Major urological surgery: The role of pre-operative assessment and Enhanced Recovery After Surgery (ERAS) protocols

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Objectives

• Pre-operative assessment
  — CPX testing

• ERAS protocols
  — Nutrition
  — Post-op ileus
  — Mechanical bowel prep
John Cabot
(Giovanni Caboto)

“seek islands and countries of the heathen towards the west”

1497 June 9
John Cabot reached the New World: The landing spot is disputed as either being Cape Breton Island or Labrador
Pre-op Assessment - Introduction

• Age of patients undergoing major urological surgery is increasing
• Increase in mortality and morbidity
• Outcome for curative radical surgery similar to younger patients \(^1\)
• Objectives of pre-op assessment
  – Allow access to appropriate older patients
  – Identify unsuitable patients or those who would benefit from HDU care post-op
  – Identify low-risk patients

(1) Figueroa A. Cancer 1997

Methods of Preop Assessment – I

• Age \(^2\)
• Risk of myocardial ischaemia \(^3\)
• Scoring systems
  – ASA: 1963
  – Goldman cardiac index: 1977
  – POSSUM
  – Adult Comorbidity Evaluation-27 (ACE-27) score

(2) Del Guercio L. JAMA 1988
(3) Haagensen R. Br J Anaesth 1988
Physiological and operative severity scoring system (POSSUM) score

Pre-op assessment

- Co-morbidities and subjective assessment of exercise tolerance
- Metabolic equivalents (METs)
- ECG, echo, respiratory function tests
- Identification of a single haemodynamic, pulmonary or renal marker of cardiovascular risk - elusive

(4) Older P. Anaesth Int Care 1988
Cardiopulmonary exercise testing (CPX)

- Major intra-abdominal surgery is associated with an increase in oxygen demand of $\geq 40\%$\(^4\)
- Functional capacity = $\uparrow$CO $\approx$ $\uparrow$O\(_2\) demand
- Anaerobic metabolism = $\uparrow$CO $\neq$ $\uparrow$O\(_2\) demand
- Risk associated with a procedure is a product of both the type of surgery and the patient’s cardiopulmonary (CP) functional capacity

(4) Older P. Anaesth Int Care 1988

CPX Testing

- Objectively measures the ability of the CP system to deliver oxygen to tissues under conditions of stress
- Not routinely used
- Inexpensive, non-invasive, out-patient
Uses a bicycle ergometer, treadmill or hand crank

Respiratory gas analysis and an ECG

**Anaerobic Threshold (AT)**

- Several measurements taken
- Point at which anaerobic metabolism is needed to supplement aerobic metabolism
- Independent of motivation and age
- Occurs before the maximum aerobic capacity, and can readily be obtained in elderly patients
- AT is expressed as a value of oxygen consumption indexed to body mass (mL/min/kg)
Surgical Anaerobic Threshold

- Older 1993
- Evaluated 187 surgical patients over 60 with CPX
- 55 patients with an AT of < 11 mL/min/kg
  - 10 died, mortality rate 18%
- 132 patients with an AT of > 11 mL/min/kg
  - 1 died, mortality rate 0.8%
- If AT of < 11 mL/min/kg combined with evidence of pre-op ischaemia – mortality rate 42% (8 out of 19)
Conclusions

• Appears to be a promising method of evaluating risk pre-operatively especially if combined with an assessment of surgical risk

• Positive results from vascular surgery \(^7\) but conflicting results in upper GI surgery \(^8-9\)

• Little data on use in major urological surgery

• May allow access to treatment for older patients and more effective use of ICU resources

Enhanced Recovery After Surgery (ERAS)

- Fast Track (FT) perioperative care
- Aims to reduce the effects of the stress response to surgery
- Integrates a variety of peri-operative interventions to maintain physiological function and facilitate earlier recovery
- Evidence comes from colorectal surgery

(1) Wilmore DW. BMJ 2001

Is ERAS effective? 1-3

- Cardiopulmonary function improved
- Earlier return of bowel function and oral intake
- Reduces hospital stay
- Reduces complications
- Decrease post-op fatigue
- Earlier resumption of normal activities

(1) Eskicioglu C. J Gastrointest Surg (Metaanalysis) 2009
(2) Pascal HE. J Gastrointest Surg 2010
(3) Lassen K. Arch Surg (Consensus statement) 2009
ERAS for cystectomy

- Day before RC
  - Normal breakfast
  - Admit to hospital
  - Unrestricted clear fluids
  - Refer to dietician
  - Stoma therapist to see patient
  - Assess social circumstances and refer if needed
- Day of RC
  - Clear fluids up to 4 h before RC, then nil by mouth
  - Restart clear fluids as tolerated when in recovery
  - Start food chart
  - Epidural analgesia in-situ.
- After RC – Day 1
  - Free fluids as tolerated
  - Female patients, remove vaginal pack
  - Mobilise and refer to physiotherapist
  - Metoclopramide regularly
  - Ranitidine three times daily i.v. or twice daily orally
  - Remove drain if draining <50 mL in 24 h
  - Flush 20 mL into neobladder, 2-hourly for 12 h and then 4-hourly

- Day 2
  - Light diet as tolerated
  - Mobilise and encourage self care (catheter care/flushing in neobladders, and stoma bag emptying in patients with a conduit)
- Day 3 and 4
  - Remove epidural on day 3
  - Continue to mobilise and encourage self care
  - Light diet as tolerated
  - Start planning for discharge
  - Continue to mobilise and encourage self care
- Day 5, 6 and 7
  - Dietitian to assess nutritional requirements on day 5
  - If a patient is not eating or drinking after 5–6 days but with bowel activity, then start nasogastric feeding. If there is no bowel activity then start total parenteral nutrition.
- Day 8
  - Stents out (no stentogram); patient to stay at least 24 h after stent removal
- Day 10
  - Remove clips
- Day 11–14
  - Continue as previous and schedule for return to home

ERAS in Urology

- Compared 112 consecutive patients – 56 before and 56 after implementing ERAS
- No difference in mortality, morbidity and re-admission rates
- Reduced hospital stay

Arumainayagam N. BJUI 2008
Pre-op nutrition

- Poor nutrition detrimental to outcome \(^4\)
- Frequently occurs with co-morbidities (chronic organ failure) and with underlying disease processes (cancer)
- Poor nutrition particularly for cancer patients undergoing surgery is an independent risk factor for complications, hospital stay and costs \(^5\)

Who should receive pre-op nutrition?

