

**Meek RMD, Treacy R, Manktelow A, Timperley JA, Haddad FS.** Sport after total hip arthroplasty: undoubted progress but still some unknowns. *Bone Joint J.* 2020;102-B(6):661-663.

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**Authors' reply:**

Sir,

We thank Prof. Sedel and his colleagues for their letter in response to our annotation.<sup>1</sup> Ceramic-on-ceramic bearings do indeed have the lowest wear on biomechanical testing, but there is less clinical evidence to convert this superiority into survivorship when compared with highly crosslinked polyethylene.<sup>2,3</sup> The extent of the reduction in risk of revision with the use of highly crosslinked polyethylene has recently been published.<sup>4,5</sup> Davis et al<sup>4</sup> linked this partly to the effect of elevated liners on reducing dislocation: these liners are not currently available for use with hard bearings. So, although ceramic-on-ceramic bearings give excellent results, modern highly crosslinked polyethylene bearings are also reported to be a safe and excellent option in young patients, with a low rate of wear and no evidence of osteolysis.<sup>6,7</sup>

Although the overall rate of fracture of ceramic-on-ceramic bearings has improved, there has been no reduction in the incidence of fracture of the acetabular liner despite the introduction of Biolox delta.<sup>8</sup> Also, if the ceramic does fracture, the subsequent revision is complicated by the presence of ceramic particles which can cause third-body abrasive wear.<sup>9</sup>

Another unsolved complication of ceramic-on-ceramic bearings is the noise they can make. When present, it is associated with poor patient satisfaction and lower patient-reported outcome measure (PROM) scores.<sup>10</sup> Increasing head size comes with a price: although it is not associated with a significant increase in wear and reduction in dislocation, it is associated with noise production and therefore a potential cause of long-term dissatisfaction in a young patient.<sup>11,12</sup>

However, the observation of increased capsular thickness with ceramic-on-ceramic bearings is of interest and deserves further study, with longitudinal imaging studies, finite analysis modelling of effect of capsular thickness on stability, and range of movement and gait analysis.<sup>13,14</sup> The properties of the hip capsule have not been fully studied and are complex: the effect of any biomaterial on them will be of importance. In view of this suggestion of a healthier capsule, it would be interesting to know the authors' views on how standard metal-on-metal cobalt-chromium (CoCr) hip resurfacing

and the recent development of ceramic-on-ceramic hip resurfacing compare with resurfacing using highly crosslinked polyethylene.<sup>15</sup>

Data reported from the New Zealand Registry does indeed support the excellent clinical results of ceramic-on-ceramic bearings. Prof. Pitto has also proposed the theory of better capsular thickness with the lack of particle debris and a “healthy, fibrotic synovial-like pseudocapsule”.<sup>16</sup> Nevertheless, more information is needed to support this hypothesis. As always, registry data must be interpreted carefully for association rather than causality: a recent analysis of the UK and Swedish registries reported no benefit from the use of ceramic-on-ceramic bearings over ceramic-on-polyethylene bearings in younger adults and, indeed, proposed that the lower risk of revision after small-head cemented ceramic-on-polyethylene hip arthroplasty reduces average lifetime costs and achieves higher quality-adjusted life year (QALY) gains than ceramic-on-ceramic implants.<sup>17</sup>

Clearly, longer-term work is needed to establish the role of bearings and the ultimate perfect bearing for patients of all ages and levels of activity. However, at present, the evidence supports the use of both hard-on-hard and hard-on-highly crosslinked polyethylene, provided that young sporting patients are appropriately advised.

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