123 Doc EDUCATION

CORE SURGERY JOURNAL

Volume 1, Issue 6

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CORE SURGERY JOURNAL

Volume 1, Issue 6

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Dear Prospective Authors

Thank you for considering the submission of an article to 'Core Surgery'. This is a new journal aiming to educate and inform surgical trainees about relevant 'core' subject topics. Each issue will cover a topic from selected subspecialty fields: General Surgery, Trauma and Orthopaedic Surgery, Plastic and Reconstructive Surgery, Otorhinolaryngology and Neck Surgery, Neurosurgery, Urology, Paediatric Surgery, Cardiothoracic Surgery and Critical Care. Articles will be required to be broad enough to help with preparation for the intercollegiate MRCS examination but also focus on key hints and tips on becoming a higher surgical trainee. Authors are encouraged to submit articles on relevant topics to core surgical training.

Types of Article

Manuscripts are considered under the following sections:

1) Case based discussions
2) Practical procedures
3) Audit
4) Review articles
5) Course reviews
6) Research papers

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Submissions will only be accepted via email and must be accompanied by a covering letter. Please submit your article to **coresurgicaltrainee@googlemail.com.** The covering letter must include a statement that all authors have contributed significantly and accept joint responsibility for the content of the article. In addition any financial or other conflict of interest must be declared.

Manuscript Style

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References

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Case Based Discussions

Should be about 1000-1500 words long and should focus on clinical assessment, differential diagnosis or treatment. The basic structure should be as follows:

Abstract: The salient points of the case and discussion.

Case history: Including the initial presentation, clinical setting and problem, investigation and treatment.

Discussion: Covering the critical aspects of the management and the treatment options.

Practical Procedures

Should be about 1000-1500 words long. Although not essential it is highly advantageous if pictures and diagrams are supplied to illustrate the most salient points. Articles should be set out as follows:

- History and pathology
- Indications and contraindications
- Gaining informed consent/explaining procedure to patient
- Equipment required
- Draping/sterile field preparation
- Patient positioning and relevant anaesthetic points
- Documentation of procedure
- Recording of complications and management of such

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The topic should be relevant to core surgical trainees, and a maximum of 2500 words long. The review should include an abstract and a clinical vignette of a case relevant to the topic. The aim of including a clinical case is to provide a focus for discussion, and to ensure that the review is relevant and useful to our readership.

Course Reviews

Should be a maximum of 1000 words and review a course which is either mandatory or desirable for core trainees and junior higher surgical trainees.

Research Papers

Although the publication of research articles is not a core aim of the journal, Core Surgery welcomes research submissions if thought to be of interest to the readership. Articles should be written using the following headings (title page, abstract, introduction, methods, results, discussion, references). They should be a maximum of 2500 words of text including abstract, 30 references, 3 illustrations or figures. The abstract should be a maximum of 250 words and use the following headings (introduction, methods, results, conclusion). The title page should contain the title of the paper, the full names of the authors, the addresses of the institutions at which the research was carried out and the full postal address, email address and telephone number of the corresponding author.

MCQs / EMQs (All Articles)

Please note that all articles should be submitted with five multiple choice questions (MCQs) or extended matching questions (EMQs) attached, in the style of the Member of the Royal College of Surgeons (MRCS) 'Part A' examination. These questions should have answers and brief teaching notes/discussion included. Examples of the requirements for question style can be found here: **http://www.intercollegiatemrcs.org.uk/old/pdf/samplequestions_MCQ.pdf**

Summary

Articles considered for publication will be sent for review by our panel of consultants and surgical trainees. We wish you every success with your submission. Please contact the editorial team with any questions.

LOCAL ANAESTHETICS: WHAT THE CORE TRAINEE NEEDS TO KNOW

Dariush Nikkhah

Local Anaesthetics:
What The Core Trainee Needs To Know.
Back to Basics.

Abstract

In this review article we discuss the use of local anaesthetics in surgical practice. We also explain the current misconceptions on the use of adrenaline in the hand. After reading this article the core trainee will be able to safely administer local anaesthetics, understand their mechanism of action and their use in different surgical subspecialities.

Case Vignette

A 64-year-old diabetic man presented to the elective day case unit for a carpal tunnel decompression. He had significant other medical problems including hypothyroidism, Angina and COPD. He had been suffering from night pain for the last 6 months in his right hand, with paraesthesia along the digits supplied by the median nerve. Nerve conduction studies confirmed carpal tunnel syndrome.

He was seen on the Day Case Unit by the CT2 in orthopaedics, consented and marked for theatre. Under supervision of the Orthopaedic Registrar, a carpal tunnel decompression was performed under LA and tourniquet control. The procedure took less than 10 minutes and the patient was discharged with a dressing an hour later. This case illustrates the safe and effective use of LA in an ASA 4 patient with multiple co morbidities who would not be an appropriate candidate for sedation and GA.

Introduction

Local anaesthetics can obviate the need for a General Anaesthetic (GA) in many surgical procedures. They have revolutionized the use of day case surgery in the National Health Service involving hand surgery, plastic surgery and general surgery. However they have to be used carefully paying strict attention to dose and technique of administration. Local anaesthetics can also be used for regional anaesthesia. Examples include brachial plexus blockade in hand surgery, or spinal anaesthesia in Total Hip and Total Knee Replacements. Regional anaesthesia offers superior and lasting pain relief, decreased stress response from surgery and avoidance of side effects from GA such as nausea and vomiting. Local anaesthetics mean patients do not warrant hospital admission and also preoperative blood tests, ECG and pre-assessment visit. These factors combined improve patient satisfaction as well as being cost effective for the health service (1).

Method of Action

Local anaesthetics work by altering membrane permeability and preventing the passage of nerve impulses. They produce a reversible local analgesia by inhibiting the propagation of the action potential. The prevention of Na+ influx, inhibits depolarization of nerve endings and hence nerve transmission is inhibited in sensory, motor and autonomic fibres (2,3).

Local anaesthetics are divided into two classes, ester agents that include cocaine and procaine and the amide agents that include the commonly administered lignocaine as well as bupivicaine and prilocaine. Esters are unstable in solution whilst amides are stable and are slowly metabolized by hepatic amidases. In contrast esters are broken down rapidly by cholinesterases and are therefore associated with allergic reactions. Hence the more common use of amides in clinical practice. Local anaesthetics are stored as acidic salt solutions , following infiltration the base is released by the relative alkalinity of the tissue . This explains why local anaesthetics are ineffective in acidic conditions such as in infected wounds (e.g pyogenic abscess) (3).

Adrenaline with Local Anaesthetic.

Over the last decade some myths regarding the use of local anaesthetics with adrenaline in the hand have been shown to be based on flawed evidence. All of the evidence for the antiadrenaline dogma comes from 21 mostly pre-1950s case reports of finger ischaemia associated with procaine and cocaine injection (4). The adrenaline digital infarction cases that created the dogma are invalid evidence because they were also injected with either procaine or cocaine, which were both known to cause digital infarction on their own at that time, and none of the 21 adrenaline infarction cases had an attempt at phentolamine rescue. In conjunction Chowdry et al (5) performed a retrospective review of 1111 cases involving digital block anesthesia with epinephrine. They found no complications with the use of epinephrine in digital blocks in all 1111 patients.

LOCAL ANAESTHETICS: WHAT THE CORE TRAINEE NEEDS TO KNOW

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Adrenaline slows the systemic absorption and prolongs the duration of action of local anaesthetics (3). Adrenaline counteracts the vasodilatory effects of local anaesthetics. Adrenaline used in dilute solutions of 1 : 200 000 and 1: 100 000 with lignocaine can be safe in digital blocks. Adrenaline 1:1000 contains 1 gram of adrenaline per 1000 mls solution i.e 1mg/ml. Hence for preparation of a 1 in 200 000 solution the 1: 100 dose must be diluted 200 times. This is achieved by taking 0.1ml that is equivalent to 0.1mg and adding 19.9 mls of local anaesthetic solution. Adrenaline should be avoided in patients with vasospastic conditions (e.g Raynaud's phenomenon), thrombotic cases and extreme medical conditions (6). Absolute contraindications are use in a skin flap with limited perfusion and in hand trauma where the disease process involves the digital vessels at the base of the proximal phalanx (6). Small volumes of Adrenaline can also result in drug interactions with MAO inhibitors and B – Adrenergic blocking agents resulting in hypertensive crises (6).

Dosage and Subclasses of Local Anaesthetic

Before administration of local anaesthetic the surgeon must be aware of the safe dose range and the individual in question. Reduced doses should be given to the very elderly or those with hepatic impairment, as the rate of drug metabolism will be reduced (2). If the incorrect amount is given there are potential local and systemic side effects. Local toxicity can simply be an inflammatory reaction, but nerve injury can also be caused by interneural injection or nerve damage. Systemic reactions to local anaesthetics involve primarily the central nervous system (CNS) and cardiovascular system (CVS). Typically in CNS toxicity the core trainee should be aware of perioral paraesthesia, dizziness, visual disturbances and even tinnitus. If a large overdose of local anaesthetic is given this can lead to generalized seizures and even coma. Local anaesthetics share some properties with class 1 antidysrhythmic agents and in large doses have a negative inotropic effect causing hypotension, arrhythmias and if untreated this can lead to cardiovascular arrest (2). One must also be aware that toxicity of a mixture is no greater than that of its individual components (6). Lidocaine and Bupivicaine are common mixtures that can be safely administered in clinical practice.

If the core trainee feels that there is any evidence of local anaesthetic toxicity, they should act promptly by maintaining airway patency, administering 15 Litres oxygen through a non re-breathe mask. The hospital CRASH team should be alerted and the anaesthetist on call should be summoned swiftly if there are any concerns of losing the airway. The surgeon should follow standard cardiopulmonary resuscitation. The patient should also be placed on a cardiac monitor. If the patient suffers from a seizure intravenous diazepam should be administered.

In the event of local anesthetic-induced cardiac arrest that is unresponsive to standard therapy, in addition to standard cardiopulmonary resuscitation, Intralipid 20% should be given intravenously. Weinberg et al (7) have published data indicating that Intralipid is effective in treating experimental models of severe cardiotoxicity secondary to intravenous overdose of local anaesthetic drugs such as bupivacaine.

Lignocaine

Lignocaine is the most commonly used amide anaesthetic in clinical practice due to its safety profile, low cost and wide availability (8). Lignocaine also has a rapid onset of action, roughly 3-5 minutes from infiltration. 1% Lignocaine is equivalent to 10mg/ml, 2% is equivalent to 20 mg/ml and so on. Plain lignocaine has an intermediate duration of action, but the addition of adrenaline makes it long acting for local infiltration. If used with adrenaline one can administer safely 7mg/kg, without this adjuvant the value is 3mg/kg. Lignocaine can be administered in many forms; subcutaneously for skin lesions, intraspinal, peripheral nerve blocks and even as a gel for urinary catheterization.

Bupivicaine

Bupivicaine (Marcaine) is a long acting local anaesthetic that is commonly used in regional anaesthesia. Bupivicaine is noted to have a propensity for sensory block over motor block at lower concentrations. It is commercially available in 0.25% and 0.5% solutions (with and without adrenaline). 0.25% bupivacaine is equipotent with 1% lignocaine. Unlike lignocaine the onset of analgesia is relatively slow with bupivicaine, taking up to 10 minutes. However the duration of anaesthesic can be up to 6 hours giving good pain relief in the postoperative period.

Bupivacaine is particularly cardiotoxic and should never be used in Bier's blocks as cases of cardiac arrest have been reported. Bupivacaine binds tightly to tissues and thus has a long duration of action (up to 24 hours in some cases). Adding adrenaline will decrease its toxicity by delaying the drug absorption but will have minimal effect on the duration of the block. The recommended maximum safe doses of bupivacaine are as follows: Bupivicaine without adrenaline - 2.0 mg/kg and Bupivicaine with adrenaline - 2.5 mg/kg.

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Esters (Cocaine/Tetracaine)

In clinical practice some Esters are still used, indeed cocaine is still used topically in the management of epistaxis in otolaryngology. The vasoconstrictive properties of cocaine allow for bleeding to be controlled and the bleeding focus to be cauterized with silver nitrate in anterior epistaxis. Another example is topical tetracaine or Ametop which is applied a half hour before cannulation in paediatric patients.

