

**VICTORIAN SURGICAL  
CONSULTATIVE COUNCIL  
INAUGURAL REPORT  
2001–2004**

**Victorian Surgical Consultative Council**  
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**VICTORIAN SURGICAL  
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INAUGURAL REPORT  
2001-2004**

**Edited by Jonathan Rush MB.BS, FRACS**

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# INTRODUCTION

The Victorian Surgical Consultative Council (VSCC) was established in October 2001, by the then Minister of Health, the Hon John Thwaites MP with the aim to continuously improve the safety and quality of surgery in the state of Victoria.

The Council's TERMS OF REFERENCE are:

- To monitor, analyse and report on key areas of potentially preventable surgical mortality and morbidity within the Victorian hospital system.
- To liaise with other consultative councils on issues of common interest, including the development of appropriate systems for reporting of relevant cases by practitioners.
- To improve surgical practice by publication and dissemination of relevant information and practical strategies identified during deliberations of the Council.
- To regularly report to the Minister for Health and to the Victorian Quality Council.
- To respond to specific matters referred to the Council by the Minister for investigation and reporting, as required.

The Council is a prescribed consultative council under Section 24 (4) of the Health Act 1958.

# ACKNOWLEDGEMENTS

The Council would like to thank:

- all the individual medical practitioners who have contributed cases;
- the various health services and the clinical risk management coordinators who have contributed cases;
- the various colleges for their interest, help and support over the past three years;
- the Royal Australasian College of Surgeons (RACS), the Royal Australian College of Obstetricians & Gynaecologists and the Royal Australian and New Zealand College of Ophthalmologists for their particular ongoing support; and
- the Victorian State Committee of the RACS for their great assistance to the Chair and the Council. It is a close association that the Council wishes to continue.

# CURRENT COUNCIL MEMBERSHIP

## VICTORIAN SURGICAL CONSULTATIVE COUNCIL – MEMBERSHIP

The VSCC membership consists of 18 members and includes surgeons from a number of different specialities, a medical administrator, a nurse administrator, a doctor from the Coroner's Office, a gynaecologist and an anaesthetist. Two surgeons from rural hospital practices are also on Council.

### **The Council membership is:**

**Chair:** Mr Jonathan Rush

**Deputy Chair:** Mr Ian Jones

Dr Jenny Bartlett: Department of Human Services (DHS) Representative  
Chief Clinical Advisor,  
Metropolitan Health & Aged Care Services  
Department of Human Services

Prof. Peter Choong

Mr Stephen Clifforth

Mr Roy Fink

Dr Jane Fox

Prof. Michael Grigg

Mr Tony Heinz

Dr Kim Hill

Dr Robert Rattray

Dr Andrew Rosengarten

Prof. John Royle

Ms Marilyn Schroeder

Prof. Bruce Waxman

### **The following members resigned during the 2001–2004 Council term:**

Prof. Stephen Cordner (Oct 2001 – April 2004)

A/Prof. Anthony Costello (Oct 2001 – February 2004)

Dr Trevor Jones (Oct 2001 – February 2003)

Dr Mark Langley (Oct 2001 – May 2003)

Dr Wirginia Maixner (Oct 2001 – July 2004)

Dr John Slavin (Oct 2001 – June 2004)

Dr Sonia Grover (Oct 2001 – July 2004)

# OPERATION OF COUNCIL

## Establishment

In late 2001, Mr Jonathan Rush, VSCC Chair and Professor Paddy Dewan, as Chair of the Victorian State Committee of the Royal Australasian College of Surgeons (RACS) wrote to all surgeons in Victoria announcing the establishment of the VSCC. This letter outlined the Council's principle objectives to analyse and report on key areas of potentially preventable surgical mortality and morbidity within the Victorian hospital system and to improve surgical practice by the publication and dissemination of strategies for practice improvement.

## Council Meetings

The Council meetings occur on a monthly basis – all reported cases are discussed, classified and if necessary, further follow-up is undertaken. All discussions occur with de-identified material, that is, the name of the patient, the name of the surgeon and the name of the institution are unknown to the Council members during their discussion.

## Data Collection

The VSCC receive direct voluntary reports from health services and individual surgeons on mortality, defined as:

*'Death in association with, or as a result of surgery. Deaths occurring during the inpatient stay should be reported as well as all deaths totally or partially attributable to surgery, irrespective of time interval.'*

Voluntary reporting of any significant adverse events or morbidities related to surgical care is also encouraged.

Reported cases are received via a completed "Confidential Initial Report – FORM ONE". This form is available on the VSCC website [www.health.vic.gov.au/vscc](http://www.health.vic.gov.au/vscc).

Once received, the report (or completed Form 1) is reviewed by the Chair and de-identified prior to discussion at the Council meeting. If it is considered necessary, the Chair, or a delegated member of the Council, may follow-up the case in more detail with a personal approach to the reporting surgeon. At no stage do Council members know the name of the patient, the institution or the reporting surgeon, except the Chairman and perhaps one member of the Council who has been delegated.

# REPORTING

The Council has continually encouraged voluntary reporting from individual surgeons and reinforced reporting as a mechanism to inform, educate and improve surgical care in Victoria.

The Quality and Safety Committees of various health services are also assisting the reporting mechanism by coordinating the completion and returning of the Form One to VSCC. This assistance is always provided with the permission of the treating surgeon.

# REPORTED CASES

Since the commencement of reporting, the Council has received a range of reports on surgical mortality and morbidity. An outline of these reports are listed below:

## MORTALITY

- **Unavoidable/Expected deaths**

These were following cases of severe ischaemic limbs in elderly sick patients, cases of bowel ischaemia, inoperable carcinoma, pulmonary emboli, subarachnoid haemorrhage and thoracic aortic arch dissection.

- **Other vascular cases**

These included ruptured aortic abdominal aneurysm and one case involved a reaction to protamine sulphate injection used to reverse heparin.

- **Gynaecological cases**

There was a case of pulmonary embolus post-hysterectomy in a 45-year-old woman.

There was a case of perforated uterus and bowel damage after a dilatation and curettage (D&C) that was not initially recognised.

- **Urology**

There was one case of severe bleeding post trans-urethral resection of the prostate that occurred in a small hospital, with concerns about adequate ICU or special care facilities.

- **Trauma**

These included cases of severe pelvic trauma with problems associated with control of haemorrhage, as well as appropriate transfer to a tertiary institution.

- **Spinal surgery**

There was one case of cardiac arrest in an elderly patient who had had a multi-level decompression laminectomy for canal stenosis.

- **Percutaneous Endoscopic Gastrostomy (PEG) problems**

One death was due to unexpected bleeding after removal of the PEG.

One death was associated with the replacement of a PEG and subsequent aspiration.

