford (1863-1947)

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