Technique of Administration

Properly injected local anaesthesia can be almost painless (9). Lalonde describes a simple technique for administration of local anaesthetic in carpal tunnel surgery. All the patient feels is one poke of pain 'a hole in one' with a fine 27 gauge needle in the wrist (9). To bathe the space between the median and ulnar nerves 10 ml of LA is injected very slowly under the skin and under the forearm fascia. Importantly the needle should be moved very little. The tumescent effect of a slowly injected large volume and a nonmoving needle permits the patient to feel the pain of only the first poke (hence hole in one) (9). This careful technique is applicable to other local anaesthetic infiltration procedures such as removal of skin lesions.

Adrenaline in carpal tunnel surgery can obviate the need for a tourniquet removing pain associated with tourniquet, yet maintaining a near bloodless field. Indeed authors have advocated carpal tunnel surgery without tourniquet or sedation (9).

Technique for Percutaneous Infiltration (3)

1.Check the patient has no allergies
2. Check the maximum safe dose for the patient and draw up only that amount, checking the vial yourself. Adjuvants such as sodium bicarbonate can remove the 'sting' from infiltration and Adrenaline to prolong the duration of action.
3. For longer acting relief use Marcaine, for rapid relief Lignocaine
4. Use an orange needle as this is less painful and less traumatic to underlying tissues, start by making a subcutaneous wheal along the line of the proposed incision. Small Insulin syringes can be used to administer LAs in very delicate and sensitive areas e.g for lip lacerations.
5. Keeping the needle in the same position as much as possible inject into the deeper subcutaneous tissue, ASPIRATING before you inject.
6. If you do draw blood DO NOT inject as IV lignocaine can cause arrhythmias
7. Test anaesthesia in 10 -20 seconds with Forceps

Techniques for reducing pain on Administration

The pH and temperature of local anaesthetic administration have also been extensively reviewed in the literature. A recent meta-analysis included a total of 18 studies examining the temperature of local anaesthetic administration. Authors concluded from this review the effect of warming local anaesthetics leads to less pain during injection (10).

Commercially available preparations of lignocaine have pHs of 3.5 to 7.0 compared to the physiologic pH of 7.35 to 7.45. The adjuvant preparation sodium bicarbonate can be added to Lignocaine, raising pH and alleviating pain on administration. A recent Cochrane review assessed the outcomes of adjusting the pH of lignocaine for reducing pain on injection. 23 studies, all of which were double blinded RCTs were included in this systematic review. Authors concluded that increasing the pH of lidocaine reduced pain on injection and augmented patient comfort and satisfaction (8).

LOCAL ANAESTHETICS: WHAT THE CORE TRAINEE NEEDS TO KNOW

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Techniques of Regional Anaesthesia

Percutaneous infiltration for suturing of lacerations and minor surgeries is the most common use of local anaesthetics. However they can also be used in ultrasound guided peripheral nerve block, central nerve block and for intravenous analgesia. Bier's Block is a simple form of intravenous regional anaesthesia. Anaesthetic is firstly injected into a vein under double arm tourniquet. The anaesthetic persists for as long as the tourniquet is inflated (maximum 2 hours). The tourniquet can be safely deflated after 30 minutes. One must watch out for faulty tourniquets in this procedure as this can result in cardiotoxicity.

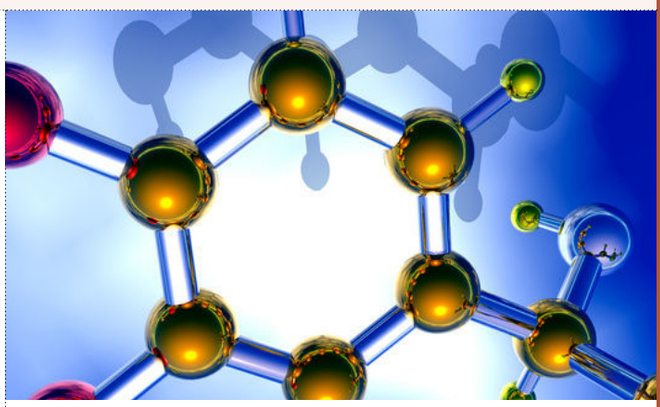
Central nerve blockade is used in surgical procedures involving the lower abdomen, lower extremity and Obstetric procedures (6). Epidural anaesthesia involves administration of local anaesthetics into the epidural space; it can be performed as a continuous technique via a catheter. Sensory block and not necessarily motor block is intended. It is commonly used in labour. In Spinal anaesthesia on the other hand local anaesthetics are injected into the subarachnoid space (CSF). Here sensory and motor functions are blocked. Central nerve blockade provides excellent postoperative pain relief.

The core trainee should be aware of the complications of these procedures and knowing when to identify them. Hypotension secondary to peripheral vasodilation and urinary retention are commonly encountered in central blockade. A 'wet epidural' puncturing the dura with a 17 gauge needle results in a postdural puncture headache (6). A high spinal that migrates towards the head can cause sympathetic block and hence block the pacemaker of the heart. Spinal cord damage is rare; there is a risk of spinal haematoma, which can result in cord compression. Urgent surgical decompression is warranted.

Summary

Local and regional anaesthesia provide a safe and efficacious method of preventing or relieving pain in circumscribed areas of the body (11). As mechanical ventilation of a GA procedure is avoided, there is little chance in gastric aspiration, atelectasis and pneumonia due to compromised respiratory function. It is also of great benefit in the postoperative course such as in epidural anaesthesia for abdominal surgery, or Brachial plexus block for elective hand surgery. The high anaesthetic risks in patients with high ASA are also minimized.

However the trainee must be aware of LA toxicity, this is usually due to the inadvertent rapid intravenous injection or the extravascular administration of an excessive dose. Indeed the latter can result in CNS depression or cardiovascular collapse. Hence sound knowledge of the pharmacological properties of local anaesthetics, and correct method of administration are all-important steps in safe local anaesthetic practice (11).



Practice MCQs (single best answer)

Q1 Adrenaline in conjunction with Lidocaine

A. Reduces the duration of action
B. Increases vasodilation
C. Allows for a maximum safe dose of 9mg/kg
D. Prolongs duration of action
E. Should never be used

Q2 1% Lidocaine is

A. A slow acting local anaesthetic
B. Safe at a dose of 3mg/kg without adrenaline
C. Safe at a dose of 3mg/kg with adrenaline
D. Long duration of action
E. Is an ester

Q3 A gentleman develops CNS toxicity post LA administration, how do you proceed?

A. Follow standard resuscitation guidelines, call an anaesthetist
B. Give diazepam
C. Check amount of local anaesthetic given
D. Give intralipid
E. Put on a cardiac monitor

Q4 A 70 Kg man requires Lidocaine without adrenaline for a carpal tunnel release, what is the maximum safe dose he can have?

A. 210 mg
B. 420 mg
C. 490mg
D. 200mg
E. 100mg

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Q5 Local anaethetics work by

A. blocking the passage of K+ through the cell membrane
B. altering the pH of the cell membrane
C. Allowing an influx of NA + into cell
D. Preventing the influx of NA + into cell
E. Changing the chloride shift of the cell

Answers.

Q1. D

Q2. B

Q3. A

Q4. A

Q5. D

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Local Anaesthetics: What The Core Trainee Needs To Know. Back to Basics.

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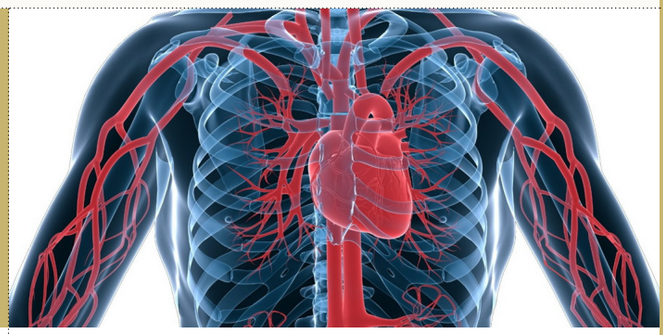
ACUTE LIMB ISCHAEMIA

P Evans, P Sutton

Acute Limb Ischaemia.
General Surgery.



Abstract

Acute limb ischaemia is a limb and life threatening emergency most commonly caused by emboli or thrombosis. A thorough history and examination is necessary to make the diagnosis and guide management based on the severity and presumed aetiology of the ischaemia. Embolectomy can have dramatic and excellent results, but often arterial thrombosis requires more complex surgical intervention. In our review we outline the epidemiology, aetiology, pathophysiology and diagnosis of acute limb ischaemia. We then go on to describe the conservative, medical and surgical management options with a detailed description of femoral embolectomy.

Case Vignette

As the on-call senior house officer (SHO), you are referred a previously fit and well 52 year old woman presenting with an acutely painful right lower limb. Mrs X was woken from sleep two hours ago with severe pain in her right lower limb. Since that time the leg has become extremely painful, cooler and progressively more pale, with some paraesthesia in her foot.

On examination her observations are normal. You find her pulse to be irregularly irregular, with normal heart sounds. Her right leg is white from low anterior thigh to the foot and feels cold. She has normal movement and power in the foot, but describes paraesthesia when testing sensation. There were no pulses palpable in the right lower limb, however pulses in the left lower limb were normal.

Suspecting embolic acute limb ischaemia secondary to new onset atrial fibrillation (AF) you ask for routine bloods tests, group and save and an electrocardiogram (ECG). You admit the patient making them nil by mouth, writing up analgesia and intravenous fluids. You contact the on-call registrar who asks you to call the on-call vascular consultant and to notify theatres.

Mrs X's blood tests are normal and her ECG shows AF with an acceptable ventricular rate and no ischaemia. The on-call vascular consultant consents the patient for a femoral embolectomy, angiography, bypass surgery and amputation. She is given a 5000IU bolus of heparin, and commenced on a continuous heparin infusion. A urinary catheter is placed. Femoral embolectomy is performed under general anaesthesia and a large embolus is removed from the superficial femoral artery. The leg reperfuses well, but prophylactic four compartment fasciotomy is performed. Post operatively there are no complications of reperfusion injury and the patient made a full recovery. Latterly, she was commenced on warfarin for management of AF.

Introduction

Acute limb ischaemia (ALI) occurs when blood supply to a limb is abruptly interrupted by embolism, thrombosis or vascular injury. Two phases of cellular injury are observed. Acute ischaemia quickly develops in tissues starved of blood causing cellular damage. Restoration of blood flow to ischaemic tissues leads to a second phase of cellular injury now widely referred to as ischaemic-reperfusion injury (1).

Acute limb ischaemia is a surgical emergency that carries significant morbidity and mortality. Its management is determined by the severity of ischaemia and proposed aetiology. Treatment of embolic acute limb ischaemia was revolutionised in the 1960s by the invention of the balloon catheter by Fogarty et al, allowing more successful embolectomy (2). Current management of acute limb ischaemia can include:

1) open surgical revascularisation (embolectomy)

2) endovascular revascularisation (thrombolysis, percutaneous angioplasty)

3) anticoagulation and observation

4) bypass surgery

Embolus	Thrombosis	Traumatic
Cardiac	Atherosclerosis	Blunt
Myocardial infarction	Aortic dissection	Penetrating
Arrhythmia	Vascular grafts	Iatrogenic
Valvular heart disease	Low flow rates	
-bacterial	-left ventricular failure	
-rheumatic	-hypotension	
-prosthetic	-hypovolaemia	
-degenerative	Hypercoagulable states	
Atrial myxoma	External compression	
Non cardiac	Iatrogenic	
Aneurysms	Idiopathic	
Atherosclerotic plaques		
Iatrogenic		
Idiopathic		
Paradoxical embolism		
Trauma		

Table 1 - Causes of acute limb ischaemia

ACUTE LIMB ISCHAEMIA

P Evans, P Sutton

Acute Limb Ischaemia.
General Surgery.

Epidemiology

The incidence of acute limb ischaemia in the general population is estimated to be 14 per 100,000 (3), with over 4000 patients in England and Wales admitted as an emergency in 2009-2010 (4). The risk of acute limb ischaemia increases with age; the results of a recent large cohort study reporting a mean age of 73 years (5). Men have a greater risk than women(6) and the leg is 2-3 times more commonly affected than the arm (7,8). Acute limb ischaemia has a mortality in the region of 15-25% with limb loss occurring in 10-30% of patients (5,6,9).