- **Malignant hyperpyrexia**

## MORBIDITY

- Cardiac ischaemia after total knee joint replacement.
- Acute pancreatitis after endoscopic retrograde cholangiopancreatography (ERCP) and sphincterotomy.
- Laparoscopic cholecystectomy complicated by a lacerated liver with significant bleeding post-operatively.
- Anastomotic leak following left hemicolectomy for a carcinoma of the colon.
- Perforated rectosigmoid colon at colonoscopy.
- Endometrial ablation and water intoxication.
- Laparoscopic cholecystectomy with clip placed onto common bile duct requiring re-operation.
- Volkman's ischaemia of forearm following the insertion of a forearm AV fistula under local anaesthetic block.
- Wrong site surgery where ulna was approached surgically from the lateral, instead of the medial side, of the elbow.

# SENTINEL EVENT PROGRAMME

The Victorian Sentinel Event Programme pilot has been in place since the 1 July 2001. It requires all Victorian public hospitals to report specific sentinel events to the Department of Human Services within 15 working days, followed by a Root Cause Analysis (RCA) and Risk Reduction Action Plan (RRAP), 45 working days later. The information is reviewed by the relevant consultative council.

The Department of Human Services defines a sentinel event as a relatively infrequent, clear cut event that occurs independently of a patient's condition; commonly reflects hospital system and process deficiencies; and results in unnecessary outcome for patients. More information can be found on website: [www.health.vic.gov.au/clinrisk](http://www.health.vic.gov.au/clinrisk)

The list of reportable sentinel events was refined for 2002/2003 and is consistent with those events reported nationally for the Australian Council for Safety and Quality in Health Care (ACSQHC). The category 'other catastrophic event' was added to broaden the reporting requirements. The reporting criteria 2003/2004 therefore, includes:

- Procedures involving the wrong patient or body part;
- Suicide in an inpatient unit;
- Retained instruments or other material after surgery requiring re-operation or further surgical procedure;
- Intravascular gas embolism resulting in death or neurological damage;
- Haemolytic blood transfusion reaction resulting from blood group (ABO) incompatibility;
- Medication error leading to the death of patient reasonably believed to be due to incorrect administration of drugs;
- Maternal death or serious morbidity associated with labour or delivery;
- Infant discharged to wrong family; and
- Other catastrophic event.

# PRACTICE, PRINCIPLES OR GUIDELINES

As a result of voluntary reports and Sentinel Events reviewed, the VSCC has established a number of principles or guidelines to assist surgeons in the prevention of a variety of problems.

These include:

- Correct Side/Site Surgery;
- Specimen Management Guidelines;
- Management of the Haemodynamically Unstable Patient with a Pelvic Fracture;
- Surgical Patient Status System;
- Guidelines for the Management of Bile Duct Stones;
- Guidelines for the Management of Ruptured Abdominal Aortic Aneurysms;
- Guidelines on the Use of Protamine Sulphate.

Also a number of other topics are currently under consideration including:

- Deep vein thrombosis prophylaxis in low-risk patients;
- Water intoxication and endometrial ablation;
- Component Selection Guidelines;
- General protocol regarding trans-urethral resection.

Two other sets of information can also be accessed via the VSCC website:

- Fires in Operating Theatres – prepared by the Consultative Council on Anaesthetic Mortality and Morbidity (CCAMM).
- Cardiac Surgery in Victorian Public Hospital – Report to the public 2002, prepared by the Victorian Branch of The Australasian Society of Cardio and Thoracic Surgeons and the Department of Human Services, on the Cardiac Surgery Database. This report demonstrates how effective mortality studies can be carried out by specific craft groups (see website [www.health.vic.gov.au/vscc](http://www.health.vic.gov.au/vscc)).

# SUMMARY OF CURRENT GUIDELINES

## 1. SPECIMEN MANAGEMENT GUIDELINES

Over the past two years a number of reports have been made to the Council, as well as to the Sentinel Event Programme, where an important biopsy specimen has been lost. In response to these reports, the Council has accepted a set of appropriate guidelines for managing pathology specimens, particularly in the operating theatre setting. These guidelines have been collated and prepared by the VSCC, after consultation with a number of hospitals throughout Victoria. The Council is grateful to Ms Marilyn Schroeder, member of the VSCC and Clinical Director (Nursing) Gynaecology and Surgical Services, Mercy Hospital for Women for her work on these guidelines.

(See page 23 for more information)

## 2. CORRECT SIDE/SITE SURGERY

This important set of guidelines has been prepared by the VSCC and the RACS (particularly the Board of Continuing Education and Standards). It is hoped that these guidelines will be accepted by all surgeons in Victoria and that there will be a significant decrease in the number of reported cases to the Council and the Sentinel Events Programme.

(See page 26 for more information)

## 3. PLAVIX (CLOPIDOGREL)

This short statement regarding Plavix (Warning: New Anti-Platelet Drugs and Potential Hazards of Surgery and Major Regional Intraspinial Analgesia) was prepared by Dr Tony Weaver from CCAMM.

(See page 28 for more information)

## 4. RUPTURED AORTIC ABDOMINAL ANEURYSM

Over the past two years, the Council has received a number of reports of deaths occurring after surgery from a ruptured Aortic Abdominal Aneurysm (AAA). Many of these deaths appeared to be inevitable.

Accordingly, the Council, with appropriate advice from specialist vascular surgeons, has written a set of guidelines about the indications for surgery when a patient presents with a ruptured abdominal aortic aneurysm. It is important to appreciate that these are only guidelines and often there is enormous pressure on the treating surgeon, from both the patient and the family, to proceed with surgery.

(See page 30 for more information)

## **5. BILIARY DUCT STONES**

There have been cases reported to the Council where patients have developed severe pancreatitis following Endoscopic Retrograde Cholangiopancreatography (ERCP) following gall bladder surgery. The Council is grateful to Mr Richard Cade (General Surgeon) for writing a short set of statements about the management of stones in the common bile duct, particularly occurring after cholecystectomy. Council has strongly endorsed these statements.

(See page 32 for more information)

## **6. SURGICAL PATIENT STATUS SYSTEM**

The VSCC received a number of reports where there were significant problems associated with the care of so-called 'unstable' patients in hospital wards.

*'Although the clinical status of a patient is of obvious importance, a change in a patient's status during the course of his or her inpatient stay should precipitate an identifiable and predictable response.'* (VSCC Guidelines)

At the Box Hill Hospital, a specific surgical patient status system has been established and this immediately improves the communication between the nursing and resident medical staff with regards to a patient's status. This has helped to decrease the incidence of adverse events. The system has also been adopted, with some success, by a major rural hospital.

The VSCC commends this system and has written to all public hospitals, suggesting that their division of surgery consider and perhaps adopt the system in their institution, or at least a similar system.

