

Peer Review File

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Reviewer

Comment 1:

Lines 92-94: The contents of the reference papers no.17 and no.18 are the results of comparing conventional and navigated THA in patients with primary hip OA or avascular necrosis (AVN) of the femoral head were included. The patients with DDH OA were not included. In the manuscript, the readers may interpret the sentence in lines 92-94 as the meaning that no improvement in accuracy and no significant benefit were reported between conventional THA and navigation THA in patients with DDH OA. Before this sentence, the authors described about patients with DDH OA. In this sentence, the authors described about the study results of the patients with primary OA or AVN contrastively. The causative disease for THA are different. The context may misguide the readers. The authors should cite papers considering the causative disease of hip OA.

Reply 1:

We are very sorry for our negligence. As you said, the description and its references may misguide the readers. Therefore, we rewrote the relevant part in “Background”; we rewrote the relevant part and supplemented the description of the etiology of THA involved in the relevant reference papers.

Changes in the text (Comment 1):

Many research groups have previously attempted to solve this problem. Some have advocated that the acetabular orientation and position can be determined by fully understanding the pathomorphology of the acetabulum and Harris fossa of all Crowe types (5). However, there are disadvantages to these methods, such as a steep learning

curve and possibly extensive surgical exposure and injury (13). Some new digital technologies assisted surgery, such as computer navigation and augmented reality (AR), may be able to solve the problem, but studies on such technologies mostly focus on assisting THA in patients with primary hip osteoarthritis or femoral head avascular necrosis, and the results of these studies suggest that ideal solutions still cannot be found. Computer navigation techniques can assist with locating the true acetabulum and installing the guide cup (14-16). However, such techniques are expensive and impractical at some institutions. Furthermore, some studies have reported no improvement in accuracy and no significant benefit between conventional methods and navigational technology (17, 18). Kollamaram et al. (19) designed an augmented reality (AR)-HIP system to aid in determining the proper orientation during surgery; however, its clinical feasibility remains unknown (20).

(See the second paragraph of “Background”)

Comment 2:

Lines 452-454: The reference paper no.39 reported the long-term results of primary THA in patients with DDH using acetabular impaction bone grafting, not reported that the COR, PACC, and cup orientation could directly determine hip function. The authors miscited the paper. The authors should have read the cited papers carefully.

Reply 2:

We are very sorry for our negligence. As you said, we miscited the paper. However, since we need to make a major revision to this part according to “Comment 3”, the corresponding reference paper is no longer required for this position. Therefore, we have deleted the reference no. 39.

Changes in the text (Comment 2):

See the Comment 3.

(See the penultimate paragraph of “Discussion”)

Comment 3:

Lines 452-454: The authors should discuss again about the reason why the HHS of the PSI group were significantly better than that of the CO group in Crowe III and IV 12 months after surgery. The cup orientation differences between the PSI group and CO group in Crowe III and IV were less than 10 degrees, less than 6 mm in COR, and complications were the same rate. To my knowledge, there are almost no reports that less than 10 degrees' differences of cup orientation can directly influence on the hip function.

Reply 3:

This is a very good question, and we know what you mean. Indeed, according to previous experience, a small cup orientation deviation cannot directly influence on the hip function. However, for this study, we would like to point out three special points:

First, for severe DDH patients such as Crowe III or IV, the degree of improvement of hip function after THA caused by cup orientation deviation will be enlarged, compared with that of ordinary primary THA.

Secondly, based on the data provided in this study, for the severe DDH of Crowe III and IV, we also do not believe that such small cup orientation deviation must be the reason for the significant difference in the improvement of hip function one year after surgery. It may also be due to shorter operative time or reduced intraoperative tissue damage.

Thirdly, the sample size of the RCT is limited and the follow-up time is not very long, so a longer follow-up with a larger sample size and even a multicenter prospective study is indeed needed to further clarify the causes of this phenomenon.

Changes in the text (Comment 3):

..... but not Crowe I and II DDH-THA. However, based on the data provided in this study and relevant references, for the severe DDH of Crowe III and IV, we also do not believe that such small cup orientation deviation must be the reason for the significant

difference in the improvement of hip function one year after surgery. In our opinion, the reason may also be due to shorter operative time or reduced intraoperative tissue damage. In addition, it cannot be ignored that for severe DDH patients, the degree of improvement of hip function after THA caused by cup orientation deviation will be enlarged, compared with that of ordinary primary THA. Therefore, a longer follow-up with a larger sample size and even a multicenter prospective study are indeed needed to further clarify the causes of this phenomenon.

(See the penultimate paragraph of “Discussion”)

Comment 4:

Line 107: “RPT technology” should be changed to “RPT”. RPT is the abbreviation of rapid prototyping technology.

Reply 4:

We are very sorry for our negligence and quite agree with your opinion, so we have taken your opinion and replaced the “RPT technology” with “RPT” in the corresponding paragraph.

Changes in the text (Comment 4):

To solve the clinical challenges associated with DDH-THA, our team evaluated relevant research and designed a PSI, based on 3D reconstruction and RPT technology.

(See the fourth paragraph of “Background”)