The Relative Cost of Cemented and Uncemented Total Hip Arthroplasties

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Abstract: The use of uncemented femoral stems in primary total hip arthroplasty (THA) has been slow to develop in the UK because of the lack of encouraging published long-term follow-up data, the continued success of the cemented primary THA, and the perceived excessive relative cost of the uncemented THA. In this article, we argue that the total costs of 3 “proven” uncemented stems are comparable with commonly used cemented femoral components, when all necessary materials are taken into consideration. In addition, we will also discuss other potential benefits and drawbacks for considering the use of uncemented stems. Key words: cost, uncemented, stem, hip, cement, NICE.

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The widespread use of uncemented femoral stems has been slow to develop in the UK and other countries because of the relatively poor medium-term results of older uncemented stems, together with the lack of adequate follow-up studies on modern equivalents. This is in contrast to the continued improvement of cementing techniques and cemented implant survival over the last 30 years. In 2 recent surveys, only 23% of UK hip surgeons used uncemented stems for primary total hip arthroplasties (THAs) in the younger age group [1] and only 3% used uncemented exclusively [2]. The National Institute for Clinical Excellence (NICE), a government organization that gives guidance on resource usage in the health service, stated in their “Guidance on the selection of prostheses for primary total hip replacement” that 90% to 95% of UK hip surgeons use a cemented primary femoral stem [3].

However, over the last few years there has been a growing body of evidence to support the use of uncemented stems in the UK. Firstly, the publication of the excellent 10-year follow-up data for at least 3 uncemented stems: the JRI hydroxyapatite-coated (HAC) stem (Joint Replacement Industries, London, UK) [4]; Corail (Deup, Warsaw, Ind) [5]; and Biometric (Biomet, Warsaw, Ind) [6]. These demonstrate results that are certainly as good as any published contemporary, cemented stem series. Secondly, it has been suggested that the use of uncemented implants has other perioperative benefits to the patient in terms of reduced fat embolism, reduced thromboembolic disease, and particularly, reduced operative time [7-10].

Nevertheless, the most important reason for avoiding the use of uncemented prostheses (and the reason quoted by NICE and others [11]) is their perceived excessive cost. It has been stated that on cost grounds alone, the use of more expensive implants cannot be justified, unless
they were proven to have a significantly reduced revision rate [12,13]. This statement, however, was based on a calculation on the use of an uncemented stem costing 3 times more than the “standard Charnley” [14].

This study therefore examines the total cost of primary THA when all the materials used to implant the stems are taken into consideration. We will compare “proven” uncemented stems with commonly used cemented stems. We will also argue that there are other hidden cost savings and patient benefits of using uncemented prosthesis in more cases.

**Methods and Results**

Fig. 1 shows the current prices (April 2004) for commonly used prosthesis and other single-use equipment used in our region. The prices were obtained from the relevant companies in pound sterling, exclude value-added tax and do not represent local discounts. The equipment listed implies the use of contemporary femoral cementing techniques, including proximal and distal restriction, pulse lavage, and 2 mixes of cement (Fig. 2). Three mixes of cement and 2 cartridges are used in the United States, which increases the price of cemented stems by at least a further £31.50, although this does not change the order of the ranking of the stems.

The acetabular component is not considered.

It can be seen from the results that of the stems surveyed, only the Charnley monoblock is cheaper than the JRI HAC stem. Of the “modern” modular cemented stems, only the CPT 10/12, Stanmore, C stem, and the MS 30 compare favorably in terms of cost (Fig. 1).

Fig. 1. Relative cost of stems. The total cost of selected femoral stems and the associated materials necessary for their implantation (in pound sterling). A minimum of £31.50 can be added to all of the cemented stems if 3 packs of cement are used (as in the United States).

Fig. 2. Equipment used for contemporary cementing.
Discussion

Although the main theoretical benefits of using of uncemented stems have been to preserve bone stock, to match narrow medullary canals to appropriately sized implants, and to avoid “cement disease” [15], until recently, there has been little convincing published long-term evidence to support their superiority over cemented stems with regard to implant survival and revision rates, even in the young. In the Swedish registry the survival rate for uncemented THAs at 10 years is only about 86%, which is well below the “benchmark” of more than 90% survival that the NICE report quotes as acceptable [16]. In addition, the efficacy for the use of cemented implants is well supported in younger patients (“cemented stems for all” [17]) [18-24], and even more so in the older age group which accounts for 80% of all UK THAs. Subsequently, the exclusive use of cemented primary hips has been supported by the recent NICE report “Guidance for the selection of prostheses for primary total hip replacement,” which stated that there is “no cost effectiveness data based on revision rate of 10 years or more follow-up to support the use of the generally more costly uncemented and hybrid hip prostheses,” and that “trusts should aim to achieve best value in purchasing of prostheses which achieve this benchmark [<10% revision at 10 years]” [3]. However, the declining trend of the use of uncemented implants in Sweden has been reversed in the last few years reflecting the improved (short-term) published results, although “the [postulated] improvement in uncemented technology introduced around 1990 will not [yet] be reflected in the Swedish or Norwegian registries, as too many unproven uncemented implants were still being used at this time.” The recent publication of excellent results for the JRI HAC, Biomet Biometric, and Depuy Corail uncemented stems easily fulfills the NICE criteria for 10-year survival and further supports the efficacy and wider use of uncemented stems. Our results show that the perceived cost differential between cemented and uncemented systems is not necessarily an issue.

Furthermore, it is apparent that the price of the implant is a relatively small part of the overall costs to the health care system when theater costs, inpatient time, and nursing care are considered [25]. Uncemented stems offer shorter operating time [26]; comparable (or better) results; possibly less fat embolus and cardiovascular compromise [8,9]; possibly less thromboembolic disease [10]; and less equipment with subsequent lower sterilization costs and less storage space required in theater. From our own data, reduced theater time of at least 15 minutes per hip can be expected from using uncemented stems. With an estimated cost of at least £10 per minute of theater time (excluding staffing costs), this immediately makes uncemented stems at least £150 cheaper and would potentially allow more cases to be done on a list of 3 or more hips, which in turn would make even more significant overall cost savings (local unpublished data). In 1996, Barrack et al [26] similarly compared the total cost of uncemented and cemented THAs and also found that the “actual cost of implanting a modern cemented stem was greater than for a corresponding cementless stem.” However, although the article supports our own conclusions, the cost comparison in the 1996 article was not made between implants that would fulfill the NICE criteria for performance. It is only now that we have a selection of uncemented and cemented stems that are comparable in proven performance that we can make a meaningful comparison of overall costs.

Arguments against the use of uncemented stems are a reported increased prevalence of thigh pain [27,28], increased heterotopic bone formation [29], and intraoperative periprosthetic fracture. Although a discussion on these is beyond the scope of this article, none of these problems seem to be of significant concern with the published series for these 3 stems [4], with little or no reported thigh pain, and all perioperative periprosthetic fractures healing without complication.

Conclusion

The costing for THA is not a simple matter of comparing the prosthesis price. The cost of modern proven uncemented stems compares favorably with the total cost of contemporary cemented stem systems. The real economic cost of THA is related to operative time, complications, revision rates, length of hospital stay, postoperative recovery, as well as the implant and equipment costs.

Uncemented stems for primary THA should not be dismissed on cost grounds alone.

References

from the National Hip Replacement Outcome Project.