(See page 34 for more information)

## **7. KNEE REPLACEMENT, EPIDURAL ANAESTHESIA AND MYOCARDIAL INFARCTION**

This statement, regarding myocardial infarction after joint replacement surgery has been endorsed by the Council. Currently there is no evidence to suggest that epidural anaesthesia increases the risk of myocardial infarction.

(See page 38 for more information)

## **8. PROTAMINE SULPHATE**

The Council has had one report of a severe reaction to protamine sulphate used to reverse the effects of heparin in a patient having vascular surgery. A short statement has been made by the Council about this issue and the importance of the rare complication of an anaphylactic reaction to protamine sulphate.

(See page 39 for more information)

## 9. DECOMPRESSION LAMINECTOMY

There have been two cases reported of sudden death at completion of decompression laminectomy in elderly patients, often undergoing the operation for multiple level lumbar canal stenosis. Although unusual, this is an important and very serious complication, which can be minimised with appropriate anaesthetic and surgical care, with appropriate haemorrhage control. The Council is grateful to Mr Harry Crock for his paper on this issue.

(See page 40 for more information)

## 10. MANAGEMENT OF HAEMODYNAMICALLY UNSTABLE PATIENTS WITH A PELVIC FRACTURE.

The Council has received two reports of deaths occurring in association with massive bleeding from a pelvic fracture. In each case there were significant issues relating to control of haemorrhage, as well as issues about the appropriate timing etc., of transfer of the patient to a tertiary referral trauma centre.

In early 2003, the Council received a copy of *Clinical Practice Guidelines*, edited by Dr Martin Heetveld, Chair of the Pelvic Trauma Sub-Committee of the Injury Advisory Committee, South Western Sydney Area Health Service, entitled *The Management of Haemodynamically Unstable Patients with a Pelvic Fracture*.

This paper has now been published in the *Australian and New Zealand Journal of Surgery (ANZJS)* and reprints of that article have been sent by the VSCC to various interested surgeons throughout Victoria.

The Victorian State Committee of the RACS and the Victorian Road Trauma Committee have also endorsed the document.

I am grateful to Dr Michael Sugrue; Director, Department of Trauma, Liverpool Hospital; who has very kindly given us permission to promulgate the paper by direct mail to a number of interested surgeons in Victoria. The publishers of the ANZJS, Blackwell Publication, have also given permission for the Council to send reprints of the article to appropriate persons.

(Reference: Heetveld M.J, Harris I, Schlaphoff G and Sugrue M, *Guidelines for the Management of Haemodynamically Unstable Pelvic Fracture Patients*, ANZ J. Surg. 2004; 74: 520-529)

# MORBIDITY REPORTING ISSUES

In October 2002, a working group of the VSCC reviewed issues relating to the reporting of morbidity or adverse events (rather than mortality) and made a number of recommendations which included:

1. That the Council undertake the role of encouraging hospitals to review their own morbidity rate, rather than the Council reviewing detailed morbidity events. This would involve the development of a framework for review of morbidity, including models for use in hospital/health services.
2. That the Council seek information on the methodology and procedures in place for reporting morbidity and mortality in hospitals/health services, to identify where the Council will add value.

Further to these recommendations, the Council wrote to the Chief Executive Officers and Directors of medical services of all hospitals/health services, seeking their advice and comments on a number of matters.

There were six specific questions:

1. Please describe the systems and procedures to review adverse surgical events in your hospital.
2. Do you use classification systems in regards to reporting and or monitoring adverse events and if so, what are they?
3. How are adverse events reported to your hospital's clinical risk management and/or quality committees or other structures?
4. Has your hospital notified any incidents to the VSCC?
5. In addition to its role in external review and reporting, what ways can the VSCC assist you in review of surgical morbidity and mortality?
6. If you are in agreement, the Council will collate the above information collected from your hospital, with that of other hospitals, and provide the collated advice back to you for your information and to assist in developing your internal systems.

In response to that letter, the Council received many suggestions/recommendations from health services regarding ways that the Council may assist in its review of surgical morbidity and mortality. It then developed a potential model, or flowchart, for reporting surgical deaths or morbidities.

In November 2003, a flowchart was sent out to all hospitals/health services in Victoria – this is a flowchart that can be used as a reference document for mortality and morbidity review.

Most of the detailed reviews, including Root Cause Analyses, occur 'in-house' and involve the treating doctor, the surgical unit, the division of surgery and the hospital Quality Committee. By reporting the event to the VSCC, there is the opportunity to inform and educate the whole surgical community in Victoria, about a particular adverse event and how steps can be taken to prevent it occurring in the future.

# INSTRUCTIONS FOR REPORTING OF INCIDENTS OF SURGICAL MORTALITY AND MORBIDITY

Please complete and return to:

**The Chairman  
Surgical Consultative Council  
GPO Box 4923  
Melbourne 8060**

Report forms may be accessed by contacting the Consultative Councils Secretariat on 9616 1382 or from the website [www.health.vic.gov.au/vscc](http://www.health.vic.gov.au/vscc)

**Identifying information on this document is confidential to the Chairman of the Consultative Council. This enables the Chairman to contact the reporting clinician should additional information on a reported incident be required.**

Subsequent review by the full Council is by case number only, as all identifying information is deleted prior to the full Council reviewing an individual case of surgical mortality or morbidity.

**Surgical mortality** refers to death in association with or as a result of surgery. Deaths occurring during the inpatient stay should be reported as well as all deaths totally or partially attributable to surgery, irrespective of time interval.

**Surgical morbidity** refers to injury in association with or as a result of surgery. The Council encourages reports of any significant morbidity.

**PLEASE COMPLETE DETAILS REQUESTED IN THE REPORTING PROFORMA OVERLEAF.**

## CONFIDENTIAL INITIAL REPORT – FORM ONE

On receipt of this preliminary report a member of the Council may either contact you for further information or send you a more detailed form for completion (Form Two).

Date of Report:

Case No (SCC use only):

### IDENTIFYING INFORMATION IS CONFIDENTIAL TO COUNCIL CHAIRMAN

Patient's Name:	Hospital/Health Service:
Hospital UR No:	Name of person reporting:
Contact phone number of person reporting:	Qualification of person reporting (please circle one): <div style="display: flex; justify-content: space-around; margin-top: 5px;"> <span>Consultant</span> <span>Registrar</span> <span>Other</span> </div>

### EVENT SUMMARY

Date of Event:	Time of Event:
----------------	----------------

Type of hospital: (circle appropriate category):

Major teaching hospital	Major suburban/ regional hospital	Country hospital	Private hospital	Other (please specify)
Age of patient:		Sex of patient:		

ASA risk classification: (circle appropriate category):

ASA 1 (A normal healthy patient)	ASA 2 (A patient with mild systemic disease)	ASA 3 (A patient with severe systemic disease)
ASA 4 (A patient with severe systemic disease that is a constant threat to life)		ASA 5 (A moribund patient who is not expected to survive without the operation)

Type of incident (circle appropriate categories):

MORTALITY	Pre-operative	Operative	Post-operative
MORBIDITY	Pre-operative	Operative	Post-operative
Nature of procedure: <input type="checkbox"/> Elective <input type="checkbox"/> Emergency Please specify procedure:		Nature of event (tick appropriate box): <input type="checkbox"/> Expected <input type="checkbox"/> Unexpected	

Was case reported to the Coroner:  Yes  No

EVENT DETAILS

(please provide a narrative summary of the incident – use back of form if more space is required):

---

Opinion as to cause of incident:

---

Recommendation for prevention of similar incident:

---

## Letter from Mr Jonathan Rush, Chair VSCC

### THE FUTURE?

The issue of voluntary reporting has been a major consideration for Council. The Council is in favour of compulsory notification of all cases of surgical mortality and perhaps even serious adverse events. The precise mechanism for this change is currently being considered by the Department of Human Services.

