

## Peer Review File

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### Review Comments

#### Reviewer A

##### Comment 1: ABSTRACT

3,32-33: "The literature is poor about the long-term related outcomes".

3,45: you forgot to describe number of abstracts selected, full text read and final selection of articles in the review.

3: you should re-write the entire results section and also your conclusion without rehearsal between them."

**Reply 1:** Thank you for your comment. We revised all the manuscript as you and other reviewers suggested. We better underlined the methods and the related research in literature with more clearly. This article is a narrative review and not a systematic review, so, in accordance with the "Author Instructions", we have not provided an article selection flowchart. Anyway, we have made the suggested change.

##### Changes in the text:

Lines 31-32: "The literature is poor on this matter and about the long-term related outcomes."

Lines 39-45: "The narrative review of the current available literature was conducted in December 2022 through electronic database. The terms used were: "Head neck taper" OR "Merete BioBall" AND "revision Total Hip Arthroplasty (MeSH Terms)". The timeframe was limited between 01/01/2000 and 01/12/2022. The studies regarding the clinical use of the Merete BioBall® system in hip revision surgery were included, while all the papers concerning modular stem prosthesis were excluded."

Lines 47-59:

Key Content and Findings: The surgical procedure is safe, quick and allows the surgeon to correct a well-fixed stem version, length and offset, besides retensioning soft tissues. Clinical and radiological outcomes are good with low complications rates.

Conclusions: The modular neck adapter system seems to be a good surgical procedure for recurrent dislocation of THA, especially in case of a second THAr surgery. However, the main indication of adapter use remains the isolated acetabular cup revision. The related complications are rare: the worst is the re-dislocation due to an insufficient stem version and length correction. Re-dislocation

rates reported in literature vary from 5.2% to 15%. Corrosion or fretting of the modular system are not reported in literature.

**Comment 2: INTRODUCTION**

5,65: “polyethylene wear and prosthetic dislocation”.”

**Reply 2:** We have made the suggested change.

**Changes in the text:**

Line 71: “[..] polyethylene wear and prosthetic dislocation [..]”

**Comment 3: METHODS**

6,97-7,110: you forgot to distinguish the Methods section. This is a major issue.

You should precise the objective of the study which is to assess the BioBall Merete system in terms of clinical and radiological long-term results in revision THA.”

**Reply 3:** Thank you for your comment. You are right and we apologized to forget the Methods section, as it is indicated in the “Author Instructions”. We created an entire new section (Paragraph 2. Methods). We explain in this section the methods used to create this narrative review, also summarized in the attached table (Table 1).

**Changes in the text:**

Lines 108-120:

2. Methods

The narrative review of the current available literature was conducted in December 2022 through electronic database PubMed, Scopus and Embase. Electronic search was performed independently by two reviewers (AP and GB) using the following terms: “Head neck taper” OR “Merete BioBall” AND “revision Total Hip Arthroplasty (MeSH Terms)”. The timeframe was limited between 01/01/2000 and 01/12/2022. Only English-language articles were selected. Published studies that contained data regarding the clinical use of the Merete BioBall® system in hip revision surgery were included, while all the papers concerning modular stem prosthesis and the related neck complications were excluded. The abstract of the selected articles was evaluated. Furthermore, a manual search within the references of the selected articles was performed by the authors (table 1).”

**Table 1.** The search strategy summary

Items	Specification
Date of Search	December 16 <sup>th</sup> , 2022
Databases and other sources searched	Embase/PubMed/Scopus
Search terms used	“Head neck taper” OR “Merete BioBall” AND “revision Total Hip Arthroplasty (MeSH

	terms)”
Timeframe	2000 – 2022 Exceptions for references of past classifications (cit. Brooker)
Inclusion and exclusion criteria	Only English language articles were included
Selection process	AP and GB conducted independently the research on the electronic database.
Any additional considerations, if applicable	Abstracts of the selected articles were evaluated; Published studies that contained data regarding the clinical use of the Merete Bioball system in hip revision surgery were included; All the papers concerning modular stem prosthesis and the related neck complications were excluded.

