Perioperative management of the patient with challenging co-morbidities

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Abstract

Patients presenting for surgery often create challenges for the surgical and anaesthetic teams, and in many cases this is due to multifactorial issues rather than a single disease process. In many cases a range of challenging co-morbidities are present. This article focuses on the challenges patients with obesity, old age, immunosuppression and pregnancy bring when they present for surgical intervention.

Keywords Immunosuppression; obesity; old age; pregnancy

Introduction

The perioperative management of patients with cardiovascular, respiratory, renal and endocrine problems are all discussed in this issue. However not all patients who present a significant challenge to the surgical and anaesthetic teams fit into these categories. As such this article will focus on the challenges surrounding patients who present for surgical intervention who are:

- elderly
- pregnant
- obese
- immunocompromised.

Old age

As in most countries the UK population is ageing, and it is estimated that by 2033 almost one-quarter of the population will be over 65. As such the proportion of surgery being performed on elderly patients is increasing. The 2010 National Confidential Enquiry into Patient Outcome and Death (NCEPOD) focussed on the care of elderly patients in a surgical setting and suggested that people over 65 accounted for two-thirds of acute and elective surgical admissions. These elderly patients often have complex health problems and co-morbidities and as a result are at a higher risk of perioperative complications.

Ageing and surgical risk

Ageing is a progressive physiological process that is characterized by degeneration of organ systems and tissues with consequent loss of functional reserve of these systems. Loss of functional reserve impairs an individual's ability to cope with physiological challenges such as anaesthesia and surgery. Methods used to stratify perioperative risk in elderly patients are limited because they do not assess the physiological reserve of the patient. Chronological age is much less important an independent risk factor than emergency surgery or co-existing disease.

The decision to operate, or indeed not operate, in the elderly population should be made in full consultation with the patients themselves, with input from the multidisciplinary team and decisions being taken at a consultant level.

Perioperative recommendations

NCEPOD recommended specifically that elderly patients undergoing surgery need access to routine daily clinical review from specialists in elderly care. This aids the careful attention that should be given to improving fluid status, reducing unnecessary drug treatment and anticipating nutritional support, especially in patients undergoing urgent surgical interventions. Equally important in the perioperative period is attention to the maintenance of normothermia, positioning and skin care, deep vein thrombosis prophylaxis, blood glucose monitoring, adequate and suitable analgesic regimes and oxygen therapy that may be needed for several postoperative days.

The elderly population frequently experience deterioration in cognitive function in the postoperative period. This can present as acute delirium which has multiple causative factors or on occasion postoperative cognitive dysfunction (POCD). This is a formal diagnosis requiring neuropsychological testing, and can present weeks or months postoperatively. In all cases, access to appropriate scoring tools and staff training are key to picking up sometimes subtle cognitive deteriorations that can ultimately have a major impact in postoperative recovery and discharge from hospital.

Rehabilitation postoperatively should be planned from the preoperative stages, with key allied health professionals in place to facilitate early mobilization, physiotherapy and occupational therapy to ensure successful recovery and discharge from hospital.

Pregnancy

During pregnancy, surgery for non-obstetric procedures occurs in up to 2% of women. Approximately 42% of these procedures occur in the first trimester, 35% in the second trimester and 23% during the third trimester. The most common non-obstetric surgical emergencies are similar to those in the non-pregnant population in that age group and include acute appendicitis, acute cholecystitis and intestinal obstruction, along with surgical procedures relating to trauma.

Timing of surgical intervention in the pregnant patient

Historically it was recommended that elective surgery be delayed until the second trimester in order to reduce the rates of spontaneous abortion and preterm labour. However operative intervention may be performed in any trimester of pregnancy and it should be remembered that postponing necessary surgery until after parturition may in some cases increase the rates of

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complications for both mother and fetus. Ultimately fetal outcome depends on the outcome of the mother.

Risk of surgical intervention during pregnancy

Surgical interventions during pregnancy should minimize fetal risk without compromising the safety of the mother. There is a risk of spontaneous abortion and preterm labour with any surgery during pregnancy and this risk is increased with intra-abdominal procedures. In all cases uterine manipulation should be kept to a minimum and drugs that increase uterine tone avoided.