- ESPEN advise that patients with the following parameters should receive 10-14 days of enteral nutrition
  - Weight loss > 10-15% in 6 months
  - BMI < 18.5kg/m2
  - Serum albumin of < 30 g/l
- The British Association of Parenteral and Enteral use the Malnutrition Universal Screening Tool (MUST)
How should patients be managed? 6-8

(6) Braga M. Arch Surg 1999
(7) Tepakske R. Lancet 2001
(8) Braga M. Surgery 2002
Surgical stress response - nutrition and metabolic aspects

- Characterised by increased catabolism
- Hyperglycaemia
- Facilitated by cortisol and catecholamines promoting hepatic glycogenolysis and gluconeogenesis
- Relative lack of insulin
- Peripheral insulin resistance

Insulin resistance

- Insulin resistance is a major variable influencing length of stay
- Poor wound healing and increased risk of infective complications
- Degree of insulin resistance is associated with the extent of surgery
- If post-operative hyperglycaemia is controlled mortality and morbidity can be reduced by half
- Similar picture after cystectomy

How do we reduce insulin resistance?

• Pain relief \(^{12}\)
  – Epidural vs opioid \(^{13}\)
• Pre-operative carbohydrate loading
• Avoid interruption of oral intake

Carbohydrate loading

• No evidence that fasting from midnight avoids pulmonary aspiration\(^{14}\)
• No increase in complications with 6 hours solids, 2 hours clear fluids \(^{15}\)
• Use of clear carbohydrate drink up to 2 hours before surgery
• Reduces pre-op thirst, hunger and anxiety
• Reduces post-op insulin resistance and nitrogen and protein losses \(^{14,16}\)
• Shorter hospital stay \(^{17}\)
Post-op nutrition

- Oral nutrition can be initiated immediately \(^\text{18}\)
- Decrease length of hospital stay
- No advantage for NBM or NG decompression vs early enteral nutrition
- No detrimental effect on anastomoses

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![Graph showing outcomes of post-op nutrition trials](image)

- Lewis SJ. BMJ (meta-analysis controlled trials) 2001

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Post-op nutrition

- Andersen HK. Cochrane Review 2006 \(^\text{19}\)
  - Direction of effect indicates was a reduction in the risk of post surgical complications
  - Reduced mortality rate
- Lewis SJ. J Gastro Surg (Meta-analysis) 2009 \(^\text{20}\)
  - Reduction in complications
  - No benefit to NBM
  - Mechanism of reduced mortality not clear

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(18) Lewis SJ. BMJ (meta-analysis controlled trials) 2001
(19) Andersen HK. Cochrane Review 2006
(20) Lewis SJ. J Gastro Surg 2009
Post-operative ileus

- Bowel complications (paralytic ileus) are amongst the commonest complications after cystectomy (17.4-23%)
- Bowel function relies on a combination of the enteric and central nervous systems, hormonal influences, neurotransmitters and local inflammatory pathways
- Peritoneal irritation leading to a disruption normal pathways within the GI tract
Post-op Ileus - bubble gum

• “sham feeding”
• Stimulates cephalo-vagal activity
• Increases concentrations of gastrointestinal hormones
• Increases secretion of saliva and pancreatic juices
• Ingredients of sugar free gum, such as sorbitol and hexitol, may also play a role in the reduction in ileus postoperatively

Box plots of time to defaecation before and after the addition of chewing to the ERAS protocol

(21) Koupparis A et al. BJMSU 2010
Post-op ileus - bubble gum

- Accounts for $1 billion expenditure in USA, gum costs 4 cents, based on 79,000 colectomies costing $1500 per stay – an outlay of $47,000 could save $119,000,000
- However, there appears to be no effect on hospital stay
  - No pre-op assessment of social issues/situation
  - Lack of interim care beds/cottage hospital beds
  - Delays with stoma care tuition
  - Concern with sepsis after stent removal

Other methods to reduce post-op ileus

- Prokinetic agents
- Avoiding fluid overload
- Avoid NG tubes
- Epidural anaesthesia
- Avoiding mechanical bowel prep

[22] Lobo DN et al. Lancet 2002
Mechanical Bowel Prep (MBP)

- Major surgical dogma
- Reduce infectious complications
- Reduce faecal and bacterial load in bowel
- Challenged over 30 years ago
- Bacterial translocation
- Dehydration and electrolyte disturbances
- Anastamotic leakage

Mechanical bowel prep - latest evidence?

- Contant ME et al. Lancet 2007
- Multi-centre RCT, 1431 patients
- Anastomotic leakage, septic complications, fascial dehiscence, or mortality did not differ between groups

- Slim MD et al. Meta-analysis Annals Surg 2009
- 14 RCT’s, 5000 patients
- No difference in anastamotic leakage or overall infection rate
Conclusions/suggestions

• Consider greater input from nutrition teams
  – pre-op nutritional supplementation where appropriate
• Carbo-loading
• Early enteral nutrition
• Avoid mechanical bowel prep