Reviewer's report

Title: Custom design of orthopedic implants based on patient specific Computed Tomography data evaluated using Finite Element Analysis - Case of Femoral Component

Version: 1 Date: 1 March 2007

Reviewer: Jia Hua

Reviewer's report:

General

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Major Compulsory Revisions (that the author must respond to before a decision on publication can be reached)

In the paper, the authors attempt to design a custom knee implant which will fit better with individual patients' femoral condyles using robotic surgery. The FE study showed that the custom implant achieved more even stress distribution compared with the standard design which has stress concentration around the cutting edges. Although the rationale of using custom knee and the design concept may be valid in some instances, the following questions need to be addressed:

1. The main clinical problems for total knee replacements are the ligament balance during surgery and surface conformity between the femoral component and tibial tray, which can directly reduce stress concentration and wear, perhaps not from femoral implant-bone contact.

2. In the FE study, the custom implant showed a more even stress distribution. However, is the implant stability (micromotion between femoral implant-bone interface) compromised?

3. From surgical point of view, is the anatomically shaped implant more difficult to insert accurately?

4. In FE model, a modulus of 10 GPa is far too stiff for cancellous bone which is normally in the range of 0.5-3.0 GPa.

5. The modulus of 110 GPa is for titanium alloy. Why use titanium alloy rather than CoCr which is the material actually used for femoral component in TKR due to its wear characteristics?

6. The authors proposed that this custom knee should be used in more unusual deformed knees; however, the FE model for testing stress distribution is based on a rather normal geometry.

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Minor Essential Revisions (such as missing labels on figures, or the wrong use of a term, which the author can be trusted to correct)

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Discretionary Revisions (which the author can choose to ignore)

What next?: Unable to decide on acceptance or rejection until the authors have responded to the major compulsory revisions

Level of interest: An article of limited interest

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