Compartment syndrome following reperfusion of an acutely ischaemic limb is seen in 0-21% of cases (10). In the United States, 5% of patients require fasciotomy following successful revascularisation of a limb (6).

Aetiology

In general, acute limb ischaemia is either secondary to thrombosis of an already diseased artery or an acute embolus lodging in a relatively healthy artery. Table 1 lists causes of acute limb ischaemia according to aetiology.

The sources of arterial emboli are vast but the majority (90%) come from the heart most commonly in association with atrial fibrillation or mural thrombus from dyskinetic myocardium post myocardial infarction (MI) (11). Other cardiac sources include heart valves (prosthetic, rheumatic, endocarditis) and less commonly ventricular aneurysms, atrial myxoma and left ventricular failure. Non cardiac sources of arterial emboli include proximal aneurysms (aortic, iliac, popliteal), aortic dissection, proximal atheromatous plaques, the venous system (paradoxical embolism), tumours and foreign bodies.

Research now suggests the incidence of arterial emboli is decreasing with reduced prevalence of rheumatic heart disease and better medical management of atrial fibrillation (6,12). In contrast, acute limb ischaemia due to arterial thrombosis is increasing and occurs in diseased arteries affected by atherosclerosis (6). Gradual arterial narrowing leads to progressive symptoms from intermittent claudication to rest pain. In the setting of atherosclerotic plaque rupture and thrombosis at the plaque site the patient can present with acute ischaemia if sufficient collateral vessels have not developed.

Pathophysiology

The term emboli has its origin from the Greek word embolus, meaning projectile. Emboli commonly lodge at branching points in the arterial tree, normally the bifurcation of the aorta, origin of superficial femoral artery and trifurcation of the popliteal artery (13). Thrombosis of atherosclerotic lesions can occur at any point in the arterial tree but like emboli are more frequent in the lower limb (14).

Independent of cause, occlusion of a limb artery leads to formation of clot proximal and distal to the obstruction and spasm of the distal artery (15). In the absence of sufficient collateral circulation, subsequent hypoxia in distal tissues causes anaerobic metabolism and the accumulation of potentially harmful metabolites such as lactic acid, potassium and myoglobin (1). Peripheral nerves are particularly sensitive to hypoxia leading to early symptoms of pain and paraesthesia. As early as 6 hours after the onset of hypoxia, muscle necrosis and nerve cell death can occur causing paralysis and anaesthesia in the affected limb.

A second hit of cellular injury termed reperfusion injury can occur when blood supply to ischaemic tissue is restored. Research has demonstrated an increase in oxygen free radicals and inflammatory mediators such as leukotrienes and tumour necrosis factor (16-18). As well as precipitating further cellular injury, these mediators cause localised vasodilation and an increase in vascular permeability. If tissue swelling occurs within a closed myofacial compartment, compartment syndrome can ensue. Here, an increase in compartment pressure causes reduced capillary blood flow leading to inadequate local tissue perfusion (19). A vicious cycle follows which if not interrupted leads to muscle ischaemia and necrosis.

The appearance of waste products from anaerobic metabolism and muscle necrosis in the systemic circulation can cause metabolic acidosis, hyperkalaemia, arrhythmias and myoglobinuria leading to acute tubular necrosis (1). Patients with prolonged ischeamia may therefore be harmed by reperfusion when a primary amputation might be the best option.

ACUTE LIMB ISCHAEMIA

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Diagnosis

A thorough history and examination are essential to determine the severity of ischaemia and its aetiology. To gauge severity ask about pain and sensory symptoms such as numbness or parasthesia and any muscle weakness. Other specific points to note are any symptoms of previous vascular disease (intermittent claudication, rest pain, trophic changes, aneurysms), significant medical problems (stroke, ischaemic heart disease, valvular heart disease, atrial fibrillation), and risk factors for vascular disease (smoking status, hypertension, diabetes, lifestyle factors).

Examination should focus particularly on the cardiovascular system (for source of emboli) and the peripheral vascular system (for signs of chronic arterial disease). Feel specifically for an irregular pulse and listen for murmurs and bruits. Compare pulses in both limbs and don't forget to test sensation and motor function.

Classically, acute limb ischaemia was defined by the 5 'P's shown below. Today most patients are older and suffer from thrombosis with some collateral vessels secondary to underlying vascular disease, thus the 5 'P's are now rarely seen except in arterial transection, thrombsosis of a popliteal aneurysm or acute embolus in a healthy artery (6).

Pain

Most common symptom, ask if it is ongoing or if it has changed in intensity. Pain can occasionally be absent in complete ischaemia with sensory loss.

Paraesthesia

Signifies a threatened limb, test if symptoms extend above the toes.

Pallor

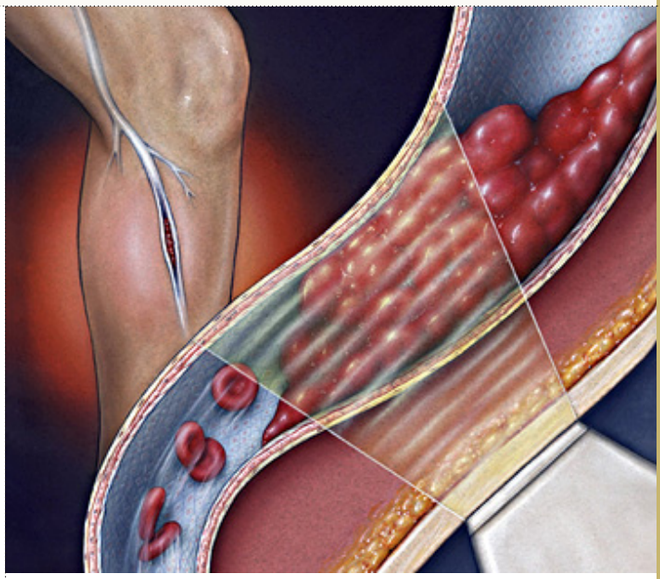
A change in colour and temperature is common. In acute ischaemia with no collateral supply, a white waxy colour develops. Mottling follows shortly after due to stagnant capillary blood flow. Fixed staining, blisters and gangrene are late signs and indicate an unsalvageable limb.

Pulselessness

Use a hand held doppler to improve accuracy and compare limbs. No pulse will be felt at or distal to the level of occlusion in the affected limb. Reduced pulses in the unaffected limb make chronic disease and thrombosis a more likely cause for acute ischaemia in the affected limb.

Paralysis

A poor prognostic sign



The presence or absence of the above clinical features should allow you to classify the severity of limb ischaemia into one of four categories agreed upon by vascular societies of the United Kingdom (UK) and United States (US) (20) (Table 2).

Category	Clinical Features		Doppler Signal		Management
	Sensory Loss	Muscle Weakness	Arterial	Venous	
1.Viable	None	None	Audible	Audible	• Anticoagulation • Observation • Imaging • Consider Reperfusion
IIa. Marginally Threatened	Paraesthesia at level of toes	None	Inaudible	Audible	• Anticoagulation • Imaging • Reperfusion
IIb. Immediately Threatened	Paraesthesia more proximal than level of toes	Mild to moderate	Inaudible	Audible	• Anticoagulation • Reperfusion
III. Irreversible	Anaesthesia	Profound paralysis	Inaudible	Inaudible	• Anticoagulation • Amputation

Table 2 – Classification of acute limb ischaemia, clinical features and management

The following clinical features are known to be most indicative of embolism as a cause for acute limb ischaemia: (14)

1. Sudden onset of symptoms

2. Known embolic source

3. Absence of previous claudication

4. Normal pulses in unaffected limb

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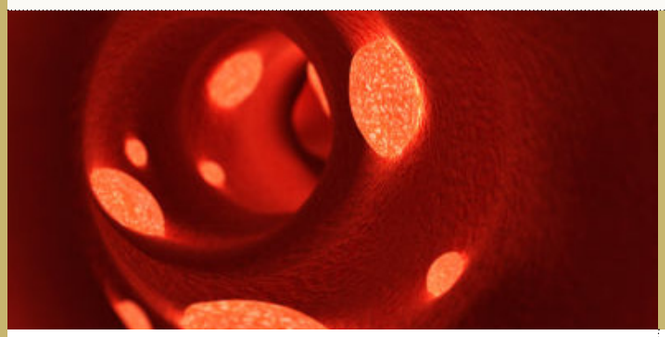

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Investigations

Routine pre-operative bloods including a group and save and coagulation screen are needed. The patient should have an ECG to look for atrial fibrillation and ischaemia. Pre-operative imaging is not indicated for a threatened limb due to suspected embolus but imaging may be appropriate for class I and IIa ischaemia or if endovascular procedures are an option.

Management

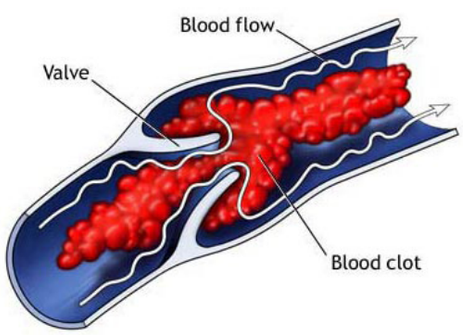
Patients should be managed in line with current guidance produced by international vascular societies(6,21). They recommend early evaluation and decision making by a vascular specialist which may require patient transfer to a tertiary centre. (21)

Anticoagulation

Upon diagnosis all patients should be anticoagulated with a loading dose of 5000 units of intravenous heparin followed by a continuous infusion with a target activated partial thromboplastin time ratio (APTTR) of 2.0-2.5. Patients should be simultaneously resuscitated with intravenous fluid.

Patients with viable and marginally threatened class IIa limbs of presumed thrombotic origin may be closely observed while specialist vascular input is sought and appropriate imaging plus or minus angioplasty or catheter-directed thrombolysis is arranged. A number of these patients will go on to have bypass surgery. Anticoaggulation alone is reserved for unstable patients and those without limb threatening ischaemia who are sedentary (11).

Patients with an immediately threatened (category IIb) limb need urgent revascularisastion either endovascularly or surgically. If thrombosis is suspected urgent discussion with a vascular specialist is needed. For embolus an embolectomy is normally preferred.



Catheter –directed thrombolysis

Thrombolysis normally uses recombinant tissue plasminogen activator (rTPA) or urokinase to dissolve blood clots. It is infused endovascularly via a catheter under local anaesthetic by interventionalists with suitable imaging facilities. It tends to be used for mild to moderate ischaemia secondary to thrombosis but can be used to treat emboli. A recent Cochrane review comparing thrombolysis and surgery for acute limb ischaemia found no difference in mortality or limb loss, but higher rates of stroke and major haemorrhage with thrombolysis (22). A potential benefit of thrombolysis is a slower return to arterial flow which may lessen the risk of reperfusion injury.

Operative

If the clinical features are suggestive of embolus the patient is taken directly to theatre for embolectomy. The patient should not only be consented for embolectomy but also for further procedures as become necessary such as angiography +/- angioplasty, bypass surgery and limb amputation. This particular patient group is normally significantly co-morbid. Surgical intervention therefore carries the risk of myocardial infarction, cerebrovascular accident and even death. Renal failure and post-operative respiratory complications, as well as the local surgical complications of bleeding, infection, numbness and lymph leak should also be explained to the patient and relatives. Where available, written information should be given to the patient and relatives to tailor their expectations to the possibility of a poor outcome.

This article describes embolectomy of the common femoral artery but the basic technique can be used for emboli in the aortic bifurcation, brachial and axillary arteries. General anaesthesia is preferred by some surgeons, but the procedure may be performed under local anaesthetic in high risk patients. The patient should be transferred onto an operating table which will facilitate X-ray imaging. The patient should be exposed and prepped from the nipple to the toes with an antiseptic that is colourless (e.g. alcoholic chlorhexidene without dye) so that any colour change in the limb can be observed after the procedure.

