Ion Levels In Unilateral And Bilateral Hip Resurfacing Patients

INTRODUCTION:

Metal-on-metal implants are used increasingly to treat hip problems in young and active patients. The wear of these all-metal bearings cannot be monitored radiographically and unless there are soft-tissue problems related to a wear-related synovitis, there is no way to know if the bearings are performing optimally. The levels of metal ions in the serum and urine of patients with metal-on-metal hip resurfacing implants can provide a means to monitor the wear of the bearings. Data in the literature has shown that patients with well-functioning metal-on-metal hip resurfacing implants can have metal levels comparable to metal-on-metal conventional stem-type devices. Studies to date have presented data from patients with a unilateral hip resurfacings and little is known about ion levels in patients with bilateral implants. This prospective study of one design of hip resurfacing, now out to 5 years or more, includes a group of patients who received a bilateral hip resurfacing either in a simultaneous or staged operation.

METHODS:

Forty-nine patients (average age 49, 9 females) consented to take part in the study which was approved by the Hospital Institutional Review Board prior to commencement. Forty-four of these cases were initially implanted with a unilateral Conserve Plus (Wright Medical Technology Arlington, TN) hip resurfacing by the senior author. Nine subsequently were implanted with a Conserve Plus on the contra-lateral side from 4 to 48 months following the first hip (staged implantations). Five male patients had bilateral resurfacings done simultaneously. Blood samples were collected pre-operatively in most patients, and at 4 months, 12 months and annually thereafter. The blood was allowed to clot, and the serum fraction was removed under a Class 100 biological safety hood. All reagents were ultrapure and collecting vessels were acid-washed to prevent contamination. The serum samples were analyzed in triplicate for cobalt and chromium using graphite furnace atomic absorption spectrometry with a detection limit of 0.3 to 0.03 ng/ml respectively. The data were compared between the groups and also correlated with UCLA activity scores, cup angle, BMI and component size. Box plots were used to compare distributions. Linear regression analysis was used to evaluate the time trends for the three groups.

RESULTS:

Five year or later data was available on 20 of the unilateral group, two of the simultaneous bilateral and 5 of the staged bilateral patients. With the exception of the 4 year chromium measurement, the simultaneous bilateral average levels were higher at all time periods compared with the staged bilateral patients monitored at the same time point for the second hip (Fig 1). Within the first year of receiving a second staged hip resurfacing, the total cobalt and chromium levels were lower for both hips than the unilateral levels. After the first year of a second staged hip, the unilateral hip levels were lower for both cobalt and chromium. At 5 years, the simultaneously performed bilateral hips had ion levels twice that of the unilateral implanted patients but the staged group had slightly lower levels. The median metal levels in the unilateral group remained relatively unchanged throughout the study suggesting that there was minimal effect of a wear-in period. There was no correlation between ion levels and any clinical variable including UCLA activity score or cup angle (but only 4 hips had an acetabular component implanted at more than 55 degrees). A number of unilateral hip had elevated ion levels and one of these outliers had a cup with the steepest cup angle (62 degrees).

DISCUSSION:

Although the numbers of patients with bilateral hip resurfacing were small, the comparison of the data from the 5 simultaneously implanted bilateral patients and the 9 staged bilateral patients showed that simultaneous implantation resulted in higher levels of metal ions, particularly chromium, compared to staged implantations monitored at the same time periods. There were no correlations between metal ion levels and patient gender or activity, in contrast to some other reports with different hip resurfacing systems (1,2). As expected, patients with a simultaneously implanted bilateral implant had double the amount of metal ions as those with a single implant. However the finding that the patients whose second hips were implanted in a staged manner had lower than double the unilateral ion levels, particularly in the first year, was unexpected. Additional data points are required in order to determine whether the staged bilateral surgery consistently reduces the ion burden in metal-on-metal total hip replacement patients.

REFERENCES: