Biographical Sketch

Sir John Charnley MD, 1911–1982

Richard A. Brand

Published online: 18 September 2010
© The Association of Bone and Joint Surgeons® 2010

Abstract This biographical sketch of Sir John Charnley corresponds to the historic text, *The Classic: The Bonding of Prostheses to Bone by Cement*, available at DOI [10.1007/s11999-010-1545-8](https://doi.org/10.1007/s11999-010-1545-8).

John Charnley was born in Bury, Lancaster in 1911, the son of a pharmacist and a nurse [6]. At Bury Grammar School, according to Eftekhar, Charnley “did not distinguish himself academically, but Leonard R. Strangeways, his school headmaster, recognized young Charnley’s potential and encouraged him to pursue a career in medicine...”. He subsequently excelled at the University of Manchester, winning scholarships and prizes. He completed his medical degree in 1935 and obtained his FRCS a year later. Charnley then had hospital posts at the Manchester Royal Infirmary and Salford Royal Hospital, following which he spent 1 year in the Department of Physiology at King’s College, London [9]. As with most British surgeons of his age during the two world wars, he served in the military (Royal Army Medical Corps), from 1939–1945. During that time he came under the influence of Mr. Brian Thomas, head of the orthopaedic unit of the 63rd Hospital in Heliopolis, Egypt, and there developed the first of his many inventions: an adjustable version of Thomas’ walking caliper than could readily be fitted to any soldier.

Following his military service, he completed his training in orthopaedics at the Robert Jones and Agnes

Hunt Orthopaedic Hospital, Oswestry, and returned to Manchester in 1947, where he worked as a lecturer in the University department under Sir Harry Platt [6]. His appointment at Wrightington Hospital came in 1950, and he became a consultant surgeon at the Royal Infirmary when Sir Harry retired in 1952 (Fig. 1).

Having previously been a confirmed bachelor devoted to his work, he met Jill Heaver on a ski holiday in Austria, and the pair married three months later in 1957 [6]. His life subsequently revolved around his work and family, but he remained devoted to his work. Older commented, “They entertained their many friends from home and abroad, and his puckish sense of humor made him an amusing and witting companion” [9].

Charnley’s wide ranging interests and major contributions in many areas are well documented [6, 9, 11]. In 1950 he published, *The Closed Treatment of Common Fractures* [1], which went through many editions and reprintings and is still available. Peltier commented, “If Charnley had done

Fig. 1 Professor Sir John Charnley is shown. Reprinted courtesy of The John Charnley Trust, Chorley, Lancashire, England.

R. A. Brand (✉)
Clinical Orthopaedics and Related Research, 1600 Spruce Street,
Philadelphia, PA 19103, USA
e-mail: dick.brand@clinorthop.org

Fig. 2 Professor Sir John Charnley is shown in the clean air operating enclosure. Reprinted courtesy of the John Charnley Research Institute (<http://www.charnleyresearch.co.uk/index.html>).

nothing more, this little volume would suffice to ensure his reputation, containing as it does the essence of the non-operative approach to the treatment of fractures. His work demonstrates the essential sophistication of a simple approach and points out the importance of giving attention to seemingly minor details” [10].

Charnley published well over a hundred original contributions, many of which he authored alone [6]. Eftekhar detailed the long list of awards, prizes, and honors; this included his induction into the Royal Society and the knighthood bestowed by Queen Elizabeth II in 1977; he noted, though, “...the honor he cherished most was the conferment, in 1974, of the ‘Freeman of Bury’...” [6].

Among his more astonishing contributions, the best known is undoubtedly the first successful artificial hip replacement [2], a procedure he insisted on referring to as an “low friction arthroplasty” because the bearing surfaces needed to have a coefficient of friction as close to the very low friction of normal joints as possible and because the operation not merely replaced the hip, but reconstructed it. Hip arthroplasty challenged Charnley in a number of ways: how to restore the distorted mechanics of a diseased hip, how to design durable surfaces, how to fix the implants to the bone. Based on experience with the available uncemented hip implants (Judet, Moore, Thompson, Street), he believed that to be durable the implant would need to have intimate contact to the bone throughout, and therefore decided that cold-curing acrylic cement should be used in some quantity as a “grout” [6]. In a sense, this created a custom implant for each patient, albeit a composite implant. The concept of affixing implants to bone with some sort of cement was not new. Gluck, in 1891 [8] attempted to fix an artificial prosthesis to bone with cement using a variety of substances: copper amalgam, plaster of Paris, resin with pumice stone or gypsum [7]. Charnley acknowledged the

work of Wiltse and colleagues who had explored the use of cold-curing acrylic several years before Charnley [12].

In the article we reproduce here from 1964, Charnley reported the findings of the cement bone interfaces in six necropsy specimens, the gross and radiographic findings in 43 reoperated hips (all but six for failure of the initial Teflon bearing [4]) from a total of 455 hips, and radiographic findings in all 455. In those patients who were reexplored, the prosthesis was well-fixed in all but two. Charnley concluded the fixation was durable up to three and a quarter years, and that, “The technique is considered justified in elderly patients where the medullary canal is large and the cortex is thin and brittle.”

Charnley was a man devoted to solving problems, and he did so with vigor and rigor. Fixation of the arthroplasty was not the only major challenge with total hip arthroplasty: initially high rates of infection [3, 5] and disastrous wear of the initial socket bearing material, Teflon [4], were others. Had he not consistently looked for problems, honestly analyzed (and reported them), and persisted in the face of adversity, he would not have successfully overcome the initial hurdles and we would not have today an operation that perhaps more than any other so effectively relieves pain and restores function for patients.

References

1. Charnley J. *The Closed Treatment of Common Fractures*. Edinburgh, Scotland: E & S Livingstone; 1950.
2. Charnley J. Arthroplasty of the hip. A new operation. *Lancet*. 1961;1:1129–1132.
3. Charnley J. A clean-air operating enclosure. *Br J Surg*. 1964; 51:202–205.
4. Charnley J. Using Teflon in arthroplasty of the hip-joint. *J Bone Joint Surg Am*. 1966;48:819.
5. Charnley J. Postoperative infection after total hip replacement with special reference to air contamination in the operating room. *Clin Orthop Relat Res*. 1972;87:167–187.
6. Eftekhar NS. The life and work of John Charnley (August 29, 1911–August 5, 1982). *Clin Orthop Relat Res*. 1986:10–22.
7. Eynon-Lewis NJ, Ferry D, Pearse MF. Themistocles Gluck: an unrecognized genius. *BMJ*. 1992;305:1534–1536.
8. Gluck T. Referat über die durch das moderne chirurgische Experiment gewonnenen positiven Resultate, betreffend die Naht und den Ersatz von Defecten höherer Gewebe, sowie über die Verwethung resorbirbarer und lebendiger Tampons in der Chirurgie. *Arch klin chir*. 1891;41:187–239.
9. Older J. A tribute to Sir John Charnley (1911–1982). *Clin Orthop Relat Res*. 1986:23–29.
10. Peltier L. *Fractures: A History and Iconography of Their Treatment*. San Francisco, CA: Jeremy Norman Co.; 1990.
11. Waugh W. *John Charnley: The Man and the Hip*. London, England: Springer; 1991.
12. Wiltse LL, Hall RH, Steneshjem JC. Experimental studies regarding the possible use of self-curing acrylic in orthopaedic surgery. *J Bone Joint Surg Am*. 1957;39:961–972.