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A longitudinal or oblique incision is made over the mid inguinal point. The femoral artery is then exposed using sharp dissection and the help of a self-retaining retractor. Silastic vascular slings are positioned around the common femoral artery (CFA), superficial femoral artery (SFA) and profunda femoral artery (PFA). An angled vascular clamp is placed on each vessel, with care being taken to avoid unnecessary trauma (23). An arteriotomy is made in the femoral artery just proximal to its bifurcation. This is usually a transverse arteriotomy, although a longitudinal arteriotomy could be performed to permit better visualisation of the origin of the CFA.

A 4F embolectomy catheter is used for the SFA and PFA, and a 5F for the aortic bifurcation. The use of 3F catheters is normally reserved for the upper limb (24). The uninflated 4F catheter is placed into the SFA. It is introduced distally as far as possible and should pass easily with only mild resistance encountered at bifurcations. Embolic material does not confer significant resistance. The balloon is inflated with normal saline until the arterial wall presents mild resistance. The catheter is then slowly withdrawn whilst adjusting the pressure in the balloon to accommodate changes in vessel diameter (figure 1). Any thrombus is removed through the arteriotomy. The assistant's role is to control bleeding by applying gentle traction on the vascular sling previously placed round the artery.

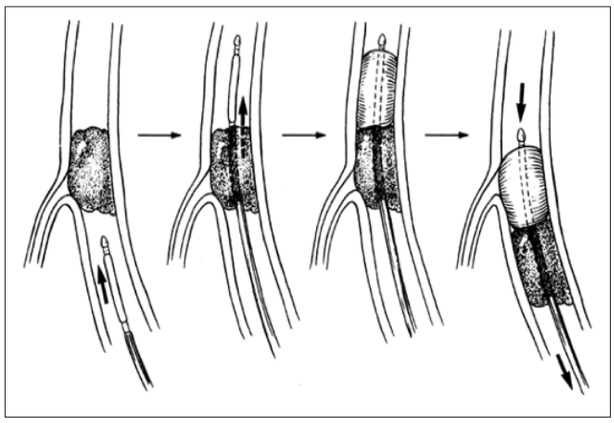

Figure 1 - Mechanism of action of fogarty catheter (taken with kind permission from Mastery of Surgery, 5th edition 19)

The procedure is repeated until no further thrombus is obtained and the vessel bleeds forcefully. At this point heparinised saline is injected into the artery which is subsequently clamped. If an emboli is suspected in the popliteal or distal vessels, multiple catheters can be inserted down the SFA to access and clear them. If catheters will not pass distally an on-table angiogram is needed to asses for the presence of emboli at or distal to the popliteal trifurcation and for atherosclerotic occlusion. The technique described above should be repeated for the PFA and finally proximally in the direction of the external iliac artery (Figure 2).

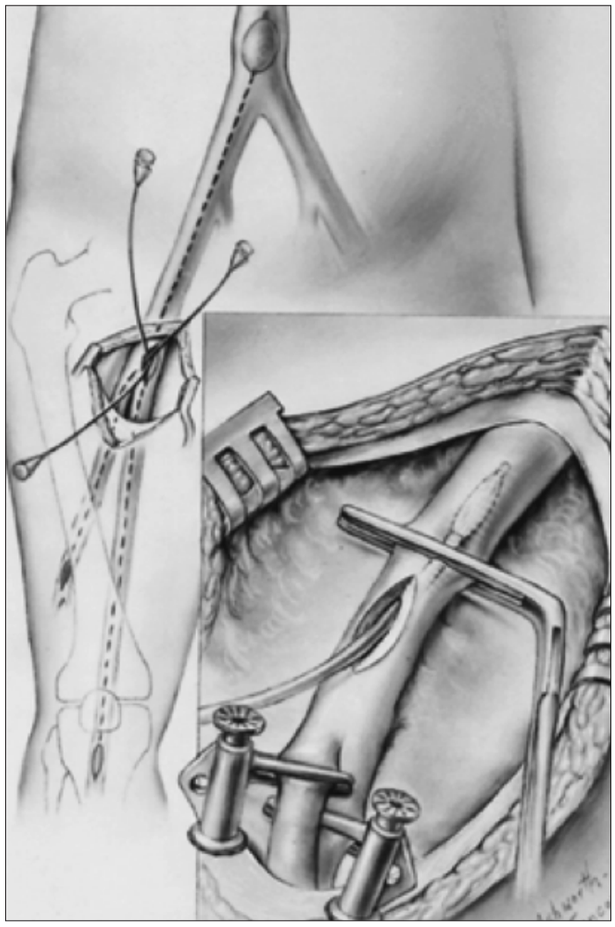

Figure 2 – Technique of fogarty catheter embolectomy of the iliofemoral system (taken with kind permission from Mastery of Surgery, 5th edition 19)

Once all vessels have been explored, completion angiography may be performed to assess the adequacy of embolectomy. This will also assist decision making regarding further intervention with angioplasty or surgical bypass. If reperfusion is successful the arteriotomy is closed with a 5/0 non-absorbable suture such as ProleneTM. Longitudinal arteriotomies must always be closed with a patch to prevent stenosis of the lumen. All clamps and slings are removed and haemostasis is assured. A vacuum drain may be inserted and the groin incision closed in layers to minimise the risk of significant lymph leak. It is important to document the presence of pulses and the general condition of the limb immediately post operatively.

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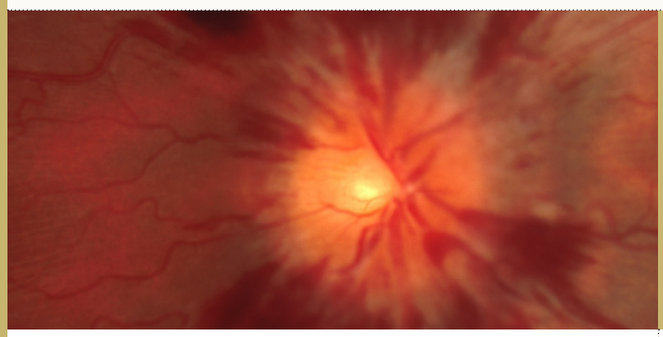

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Fasciotomy

Prophylactic fasciotomy is performed to prevent compartment syndrome in a limb at risk of reperfusion injury following revascularisation. Approximately 5% of patients will require fasciotomy after successful revascularisation (6). Even though the anterior compartment of the lower limb is most commonly affected, it is recommended to perform four compartment fasciotomy (6). This can be achieved via a two incision technique, a detailed description of which can be found in a previous issue of this journal (19).

Amputation

Amputation is needed for patients with category III, irreversible ischaemia and in patients where revascularisation has failed and a limb is now unsalvageable. This should happen on the next available emergency list once resuscitation and optimisation of co-morbid conditions is achieved.

Post Operative

Patients need close monitoring to detect and treat any complications of reperfusion injury and to assess for deterioration in the revascularised limb. Daily monitoring of urea and electrolytes along with accurate measurement of urine output for signs of renal failure is vital, as is an assessment of calf muscle tenderness. The patient should be maintained on an intravenous heparin infusion for 48-72 hours or until an International Normalised Ratio (INR) of 2 is achieved with warfarin. Further investigation and treatment for embolic sources should then begin, including echocardiography and CT.

Conclusion

Early diagnosis and prompt intervention is critical in acute limb ischaemia to prevent significant morbidity and mortality. History and examination should focus on determining the aetiology and severity of the ischaemia, as this directly determines patient management. Careful post operative monitoring is needed to detect local and systemic complications of revascularising an ischaemic limb.

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MCQs – True or False?

1. A category IIa limb will have an audible arterial doppler, but an inaudible venous doppler

2. A category IIb limb will demonstrate paraesthesia at the level of the toes.

3. The second phase of cellular injury is referred to as 'ischaemic-reperfusion injury'

4. The leg is 2-3 times more commonly affected than the arm

5. Acute limb ischaemia has a mortality of 50%

6. Limb loss occurs in 10-30% of patients

7. Compartment syndrome occurs in up to 21% of patients

8. Upon diagnosis, a loading dose of 2500 units of IV heparin should be given

9. Comparing thrombolysis and surgery for acute limb ischaemia, a Cochrane review found no difference in mortality or limb loss, but higher rates of stroke with thrombolysis

10. Any antiseptic can be used intraoperatively

11. A 5F embolectomy catheter is used for the SFA and PFA

12. Longitudinal arteriotomies must always be closed with a patch

13. Fasciotomy may be performed as a prophylactic measure

14. Amputation is needed with patients with a category III limb ischaemia

15. IV heparin should be infused for 48-72 hours until the INR of 2 is achieved with warfarin

Answers

1. F **2. F** **3. T** **4. T** **5. F**

6. T **7. T** **8. F** **9. T** **10. F**

11.F **12.T** **13.T** **14.T** **15.T**

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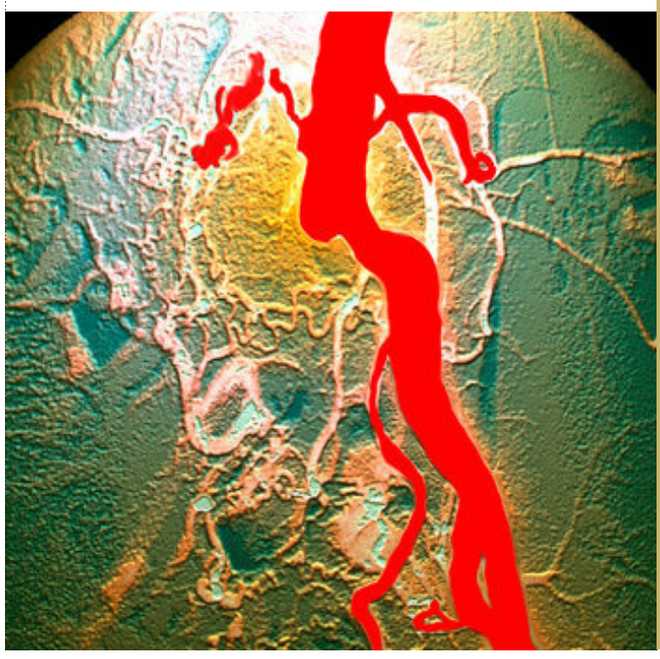

OPERATIVE MANAGEMENT OF WEBER B ANKLE FRACTURES, A PRACTICAL GUIDE

N Gunasekera

Operative Management Of Weber B Ankle Fractures, A Practical Guide. Trauma & Orthopaedic Surgery.

History and Pathology

Ankle fractures are extremely common, and are the most commonly injured weight-bearing joint. The ankle joint itself has a relatively small surface area, through which relatively large forces are transmitted. For example, in normal gait, 1.5 times body weight is transmitted through the ankle joint, and in more vigorous exercise this can increase to 5.5 times body weight being transmitted through the ankle joint.

It has been shown in cadaveric studies, as little as 1mm lateral translation of the talus can reduce the surface contact area in the ankle joint by up to 42%. It is therefore important to preserve the congruency of the ankle joint following injury.

The Weber classification of ankle fractures was developed in 1972. It is a simple anatomical classification corresponding to the level fracture in the fibula, but it does not take into account the mechanics of the injury. The Weber B fracture is the most common type of fibula fracture and is caused by a supination and external rotation injury of the ankle, resulting in an oblique fracture at the level of the syndesmosis (Fig. 1). These fractures are commonly fixed with lag screw compression and a neutralisation plate.

Figure 1. AP xray showing Weber B fracture

Indications and Contraindications

Fixation of ankle fractures is indicated for unstable injuries. Indications for immediate surgery include open fractures and irreducible dislocations, however in the absence of these, early fixation is advised to minimize soft tissue damage. If early fixation is not possible, consider delaying fixation until the soft tissues have settled sufficiently in order to reduce the risk of wound problems.

Operative fixation for unstable injuries may not be appropriate in patients with a poor general medical condition who pose a high anaesthetic risk, or in those with significant peripheral vascular disease.

