

Implantation Syndrome

How to Minimise the Risk

WHY IT MATTERS

Based on recent evidence and international guidelines, cemented fixation is increasingly recommended for hip arthroplasty in certain patient groups. These include older patients, women and patients with hip fractures. Benefits include fewer revisions for periprosthetic fractures, improved postoperative mobility and reduced postoperative pain.¹

As the patients who benefit most from cemented fixation also have the highest risk of severe Implantation Syndrome, also known as Bone Cement Implantation Syndrome (BCIS), it is important to take preventive measures to minimise the risk of BCIS.²

PRECAUTIONS TO BE TAKEN BY SURGEON²

1. Inform the anaesthetist of each step of the cementing process
2. Clean carefully with extensive use of pulse lavage and dry the femoral canal, e.g. using a suction catheter
3. Place an intramedullary plug/cement restrictor
4. Clean carefully a second time with extensive use of pulse lavage and dry the femoral canal, e.g. using a suction catheter
5. Apply bone cement in retrograde fashion
6. Avoid proximal pressurisation in elderly patients after FNOF – dosed proximal pressure only in active patients
7. Insert the prosthesis without too much pressure

PRECAUTIONS TO BE TAKEN BY ANAESTHETIST²

1. Confirm to the surgeon your awareness & support
2. Ensure that the patient is adequately hydrated pre-operatively
3. Maintain vigilance for possible cardiovascular events once the femoral head is removed
4. Aim for a systolic blood pressure within 20% of pre-induction value
5. Prepare vasopressors in case of cardiovascular collapse

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RECOMMENDED LITERATURE

- ✦ “We found that BCIS was common after arthroplasty, but severe BCIS was uncommon.”³ Rassir et al. (2021)
- ✦ “Safety guideline: reducing the risk from cemented hemiarthroplasty.”² Griffiths et al. (2015)
- ✦ “Using a modified 3rd generation cementing technique, it is possible to significantly reduce the incidence of Bone Cement Implantation Syndrome and its associated mortality.”⁴ Bökeler et al. (2022)
- ✦ “Cemented hemiarthroplasty resulted in modestly but significantly better quality of life and a lower risk of periprosthetic fracture than uncemented hemiarthroplasty among patients 60 years of age or older with a displaced intracapsular hip fracture.” Mortality at 12 months did not differ significantly.¹ Fernandez et al. (2022)
- ✦ “We found no evidence of a difference in mortality at 12 months (cemented HA vs uncemented HA).”⁵ Lewis et al. (2022)

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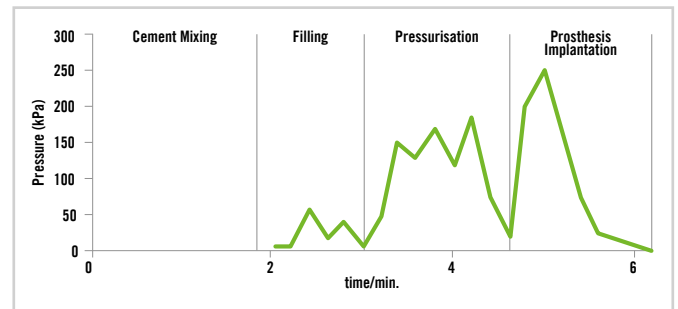
Facts & Figures

EPIDEMIOLOGY

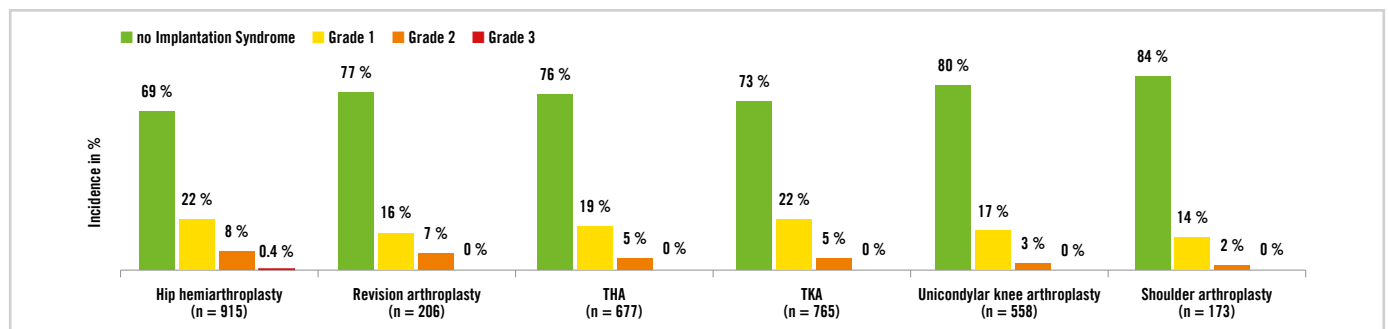
As a result of the instrumentation in the bone cavity, the pressure rises and fat, bone marrow and air embolise into the venous system and into the lungs.⁶ BCIS can occur with any surgery, especially procedures that breach the femoral canal, such as intramedullary nailing and cemented and uncemented hip implants.^{2,7}

As BCIS is not caused by the bone cement itself, the term “Implantation Syndrome” is alternatively used to “Bone Cement Implantation Syndrome”.⁶

INTRAFEMORAL PRESSURE CEMENTED THA⁶



INCIDENCE FOR DIFFERENT CEMENTED ARTHROPLASTIES³



CLASSIFICATION^{3,8}

Grade 1

- Moderate hypoxia: SpO₂ < 94 % or
- Hypotension: Fall in SBP > 20 %

Grade 2

- Severe hypoxia: SpO₂ < 88 % or
- Hypotension: Fall in SBP > 40 % or
- Unexpected loss of consciousness

Grade 3

- Cardiovascular collapse requiring cardiopulmonary resuscitation

PATIENTS AT HIGH RISK⁹

- Advanced age
- Male gender
- ASA III or IV
- Diuretic medication
- Significant cardio disease
- Frail patients undergoing hemiarthroplasty

Pre-operative multidisciplinary discussion and “time-out” is recommended.