

# **Surveillance report – Hip fracture (2011)**

## **NICE guideline CG124**

December 2015

### **Surveillance decision**

We will plan a partial update of the following sections in the guideline:

- Displaced intracapsular hip fractures – total hip replacements.
- Undisplaced intracapsular hip fractures.

### ***Reason for the decision***

We found 93 new studies through surveillance of this guideline.

New evidence that could affect recommendations was identified.

Topic experts, including those who helped to develop the guideline, advised us about whether the following sections of the guideline should be updated and any new sections added:

#### **Intracapsular fractures**

- In patients undergoing repair for intracapsular hip fractures what is the clinical and cost effectiveness of internal fixation compared to hemiarthroplasty compared to total hip replacement on mortality, surgical revision, functional status, length of stay, quality of life, pain and place of residence after hip fracture?

#### ***Displaced fractures***

From the surveillance review, 3 studies were identified comparing internal fixation with total hip replacement (THR), and 3 studies were found comparing hemiarthroplasty with THR. The studies were consistent with the current recommendation to perform hemiarthroplasty or total hip replacement in patients with a displaced intracapsular fracture.

However, the topic experts noted that based on data from the National Hip Fracture Database (NHFD), there appears to be low compliance with recommendation 1.6.3 in NICE CG124 on the use of THR. Currently, the recommendation specifies that patients should be offered a THR who: were previously able to walk independently, are not cognitively impaired, and are medically fit for anaesthesia and the procedure. But the topic experts noted that when surgeons are deciding on patients' suitability for THR, they may be using a fourth criteria related to expected long-term functional benefit.

The topic experts noted that future functional status was not part of current recommendations, and also that the original evidence used to develop the recommendation was mainly from patients aged less than 80 years. It was therefore debated whether the current recommendation was applicable to the whole hip fracture population, or only patients with better prospects of long-term functional benefits. It was felt that the original evidence base should be re-examined with an emphasis on long-term functional benefit.

### ***Undisplaced fractures***

From the surveillance review, 2 studies were identified that found no difference between 2 alternative types of screw fixation in patients with undisplaced intracapsular fractures.

The topic experts explained that undisplaced fractures were not examined during the development of the original guideline, but noted this area should be included in an update of this question. They also stated that there may be variation between hospitals in diagnosing undisplaced fractures, and ensuring that the correct diagnosis is made is a key consideration.

**Decision:** This review question should be updated.

### **Other clinical areas**

We also found new evidence relating to the following areas, but it was not deemed to have an effect on current recommendations: timing of surgery; analgesia; anaesthesia; surgical approach for intracapsular fracture;

trochanteric extracapsular fracture; mobilisation strategies; and multidisciplinary management.

We did not find any new evidence related to: imaging options in occult hip fracture; planning the theatre team; stem design; subtrochanteric fracture; and patient and carer information.

### **Overall decision**

After considering all the new evidence and the views of topic experts, we decided that a partial update is necessary for this guideline.

See [how we made the decision](#) for further information.

### **Commentary on selected new evidence**

With advice from topic experts we selected 2 studies for further commentary.

#### ***[Anaesthesia – mortality following general versus spinal anaesthesia in hip fracture surgery](#)***

We selected the observational study by [White et al. \(2014\)](#) for full commentary because it lends support to the current recommendation in NICE CG124 that patients should be offered a choice of spinal or general anaesthesia after discussing the risks and benefits.

Although it analyses observational data (whereas the original recommendation was based on randomised controlled trials), the study has additional relevance to NICE CG124 by examining the ‘type of anaesthesia’ field in the UK National Hip Fracture Database. This field was added to the database to measure compliance with the NICE recommendation to offer a choice of spinal or general anaesthesia. The study also generated several [comments to the journal](#) after publication about the interpretation and limitations of the evidence.

### **What the guideline recommends**

NICE CG124 recommends offering patients a choice of spinal or general anaesthesia after discussing the risks and benefits.

## **Methods**

An observational study by White et al. (2014) compared mortality after general anaesthesia (GA) or spinal anaesthesia (SA) for hip fracture surgery. The study analysed 65,535 patient records from the UK National Hip Fracture Database, of which type of anaesthesia used was recorded in 59,191 records (90%). Anaesthesia type was logged in the database as: GA only; GA + nerve block; GA + SA; GA + epidural; SA only; SA + nerve block; or SA + epidural.

The primary aim was to determine whether cumulative 30-day mortality differed between GA (with or without nerve blockade) and SA. Secondary aims included analysis of early (less than 5-day) mortality.

## **Results**

The frequency of the types of anaesthesia recorded in the database were: SA only (28.9%); GA only (23.9%); GA + nerve block (23.2%); SA + nerve block (6.7%); GA + SA (6.5%); SA + epidural (0.5%); and GA + epidural (0.4%). In 9.9% of patients, anaesthesia type was not recorded, unclear, or other.