Gaining informed consent / Explaining procedure to patient

The risks and benefits of the procedure should be fully discussed with the patient to allow for informed consent in accordance with the General Medical Council guidelines. Options for alternative management should also be discussed. Specific points that should be discussed include:

Timing of surgery

Details of operation and proposed implant
Location of incision
Risk of bleeding and infection
Risk of damage to nerves and blood vessels
Risk of mal union/non union
Risk of further revision surgery or removal of metal work

Equipment required

Radiolucent table
Tourniquet
Small fragment set
Complete set of implants and screws
Image intensifier
Diathermy and suction

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Patient positioning

The patient is positioned supine on the radiolucent table with a well-padded tourniquet to the thigh. Use of a tourniquet is determined by the surgeon's preference. The injured leg is placed on a foam block (Fig. 2), allowing easy access to approach the lateral and medial sides as necessary.

Figure 2. Patient in position with tourniquet and foam block in place

A sandbag should be placed under the ipsilateral buttock to internally rotate the hip and aid fixation of the lateral side. If neither a sandbag or block is available, the table may be tilted to lower the side of the contralateral leg, to approximately 30 degrees.

Draping/Sterile field preparation

The operative site is then cleaned using a standard skin preparation such as chlorhexidine or povidone-iodine. A sterile stocking may be used to cover the lower leg, with a hole made in the stocking in the region of the incision. This may then be covered with an antimicrobial sticky drape.

Procedure

The standard approach for fibular fractures is the lateral approach. Starting proximally, make a 10-15cm incision in line with the fibula.

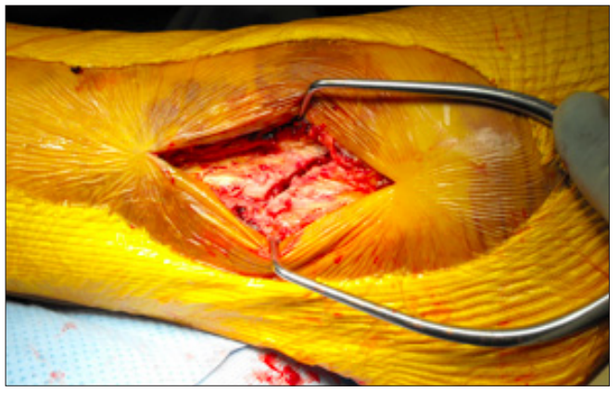

Figure 3. Lateral approach and dissection between the peroneus muscles to expose the fracture site

It is useful to make the incision slightly anteriorly as this will keep the incision away from the plate, and also facilitate lag screw insertion from anterior to posterior; however if the incision is too anterior this may hinder reduction. Be aware of the superficial peroneal nerve which lies very close to the proximal part of the incision anteriorly, and when dissecting posteriorly, the sural nerve and short saphenous vein are at risk of damage.

Dissect between peroneus tertius anteriorly and peroneus longus and brevis posteriorly. Once at the fracture site (Fig. 3), free the periosteum, reflecting only as much as is needed to expose the fracture in order to minimize devascularisation. Irrigate the fracture site, remove any haematoma present and attempt to reduce the fracture using small pointed reduction forceps. Ensure the forceps will not interfere with lag screw insertion (Fig. 4).

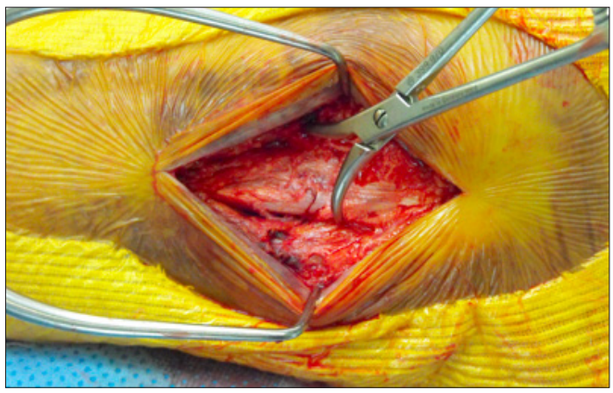

Figure 4. Application of small pointed reduction forceps to reduce the fracture

A lag screw is then used to hold reduction and achieve interfragmentary compression. Drill a 3.5mm glide hole perpendicular to the fracture into the anterior cortex only of the proximal fragment. Then insert the 2.5mm drill sleeve into the glide hole and drill with the 2.5mm drill into the posterior cortex. Countersink the proximal fragment and measure the depth of the hole. The cortical screw must be long enough to engage the posterior cortex, but should not be so long that it impinges upon peroneal tendon sheaths. Using a 3.5mm cortical tap, tap the posterior cortex and insert the lag screw.

Whilst inserting the lag screw, watch the fracture carefully and observe the compression effect as the screw is tightened. Remove the reduction forceps before tightening the screw completely, ensuring reduction of the fracture is maintained as the forceps are removed.

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A one third tubular plate should be applied to the fibula to act as a neutralization plate. This will counteract any shearing or bending forces which would otherwise disrupt the lag screw fixation. The plate should be long enough to achieve secure hold with three screws proximally and three screws distally. The plate will need contouring so that it fits the contour of the lateral malleolus throughout its entire length. Position the plate on the fibula with a bone holding clamp and drill a 2.5mm hole through both cortices for the first most proximal screw. Measure and tap with the 3.5mm cortical tap, and insert the screw. The screw should be long enough to engage the opposite cortex, but it should not contact the tibia.

Next, insert screws using the same technique into the first distal hole and the remaining proximal holes of the plate. Aim for three screws proximal to the fracture site. The two remaining distal cancellous screws should be inserted obliquely and engage the medial cortex only and not extend into the fibuoltalar joint. Most often two or three cancellous screws are placed distal to the fracture (Fig. 5).

Figure 5. Plate application with three proximal cortical screws and three distal cancellous screws.

Release the bone holding clamp and gently tighten all screws. Check the fixation with mortise and lateral xrays, ensuring proximal screws do not come into contact with the tibia, and distal screws are not in the fibulotalar joint.

The mortise view is particularly important as it allows assessment of the distal fibular length by measuring the talocrural angle. This is the angle between a line parallel to the articular surface of the distal tibia and the intermalleolar line, and is normally 8-15 degrees. The angle measured should be within 2-5 degrees compared with the contralateral side, a greater difference is indicative of fibular shortening.

The post-operative plan should also include:

Elevate leg and analgesia
Intravenous antibiotics and thromboprophylaxis
Formal xrays (Fig. 6)
Weight-bearing status with physiotherapists
Plan for wound inspection and application of below knee non-weight bearing cast
Plan for suture removal
Outpatient follow up plan

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Complications

Unstable Weber B fractures are commonly fixed using lag screw and neutralisation plate techniques, however prominent lateral screws may become symptomatic leading to peroneal tendon irritation or cause wound necrosis; and may need removal of metalwork. Posterior anti-glide plates is another technique that can be used to fix these fractures and has the advantages of better soft tissue coverage.

Summary

Weber B ankle fractures are extremely common and fixation with lag screw compression and a neutralisation plate is a procedure for the junior orthopaedic trainee. Effective fracture reduction and good understanding of the concepts of lag screw insertion and plate fixation are essential to the success of this procedure.

Acknowledgements

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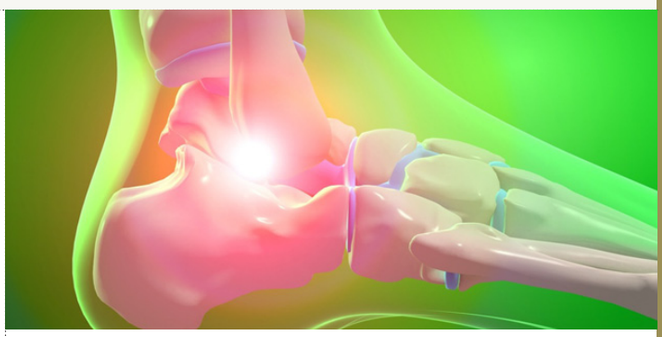
MCQs

1. A Weber B fracture is a result of what type of injury?
A. Supination-adduction
B. Supination-external rotation
C. Pronation-External rotation
D. Pronation-Abduction

2. Indication for immediate fixation of ankle fractures include:
A. Open fractures
B. High anaesthetic risk
C. Peripheral vascular disease
D. Irreducible dislocations



3. When making the lateral incision, which structures are at risk during dissection?
A. Superficial peroneal nerve
B. Saphenous nerve
c. Sural nerve
D. Short saphenous vein
E. Long saphenous vein

4. Place the following procedural steps of lag screw insertion in order:
A. Measure the depth of the hole
B. Drill a 3.5mm glide hole into the anterior cortex
C. Countersink the proximal fragment
D. Insert the lag screw
E. Use the 2.5mm drill to drill into the posterior cortex
F. Tap the cortex with a 3.5mm cortical tap

5. Which of the following statements are true regarding Weber B fixation?
A. A quarter tubular plate is used as a neutralization plate
B. The neutralization plate will bridge a segment of comminution
C. The plate should be long enough to hold 3 screws both proximal and distal to the fracture site
D. The plate will need to be contoured to fit the distal fibula only

Answers

1. B
2. A and D
3. A, C and D
4. B,E, C, A, F, D
5. C

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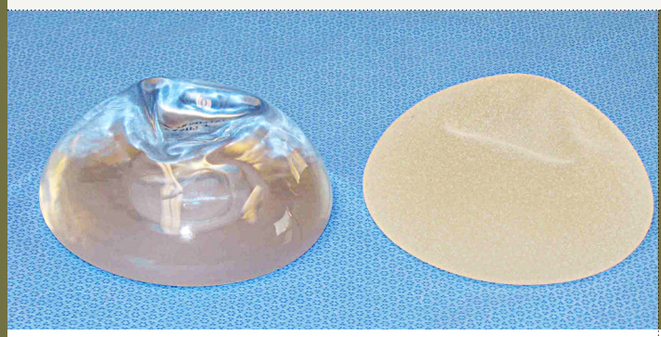
BREAST RECONSTRUCTION

RAJ Wain, JR Srinivasan



Breast Reconstruction.
Plastic & Reconstructive Surgery.

Abstract

Breast cancer is the most common cancer affecting women in the UK. The majority of surgical trainees during their career will therefore be involved in managing these patients. This article provides an overview of the options available for breast reconstruction after mastectomy.

Introduction and Background

Over 40,000 new breast cancer cases are diagnosed in the UK each year[1]. Approximately 40% will undergo a mastectomy and, according to NICE, all should be offered the chance of breast reconstruction.

The first published breast reconstruction was performed by Czerny in 1895, using a lipoma from a patient's back to fill the defect after removal of a large benign breast mass[2]. Techniques have advanced significantly since, with pedicled flaps and microvascular free-tissue transfer, along with tissue expanders and breast implants, now forming the mainstay of 21st Century breast reconstruction.

One key factor affecting the improved quality of breast reconstruction is acceptance of the skin-sparing mastectomy (SSM) as oncologically safe[3]. This technique assists the reconstructive surgeon by preserving the inframammary fold, helping to maintain native breast contour and providing better skin colour and texture.

It is important to note that with any breast reconstruction surgery further procedures may be necessary to improve breast symmetry and aesthetic appearance. Symmetrisation procedures may include lipofilling / liposuction to the reconstructed breast, and/or mastopexy or breast reduction to the contralateral breast.

Timing of Reconstruction

Immediate Reconstruction

This is when breast reconstruction is performed during the same operation as the mastectomy. It is considered oncologically safe[4] and can be performed in patients who require post-operative radiotherapy. However, if this is planned, autologous tissue is preferential to implant-based procedures due to an increased risk of capsular contracture[5].

Benefits[1,6]:

- Maximum preservation of breast skin and the inframammary fold
- Maintaining 'body image'
- Natural shape of breast envelope after volume replacement
- Potential for a single general anaesthetic & hospital stay

Disadvantages:

- Limited time for decision-making
- Increased operative time
- Difficulties of coordinating two surgical teams
- Potential delay of adjuvant treatment due to complications

Delayed Reconstruction

Delayed reconstruction occurs anytime after four months from initial mastectomy[6]. This allows patients to undergo, and recover from, adjuvant radiotherapy and/or chemotherapy prior to reconstruction.

