50 Years Ago in CORR

End-result Study of Vitallium Cup Arthroplasties of the Hip

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CORR 1958;11:41–50

The concept of the “end result” can properly be ascribed to E. Armory Codman [7]. In 1918 Codman, while reporting the outcomes of ovarian cancer, noted, “My hobby for looking up end results has led me to some pleasant surprises in this type of case, for I find 5 cases still alive after periods of sixteen, eight, three, two, and one year respectively. Nature has been in the main responsible for these miracles, but I believe that certain principles of treatment have helped” [2]. The concept of longer term followup to evaluate patients was a novelty at the time, and Codman encountered no small amount of (unjustified) criticism for his approaches, although one wonders how much of the criticism was aimed at his sometimes controversial personality rather than his encouragement of following patients [7]. In fact, most of Codman’s “end results” [3] would not be considered long-term today, where we consider following patients decades rather than years. And, his “end results” typically referred to the last followup, not truly an end result. However, there is little question recognition for the need for followup can be more ascribed to Codman than any other individual.

Codman also established the first registry, as a result of a gift of \$1000 in 1919 from the grateful family of a patient with bone sarcoma [7]. Codman, Ewing, and Bloodgood presented their idea of a Registry of Bone Sarcoma to the American College of Surgeons at their annual meeting in Philadelphia in 1921. The College was impressed and provided an additional \$8000 for the research on bone tumors. While the registry was slow to develop, Codman had a systematic approach to the desirable data.

Codman’s registry allowed the answers to certain questions, but as with all subsequent registries, was necessarily limited by practicality: detailed information on the functional outcomes of treatments could not be discerned. There was, however, a growing recognition of the need for more systematic means of assessing patients. Perhaps the first to describe such a method in orthopaedic surgery was Robert Merle d’Aubigné who, along with his colleagues Jean Cauchoix and Jacques Odilon Ramadier, in 1949 described a rating scheme to systematize the collection and reporting of data relevant to the function of the patient [1].

Subsequent authors used various other schemes, one of which we highlight from the study of Emmel et al., on

the “End-result Study of Vitallium Cup Arthroplasties of the Hip” [4]. In contrast to the numerical rating of Merle d’Aubigné et al., that of Emmel et al. relied on categorical ratings: Excellent, Good, Fair, Poor (Table 4). Each of the four categories was associated with a number of criteria. It was possible a given patient would meet some criteria in one category and some in another and thus a user might find it difficult to classify that patient. Further, the categories were arbitrary, and subsequent authors would create their own categories and criteria. Later authors, notably Carroll B. Larson in 1963 [6] and William B. Harris in 1969 [5] would report their own systems, both of which were based upon functionally similar criteria as those espoused by Merle d’Aubigné and Emmel and his colleagues, but used a 100 point scale. Again, the assignment of points was arbitrary and these early schemes were based entirely upon physician observations, not those of patients. Today the science of validating such instruments has greatly advanced and we have many validated patient-generated scoring systems that undoubtedly better reflect outcomes. Nonetheless, we owe early pioneers like Codman, Merle d’Aubigné, and Emmel and his colleagues for developing key concepts

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Table 4. Classification of results (Reprinted with permission from Emmel HE, Lecocq EA, Leavitt DG, Leavitt HL, Anderson KJ, Nash HH, Mooney JG. End-result study of vitallium cup arthroplasties of the hip. *Clin Orthop Relat Res.* 1958;11:41–50.)

Subjective complaints	Objective findings
Excellent	
No pain	No limp
No restriction of motion	Passive and active motions as good as opposite hip
Patient feels the operated hip is as good as opposite hip	
Good	
Minimal or no pain	Negative Trendelenburg test
Walks with slight or no limp	Flexes hip at least to 90°
Does not require crutches or cane	Abducts at least 25°
Puts on own shoes and stockings	Sufficient internal and external rotation to allow patient to put on shoes and stockings
Able to pursue a gainful occupation if employed before surgery—or does own housework	
Fair	
Some pain but much improved over pre-surgical condition	Moderate limp
Improved ability to walk	Able to flex hip 60°
May use cane but not crutches	Abduct 15°
	Flexion deformity of 30° allowed
Poor	
More pain and restricted motion than before surgery	Definite decreased range of motion
	Decreased ability to walk

and promoting more objective ways to assess patients.

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