When patients were omitted who received both GA and SA, or whose anaesthesia was unknown, cumulative 30-day mortality did not differ significantly between the 30,130 patients receiving GA and the 22,999 patients receiving SA (7.0% versus 7.5%,  $p=0.053$ ). This difference remained non-significant ( $p=0.226$ ) after multivariable regression adjustments for age and American Society of Anesthesiologists (ASA) status, which are known to be associated with increased mortality.

A secondary analysis (unadjusted for age and ASA status) noted that mortality within 24 hours of surgery was significantly higher after cemented than uncemented hemiarthroplasty (1.6% versus 1.2%,  $p=0.030$ ). However, when 30-day mortality was examined, the outcome was reversed and mortality was higher with uncemented than cemented arthroplasty (8.9% versus 7.4%,  $p<0.001$ ).

## **Strengths and limitations**

### ***Strengths***

- The National Hip Fracture Database currently collects data from 95% of patients with hip fracture in the UK, and is therefore representative of the population targeted by NICE CG124.
- Adjustment was made for some of the variables (age, ASA status) known to affect mortality.

### ***Limitations***

- The study was observational and therefore the link between anaesthesia type and mortality is associative but may not be causative.
- The reliability of the study results depend on the accuracy of the data collected by the National Hip Fracture Database. Additionally, type of anaesthesia was not recorded in 6344 (9.7%) patients and these patients were therefore omitted from the analysis.
- Potential confounders may not all have been accounted for, such as:
  - Specific comorbidities (comprehensive comorbidity data are not currently collected by the database).
  - Whether, and what type of, orthogeriatric care and rehabilitation were received by patients.
  - Use of nerve block or epidural alongside GA or SA in some patients.
- Other outcomes that may be affected by anaesthesia and peri-operative care, but were not examined by the study, include: hypoxia, hypotension, anaemia, pain, myocardial ischaemia, respiratory infection, confusion, and thromboembolism.

## **Impact on guideline**

The new evidence suggests that 30-day mortality does not differ following GA or SA for hip fracture surgery, which provides support for the recommendation in NICE CG124 to offer patients a choice of SA or GA after discussing the risks and benefits. However, the observational nature of the evidence limits firm conclusions around causality.

Topic experts also noted that the results emphasised the heterogeneity of anaesthesia practice across the UK.

### ***Surgical procedures – bone cement implantation syndrome in cemented hemiarthroplasty for femoral neck fracture***

We selected the retrospective cohort study by [Olsen et al. \(2014\)](#) for full commentary because it suggests that patients with comorbidities could benefit from uncemented implants. This may affect the current recommendation to use cemented implants for all patients.

#### **What the guideline recommends**

NICE CG124 recommends using cemented implants in patients undergoing surgery with arthroplasty.

#### **Methods**

A retrospective study by Olsen et al. (2014) examined bone cement implantation syndrome (BCIS) in 1080 consecutive patients undergoing cemented hemiarthroplasty at a single hospital in Sweden. Medical and medication history were obtained from medical records. Anaesthesia charts were reviewed for mean systolic pressure, arterial oxygen saturation, and heart rate before, during, and after cementation.

Each patient was assessed using a BCIS classification system based on their status around the time of cementation:

- Grade 0: no BCIS.
- Grade 1: moderate hypoxia (arterial oxygen saturation <94%) or hypotension (decrease in systolic arterial pressure >20%).
- Grade 2: severe hypoxia (arterial oxygen saturation <88%) or hypotension (decrease in systolic arterial pressure >40%) or unexpected loss of consciousness.
- Grade 3: cardiovascular collapse requiring cardiopulmonary resuscitation.

The study aimed to estimate the incidence of and risk factors for BCIS following cemented hemiarthroplasty for femoral neck fracture. An additional Surveillance report December 2015  
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aim was to examine the impact of BCIS on mortality after 30 days and after 1 year. Kaplan-Meier methods were used to compare postoperative mortality between BCIS grades. For risk factors, stepwise multiple logistic regression analysis was used to find any independent predictors of severe BCIS (grade 2 or 3) based on adjusted odds ratios (OR). The final regression analysis included any predictors with an initial unadjusted OR of less than 0.5 or greater than 2.0, or  $p < 0.05$ .

## Results

Of the 1080 patients originally enrolled, 64 were excluded because of: receiving hemiarthroplasty other than for hip fracture ( $n=31$ ), classification errors in the surgical registry ( $n=30$ ), or lack of perioperative documentation ( $n=3$ ). After exclusions, 1016 patients were included for analysis.

The incidence of each BCIS grade, and the accompanying 30-day and 1-year mortality were:

- Grade 0: incidence 72.2%; 30-day mortality 5.2%; 1-year mortality 25.2%.
- Grade 1: incidence 21%; 30-day mortality 9.3%; 1-year mortality 29.9%.
- Grade 2: incidence 5.1%; 30-day mortality 35%; 1-year mortality 48.1%.
- Grade 3: incidence 1.7%; 30-day mortality 88%; 1-year mortality 94.1%.