Within the next three years I hope that the work of the VSCC will significantly increase. It is essential that the Council receives notification of all surgical deaths in both the public and private hospital systems – currently that information is not available. Following notification, the Council will then be able to approach the treating surgeon either directly or through the hospital safety and quality committee and ask him, or her, to voluntarily report the details of the case which can then be discussed and categorised in a de-identified manner by the Council.

In Victoria, the Council believes that there are about 4000 surgical\* deaths per year. This is a large number of cases and if the reporting increases to appropriate levels, then clearly there will need to be an increase in resources.

We really do need to know, for example, how many appendicectomies are performed each year, in both public and private hospitals, in Victoria, how many deaths occur as a result of appendicitis and the subsequent surgery and what, if any, system issues were involved in these deaths. Yes, hospital audit systems look at these issues, but our aim is to inform the whole surgical community in Victoria so that we can all be informed.

The number of clearly preventable surgical deaths is extremely low, probably less than 5%. Ultimately I believe that this information should be made available to the whole community – we cannot deny that they have a right to know. I am sure, however, that it will rarely be seen on the front pages of the newspapers because it is nearly always a 'good news story'. It is a story that we as surgeons need to tell.

In recent months the Royal Australasian College of Surgeons (RACS), through the Board of Continuing Professional Development and Standards, have requested that all states set up a surgical mortality audit system based on the Western Australian Audit of Surgical Mortality (WAASM). This particular audit system, based on the Scottish Audit of Surgical Mortality (SASM), which has been in existence for some years, was established in Western Australia some two to three years ago, and is now functioning well with an excellent database. In response to this, the RACS, the Department of Human Services (DHS) and the VSCC, have been in discussion to establish a Victorian Audit of Surgical Mortality (VASM), based on the WAASM model. Hopefully VASM will be established within the foreseeable future.

This initiative would go a long way to solving the problems of obtaining quality data and ensuring that all cases of surgical mortality are notified by the institution involved. Following notification, the treating surgeon would be approached with a request for a short report concerning the circumstances of the case – this would be on a voluntary basis with appropriate de-identification and confidentiality provisions included. Clearly this will be an expensive undertaking and appropriate funding will be required.

**Jonathan Rush, FRACS**  
**Chairperson**  
**Victorian Surgical Consultative Council**

\*Surgical Mortality – the VSCC defines surgical mortality as any death that occurs in association with the surgical procedure, or whilst under the care of a surgeon, even if no operation was performed. Death occurring during the inpatient stay should be reported, as well as all deaths totally or partially attributable to surgery, irrespective of time interval.

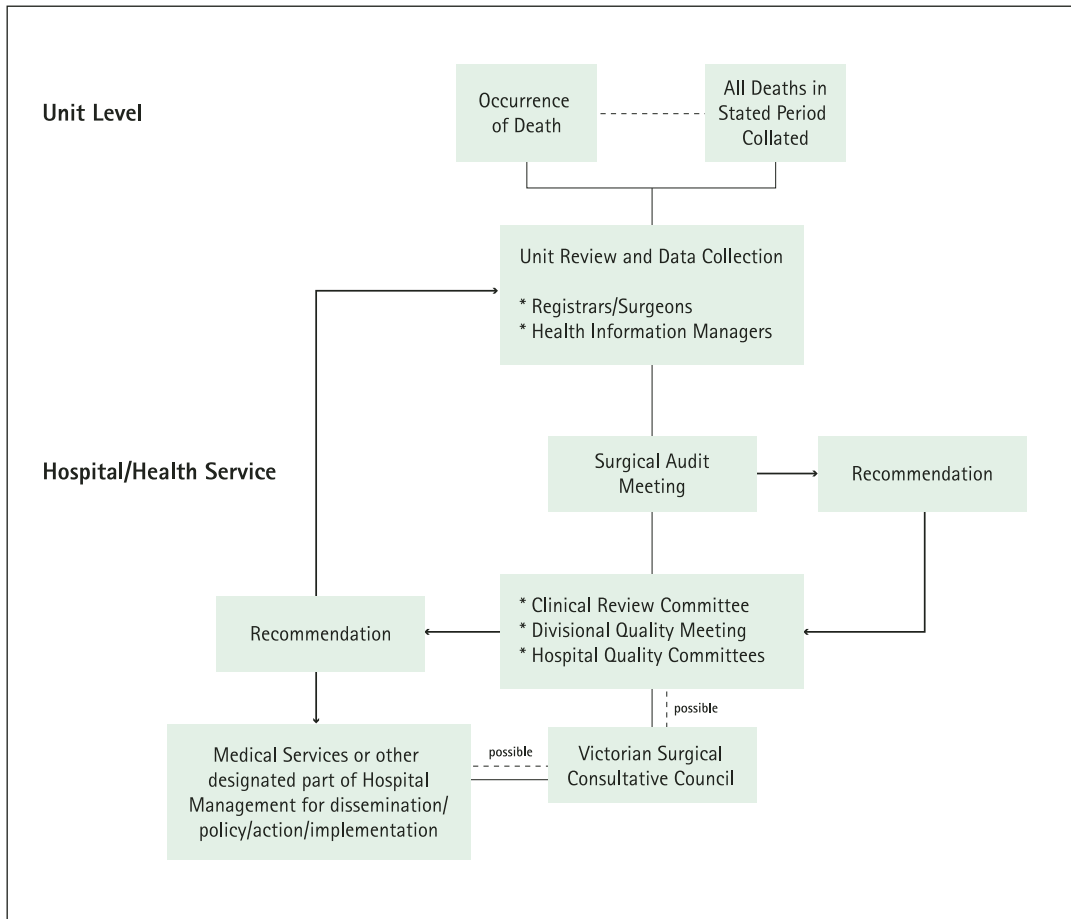
The Victorian Surgical Consultative Council  
**GUIDELINES FOR SURGEONS**



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# REPORTING SURGICAL DEATHS – POTENTIAL MODEL/FLOWCHART



# KEY PRINCIPLES FOR THE MANAGEMENT OF SPECIMENS FOR PATHOLOGICAL DIAGNOSES

## 1. Facility Policy / Procedure

- 1.1 All facilities should have a documented policy or procedure for the management of specimens. This document should reflect standards consistent with the professional colleges and Australian Standards including the Royal Australasian College of Surgeons, Australian College of Operating Room Nurses, the National Health and Medical Research Council and Australian Standard 4187.
- 1.2 Orientation for all facility staff should include an introduction to this policy.

## 2. Consent of the Patient

- 2.1 Prior to the performance of a surgical or diagnostic procedure by a surgeon, registered nurse or pathology technician, it is the right of all patients to be informed that tissue or body fluid may be taken for pathological diagnoses. This may or may not be confirmed with a written consent.

## 3. Protection of the Handler

- 3.1 The handler should wear protective attire appropriate for the type of specimen. This may include but may not be limited to:
  - gloves
  - mask
  - protective eyewear
  - protective clothing
- 3.2 Where Formaldehyde 10% is used, it is desirable that the handler use this product in an area that has downward venting to minimise the effect of fumes. Small specimen containers may be pre-filled. Larger containers for specimens should be filled from a 'wine-cask' type container, which is fully and correctly labelled as containing Formaldehyde 10%. A Chemical Spill Kit should be held in the area of use. All handlers should be familiar with the Chemical Spill Protocol.

## 4. Handling & Protection of the Specimen

- 4.1 Specimens should be handled appropriately to avoid destruction of the tissue or fluid. Some specimens may be damaged by the use of forceps or similar instrumentation.
- 4.2 Raytec swabs have been commonly used by many facilities to protect tissue for pathology. In surgical procedures, Raytec swabs are accountable items and should not be permitted to be removed from the operative field. Where this practice continues, the facility should ensure that there is a procedure in place for documenting the inclusion of the Raytec swab in the specimen.
- 4.3 The handler should ascertain the need for the inclusion or absence of a protective medium for the transport of the specimen. This should never be assumed. There may be protocols in place for this in some clinical settings where the medical practitioner is not actively involved. Where the medical practitioner is present, the handler (nurse or technician) and the medical practitioner should confirm this.
- 4.4 Where Formaldehyde 10% is used, it should fully cover the specimen, a 1:3 ratio (specimen 1, medium 3).
- 4.5 An appropriate container should be selected for the transport of the specimen. This will be of sufficient size to avoid damage and if required, contain medium such as Formaldehyde 10%. The container should be properly sealed if containing Formaldehyde 10% to avoid leaking or spillage. The specimen may also be placed in a protective 'hazard' plastic bag designed for transport purposes.

## 5. Documentation

- 5.1 The specimen container should be fully labelled with patient details not limited to, but including: (if available, an adhesive hospital generated patient name label may be used)
  - patient's name
  - date and time of collection
  - full description of specimen (including laterality [fully written] if appropriate)
- 5.2 A process should be implemented to ensure that the correct patient details are attached to the specimen container and that they match the specimen request form. This may take the form of the circulating nurse checking this information with the instrument nurse either at the time of collection or prior to transfer to pathology.
- 5.3 A pathology request form should be fully labelled (as with the specimen) and completed by a medical practitioner.
- 5.4 A permanent record of the specimen collection should be maintained by the clinical facility, preferably at the point of specimen generation. Record details may include:
  - full patient details
  - full specimen details
  - site of collection (e.g. 'theatre 2')

- 5.5 A record of the specimen collection should be recorded in the patient health information record. In the operating suite, this will include the perioperative or count record and should include as a minimum:
- number of specimens
  - management/medium used for specimen (e.g. fresh, frozen, Formaldehyde 10%)
- 5.6 It is recommended that the operating surgeon also record details of the collection of specimens for pathological diagnoses.

## **6. Responsibility for the Specimen**

- 6.1 The facility should determine who will have responsibility for ensuring the specimen is transferred to the site for collection by the pathology service. (In some facilities this may include delivery arrangements.)

## **7. Storage**

- 7.1 The specimen should be placed in, or taken to a dedicated area (as appropriate for the storage of the specimen [i.e. fridge or specimen trolley]) for collection by the pathology service. Where immediate transport/collection should occur (such as frozen section) this arrangement would be managed accordingly.

# CORRECT SIDE AND CORRECT SITE SURGERY GUIDELINES

## ROYAL AUSTRALASIAN COLLEGE OF SURGEONS

It is the surgeon's responsibility to identify the patient and to ensure that the operation is performed on the correct side and at the correct site. However, every member of the operating team and anaesthesia team bears a responsibility to ensure that they are aware which side is to be operated on and that an operation is to be performed at the appropriate site. If at any time any member of the team has a doubt that the incorrect side/site is being prepared for surgery, they should immediately voice their concerns. There should be no criticism of persons raising concerns even if their concerns prove to be unfounded.

1. The surgeon is responsible for ensuring that the correct patient undergoes the procedure.
2. The side of the operation should be written in full (i.e. RIGHT or LEFT) and not abbreviated to R or L, whenever the side is recorded. All documentation must include the side and site. This includes patient notes, hospital forms and operating theatre lists.
3. The surgeon should be satisfied on which side and site the procedure is to be performed. This should occur in consultation with the patient and the side/site marked.
4. An indelible pen is used to unambiguously mark the side/site of the procedure. This is done by the surgeon in consultation with the patient and operative notes. The patient is informed that the pen mark indicates the site of the operation.
5. The mark needs to be visible within the operating field after preparation and draping.
6. The pen mark is checked by the nurse as the patient leaves the ward or holding area for the operating theatre.
7. The pen mark is checked by the scout nurse prior to the patient entering the operating theatre. This mark must then be verified by the scrub nurse.
8. The surgeon visibly checks the pen mark prior to commencing surgery and ensures this is in accord with his/her intended operation before the induction of anaesthesia.

9. At all stages of this process, there should be consistency of documentation of side/site. If any inconsistency arises progress towards operation should be suspended, the incorrect documentation should be changed and signed, and an explanation of the inconsistency recorded in the patient's medical history and signed by the surgeon. The surgeon should satisfy him/herself of the appropriate side/site of surgery and record this in the patient's medical notes before proceeding with surgery. An incident form should be completed.
10. If the surgeon remains uncertain of the side/site of surgery or the side/site differs from that previously discussed with the patient, the procedure should be cancelled and the patient returned to the ward.

