Risk of cancer with metal-on-metal hip replacements: population based study

Keijo T Mäkelä, Tuomo Visuri, Pekka Pulkkinen, Antti Eskelinen, Ville Remes, Petri Virolainen, Mika Junnila, Eero Pukkala

Turku University Hospital, Hjelt Institute (Helsinki University), Coxa Hospital, Peijas Hospital, School of Health Sciences (University of Tampere), Finnish Cancer Registry (Institute for Statistical and Epidemiological Cancer Research)

Background and purpose

Metal-on-metal hip resurfacing arthroplasty and large diameter head total hip arthroplasty have regained popularity during the past 10 years.

Recently, more complications involving wear of the metal-on-metal bearing surface have been detected. Metal debris can be dispersed throughout the body and has been found in the liver, spleen and in local and distant lymph nodes. Metal debris from hip implants can be associated with chromosomal aberrations and DNA damage.

This study's purpose was to assess the risk of cancer associated with modern primary metal-on-metal hip replacements.

Materials and methods

The metal-on-metal cohort included all patients who had received metal-on-metal hip resurfacing and large head metal-on-metal total hip designs that had been used at least 20 times from 2001–2010. We excluded patients with rheumatoid arthritis because they have a non-typical pattern of cancer.

Patients who underwent metal-on-polyethylene, ceramic-on-polyethylene or ceramic-on-ceramic total hip arthroplasty during the study period were the reference cohort.

The metal-on-metal cohort comprised 10 728 patients and the non-metal-on-metal cohort comprised 18 235 patients.

The relative risk of cancer was expressed as the ratio of observed to expected number of cases from the Finnish population – that is, the standardised incidence ratio. The relative risk of cancer in the metal-on-metal cohort compared with non metal-on-metal cohort was estimated with analyses of these ratios and Poisson regression

Results

The overall risk of cancer in patients with metal-on-metal hip implants was similar to that in the Finnish population (378 observed v. 400 expected, standardised incidence ratio 0.95, 95% confidence interval 0.85 to 1.04). The overall risk of cancer in patients with metal-on-metal cohort was also no higher than in patients who had received non-metal-on-metal hip implants (relative risk 0.92, 0.81 to 1.05).

The incidence of basal cell carcinoma in the metal-on-metal cohort was higher than the expected number of cancers (1.37, 1.15 to 1.61) and in the non-metal-on-metal cohort (relative risk 1.32, 1.06 to 1.66).

The risk of soft tissue sarcoma in the metal-on-metal cohort was also increased but not significantly so (standardised incidence ratio 2.18, 0.71 to 5.09).

Interpretation

Metal-on-metal hip replacements are not associated with an increased overall risk of cancer during a mean follow-up of four years.

There is a suggestion of an increased risk of basal cell carcinoma and sarcoma at the early stage of follow-up, though this could be a chance finding.

All five sarcomas found in patients with metal-on-metal hip implant were diagnosed during the last three years of the follow-up. Longer follow-up is needed to assess the sarcoma issue.

References

1. BMJ 2012;345:e4646