Revision Rate due to Dislocation in Relation to Head Size

Peter Münger¹, Jessica Bettführ¹, Lukas Staub², Emin Aghayev²

1 Mathys Ltd Bettlach, Switzerland
2 Swiss Implant Registry, Switzerland

Introduction

Dislocation is the most common reason for early component revisions and a major complication for failure of inserted prosthesis in total hip arthroplasty. Dislocation can be influenced by head size (Fig. 1).

Although the use of femoral head sizes smaller than patient’s own femoral heads is a critical cause for dislocation, the use of larger femoral heads has been limited due to the increased volumetric wear at bearing surfaces. However, with recent advances in articulation materials such as highly cross-linked polyethylene, progress has been made on wear and may overcome these issues.

The aim of this study was to analyze the dislocation rate for the RM Pressfit acetabular components based on data from the Swiss Implant Registry (SIRIS).

Methods

SIRIS runs since September 2012, has national coverage of >95% and so far more than 83'000 hip procedures have been documented. One un cemented monobloc cup (available with 28 mm, 32 mm and 36 mm inner diameters) and two different polyethylene inlays was evaluated (RM Pressfit and RM Pressfit vitamys cup, Mathys Ltd Bettlach, Switzerland; Figs. 4, 5). The RM Pressfit cup is made of Ultra High Molecular Weight Polyethylene (UHMWPE) and available with 28 and 32 mm inner diameters. The RM Pressfit vitamys cup is made of Highly Cross Linked and vitamin E doped Polyethylene (VEPE). As the outer design of the two cups are identical they are matched and revision rates per 100 Observed Component Years (OCY) due to dislocation were calculated for the 3 different head size groups. Not overlapping confidence intervals (CI) were considered to be significantly different. We hypothesize that the revision rate is decreasing by head size and diameter 36 mm will have the lowest revision rate for dislocation. We compared our results with the data from the AOANJRR and New Zealand Joint Registries (NZJR).

Results

9029 cups were documented in the SIRIS (1227 UHMWPE and 7802 VEPE) - 1169 28 mm, 5687 32 mm and 2173 36 mm heads were used. A total of 45 revisions due to dislocation occurred. 19 revisions were found in the group of 28 mm heads, 18 in the group of 32 mm and 8 for 36 mm heads, leading to a revision rate per 100 OCY of 0.66, 0.17 and 0.19, respectively (Table 1).

Discussion

The revision rate due to dislocation is decreasing when head sizes larger than 28 mm are used. No significant difference was observed between 32 and 36 mm heads. However, the long-term behavior in terms of wear produced by large heads remains unclear. Both studied monoblock cups show excellent mid- to long-term outcome and have a SA* and a 10A* ODEP rating, respectively. Using whenever possible a head larger than 28 mm may reduce failure due to dislocation. In comparison to a modular cup this type of uncemented cup allows to have a thicker polyethylene, as no outer shell is needed. In terms of durability, a thicker polyethylene may be a potential benefit of the RM Pressfit cups.

Conclusion

The preliminary results of SIRIS data confirms the higher revision rate due to dislocation of small heads. To reduce the dislocation rate, a larger head size may be recommended. However, no difference was found between femoral heads of 32 mm or 36 mm diameter. In addition these results are in agreement with the findings reported by both, NZJR and AOANJRR.

References

1) AOANJRR, Annual Report 2016
2) The New Zealand Joint Registry, Seventeen Year Report, January 1999 to December 2015
3) AOANJRR, Annual Report 2014

Methods

Table 1: Revisions for dislocation per 100 OCY in relation to the different inner diameters and head size respectively

