Reviewer's report

Title: Prediction of Conversion of Laparoscopic Cholecystectomy to Open Surgery with Artificial Neural Networks

Version: 1 Date: 25 March 2008

Reviewer: Juliane Bingener-Casey

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Journal: BMC Surgery
Type of article: Research article

Authors:
Changiz Gholipour
Mohammad Bassir Abolghasemi-Fakhree
Rosita Alizadeh Shalchi
Mehrshad Abbasi

1. Is the question posed by the authors well defined? Yes. The intent of this study was to predict the conversion of LC to open surgery using ANN.

2. Are the methods appropriate and well described? The methods are appropriate. The authors define a large retrospective training population and a subsequent prospective training population, although this population is significantly different from the training population in at least two aspects that influence the statistical model. The description of the methods would benefit of clarification of the term “enrolled” for the retrospective section and an easier to read description of the Neural Network construction.

3. Are the data sound?
Univariate and multivariate analysis were employed and compared with the results for the ANN. There is potential for significant interaction among several of the variables (bilirubin, Alk phos, CBD size, CBD exploration, experience of the surgeon) listed as reason for conversion, which is not addressed. No information is provided on the standard management of common bile stones in the practice of the authors. CBD stones were the single significant determinant of conversion in the multivariate analysis however. The authors predict 5/9 conversions with a discrimination model and 6/9 conversions with the Artificial neural networks correctly. The occurrences of conversions in the validation group may be to small to show that the ANN is indeed significantly more capable in predicting the conversion than the easier to use method. As an aside: Results for bleeding time
which was listed in the method section are not given. The trend of conversions over the time period of the study (1997-2004 and 2006) would be interesting to know, as in many institutions equipment issues and staff learning curves have affected the conversion rate.

4. Does the manuscript adhere to the relevant standards for reporting and data deposition? Yes

5. Are the discussion and conclusions well balanced and adequately supported by the data? The discussion concludes that the conversion of LC to open surgery is “fairly” predictable ….by ANN. While the technologically more complex method appears to have less false positives, the utility of the ANN beyond the discrimination method (or even beyond the bedside assessment of the experienced surgeon?) in preparing the patient and the team for a conversion is not clearly supported by the data. It would be interesting to know if the authors changed their practice based on their findings.

6. Are limitations of the work clearly stated? Several of the limitations of the study and the Artificial Neural Network method have been clearly stated in the manuscript.

7. Do the authors clearly acknowledge any work upon which they are building, both published and unpublished? Yes

8. Do the title and abstract accurately convey what has been found? Yes

9. Is the writing acceptable? Yes

The above would all fall under minor essential revisions.

What next?: Accept after minor essential revisions

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Acceptable

Statistical review: No, the manuscript does not need to be seen by a statistician.

Declaration of competing interests:

'I declare that I have no competing interests'