Benefits[1,6]:

- Avoids the detrimental effect of radiation on the reconstruction
- Allows excision and replacement of damaged skin
- Avoids delay in commencement of adjuvant therapies
- Shorter recovery following each stage
- Permits time for patients to consider whether reconstruction is right for them

Disadvantages[1,6]:

- Minimum of two operations, general anaesthetics and hospital stays
- Mastectomy flaps may be thin, scarred, contracted, irradiated or poorly positioned
- Increased financial costs
- Psychological effects of time living without a breast

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No Reconstruction

Some patients undergoing mastectomy will decide not to have reconstructive surgery. In these circumstances non-surgical options, such as prosthetic breasts, can be discussed. Patients should always be reminded they can consider delayed reconstruction later if desired. There are, however, circumstances in which breast reconstruction is contraindicated including non-resectable local chest wall disease, rapidly progressive systemic disease, and patients who have serious co-morbidities.

Methods of Reconstruction

Prosthetic Techniques

- Fixed volume implant
- Variable volume expander-implant
- Tissue expander and subsequent exchange for implant

Autologous Reconstruction

- Latissimus Dorsi (LD) Flap +/- implant
- Transverse Rectus Abdominis Myocutaneous (TRAM) Flap
- Free tissue transfer

Prosthetic Techniques

Background

Implant technology and surgical techniques have developed significantly since the original 1960s silicone gel-filled implants. Several techniques are recognised and numerous varieties of implants are available to allow the reconstructive surgeon to tailor the procedure to an individual. The popularity of one-stage implant-only reconstruction has diminished over recent years with the two-stage expander-implant procedure now being favoured[5]. A 2009 survey of the American Society of Plastic Surgeons revealed that of 86,424 breast reconstructions performed, 66,075 (76%) were implant based. Of these, 9,097 (14%) were implant-only and the remainder expander-implant procedures[7].

Consideration of the amount of available skin, subcutaneous tissue and muscle, and the need for post-operative radiotherapy, when planning implant-based reconstruction is important as insufficient soft tissue coverage will give poor cosmetic results. The ideal candidates for breast reconstruction with prosthetic implants are patients of normal body mass index (BMI) with small to moderate non-ptotic breasts, good soft tissue cover and an intact pectoralis major muscle. Prosthetic techniques can be used for bilateral reconstruction and in patients who are unwilling or unfit to undergo autologous tissue reconstruction.

Technique

The inframammary fold (IMF) should be marked preoperatively and preserved wherever possible intraoperatively. After ensuring viability of mastectomy skin flaps, a submuscular plane is created by elevating the lateral border of pectoralis major from the chest wall[5,6]. The correct size tissue expander is inserted, whilst considering the contralateral breast dimensions and allowing for overexpansion to produce natural post-operative ptosis. Textured, integrated port expanders are most frequently used and are filled with enough saline to obliterate dead-space but not to exert excessive pressure on the skin flaps[5]. (Figure 1) Dermal/collagen matrix slings are now being used to support the lower pole, help prevent migration, provide total coverage and add support during expansion. Tissue expansion usually commences 10-14 days post-op and continues every 1-2 weeks until the breast is approximately 20% overexpanded to create a better ptosis. Exchange for a permanent silicone implant is performed 4-6 weeks after the last expansion.

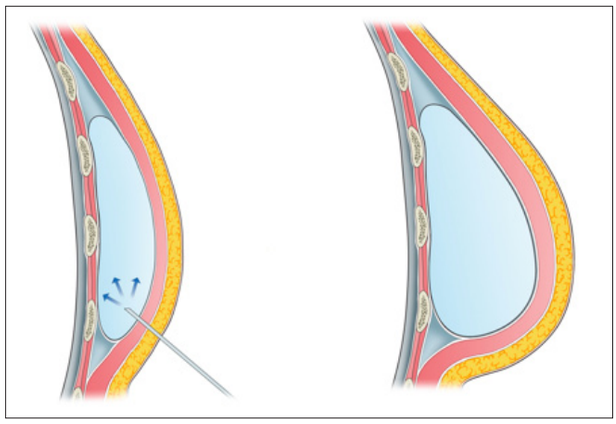

Figure 1 – Cross sectional view of a breast tissue expander in situ showing expansion on the left, and the end volume on the right.

Complications

Complication rates are generally low. Early complications include bleeding, haematoma, infection, skin flap necrosis and implant failure. Late complications include asymmetry, capsular contracture, wrinkling, implant migration, rotation and rupture[5,6].

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Breast Reconstruction.
Plastic & Reconstructive Surgery.

Autologous Reconstruction

Background

Breast reconstruction with autologous tissue can involve pedicled and free tissue transfer, with or without an implant. Autologous tissue gives a more natural appearance and texture when compared to implant-based reconstructions and also provides reliably vascularised flaps.

According to the American Society of Plastic Surgeons 2009 data, around 24% (20,349) of all breast reconstructions were performed using autologous tissue. These were subdivided into the types of flap: 11% (9,327) transverse rectus abdominis myocutaneous flap (TRAM), 5% (4,424) deep inferior epigastric perforator flap (DIEP), and 8% (6,598) latissimus dorsi (LD) flap[7].

Autologous reconstruction is particularly beneficial in patients who require radiotherapy, who want to avoid having a silicone implant, or in cases where implant reconstruction has been unsuccessful[6].

Latissimus Dorsi (LD) Flap

The LD flap is reliable, well vascularised and is based on the thoracodorsal pedicle containing the thoracodorsal artery and vein. Its proximity to the chest wall makes it ideal for providing muscle, fat and skin for breast reconstruction in the immediate or delayed setting[8]. Although in selected cases this flap may be used alone, it is usually combined with an implant to provide adequate volume. It is often used when the abdomen is unsuitable for an abdominal based flap due to previous surgery or lack of adipose tissue6. (Figure 2)

Figure 2 – Left LD flap breast reconstruction two months post operatively.

Technique

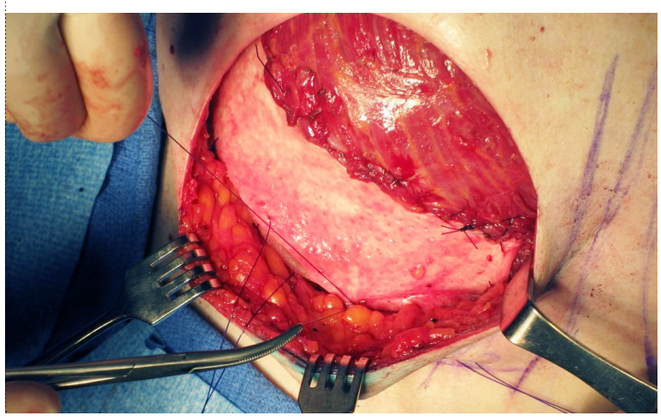
The patient is marked preoperatively to identify the latissimus dorsi muscle borders and to plan the orientation and size of the skin paddle (usually an oblique/transverse ellipse). LD flap elevation is performed with the patient in the lateral decubitus position. The skin paddle is incised through thoracic fascia and the remaining dissection is carried out subfascially. Once the pedicle is identified and protected, a communication is made via the axilla to the mastectomy site. The LD flap is passed through, taking care not to 'kink' the pedicle, and the back wound is closed. The patient is then repositioned supine and the flap inset with or without a submuscular implant[6,8].

Complications

Although this procedure carries risks associated with implants, the most frequently encountered complication is donor site seroma. This can be reduced by applying quilting sutures[6,8] or by infiltrating local corticosteroid.

Transverse Rectus Abdominis Myocutaneous (TRAM) Flap

The TRAM flap, taken from the lower abdomen, has been used to recreate the breast for around thirty years. It can be used as a pedicled or free flap requiring microvascular surgery. Pedicled TRAM flaps rely on the superior epigastric vessels and allow good volumes of subcutaneous fat and skin to be transferred, along with variable amounts of muscle. Free TRAM flaps rely on perforators from the deep inferior epigastric artery, which is the dominant supply. Both pedicled and free TRAM flaps are used in immediate or delayed, unilateral or bilateral breast reconstructions. The TRAM flap also has the advantage of reducing excessive lower abdominal tissue and providing a neat 'tummy tuck'-like abdominal scar.



BREAST RECONSTRUCTION

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Pedicled TRAM

This involves keeping the abdominal tissue attached to the supplying vessels and the rectus abdominis muscle and tunnelling it up through the inframammary fold into position. The flap can be based on the ipsilateral or contralateral pedicle and can be positioned horizontally or vertically. It is versatile, reliable and does not require microvascular surgery[6,9]. (Figure 3)

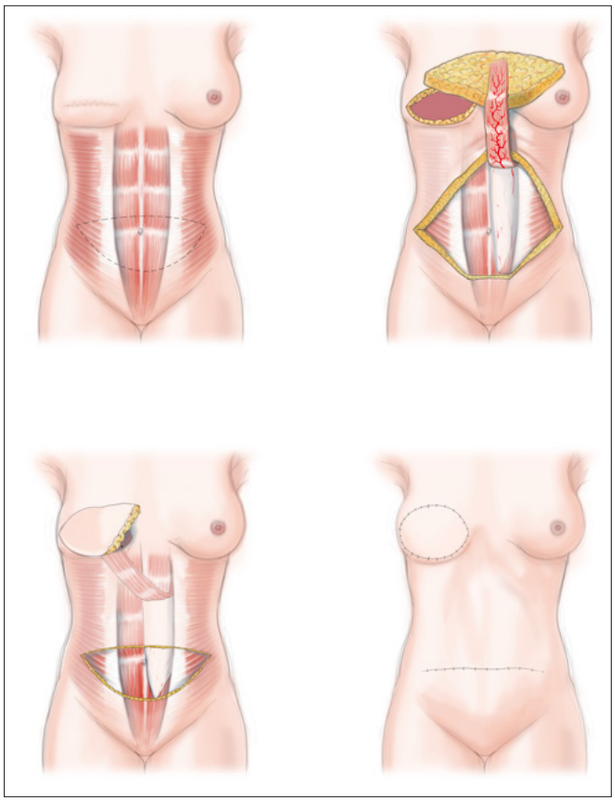

Figure 3 – An illustration demonstrating the stages of a pedicled TRAM flap breast reconstruction.

Free TRAM

This involves disconnecting the abdominal tissue from its blood supply and anastomosing the vessels near the recipient site, commonly the internal mammary or thoracodorsal vessels. Holmstrom first performed this in 1979 when he revascularised discarded abdominoplasty tissue to reconstruct a breast[10]. Vessels can be anastomosed using conventional microvascular suturing techniques or a contemporary coupling device for venous anastomoses. Advantages of free TRAMs include better vascularisation of the skin paddle, ease of flap inset, and preservation of the inframammary fold[6,9].

Complications

Both pedicled and free TRAMs are associated with a degree of muscle division, although much less so in free tissue transfer. Abdominal contour defects and herniation are more common with increasing muscle disruption. Fat necrosis and partial and total flap loss can occur with either technique but more frequently in patients who smoke and are obese[6,9]. The failure rate of free TRAM anastomosis is approximately 5%.

Deep Inferior Epigastric Perforator (DIEP) Flap

An evolution of the free TRAM, the DIEP flap has the same adipocutaneous component but does not require abdominal muscle division. Once a perforator is identified, it is carefully dissected through the muscle until a suitable length is exposed. This can be challenging and time consuming, particularly if there is excessive muscle twitching whilst using diathermy. Local anaesthetic can be infiltrated to reduce this[11]. The remainder of the procedure continues in the same way as for the free TRAM. The benefit of performing a free DIEP over a free TRAM is reduction in the degree of abdominal weakness/herniation. However, a 2005 study demonstrated a similar incidence of weakness/herniation in both DIEP and muscle-sparing TRAM[12]. Absolute contraindications to DIEP flaps are previous abdominoplasty, abdominal liposuction or current smoking[6].

Superficial Inferior Epigastric Artery (SIEA) Flap

The SIEA flap has similar adipocutaneous content to TRAM and DIEP flaps. It is based on the SIE artery and vein which arise from the femoral vessels with variable anatomy. Unfortunately, this vessel is absent in a third of patients and can be damaged by previous surgery. A small calibre vessel (1.5-2mm) is the main drawback of this technique limiting it to small/medium sized reconstructions and rendering it susceptible to partial flap necrosis. Advantages of this method include no interruption of the muscular fascial abdominal wall[13], and shorter operating time, as dissection is easier.

