Factors effecting Bone Mineral Density Changes after Surface Replacement of the Hip: A DEXA study
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INTRODUCTION:
Surface replacement is widely used as a treatment for younger patients requiring hip replacement. There are well documented early complications with this procedure after which there is good medium term success (1). However the long-term performance of such devices remains unknown. One area of concern is the viability of the bone in the proximal portion of the femur. These concerns are related to the trauma which the proximal femur is exposed to during the operative procedure and the level of vascularity which is subsequently attained (2). Previous studies have shown reduced loss in bone stock compared to total hip replacement (3) and minimal difference with the contra-lateral unaffected hip (4). Both studies used a single time point

METHODS:
A total of twenty-six patients were recruited (18 male, 5 female; 15 left hip 11 right, mean age at surgery 56 years, range 31-69) who had DEXA measurements at all three time points post-op, 120 and 420 days (4 and 14 months). Measurements were taken in the neck region and Gruen zones 6 and 7. Eighteen patients were male and 8 were female. Metal ion levels were measured in whole blood using the high resolution ICP-MS technique. Experimental details are described elsewhere (5).

RESULTS:
The BMD in the neck region, zone 7 and 6 post-operatively were 0.945, 1.092 and 1.451g/cm² respectively. As shown by Figure 1, in the neck region BMD reduces at 120 days (96.5%) and then increases to higher than the post-op level at 420 days (103.6)% (differences between all three groups: p<0.008).

In zone 7, BMD drops at 120 days (98.2%, p=0.03) but recovers to higher than post-op levels after 420 days (101.6%, but not significantly so: p=0.13)

In zone 6 there are no significant differences at any time points with the changes from post-operative values to 99.8% and 100.1% at 120 and 420 days respectively.

Figure 2 is a histogram of changes in the BMD in the neck region at 120 and 420 days. Whilst illustrating the wide variation in changes in BMD, it shows that out of 18 cases, 8 (44%) had a BMD that was less than the immediate post-operative value.

Figure 3 compares the change in BMD with the immediate post-operative values and shows that there is no obvious relationship bone density and the capacity of the bone to recover from the operative trauma.

DISCUSSION:
The finding that bone mineral density reduces in the neck and Gruen zone 7 but by 420 days the BMD has recovered to post-op levels and in zone 7 has exceeded the post-op levels is reassuring. Whilst 44% of cases still had drop in BMD in the neck region after 420 days, the follow-up is relatively short and the maximum drop was 7% and in only 2 cases did the drop exceed 5%. The changes in BMD are greater in regions close to the femoral component (neck region and zone 7) and negligible in the zone furthest away (zone 6). These changes are comparable but slightly less than those reported by previously in zone 7 (6).

REFERENCES:

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