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# WARNING RE: NEW ANTI-PLATELET DRUGS AND POTENTIAL HAZARDS OF SURGERY AND MAJOR REGIONAL INTRASPINAL ANALGESIA

The past few years have seen the introduction of several new platelet-inhibiting agents brought about by research in coronary artery stenting and prevention of arterial thrombosis and embolism. ABCIXIMAB, TIROFIBAN, TICLODIPINE, CLOPIDOGREL are examples. (1), (2), (3) Aggressive marketing has encouraged their wide spread use. Of particular interest is CLOPIDOGREL which has two trade names viz: ISOCOVER and PLAVIX.

(Ticlopidine, trade name Tilodene, has similar pharmacology but has a greater side effect profile discouraging it's use).

CLOPIDOGREL is a thienopyridine derivate that exerts its effect via a low affinity type 2 purinergic receptor that inhibits the binding of ADP to the glycoprotein IIb/IIIa complex and its subsequent activation to bind fibrinogen and cause platelet aggregation. Maximum efficacy occurs 2-4 days after therapy commences and the platelet effect is irreversible lasting 10 days (life of the platelet). Therefore it would be prudent to cease this agent 7 - 10 days prior to surgery if their medical risks have been considered.

CLOPIDOGREL and TICLODIPINE require metabolism by hepatic cytochrome P450-1A for activation to an unknown active metabolite. Active metabolites are primarily excreted renally. CLOPIDOGREL exists in the circulation bound to platelets and as **free drug for approximately 18 hours** assuming normal renal function. **Therefore, exogenous transfused platelets will be inhibited and rendered ineffective if administered within 18 hrs of the last dose**, assuming normal pharmacokinetics. At least 24 hrs would seem a minimal period to postpone surgery after the last dose.

Furthermore, the practice of administering both Clopidogrel and Aspirin appears to be gaining popularity making the risks of surgery and intraspinal analgesia potentially greater still.

Anecdotal reports of uncontrollable haemorrhage during surgery associated with very recent administration are occurring and caution should be exercised even if the drug has been stopped within 7-10 days of surgery, as with Aspirin. Also spontaneous subdural haemorrhages are being reported. One report of intraspinal haematoma (4) has occurred after cervical epidural anaesthesia in a patient on a NSAID, Clopidogrel and Aspirin.

There are also articles that reject the association between earlier anti-platelet agents and the development of intraspinal haematomas. (5) These however, do not cite experience with the latest agents.

A careful risk/benefit analysis should therefore be undertaken for patients on these new anti-platelet agents alone and in combination with other agents when considering surgery and intraspinal analgesic techniques.

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# GUIDELINES FOR MANAGEMENT OF RUPTURED AORTIC ANEURYSM

50% of patients who rupture an AAA do not reach hospital alive. Of those who reach hospital alive in Victoria, 35% will succumb despite urgent surgery and resuscitation. The question may arise as to whether attempted salvage by an urgent operation should be undertaken.

Although undertaking repair of a ruptured AAA entails a considerable burden on the logistics of a hospital (operating theatres and ICU), in general repair should be undertaken as rapidly as possible. It is vital that time is not wasted on lengthy assessments, time consuming investigations and prolonged efforts at resuscitation in the Accident and Emergency Department. Such delays often result in an unnecessary fatal outcome.

## A Operation on Ruptured AAA Not Advised

- 1 The patient is known to have an AAA and has previously been assessed in a Vascular Outpatients Clinic. The conclusion has been reached that the patient would be most unlikely to survive any operative procedure in the event of rupture. This is discussed with the family and recorded in the notes.

When such a patient arrives in the A&E Dept with a rupture of his known AAA, after appropriate discussion with the patient and family, the appropriate treatment is analgesia – no operation.

- 2 A patient who has previously been assessed at a hospital and is known to have one of the following:
  - (a) Very severe coronary artery disease
  - (b) Very severe COAD
  - (c) Terminal cancer.

This patient arrives at the A&E Dept with a ruptured aneurysm. Similarly after appropriate discussion with the patient and family, the appropriate treatment is analgesia – no operation.

- 3 A patient is institutionalised permanently because of severe dementia.

This patient arrives in an A&E Dept with a ruptured AAA. After appropriate discussion with the family, the appropriate treatment is analgesia – no operation.

## **B Operation on Ruptured AAA Advised**

At the age when patients develop an AAA, many will have:

- (a) Coronary artery disease
- (b) COAD
- (c) Diabetes
- (d) Mild renal disease
- (e) And/or other medical problems.

These conditions do not preclude an emergency operation for a ruptured AAA with the provisos outlined in A.2.

In the absence of any prior assessment (or the knowledge thereof), management should proceed on the basis that the problems listed a - e above, are not prohibitive.

When a patient presents with a ruptured AAA, the general condition of the patient (shocked) often appears terrible, even hopeless. Nevertheless, operation should proceed as rapidly as possible and an attempt made at salvage. It is preferable to err on the side of inappropriate operation, rather than deny appropriate patients an opportunity for survival.

### **1. Cardiac Arrest**

If a cardiac arrest has already occurred due to the rupture of an AAA, unless prompt reversal of the cardiac arrest occurs, there should be no further resuscitation and no surgery.

### **2. Abandonment of Operation Already Commenced**

- (a) If a cardiac arrest occurs during surgery, survival is most unlikely. Therefore, unless cardiac rhythm is restored quite promptly, surgery should be ceased.
- (b) Assessment of the likelihood of survival is frequently not possible until an aortic clamp is in place and blood loss ceases. Failure to achieve circulatory improvement after application of an aortic clamp usually means that surgery should be abandoned forthwith.

Decisions regarding the severity of cardiovascular disease, the likelihood of response to surgery etc are often judgemental and it remains the operating surgeon's judgement, in conjunction with the anaesthetist, to decide whether any surgery should take place and when it has commenced, whether it should continue. The development of these guidelines does not replace an individual surgeon's judgement.

# GUIDELINES FOR THE MANAGEMENT OF BILE DUCT STONES

There are various ways of managing bile duct stones with the two main variables that determine management being the mode of presentation and local expertise/ preference. Whilst it is therefore difficult to be prescriptive about the management of duct stones, there are guiding principles.

## 1. Bile duct stones are suspected pre-operatively

If there is a suspicion that the patient may have a stone in the bile duct, a decision needs to be made as to whether the stone should be removed pre-operatively or intra-operatively (not post-operatively).

If the decision is to remove the stone pre-operatively by Endoscopic Retrograde Cholangiopancreatography (ERCP) in some patients it is advisable to confirm the presence of the stone by Magnetic Resonance Cholangiopancreatography (MRCP). This applies particularly if the evidence for a bile duct stone is equivocal.

Patients with malignant obstruction of the bile duct frequently have co-existent gallstones. Those patients therefore presenting with jaundice should have the cause of the jaundice established before surgery.

When a diagnosis of bile duct stones is made pre-operatively and the decision is made to remove them intra-operatively, ideally, facilities and expertise to perform this procedure laparoscopically should be available.