Superior and Inferior Gluteal Artery Perforator (SGAP) & (IGAP) Flaps

The SGAP & IGAP flaps are alternative free flaps used when the abdominal donor site is contraindicated, for example, due to excessive scarring. It is limited to use in small/moderate breast reconstruction due to flap size restrictions. The SGA and IGA have reliable anatomy and arise from the internal iliac artery. This flap is composed of adipocutaneous tissue and does not require muscle division. The skin paddle is taken horizontally and the flap raised in the subfascial plane. Recipient vessels for this technique are the same as for TRAM, DIEP & SIEA although the internal mammary vessels are preferred[6,13]. Donor site morbidity and seroma rates are low[14].

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Breast Reconstruction.
Plastic & Reconstructive Surgery.

Nipple reconstruction

Methods[1,6,14]:

- Local flaps
- Grafts
- Prosthesis

Background

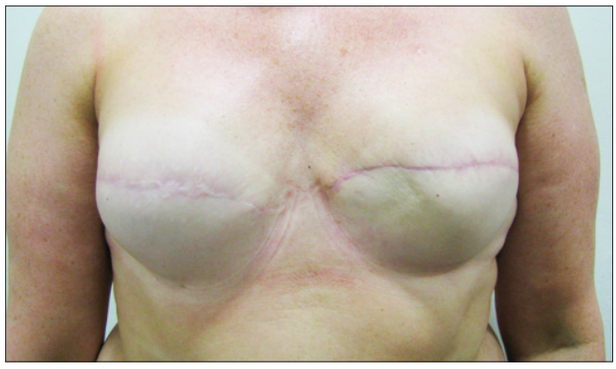
Reconstruction of the nipple-areola complex (NAC) forms the final part of breast reconstruction, and is the stage that converts a 'breast mound' into a 'breast'. Factors to consider when planning NAC reconstruction include size, shape, texture, colour, projection and overall position, making this stage of the process relatively challenging. This procedure is often delayed until the reconstructed breast has fully healed and settled to its final shape.

Technique

Local flaps are most commonly used and are performed under local anaesthetic. They involve raising dermal flaps around a central dermal-fat pedicle e.g. C-V flap, Star flap or Skate flap. It is essential to plan the new nipple site appropriately after patient discussion and comparison with the contralateral breast. The reconstructed nipple is known to lose projection, particularly in the first 3 months[15], therefore overcorrection by ~50% is recommended[14].

Grafts from a variety of sites have been used to reconstruct the nipple, with the most common being the contralateral nipple tissue or costal cartilage. Although these provide good results, the main disadvantage is the need for a second procedure at the donor site.

Unless tissue from the contralateral nipple is used, the above techniques do not provide a colour match. In order to produce this, the patient can undergo a nipple tattooing procedure. (Figure 4)



Figures 4a & 4b – Bilateral expander implant reconstruction before (4a) and after (4b) bilateral nipple reconstruction and tattooing.

Some patients may choose not to have permanent nipple reconstruction. In this case adhesive silicone prostheses can be supplied. These are excellent substitutes as they are taken from a mould of the contralateral NAC and colour matched exactly.

BREAST RECONSTRUCTION

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Clinical Vignette

A clinical scenario is presented below. Taking into account the range of techniques presented, the best reconstructive option is discussed.

A 56 year-old lady presents to clinic six months after mastectomy and adjuvant radiotherapy for left sided breast carcinoma. She is fit and well, has a BMI of 28 and her bra size is 36D. She is keen to undergo breast reconstruction, but does not want silicone implants.

Options

Immediate vs. Delayed vs. None

The patient is already over four months from her mastectomy and has requested reconstruction, so delayed reconstruction is the only option.

Prosthetic vs. Autologous

This patient has received a course of post-operative radiotherapy to the mastectomy site. As tissue-expansion is therefore contraindicated, an autologous technique is favoured.

LD, TRAM, DIEP, SIEA, SGAP or IGAP

The patient has mentioned that she is not keen on having silicone implants. An LD flap may not be suitable, as implants are often required to provide additional volume. Her BMI is 28 with good lower abdominal soft tissue, which means a TRAM or DIEP would be suitable. This provides adequate volume and skin making it easier to match the opposite breast. The SIEA has variable anatomy and SGAP and IGAP flaps are not 'first-line' unless abdominal tissues are unsuitable.

Nipple reconstruction – Flap vs. Graft

The patient is keen to have nipple reconstruction, but does not want a second donor site operation. The most appropriate option would be a local flap with subsequent tattooing.

Outcome

The most suitable option for this patient is a delayed, autologous reconstruction with a TRAM / DIEP flap. The patient would be suitable for free tissue transfer as she is fit & well. Her NAC would be reconstructed with a local flap and nipple tattooing to achieve a colour match.

MCQs

1. Benefits of immediate breast reconstruction include the following EXCEPT:

a) Preservation of the inframammary fold
b) Maintaining 'body image'
c) Natural shape of breast envelope after volume replacement
d) Retention of more native skin
e) Two separate operations, general anaesthetics and hospital stays

2. Which of the following is NOT true regarding a TRAM flap?

a) It may be based on a pedicled superior epigastric artery
b) It can be transferred as a free flap
c) It is a myocutaneous flap
d) It uses supraumbilical fat
e) It can be used to reconstruct ipsilateral or contralateral breasts

3. Suitable techniques for post-radiotherapy breast reconstruction include the following EXCEPT:

a) Pedicled TRAM flap
b) LD flap with implant
c) One-stage implant only
d) Free DIEP flap
e) Free TRAM flap

4. The LD flap is based on which vascular pedicle?

a) Axillary artery
b) Thoracoacromial artery
c) Internal mammary artery
d) Thoracodorsal artery
e) Dorsal scapular artery

5. Accepted techniques for nipple reconstruction include the following EXCEPT:

a) C-V flap
b) Costochondral graft
c) Skate flap
d) Composite earlobe graft
e) Star flap

BREAST RECONSTRUCTION

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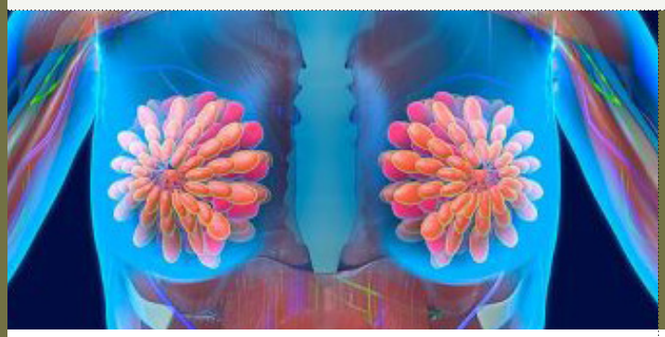

Breast Reconstruction.
Plastic & Reconstructive Surgery.

Answers

1 = e **2 = d** **3 = c** **4 = d** **5 = d**

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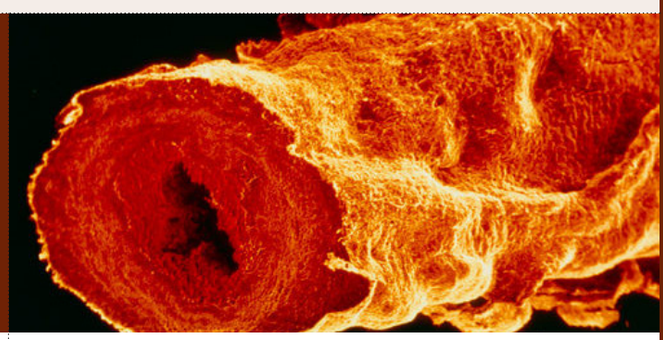
HARVESTING CONDUITS FOR CORONARY ARTERY BYPASS GRAFT SURGERY

A Meduoye



Harvesting Conduits For Coronary Artery Bypass Graft Surgery.
Cardiothoracic & Critical Care.

Introduction

It has been estimated that over 800,000 patients undergo coronary artery bypass graft (CABG) surgery each year, worldwide. We can trace the development of CABG back to 1876, Hammer et al establish that angina pain could be attributed to interruption of blood flow in coronary arteries and that heart attacks occurred when 1 or more coronary artery was blocked[1]. The first attempt at myocardial revascularisation which can be said to resemble, in any way, the techniques employed in cardiac surgery today, was undertaken by Arthur Vineberg of Montreal who developed the technique of harvesting a distally ligated left internal mammary artery (LIMA) and attaching it to a bluntly created tunnel in the outer or middle third of the left ventricular myocardium[2]. By 1958 he had performed almost 1500 animal experiments with clinical implants beginning in 1950[3].

When considering cardiac surgery, it is always interesting to note that, whereas we have evidence of neurosurgery (trephining) in prehistoric human remains from neolithic times onwards and have discovered flat copper needle knives used for cataract surgery in ancient Egyptian tombs dating from 2700BC, the first successful open heart operation using cardiopulmonary bypass was not undertaken till 1953 by John Gibbon[4]. So despite the leaps and bounds that we know have subsequently been made in this field, as a surgical specialty, it is in relative infancy.

In 1960 Robert Goetz performed single mammary artery bypass to left anterior descending coronary artery and implanted tantalum stent[5].

A non-surgical milestone and prerequisite for the success of direct coronary revascularisation was the development of coronary cinearteriography (coronary angiography) by Sones and Shirey, for the first time it was possible to define coronary artery anatomy and also to demonstrate the success of revascularisation.

Here, we will briefly discuss the three most widely used conduits for coronary artery bypass grafting, considerations for use, anatomy and harvesting techniques. It goes without saying that there are many different techniques employed by surgeons worldwide. Here we will attempt to familiarise you with those with which we are familiar.

Venous conduits

The greater saphenous vein is the primary source for vein grafts although lesser saphenous, basilica and cephalic veins are all options, we will not discuss those here. The greater saphenous vein may be surgically absent, too small for use (<2.5mm), varicose or diseased from prior phlebitis. It is essential to examine the patient's legs prior to operation. Many patients with superficial varicosities may yet have usable long saphenous vein but superficial varicosities can have a detrimental impact on healing, if one leg has no varicosities, a vein harvested from this leg is preferable. If the distal saphenous vein is too small for use then vein may need to be harvested from the thigh. Remember Poiseuille's law; that the velocity of a liquid flowing through a "capillary" is directly proportional to the pressure of the liquid and the fourth power of the radius of the "capillary", also that when a vein is arterialised, obligatory fibrous intimal hyperplasia reduces the luminal diameter by 25 percent.

Greater Saphenous Vein Anatomy

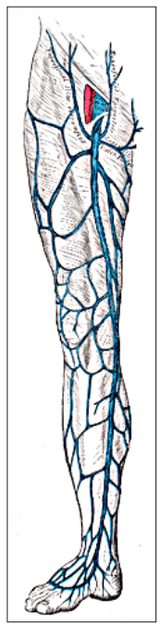


Figure 1: Greater Saphenous Vein (Courtesy of Gray's Anatomy of the Human Body[7])

HARVESTING CONDUITS FOR CORONARY ARTERY BYPASS GRAFT SURGERY

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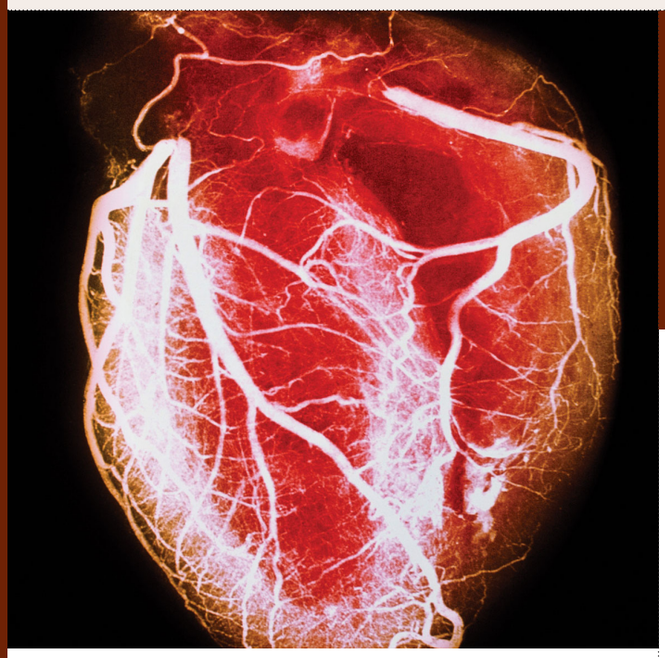

Harvesting Conduits For Coronary Artery Bypass Graft Surgery.
Cardiothoracic & Critical Care.

