ANALYSIS OF CEMENT MANTLE IN RELATION TO SURGICAL APPROACH

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INTRODUCTION

Aseptic loosening remains the commonest cause of failure of total hip arthroplasty. Cement mantle defects are associated with aseptic loosening. Cementing technique has a profound influence on the incidence of aseptic loosening of total hip replacements. Two specific measures that seem to have the greatest impact on the longevity of cemented femoral stems are pressurization of cement and control of mantle thickness. Although there have been considerable improvements in cementing techniques cement mantle defects are still present, in particular in Gruen Zones I, VII and XII.

Cement mantle defects have been shown to be associated with aseptic loosening. This study aimed to determine the effect of surgical approach on the incidence of cement mantle defects. The Stanmore total hip replacement was chosen because it has greater than an eighty-five percent survivorship over 15 years and it remains essentially unchanged to date. The null-hypothesis was that there was no difference between the cement mantles achieved via either the anterolateral or posterior surgical approach.

METHOD

Anteroposterior and lateral radiographs were available for 62 patients operated via the posterior approach and 100 patients operated via the anterolateral approach. A data sheet was completed for each case, documenting personal details, date of operation, surgeon and approach. AP and lateral x-rays were analysed and their cement mantles were divided into Gruen zones.

Mean cement thickness in all fourteen Gruen zones was estimated for each patient. Cement mantles were graded as less than 2mm, 2-5mm, 5-10mm and more than 10mm. Alignment was also measured. Data from Gruen zones IV and XI were not included in the analysis as these areas represent the mantle distal to the stem tip and are dependent only upon the depth of insertion of the cement restrictor relative to the tip of the stem implant.

RESULTS

Fifty-nine percent (32/54) of cement mantle defects are seen in Gruen zones VIII to XIV. The mean cement mantle thickness in the anterolateral approach was 3.11mm compared to 4.23mm with the posterior approach. (Figure1).

This corresponds with the frequency of cement mantle defects observed. No cement defects were seen in Gruen zones IV or XI. Using the anterolateral approach, defects were observed in 49 out of 1200 zones (4.08%) and using the posterior approach in 6 out of 744 zones (0.81%). With the anterolateral approach, 19 out of 100 cement mantles (19%) had defects, compared to only 3 out of 62 (4.84%) with the posterior approach (Figure 2). Defects were most commonly seen in zones I, V, VIII and XII, which corresponds to valgus and posterior orientation of the stem.

DISCUSSION

Several studies suggest that a cement mantle smaller than 2mm or greater than 10mm can be detrimental to the survivorship of the arthroplasty. The posterior approach generates a more uniform cement mantle than the anterolateral approach. Another factor associated with early aseptic loosening is stem orientation. Neutral alignment of the prosthesis has the lowest failure rate. The anterolateral approach in this series more commonly produces a valgus/posterior stem tip. This study demonstrates that a deficient cement mantle is more likely using an anterolateral approach.

REFERENCES