#### **Comment 4: RESULTS**

7...: you forgot to distinguish the Results section. This is another major issue. Where is your flow-chart description?

9,151: “these parameters are not so much important”: please re-write it as it is scientifically inappropriate.

9,156: “VAS” should be explained first.

10,172: “an in vitro”.

10,173: “released”.

11,204: “very big mistakes” is inappropriate.

**Reply 4:** We have made the suggested change as you indicated. Concerning the Results section, this paper is a narrative review and so, all the different sections “3. Indications” – “4. Clinical and radiological outcomes” – “5. Related complications and implants survival” are results of what is expressed in the scientific literature. We read again and with more accuracy the Authors Instructions, and it does not describe a specific “Results section” but a “main body” (beyond Methods section as you correctly underlined before).

#### **Changes in the text:**

Lines 165-167: “Lekstein et al (18) and De Fine et al (19) in their studies do not show a significant relationship between leg length or femoral offset restoration and the patient’s functional recovery.”

Line 171: “[..] Visual Analogue Scale (VAS) [..]”

Line 188: “[..] an in vitro study [..]”

Line 193: “[..] metal ions released [..]”

Line 228-229: “The adapter system cannot always compensate big version defects of the acetabular cup and the stem.”

#### **Comment 5: CONCLUSIONS**

11,209-12,220: please, re-write some parts of your conclusion as an answer to your reformulated objective.”

**Reply 5:** Thank you for your suggestion. We completely modified this section.

#### **Changes in the text:**

Lines 232-244:

#### 6. Conclusions

The modular neck adapter system seems to be a good surgical procedure for recurrent dislocation of THA with a well-fixed stem but not positioned correctly or during an isolated acetabular cup revision, which is actually the main indication of implant use. The literature is very poor on this matter and the long-term outcomes have yet to be proven in more clinical trials.

However, the taper adapter system allows different length and offset neck changes to reach a stable THA, it permits the surgeon to perform a quick revision without removing the existing components, and finally, the great flexibility and precision of the system results helpful in cases of unexpected surgical situations like unstable hip prosthesis. Some possible complications related to the implant design were reported but as isolated cases. The neck adapter failure or corrosion phenomena have not been reported to date in literature.

#### **Reviewer B**

The authors have presented a review of clinical reports related to modular taper junctions used in revision total hip arthroplasty. This is an interesting topic and has not been done systematically before. I have read the manuscript and have noted my recommendations below. I encourage the authors to address these concerns before publication of their article.

**Comment 1:** Recommend spelling and grammatical revision of the manuscript.

**Reply 1:** We apologize for the poor language. We conducted a revision of spelling and grammar of the entire manuscript, there were different mistakes that we had not noticed. In addition, we submitted our paper to an expert translator in order to improve it. All the changes are highlighted in bold.

**Comment 2:** I had difficulty understanding the scope of each of the articles reviewed. From lines 106 - 8: "Electronic search was performed by AP and GB using the following terms: “Head Neck taper” OR “Merete BioBall” AND “revision Total Hip Arthroplasty (MeSH Terms)”" it seems all modular taper systems were included. From the manuscript, in some cases it is clear that some publications reviewed were exclusively studying Merete BioBall (Eg. lines 162 - 5) while some other publications considered several different modular systems (Eg. lines 171 - 5), whereas in other cases it is not clear if the analyzed population was exclusively Merete BioBall, or some other system, or a combination of several systems (Eg. lines 115 - 7). The results need to be separated for only Merete Bioball and for modular taper systems in general.

**Reply 2:** Thank you for your comment. We have added and re-written the methods section, underlining the objective of our paper (also declared at the end of the Introduction Section in the lines 103-105). Our narrative review, as it was proposed by the editorial team, regard the adapter in the partial hip revision. As we mentioned in lines 90-91, the Merete Bioball® is currently the only head-neck universal adapter commercialized on the market. The modular tapers of the modular stem prosthesis are not adapters but part of the stem prosthesis itself. Furthermore, this concept is clearly specified by Kretzer et al in their in vitro study: we have reported it in our manuscript in lines 187-193 concerning the complications and the implants survival (Section 5).

