Intraoperative custom press-fit and standard press-fit femoral components in total hip arthroplasty: a comparison of surgery, charges, and early complications

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Record Status
This is a critical abstract of an economic evaluation that meets the criteria for inclusion on NHS EED. Each abstract contains a brief summary of the methods, the results and conclusions followed by a detailed critical assessment on the reliability of the study and the conclusions drawn.

Health technology
Intraoperative custom press-fit and standard press-fit femoral components in total hip arthroplasty (THA).

Type of intervention
Treatment.

Economic study type
Cost-effectiveness analysis.

Study population
Patients undergoing hip arthroplasty.

Setting
A university hospital. The economic study was carried out in the USA.

Dates to which data relate
Effectiveness data were collected during the period January 1987 to June 1989. The price year was not stated.

Source of effectiveness data
The evidence for outcomes was derived from a single study.

Link between effectiveness and cost data
The costing was undertaken retrospectively on the same patient sample as that used in the effectiveness analysis.

Study sample
There were 60 patients in the intraoperative custom press-fit titanium femoral components group and 60 patients in the standard press-fit titanium femoral components group. There is no evidence to suggest that power calculations were used to determine the sample size.

Study design
The study was a non-randomized trial with concurrent controls carried out in a single centre. Each series was performed in its entirety by a separate surgeon.
Analysis of effectiveness
It was not stated whether the analysis of the clinical study was based on 'intention to treat' or 'treatment completers only'. Hospital and clinical charts were retrospectively reviewed and the specific outcomes compared included: anaesthesia time, operating time, intraoperative blood loss, prophylactic anticoagulation, and complications (up to 6 months). The two groups of patients were shown to be similar with respect to preoperative diagnosis.

Effectiveness results
In the intraoperative custom-fit group, the unilateral THAs had an average anaesthesia time of 219 minutes (range: 175 to 330 minutes) compared with 139 minutes (range: 100 to 240 minutes) in the standard group, (p=0.0001). The mean operating time for the unilateral custom THAs was 146 minutes (range: 105 to 230 minutes), while in the standard group, it was 85 minutes (range: 60 to 185 minutes), (p=0.0001). The average intraoperative blood loss for the unilateral custom THAs was 725 mL (range: 150 to 1,800) compared with an average of 480 mL (range: 140 to 1,500) in the standard group, (p=0.0005). There were 17 early postoperative complications in the intraoperative custom group compared with 3 in the standard group, (p=0.0009).

Clinical conclusions
The incidence of complications in the intraoperative custom group was unacceptably high when compared with that in the standard group.

Measure of benefits used in the economic analysis
No summary benefit was identified in the economic analysis.

Direct costs
Hospital charges were included in the analysis and based on actual data. Quantities of cost components were not reported separately. The price year was not specified.

Currency
US dollars ($).

Estimated benefits used in the economic analysis
Not applicable.

Cost results
Hospital charges for the intraoperative custom group averaged $19,950 for unilateral THA (range: $16,368 to $37,125) compared with an average of $14,322 (range: $11,052 to $25,148) for the standard group (p=0.0001). The average charge for bilateral intraoperative custom THA was $29,671 (range: $26,775 to $34,762) compared with an average of $26,755 (range: $19,869 to $35,193) for the standard group (p=0.7).

Synthesis of costs and benefits
Not applicable.

Authors' conclusions
Because of the high incidence of complications and insufficient information, together with the increased charges, the authors did not recommend the use of this particular custom intraoperative prosthesis for routine primary total hip replacement. The authors suggested that any intraoperative custom system should be compared with a standard off-the-shelf system to justify the additional time, expense, and possible complications.
CRD COMMENTARY - Selection of comparators
A justification was given for the comparators used. Standard press-fit femoral components in cementless THA have been in use for over 25 years. The newer method involves the use of CT-generated, computer-assisted designing and manufacturing of the prosthesis intraoperatively. It has been suggested that this technique improves the fit of the femoral components, which may lead to better fixation when compared with standard press-fit prostheses. You should consider whether this a widely used health technology in your own setting.

Validity of estimate of measure of benefit
No summary estimate of benefit was presented. The incidence of complications was the only intermediate outcome reported. It does not appear that power calculations determined the sample size.

Validity of estimate of costs
Inadequate details of cost estimation were presented; only hospital charges were reported and these were not broken down into specific components. Quantities of resource use were not reported separately nor was the price year specified.

Other issues
As the study was not randomised, the results need to be treated with some caution. The issue of generalisability to other settings or countries was not addressed.

Implications of the study
A well designed randomized controlled trial is needed in order to assess the cost-effectiveness of intraoperative custom compared to standard press-fit THA.

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