Reviewer’s report

Title: Does the principle of minimum work apply at the carotid bifurcation: a retrospective cohort study.

Version: 1 Date: 9 June 2011

Reviewer: Stefan Klein

Reviewer’s report:

This article investigates the hypothesis that the radii of common, internal and external carotid satisfy the relation \( r_c^3 = r_i^3 + r_e^3 \). It is a well written paper and the results are interesting.

Major Compulsory Revisions

1) The way of visualising the distribution of \( n \) is not very clear. The histograms in figure 2 and 3 are hard to compare because of the different axis scales and the limited number of subjects (which makes the histogram shape very much dependent on the choice of barwidth etc). I think a single figure with 4 boxplots (entire set method A, entire set method B, low-tortuosity subset method A, low-tortuosity subset method B) would be much more clear.

2) Two radius estimation methods were evaluated. It should be better explained why these two methods were compared (do they have theoretical advantages/disadvantages wrt eachother?), and in the discussion section it should be discussed if we can draw any conclusions about this comparison.

3) The nonlinear regression method to estimate the optimum exponent for the entire cohort should be explained in more detail, to facilitate implementation by other researchers. Also some more details should be given on the implementation of the numerical root finding method. In the Results section, when mentioning "close to 1.3" it should be more explicitly stated that this is the result of the nonlinear regression. Also, this result should be reported both for method A and method B.

4) The use of patients with stenosis (although smaller than 30%) may have influenced the results. Although this is acknowledged in the discussion by the authors already, it would be good to analyse the potential effect of this a bit more in detail. I suggest to report the results also on a subset of arteries without stenosis and compare to the remaining stenosed arteries.

- Discretionary Revisions

none

- Minor Essential Revisions
5) Methods, Segmentation: "minimal paths" -> maybe the term "minimum cost path" is more clear (if that is what was meant)

6) Discussion: "such variation" -> "such as variation"

**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