Metal-on-Metal vs Conventional Total Hip Arthroplasty: A Systematic Review and Meta-Analysis of Randomized Controlled Trials


A systematic review was undertaken to identify the Level I studies comparing metal-on-metal (MOM) with conventional total hip arthroplasty (THA) and to perform a meta-analysis of the aggregate data comparing their functional and radiographic outcomes and complication rates.

Articles published between January 1980 and July 2011 were searched in the Medline and EMBASE databases using the keyword terms metal-on-metal and hip arthroplasty, yielding 608 unique articles. The study design was such that all authors reviewed the titles, abstracts, and full text of the articles to determine whether they met study criteria.

Inclusion criteria were (1) written in the English language; (2) randomized, controlled trial (Level I or II evidence); (3) compared MOM with conventional primary THA with regard to functional outcomes, radiographic outcomes, or complication rates; and (4) follow-up longer than 2 years. Exclusion criteria were review articles, case reports, technique articles, editorials, and studies without defined inclusion criteria.

First, the authors reviewed the titles of the articles to determine whether inclusion criteria were met, resulting in the elimination of 560 articles. Next, the abstracts for the remaining articles were reviewed, resulting in the elimination of 39 articles. Then, the full text of the remaining 9 articles were reviewed, resulting in the elimination of 5 articles. Four Level I randomized, controlled trials were included in the current systematic review.

Data for the studies were extracted. A Mantel-Haenszel cumulative fixed-effects weighted meta-analysis was performed. The weighted mean differences for continuous variables and weighted odds ratios for dichotomous variables were calculated. Egger statistic was used to assess for publication bias in the major variables of Harris Hip Scores and complication rates.

The aggregated data included 412 hips with a frequency weighted mean patient age of 57.8 years and a frequency weighted mean follow-up time of 5.7 years. The MOM and conventional THA groups did not significantly differ with regard to mean patient age (MOM, 57.0 years; conventional THA, 58.9 years) or mean follow-up time (MOM, 5.6 years; conventional THA, 5.9 years).

No significant differences were found between conventional and MOM THAs in terms of pre- and postoperative Harris Hip Scores at final follow-up (weighted mean difference, 1.12 and –1.05, respectively; P=.50 and .37, respectively). No significant difference was found in radiographic outcomes as measured by radiolucent lines at final follow-up (P=.47).

However, patients with MOM THAs demonstrated a 3.37 times greater complication rate than those with conventional THAs. The most commonly reported complications were dislocation, aseptic loosening, trochanteric or iliopsoas bursitis, periprosthetic femoral fracture, and wound dehiscence.

Due to the lack of demonstrated superiority, increased complication rate, greater cost, and potential for adverse medical consequences associated with MOM THA, the authors found the use of MOM bearing surfaces difficult to support.
In this systematic review of metal-on-metal THA vs conventional THA, the authors performed a thorough review of all studies in Medline and EMBASE between January 1980 and July 2011 containing the key words metal-on-metal and hip arthroplasty. With strict inclusion and exclusion criteria, they were able to identify 4 Level I randomized, controlled trials that addressed functional outcomes, radiographic outcomes, and complication rates. A meta-analysis was then performed on the aggregated data. The authors were unable to find any significant difference in functional or radiographic outcomes between the 2 options; however, metal-on-metal THA was associated with a 3.37 times greater complication rate.

Metal-on-metal THA has enjoyed a surge in popularity over the past several years as a possible solution to polyethylene wear, loosening, and early failure of conventional THA. This enthusiasm has recently been severely tempered by reports of significant potential complications, such as pseudotumors, metal ion toxicity, hypersensitivity reactions, and early failure. Although no good long-term data exist on metal-on-metal THA, the early- to mid-term results are discouraging. Given the increased complication rates and cost and the uncertain long-term effects of metal ions and debris, it is hard to justify routine use of metal-on-metal implants. The search for the optimal bearing surface in THA continues.

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