Without entering the debate relating to routine operative cholangiography versus selective cholangiography, operative cholangiogram facilities should always be available at cholecystectomy. If the surgeon does not perform routine operative cholangiograms, then at least his indication for performing an operative cholangiogram should be liberal, eg. slightly abnormal LFT's, mildly dilated duct on ultrasound, past history of acute pancreatitis.

## 2. Unsuspected duct stone discovered at operation

If an unsuspected duct stone is diagnosed at operation, removal of the stone by either laparoscopic or open exploration or post-operatively at ERCP, are acceptable alternatives.

## Summary

1. Common bile duct stones diagnosed pre-operatively should be dealt with either pre-operatively or intra-operatively. A decision to leave the stones for post-operative ERCP extraction is unacceptable.
2. Jaundiced patients should have a firm diagnosis established before surgery.
3. MRCP is a very useful and safe method of imaging the biliary tree. Where MRCP is unavailable, CT cholangiography is an alternative.
4. If operative cholangiography is performed selectively rather than routinely the indications for it should be liberal.
5. Unsuspected bile duct stones diagnosed intra-operatively may either be dealt with at surgery or by ERCP post-operatively. ERCP is facilitated by the insertion at operation of a transcystic biliary stent. Of course ERCP may not be possible in patients who have had previous gastric surgery.

# SURGICAL PATIENT STATUS SYSTEM

Although the status of a patient is of obvious importance, a change in a patient's status during the course of his or her inpatient stay should precipitate an identifiable and predictable response.

The status at any one time of a particular patient may also be important in terms of analysing staffing and supervision requirements. It should serve to focus staff's attention on the neediest patients. This may be of value given the shift work type staffing arrangements. Whereas, nursing staff have well defined hand over procedures, this is not always the case amongst medical staff. It may therefore be of value for a covering RMO or Registrar, when visiting a ward, to know which patients may need more attention and review.

In order to be of value, the status classification of a patient needs to be constantly updated and accurate. The following classification in order of increasing severity has been created:

STABLE	(S)
LABILE	(L)
UNSTABLE	(U)
WARD CRITICAL	(C)

## Determining and Changing a Patient's Status.

Individual patients should have their status determined each morning by the Unit RMO/Registrar and at the end of each day. Any person may change a patient's status to a more severe category, eg ward nurse, Allied Health Professional, RMO etc, but the Unit RMO should be notified immediately of any change in a patient's status to a more severe category.

Changing a patient's status to a less severe category can only be done by the Unit RMO/Registrar or the Ward Nursing Manager (or deputy).

A patient's status and when last updated should be maintained with surgical ward patient lists.

## Definitions

### STABLE

- Patient whose observations have been within normal limits for > 24 hours;
- Patient receiving maintenance fluids only (IV or oral);
- Patient whose biochemistry/haematology is normal (Typically a patient who is awaiting elective surgery or who underwent operation more than 24 hours previously and who is experiencing an uneventful recovery).

### LABILE

- Patient who has undergone operative or other invasive procedure within last 24 hours but whose recovery is proceeding as expected;
- Patient who requires more than routine observations eg with epidural catheter;
- Patient who has been unstable less than 24 hours ago;
- Patient who has developed an abnormal observation which is explainable and unlikely to require intervention or deteriorate;
- Patient who has developed an abnormal biochemistry or haematology result.

### UNSTABLE

- Patient who has undergone operative or other invasive procedure within last 24 hours but whose recovery is not proceeding as expected;
- Patient whose observations became abnormal but responded to corrective measures;
- Increasingly abnormal biochemistry or haematology results;
- Patient who has required 'abnormal, unexpected' intervention in last 24 hours.

### WARD CRITICAL

- Patient who has persisting abnormal observations despite corrective intervention;
- Patient who has qualified as unstable more than once in the last 24 hours;
- Patient who has abnormal observations and diagnosis remains unclear;
- Patient in whom further deterioration is deemed a likely possibility.

## Nursing Observation Protocols according to Patient Status

These should be developed in conjunction with the RMO/Registrar/Fellow/Surgeon. The nature of observations and reportable levels should be agreed upon and recorded. The required observations will vary with each patient.

The following should be regarded as minimum guidelines:

### STABLE PATIENT

4 hrly obs	BP, Pulse
	Temp
	Resp rate.

### LABILE PATIENT

1-4 hrly obs	BP, Pulse
	Temp
	Resp Rate
Consider	fluid balance chart
	CVP pressures
	O2 Sats
	FBE, U&E's

### UNSTABLE PATIENT

30 min – 1 hrly	BP, Pulse
	Temp
	Resp Rate
Consider	fluid balance chart
	CVP pressures
	O2 Sats
	FBE, U&E's

### WARD CRITICAL PATIENT

30 min or more frequently	BP, Pulse
	Temp
	Resp Rate
Consider	fluid balance chart
	CVP pressures
	O2 Sats
	FBE, U&E's

## Medical Staff Actions

Any patient moving to a more severe category – RMO notified.

Any patient who moves to Unstable or Ward Critical Status:

1. should be reviewed at earliest possible time by Unit or Covering Registrar (<1hr);
2. surgeon responsible for patient should immediately be contacted;
3. differential diagnostic list created and contingency planning initiated;
4. 'worst case' scenario identified;
5. nursing observation plans and reportable levels reviewed;
6. should be individually and specifically handed over to covering RMO and Registrar before unit management staff leave hospital.

### REMEMBER!

The major causes of adverse patient outcomes are:

1. Failure of communication with other medical and nursing staff;
2. Failure to involve senior staff in timely fashion;
3. Failure to detect signs of further deterioration;
4. Tendency to attribute the abnormal to common, benign events without preparation for the uncommon catastrophic event.

# KNEE REPLACEMENT, EPIDURAL ANAESTHESIA AND MYOCARDIAL INFARCTION

Two cases have been reported to the Victorian Surgical Consultative Council (VSCC) where patients having knee replacement under epidural anaesthesia have died about 24 hours post-operatively from myocardial infarction.

Comment:

The outcome for primary knee and hip replacement surgery is the same whether performed under regional or general anaesthesia and thus the risk of myocardial infarction is identical.

With major orthopaedic surgery the cardiac risk is said to be intermediate (less than 5%) Particular risk factors for this type of surgery include age, hypertension, ischaemic or valvular heart disease, peripheral vascular disease, diabetes and other co-morbidities. Pre-operative evaluation must focus on the patient's cardiovascular stability and the ventricular response to stress and guidelines for special tests can be determined by an algorithm published by the American College of Cardiology/American Heart Association Task Force.

Irrespective of the anaesthetic technique employed the important principles in peri-operative management of patients undergoing major joint replacement are avoidance of a fall in systolic blood pressure of greater than 20% of the patient's usual blood pressure, maintenance of normovolaemia and maintenance of oxygen saturation in the early post-operative period.