One of the most serious risks to the fetus during maternal surgery is intrauterine asphyxia. Unlike many vascular beds, uteroplacental circulation is not auto-regulated and hence perfusion is entirely dependant on the maintenance of an adequate maternal blood pressure.

Intrauterine asphyxia is avoided by maintaining maternal oxygenation and haemodynamic stability. Aortocaval compression becomes clinically relevant from 20 weeks. Supine positioning results in the gravid uterus placing pressure on the inferior vena cava, decreasing venous return. This can result in a significant reduction in cardiac output with concominant maternal hypotension and decreased placental perfusion. This is mitigated by placing the mother in a left lateral tilt position. Any maternal hypotension, either during surgery, or in the ward environment should be treated aggressively with fluids and left lateral tilt.

Laparoscopic surgery during pregnancy

Pregnancy should not be seen as a contraindication to laparoscopic surgery if appropriate. There were previous concerns regarding fetal safety during laparoscopic surgery. These risks included direct uterine and fetal trauma, fetal acidosis due to carbon dioxide insufflation and decreased maternal cardiac output secondary to the pneumoperitoneum and positioning with a subsequent decrease to uteroplacental perfusion. However recent data show the safety and efficacy of laparoscopy during all trimesters for many surgical conditions, with outcomes similar to conventional operations, and it has become the preferred treatment for many surgical diseases in the gravid patient. There are advantages to laparoscopic surgery such as decreased postoperative pain and therefore less need for analgesics, shorter recovery times and lower risk of thromboembolic events.

Practical considerations

Patients should be given pneumatic stockings to promote venous return intraoperatively. The lowest pressure pneumoperitoneum under 12 mmHg should be used wherever possible and aortocaval compression avoided by strict attention to patient positioning. Control of carbon dioxide levels helps avoid fetal acidosis. Intraoperative fetal monitoring with a clear plan for intraoperative intervention may be useful. If pregnancy continues beyond the first postoperative week, the incidence of premature labour is no higher than in the non-surgical patient.

Obesity

Approximately 7% of the worldwide adult population is obese, and obesity in adolescents and children is also increasing.

Measurement and definition of obesity

Body mass index (BMI) is the commonest method used to define obesity. It can be calculated by:

$$\text{BMI} = \frac{\text{Weight in kilogrammes}}{\text{Height in metres}^2}$$

Morbidity and mortality rise sharply when the BMI is over 30 kg/m^2, however BMI measurement does have its limitations and the regional distribution of excess fat is thought to be more predictive than BMI for morbidity and mortality. Excessive abdominal fat is particularity predictive for non-insulin-dependent diabetes, dyslipidaemia and cardiovascular disease (Table 1).

Perioperative implications

Anaesthesia and surgery may put the obese patient at considerable risk. Surgery is technically more challenging due to reduced surgical access, difficult visualization of underlying structures and excessive bleeding. This leads to longer operating times and the subsequent exacerbation of the risks of anaesthesia in the obese. There is a higher risk of infection in obese patients, due in part to poor blood supply to the fatty tissues, and impaired immune system function due to neurohumoral factors.

Special surgical equipment may need to be ordered, the weight limit and width of the operating table should be adequate. 'Overflow' of the patient over the sides of the table increases the risk of pressure sores and nerve damage. Patients are more difficult to position and there is an increased risk to theatre staff during moving and handling.

These patients also pose a significant challenge to the anaesthetic team. Airway management may be hampered by reduced neck mobility and altered oropharyngeal anatomy. Altered respiratory mechanics and decreased chest wall compliance interfere with oxygenation and ventilation, and the functional residual capacity declines exponentially with increasing BMI. As such the intraoperative and postoperative tissue oxygen tension of these obese patients may be significantly reduced compared to baseline, even with supplemental oxygen.

Non-insulin-dependent diabetes and its associated microvascular changes are much more common in obese patients, caused by insulin resistance and inadequate insulin production. Good perioperative glycaemic control is important in reducing infection and risk of myocardial events and continuing statins over the perioperative period might help improve coronary plaque stability. In addition the pharmacodynamics and pharmacokinetics of many medications are unknown in the severely obese, making drug dosage difficult.

Classification according to body mass index (BMI)

Classification	BMI (kg/m^2)
Underweight	<19
Normal range	19 < 25
Overweight	25 < 30
Obese	30 < 35
Morbidly obese	>35
Super — morbidly obese	>55

Table 1