<table>
<thead>
<tr>
<th>Head size</th>
<th>N</th>
<th>Revised for dislocation</th>
<th>OCY</th>
<th>Revisions per 100 OCY</th>
<th>95% CI lower limit</th>
<th>95% CI upper limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>28mm</td>
<td>1169</td>
<td>19</td>
<td>2887</td>
<td>0.66</td>
<td>0.42</td>
<td>1.03</td>
</tr>
<tr>
<td>32mm</td>
<td>5687</td>
<td>18</td>
<td>10654</td>
<td>0.37</td>
<td>0.21</td>
<td>0.77</td>
</tr>
<tr>
<td>36mm</td>
<td>2173</td>
<td>8</td>
<td>4275</td>
<td>0.19</td>
<td>0.09</td>
<td>0.37</td>
</tr>
<tr>
<td>Total</td>
<td>9029</td>
<td>45</td>
<td>17799</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Discussion

The revision rate due to dislocation is decreasing when head sizes larger than 28 mm are used. No significant difference was observed between 32 and 36 mm heads. However, the long-term behavior in terms of wear produced by large heads remains unclear. Both studied monoblock cups show excellent mid- to long-term outcome and have a SA* and a 10A* ODEP rating, respectively. Using whenever possible a head larger than 28 mm may reduce failure due to dislocation. In comparison to a modular cup this type of uncemented cup allows to have a thicker polyethylene, as no outer shell is needed. In terms of durability, a thicker polyethylene may be a potential benefit of the RM Pressfit cups.

Conclusion

The preliminary results of SIRIS data confirms the higher revision rate due to dislocation of small heads. To reduce the dislocation rate, a larger head size may be recommended. However, no difference was found between femoral heads of 32 mm or 36 mm diameter. In addition these results are in agreement with the findings reported by both, NZJR and AOANJRR.

References

1) AOANJRR, Annual Report 2016
2) The New Zealand Joint Registry, Seventeen Year Report, January 1999 to December 2015
3) AOANJRR, Annual Report 2014

Discussion

The revision rate due to dislocation is decreasing when head sizes larger than 28 mm are used. No significant difference was observed between 32 and 36 mm heads. However, the long-term behavior in terms of wear produced by large heads remains unclear. Both studied monoblock cups show excellent mid- to long-term outcome and have a SA* and a 10A* ODEP rating, respectively. Using whenever possible a head larger than 28 mm may reduce failure due to dislocation. In comparison to a modular cup this type of uncemented cup allows to have a thicker polyethylene, as no outer shell is needed. In terms of durability, a thicker polyethylene may be a potential benefit of the RM Pressfit cups.

Conclusion

The preliminary results of SIRIS data confirms the higher revision rate due to dislocation of small heads. To reduce the dislocation rate, a larger head size may be recommended. However, no difference was found between femoral heads of 32 mm or 36 mm diameter. In addition these results are in agreement with the findings reported by both, NZJR and AOANJRR.

References

1) AOANJRR, Annual Report 2016
2) The New Zealand Joint Registry, Seventeen Year Report, January 1999 to December 2015
3) AOANJRR, Annual Report 2014

Discussion

The revision rate due to dislocation is decreasing when head sizes larger than 28 mm are used. No significant difference was observed between 32 and 36 mm heads. However, the long-term behavior in terms of wear produced by large heads remains unclear. Both studied monoblock cups show excellent mid- to long-term outcome and have a SA* and a 10A* ODEP rating, respectively. Using whenever possible a head larger than 28 mm may reduce failure due to dislocation. In comparison to a modular cup this type of uncemented cup allows to have a thicker polyethylene, as no outer shell is needed. In terms of durability, a thicker polyethylene may be a potential benefit of the RM Pressfit cups.

Conclusion

The preliminary results of SIRIS data confirms the higher revision rate due to dislocation of small heads. To reduce the dislocation rate, a larger head size may be recommended. However, no difference was found between femoral heads of 32 mm or 36 mm diameter. In addition these results are in agreement with the findings reported by both, NZJR and AOANJRR.

References

1) AOANJRR, Annual Report 2016
2) The New Zealand Joint Registry, Seventeen Year Report, January 1999 to December 2015
3) AOANJRR, Annual Report 2014