**Comment 3:** In some studies reviewed by the authors, the sample size is not mentioned casting doubt on the deductions drawn from those publications. (Eg. - Lines 144 - 61)

**Reply 3:** Thank you for your suggestion. We added the sample size of the studies involved in the review where we had not reported it. We mentioned the number of enrolled patients in each articles cited.

**Changes in the text:**

Line 125: “Hoberg et al (2), in their study on 95 patients, found out [..]”

Lines 130-131: “In the recent systematic review of the Merete BioBall® system described by Novoa et al (1), which involved 194 patients out of 14 studies included, [..]”

Line 156: “Hoberg et al (2), in their study on 95 patients, did not find [..]”

Lines 160-161: “[..] was demonstrated by Woelfle et al (12). In their study on 37 patients who performed [..]”

**Comment 4:**

It is not clear if the following data presented are averages or had a sample size of 1.

line 154 - 80.9 score in Harris Hip Score.

line 158 - Harris Hip Score was only 54.0.

**Reply 4:** Thank you. We have more clarified the HHS data presented.

**Changes in the text:**

Lines 168-169: “Patients experienced a Harris Hip Score (HHS) average of 80.9 after surgery [..]”

Lines 173-174: “[..] the Harris Hip Score average post-surgery was 54.0 in their series on 37 patients.”

**Comment 5:** The following sentence does not convey any meaning. I suspect the author means to say "... to note that no cases of ...", line 190 - It is important to note that any cases of ceramic head fracture have ever been reported when using BioloX<sup>®</sup> Delta<sup>®</sup> ceramic heads<sup>8,16</sup>”

**Reply 5:** We have made the suggested change.

**Changes in the text:**

Lines 210-211: “It is important to note that **no** cases of ceramic head fracture have ever been reported when using BioloX<sup>®</sup> Delta<sup>®</sup> ceramic heads (8), (16).”

**Comment 6:**

Numbers (Eg. 5 in 10,000) regarding the complication rate are far more valuable than simply mentioning that the rates are low or rare. I recommend adding these statistics to the following claims in the abstract:

lines 48 - 9: Clinical and radiological outcomes are good with low complications and a long service life of the prosthetic implant

lines 52 - 4: The related complications are rare: the worst is the re-dislocation due to an insufficient correction of the stem version and length.”

**Reply 6:** Thank you for your comment. We now cited the re-dislocation rates after the use of the Merete BioBall adapters. We modified the text without citing the long-term outcomes and durability of the implant, since in literature there is few evidence about this matter. We added data about the BioBall’ time survival, as shown by Hoberg et al with 92.8% of implant survival at 8.17 years. This outlines the long-term duration of the implant, although more studies could confirm this thesis.

**Changes in the text:**

Lines 57-58: “Re-dislocation rates reported in literature vary from 5.2% to 15%. ”

Lines 219-222: “Hoberg et al (2) reported in their study a 92.8% (95% CI: 84–95) implant survival at 8.17 years: this confirms the good survival of the adapter. Nevertheless, more studies are needed to confirm the long term-outcome presented.”

Lines 227-228: “The Re-dislocation rates reported in literature vary from 5.2% (2) to 15% (12).”

### **Reviewer C**

**Comment:** The authors conducted a narrative review on the topic of the use of Modular Neck Adapter in Partial Hip Revision. The manuscript is well written even if some concerns regarding spelling and grammar have been made by reviewers. We strongly suggest to address this issue. Moreover, discussion and conclusions section need to be arranged as an answer to your reformulated objective, that focus the on the different results they have discussed in the paper (indications, outcomes, survival etc). Overall, the paper is suitable for publication after these major revisions.

**Reply:** Thank you for your comment. We have followed your suggestions and the manuscript was revised by a native English speaker. We have better clarified the objective of the manuscript and reformulated different parts, or entire sections, of the paper. We hope that the changes satisfactorily address your concerns.