

# Ectopic Ossification Following Total Hip Replacement

INCIDENCE AND A METHOD OF CLASSIFICATION

BY ANDREW F. BROOKER, M.D.\* , JACK W. BOWERMAN, M.D.\* ,  
ROBERT A. ROBINSON, M.D.\* , AND LEE H. RILEY, JR., M.D.\* , BALTIMORE, MARYLAND

*From the Division of Orthopaedic Surgery, The Johns Hopkins Hospital, Baltimore*

**ABSTRACT: A method to classify the degree of ectopic-bone formation about the hip following total hip arthroplasty revealed that 21 per cent of 100 consecutive patients treated by total hip arthroplasty had ectopic-bone formation about the hip of various degrees when reviewed six months following the operation. Ectopic-bone formation, however, did not seem to affect the functional result as judged by the Harris hip evaluation unless apparent bone ankylosis resulted.**

Ectopic-bone formation following total replacement of the hip is a recognized complication of the procedure. Charnley stated that a notable degree of ectopic ossification is seen in 5 per cent of hips not previously operated on. Harris noted myositis ossificans in 14 per cent of patients following total hip replacement but stated that in only 3 per cent did the condition interfere significantly with motion.

It is the purpose of this study to present a system whereby ectopic-bone formation following total hip replacement may be classified and to report the incidence of ectopic-bone formation following total hip replacement at The Johns Hopkins Hospital using this classification method.

## Materials and Methods

One hundred consecutive patients treated with total replacement of the hip by three members of the full-time staff of The Johns Hopkins University School of Medicine were reviewed a minimum of six months following the operative procedure. Total hip replacement was performed utilizing the technique and prosthesis of McKee and Farrar in four cases, the technique of Charnley in twelve cases, and the technique of Müller in eighty-four cases. Each patient was graded on the Harris hip rating scale in the preoperative and postoperative period. Anteroposterior roentgenograms of the hips were reviewed preoperatively and a minimum of six months following the operative procedure to establish the presence and degree of ectopic-bone formation in the postoperative period.

The degree of ectopic-bone formation was defined in accordance with the following grading system. All determinations were made on review of supine anteroposterior roentgenograms of the hip taken with a tube-to-plate distance of 101.6 centimeters.

*Class I:* Islands of bone within the soft tissues about the hip (Fig. 1).

*Class II:* Bone spurs from the pelvis or proximal end of the femur, leaving at least one centimeter between opposing bone surfaces (Fig. 2).

*Class III:* Bone spurs from the pelvis or proximal end of the femur, reducing the space between opposing bone surfaces to less than one centimeter (Fig. 3).

*Class IV:* Apparent bone ankylosis of the hip (Fig. 4).

\* Division of Orthopaedic Surgery, The Johns Hopkins Hospital, 601 North Broadway, Baltimore, Maryland 21205.



FIG. 1



FIG. 2

### Results

Significant ectopic-bone formation was present in twenty-one of the 100 consecutive cases reviewed at six months following total hip arthroplasty. Ectopic-bone formation was rated as Class I in seven patients, Class II in five, Class III in seven, and Class IV in two.

The average preoperative score on the Harris hip evaluation form in these 100 consecutive patients was 34 points, with a mean of 32 and a range of from 9 to 74. The



FIG. 3



FIG. 4

average score on the hip evaluation form at least six months following surgery in this group was 82 points, with a median of 89 and a range of from 36 to 100. The average gain in these 100 consecutive patients at least six months following total hip arthroplasty was 53 points (Table I).

Ectopic-bone formation classified as Class I was present in seven patients at least six months after total hip arthroplasty. The average postoperative score in this group of patients was 91 points, with a median of 93 and a range of from 78 to 100. The average gain from the preoperative score in this group was 67 points (Table I).

Class-II ectopic-bone formation was noted in five patients. The postoperative score in this group was 92 points, with a median of 90 and a range of from 81 to 100. This represents an average gain of 56 points over the preoperative score.

Ectopic-bone formation rated as Class III was present in seven patients. The postoperative score in this group was 87 points, with a median of 86 and a range of from 71

TABLE I

	Number of Patients	Average Preoperative Score	Average Postoperative Score	Average Gain
Entire group	100	34	82	48
Ectopic-bone formation according to class				
Class I	7	28	91	63
Class II	5	36	92	56
Class III	7	31	87	56
Class IV	2	29	48	9

to 95. This represented an average gain of 52 points as compared with the preoperative score.

Two patients had ectopic-bone formation classified as Class IV. These patients had postoperative scores of 36 and 60 which represented an improvement of 12 and 25 points, respectively, over the preoperative score.

Therefore, ectopic-bone formation rated Class I, II, or III does not alter significantly the result achieved with total hip arthroplasty as judged by the degree of improvement utilizing the Harris hip evaluation method.

Fourteen of the 100 consecutive patients had had previous operative procedures on the hip. Seven of these fourteen patients had ectopic-bone formation.

Fourteen of eighty-six patients with no previous hip surgery had ectopic calcification, while seven of fourteen patients having their second procedure had ectopic calcification to a significant degree. Five of the seven had had femoral-head prostheses inserted (three Austin-Moore, one Thompson, and one Bechtol), and the ectopic-bone formation after total hip arthroplasty was evenly distributed in Classes I, II, and III. Both patients with Class-IV ectopic-bone formation had had prior procedures (cup arthroplasty and McMurray osteotomy). This suggests two conclusions: first, that patients with previous procedures have a much higher incidence of ectopic ossification, and second, that those patients with femoral-head prostheses, while they are more likely to have ectopic ossification after total hip replacement, do not necessarily have poor functional results.

No correlation can be noted between the type of total hip arthroplasty performed and the development of ectopic-bone formation, although the number of procedures performed using the McKee-Farrar and Charnley prostheses were too few to allow a definitive statement to be made on this point.

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