Mortality was significantly higher in BCIS grades 2 and 3 compared with grade 0 (both  $p < 0.001$ ) and grade 1 ( $p < 0.009$  and  $p < 0.001$  respectively). Mortality was also higher in grade 3 than grade 2 BCIS ( $p < 0.001$ ).

The adjusted ORs for independent predictors of severe BCIS (grade 2 or 3) based on the regression analysis were:

- ASA grade III or IV ( $OR = 1.97$ , 95% CI 1.07 to 3.61,  $p = 0.029$ ).
- Chronic obstructive pulmonary disease ( $OR = 2.02$ , 95% CI 1.10 to 3.72,  $p = 0.024$ ).
- Medication with diuretics ( $OR = 1.92$ , 95% CI 1.15 to 3.22,  $p = 0.013$ ).
- Medication with warfarin ( $OR = 2.69$ , 95% CI 1.33 to 5.43,  $p = 0.006$ ).

Other predictors included in the regression analysis, but not found to independently predict severe BCIS, were arteriosclerosis, angina pectoris, congestive heart failure, beta-blockers, and angiotensin-converting enzyme inhibitors.

Severe BCIS was a significant predictor of 30-day mortality (OR=16.35, 95% CI 8.84 to 30.24, p<0.005). It was also noted that 95% of the patients who died within 48 hours of surgery had severe BCIS.

### **Strengths and limitations**

#### ***Strengths***

- Anaesthesia charts were used to assess clinical signs of BCIS. At the study institution, the relevant signs were recorded immediately before induction of anaesthesia and every fifth minute during the operation.
- Severity of BCIS was assessed according to a standard scoring system.

#### ***Limitations***

- The study was retrospective and therefore patient outcomes were known, which may introduce bias. Additionally, as an observational study the link between BCIS, its risk factors and mortality is associative but may not be causative.
- The study included only patients undergoing cemented hemiarthroplasty and did not compare outcomes with patients who had received cementless prostheses.
- The reliability of the study results depend on the accuracy of data in medical records and anaesthesia charts.
- Mortality at 30-days may have been influenced by other variables that were not controlled or adjusted for, such as orthogeriatric care and rehabilitation services.

### **Impact on guideline**

The new evidence suggests that mortality after cemented hemiarthroplasty for femoral neck fracture is significantly higher in the most severe grades of BCIS, and there could be an association between severe BCIS and some

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existing comorbidities. This evidence may therefore suggest that patients with particular comorbidities could benefit from extra caution if using cement.

These data may affect the recommendation in NICE CG124 that cemented implants should be used for all patients. However, it was noted that this recommendation was based on a review from the original guideline that included only randomised controlled trials –the current evidence on BCIS is retrospective. Topic experts also noted that the absence of an uncemented comparator group could limit firm conclusions.

Topics experts additionally noted that in response to the publication of this new evidence, a [Working Party \(2015\)](#) of representatives of the Association of Anaesthetists of Great Britain and Ireland, the British Orthopaedic Association, and the British Geriatric Society published a consensus safety guideline. It discussed reducing the risk from cemented hemiarthroplasty for hip fracture, including identification of patients at high risk. Topic expert feedback indicated that all patients (not just those at greater risk) would benefit from safe practices when using cement.

## **How we made the decision**

We check our guidelines regularly to ensure they remain up to date. We based the decision on surveillance 4 years after the publication of [Hip fracture \(2011\)](#) NICE guideline CG124.

For details of the process and update decisions that are available, see [ensuring that published guidelines are current and accurate](#) in ‘Developing NICE guidelines: the manual’.

## **New evidence**

We found 74 new studies in a search for randomised controlled trials and systematic reviews published between 8 October 2012 and 2 February 2015. We also considered 8 additional studies identified by members of the Guideline Committee who originally worked on this guideline, and 1 additional study from other correspondence we have received since the publication of the guideline.

Evidence identified in an [Evidence Update](#) from 2 years after publication of the guideline was also considered. This included 10 studies identified by a literature search.

From all sources, 93 studies were considered to be relevant to the guideline.

We also checked for relevant ongoing research, which will be evaluated again at the next surveillance review of the guideline.

See appendix A: decision matrix for summaries and references for all new evidence considered

### ***Views of topic experts***

We considered the views of topic experts, including those who helped to develop the guideline, and other correspondence we have received since the publication of the guideline.

### ***Views of stakeholders***

Stakeholders are consulted only if we decide not to update the guideline following checks at 4 and 8 years after publication. Because this was a 4-year review, and the decision was to update, we did not consult on the decision.

See [ensuring that published guidelines are current and accurate](#) in 'Developing NICE guidelines: the manual' for more details on our consultation processes.

### ***Date of next surveillance***

Our next surveillance to decide whether the guideline should be updated is scheduled for 2017.

### ***NICE Surveillance Programme project team***

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