The Council has endorsed this statement regarding myocardial infarction after joint replacement surgery. Currently there is no evidence to suggest that epidural anaesthesia increases the risk of myocardial infarction.

# REACTION TO PROTAMINE SULPHATE USED TO REVERSE HEPARINISATION IN VASCULAR SURGERY

The Council has had one report of a severe reaction to protamine sulphate used to reverse the effects of heparin in a patient having vascular surgery. A short statement has been made by the Council about this issue and the importance of the rare complication of an anaphylactic reaction to protamine sulphate.

A case was reported to the VSCC about a patient undergoing ilio-femoral endarterectomy. Heparin had been employed as an anticoagulant and this was reversed with protamine sulphate. The patient became hypotensive and developed an arrhythmia followed by acute myocardial infarction and died on the table.

Comment:

Protamine sulphate may cause catastrophic pulmonary hypertension and systemic hypotension, particularly if a large dose has been administered rapidly and if there has been previous exposure. It is not uncommonly encountered in cardiac surgery where larger doses are employed.

Sensitivity reactions may be related to histamine release where there has been rapid injection and rare cases of anaphylaxis to the drug have also been reported.

The risk is minimized by very slow IV injection and careful titration of the dose needed to counteract the anticoagulant.

# CASES OF SUDDEN DEATH FOLLOWING LUMBAR SPINAL SURGERY IN THE ELDERLY

Spinal canal decompression operations are performed frequently for the relief of symptoms arising in patients with spinal canal stenosis. The majority of those who require surgery for this condition are elderly. Providing certain precautions are taken to avoid complications in the course of these procedures by both the anaesthetist and the surgeon, they are currently held to be safe and effective. Death on the table or immediately post operation should be extremely rare.

## Anaesthesia

In patients with associated medical conditions such as diabetes mellitus, hypertension, impaired renal function and peripheral vascular disease, the use of central venous or arterial lines may be indicated for monitoring during surgery, in addition to the routine of an intravenous line.

## Positioning the patient

The surgeon in concert with the anaesthetist should supervise the positioning of the patient on the operating table. The patient's eyes should be carefully padded to avoid ocular compression and below-knee elastic stockings applied to the legs. Elderly patients must be turned slowly to lie face downwards on to an excavated support, which leaves the abdomen uncompressed. The cranial end of the table should be elevated to prevent suffusion of the head, which may cause mental confusion after operation. Intermittent calf stimulators should be fitted after the patient has been turned on the operating table.

The table should then be adjusted so that the hips and knees are slightly flexed. Positioning elderly patients prone, with legs in the kneeling position, should be avoided.

1. Decompression laminectomy involves excision of spinous processes and removal of the lamina or laminae at the level of spinal stenosis.

## The exposure

The spinal muscles on each side are separated from their bony attachments and held apart with self-retaining retractors to expose the stenotic segment or segments of the vertebral column. In large patients, blood loss during this phase may be considerable unless care is taken dissecting the muscle mass, first on one side of the spinous process, using cutting diathermy at the tip of the spinous process, followed by separation of the muscle from the outer surface of the lamina to the level of the facet joint capsule, and prompt insertion of packing gauze between the roof of the spinal canal and the separated muscle mass. The procedure is repeated on the other side of the spinous process and lamina, again with the insertion of gauze packing. Using this technique, blood loss at this stage of surgery should be minimal. The packs are then removed rapidly and self-retaining retractors inserted to expose the roof of the spinal canal.

## The laminectomy

The interspinous ligaments are excised and the spinous process or processes are then removed with rongeurs to their bases on the centre of their respective laminae. In osteoporotic patients, blood loss from the cut surfaces of the bone can be brisk. Bone wax should be applied promptly to control this source of bleeding.

The interlaminar space at one level should be cleared of soft tissue remnants to expose the ligamentum flavum, using pituitary rongeurs. The inferior edge of the rostral lamina should then be trimmed laterally to the inner margins of the facet joint capsules, thereby exposing the ligamentum flavum near its upper attachment at the under surface of the lamina. The distal attachment of the ligamentum flavum to the rostral edge of the caudal lamina should be curetted from the bone and retracted to expose the epidural space. The ligamentum flavum in patients with long-standing spinal stenosis is grossly thickened with patchy calcification. It may be adherent to the dural sac in which case tears in the dural membrane may occur unless the dissection is performed with great care.

Following removal of the ligamentum flavum, the laminae are then removed with angled rongeurs, preserving the pars interarticularis on both sides at each spinal segment. The medial and apical margins of the facet joints are then rimmed to complete decompression of the nerve root canals and intervertebral foramina bilaterally. During this phase of the operation, venous haemorrhage may occur. It can be controlled using strips of gelfoam placed on the bleeding site, held in place with cottonoid patties which are manipulated into place on the end of a sucker. This method of controlling venous haemorrhage is effective in most cases, so that bipolar electrocoagulation is rarely required.

## Closure of the wound

A drain tube is placed along the length of the decompressed spinal canal, lying along one side of the exposed dural sac. The paraspinal muscles are brought side by side with sutures inserted only in the lumbar dorsal aponeurosis, the drain tube emerging lateral to the midline. Skin closure is effected and dressing applied. The drain tube is connected to a sealed bottle, but is only activated once the patient is lying on his/her back, when the body weight pressure will prevent the suction of large amounts of blood.

## Removing the patient from the operating table

The table is straightened and the turning team instructed to roll the patient slowly on to his/her back into the arms of two attendants, while the anaesthetist holds the head and the patient is gently lowered on to a trolley. The anaesthetist removes the endo-tracheal tube and the suction drainage system is activated. If the patient coughs violently during extubation, a large volume of venous blood may drain suddenly in to the suction bottle. Should this occur, the drain tube suction should be closed immediately.

## Summary

Potential hazards:

- (i) Positioning the patient on the operating table;
- (ii) Arterial bleeding during the preliminary exposure of the laminae over the length of the spinal stenosis;
- (iii) Excessive blood loss from cut ends of bones;
- (iv) Excessive venous haemorrhage from epidural veins;
- (v) Sudden loss of blood at the conclusion of surgery when the patient is turned on to a trolley and the suction drain is activated; and
- (vi) Cardiac arrest following failure to control sudden blood loss into the suction drainage bottle.

2. Bilateral foraminal and nerve root canal decompression, with perseveration of the midline bony structures of the spinal canal.

This operation has evolved as the preferred method of decompression of the spinal canal in cases of spinal stenosis. While the hazards outlined in the text dealing with decompression laminectomy remain the same for the second method, it carries two major benefits for patient welfare. The first is a reduced risk from blood loss immediately following surgery and in the early post-operative period. The second is a more rapid return of paraspinal muscle function after the surgery.

**Henry V Crock**  
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