Harvesting Technique

The patient is laid supine and draped for median sternotomy, legs are prepared with an antiseptic solution circumferentially and draped so that the entire leg is accessible from ankle to groin, the foot should be covered. Some surgeons find that flexion of the knee and extension and external rotation of the hip facilitates exposure; this may be the case, but in practice, gross movements of the legs disturb the senior surgeon working in the chest so it is useful to get used to harvesting the greater saphenous vein from a leg in neutral position.

The greater saphenous vein is easiest to palpate at the ankle, where it passes 1cm anterior to the medial malleolus. it is easiest to do this by placing one hand around the lower leg firmly and sliding it towards the ankle slowly, you should see the greater saphenous vein filling. To confirm its position, tap it at the medial malleolus with a single finger from the other hand, when the vein is tapped with the second hand, a fluid thrill will be palpable by the first.

Using 2.5X surgical loupes, locate the vein through a 5-10 cm incision at the ankle, use a scalpel to breach the skin followed by blunt dissection with a fine dissecting scissor. Remember that the vein is very superficial at this point and any damage at all, necessitating repair, may make the entire segment of vein unusable. Once the vein is located use a finger (or heavy scissors) for blunt dissection, push the finger proximally along the course of the saphenous vein creating a tunnel. Look down the tunnel to confirm the position and course of the saphenous vein and cut the overlying skin and subcutaneous tissue. The senior surgeon will advise you as to what length of vein is required, this will vary depending on which vessel is being grafted but is usual anywhere from 10 to 20cm per graft.

Once the vein is suitably identified and exposed and its calibre is confirmed as suitable, it is time to begin mobilising it. Use a forceps and fine dissecting scissor to free it up from the connective tissue surrounding it and pass a heavy silk ligature around it and tie it off close to the ankle, this is the distal extent of your length of vein. Use a forceps and dissecting scissor to free up the vein in a proximal direction, only the adventitia of the vein should be handled and not the full thickness of the vein as pinching the full thickness of the vein with forceps damages the intima, endothelium must be preserved and every portion of your harvesting technique should reflect this. If you can feel tissue within the forceps, you've got too much vein. (I actually prefer to pass a heavy tie around the vein and hold it in my left hand, retracting gently whilst dissecting with the scissors in my right hand, this way I never handle the vein with forceps and tributaries are immediately apparent). Remember that endothelium is necessary for the vasodilating effect of nitric oxide and that harvesting of vein is associated with loss of endothelium in proportion to how gentle the harvesting technique is.

The saphenous nerve crosses the greater saphenous vein postero-anteriorly within 10-15cm of the ankle and should be preserved.

Tributaries should be ligated with two clips or fine silk ties, no closer than 1-2mm to the vein and 5-10mm apart. Ligatures placed closer than this will cause adventitial constriction of the vein. Cut the tributary between the ligatures leaving a reasonable "stump" on the vein side.

Next, using a fine dissecting scissors, (and your loupes) make a cut part of the way through the vein adjacent to the ligature. Insert a Tibbs cannula (fig. 2) into the vein and tie it in place with a heavy silk ligature. The spherical prominence at the tip of the Tibbs cannula will prevent the vein from becoming detached once tied in place.

HARVESTING CONDUITS FOR CORONARY ARTERY BYPASS GRAFT SURGERY

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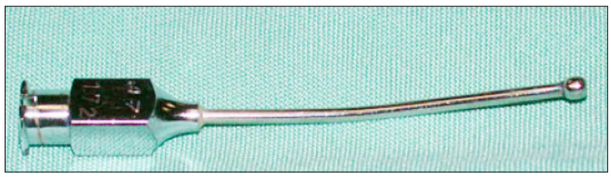

Figure 2: Tibbs cannula

Now, using a syringe filled with saline, you can gently distend the vein in segments by holding it firmly in one hand and infusing saline with the other. If there is no resistance to flow and the vein does not distend, there is a tributary between the syringe and the point of occlusion which has not been ligated or a defect in the vein wall. Tributaries can be closed with small clips, damage to the vein wall will necessitate review by the senior surgeon and repair with 7.0 prolene suture. Generally, suture bites are placed in the adventitia, parallel to the long axis of the vein to avoid constriction. Once the length of vein required (if more than one graft is required this may be upward of 40cm) has been mobilised and distended and the senior surgeon has confirmed that it is adequate, ligate the vein proximally with a heavy silk ligature and divide it with fine dissecting scissors, place the vein in a basin containing room temperature saline, heparinised blood and papaverine.

After observing meticulous haemostasis, close the leg wound using a 2.0 Vicryl suture and use clips for the skin. Apply a long absorbent, adhesive dressing. Some surgeons opt for wrapping the leg in a crepe bandage, this discourages venous oozing of heparinised blood during the case (you would be surprised how much blood can collect under the drapes during a procedure!) but also introduces a risk of foot ischaemia. If you harvest the vein then it is your responsibility to confirm distal neurovascular status at the end of the procedure. If there is already blood soaking the dressings after the operation, take the dressings down and run a swab firmly down the wound to express any collected blood (this is preferable to haematoma formation). If there is an obvious area that requires attention, re-open the wound at this point and proceed. Now that the heparin has been reversed, venous oozing should be less, wrap again with crepe bandage if indicated.

Pedicled Arterial Conduits

The pedicled arterial conduit of choice is the left internal mammary artery, followed by the right. Other choices include the gastroepiploic artery but this will not be covered here.

Internal Mammary Artery Anatomy

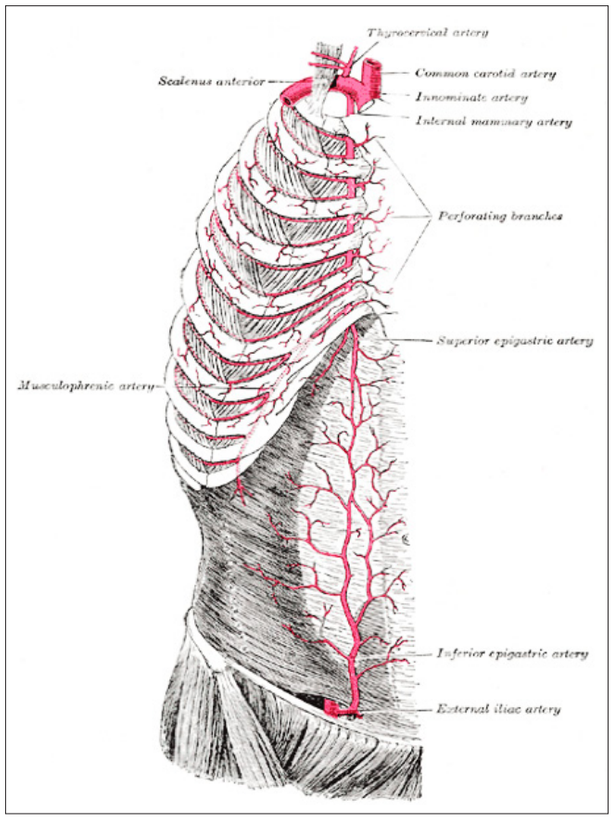

Figure 3: Internal Mammary Artery, courtesy Gray's Anatomy of the Human Body[7]

Harvesting Technique

After median sternotomy, obtain adequate periosteal haemostasis and insert a symmetrical sternal retractor such as the Finochietto, proceed to open pericardium and inspect the heart and intended anastomosis sites. Not all surgeons open the pericardium before harvesting the IMA but it does help eliminate surprises later on. The length of grafts can be measured and recorded by cutting a heavy silk tie to the desired length, this can be given to the surgeon harvesting the saphenous vein for definitive measurement. It may be felt that certain vessels are too small to graft at this point, which will avoid the taking of unnecessary lengths of vein. A distal site of anastomosis may require IMA harvest to continue beyond the bifurcation and into the superior epigastric artery. Finally, a finding of porcelain aorta and the subsequent inability to cross-clamp the aorta may necessitate conversion to off-pump surgery or other significant change of plan or even abortion of the entire procedure.

HARVESTING CONDUITS FOR CORONARY ARTERY BYPASS GRAFT SURGERY

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Now change to an asymmetrical sternal retractor such as the Chevalier. The table should be elevated to the appropriate height for the seated or standing surgeon and rotated away. Theatre light should be adjusted to cast light over your shoulder into the incision. Head light is optional but advised. Elevate the sternal leaf in stages to avoid unnecessary trauma to the sternum. Separate mediastinal contents from the sternum using medium-current cautery set to dessicate. Mediastinal branches of the ITA can be controlled with cautery or clips. The pleura can be left closed or, if opened, should be opened widely, reducing the chance of post-operative pneumothorax. If the pleura is opened, the lung can be packed out of the field with a large gauze pack. Tidal volumes can be reduced to aid exposure.

It should now be possible to see the dark blue colour of the vein running immediately medial to the mammary artery along the inside of the chest wall, behind the endothoracic fascia. If you can not see it, confirm the position of the artery by palpation (feel for a pulse). Using 2.5X surgical loupes, a fine forcep, and low-current electrocautery with the blade bent to 45 degrees, the endothoracic fascia and sternocostalis muscle are incised in a line at the edge of the sternum along the middle third of the internal mammary artery, place the incision medial to the vein. Apply downward traction with the forcep in the left hand and the vein and artery should come into view. Use blunt dissection with a cold cautery tip (and occasional current to divide dense tissue well away from the artery) and gently push the IMA downwards, branches will become apparent these should be clipped with two medium clips and divided in between with dissecting scissors (Figure 4).

Some surgeons prefer to clip only the artery side of the the branch and use electrocautery to divide the sternal side well away from the artery. Continue dissection distally as the IMA passes beneath the thick sternocostalis muscle, use your forcep to retract this away from the pedicle and divide the muscle to expose the IMA. Depending on the length required, many surgeons will continue harvesting beyond the bifurcation (usually at the sixth intercostal space) into the superior epigastric artery although there are those who assert that use of this vessel, whose calibre is often smaller than the IMA, is associated with reduced graft patency. Now continue the dissection through endothoracic fascia, dividing branches as they are encountered, medial to the mammary vein in a proximal direction, as far as the subclavian vein. Divide the internal mammary vein at the junction with the subclavian vein after placing teo clips proximally and one distally. Now develop the lateral border of the pedicle, aim for a pedicle width of 2cm. Most of the smaller branches here can be controlled with cautery.

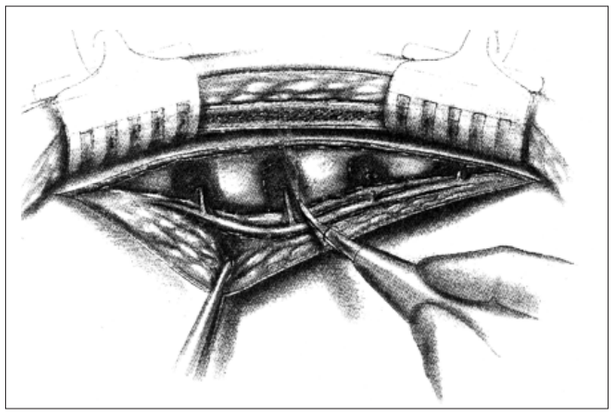

Figure 4: IMA harvesting

Once ready to divide the pedicle, either ligate with a heavy tie or use two medium clips distally. Some surgeons insist that this does not happen until the patient is heparinised. If the IMA goes into spasm, it can be sprayed with a solution of papaverine. Once the pedicle is divided, clip it at the very tip with a medium clip, wrap in a papaverine-soaked swab and keep it safely out of the way so you can proceed to cannulation.

Some surgeons prefer to harvest the IMA without its associated tissue and without the venae comitantes, so-called skeletonisation. The IMA is exposed as above and then is teased away from the chest wall with a cold cautery tip. Individual branches must be divided between small clips using dissecting scissors. There are several theoretical advantages; preservation of sternal blood flow, less mediastinal wound infection, longer length of IMA, easier recognition of harvesting-related injury or spasm and greater ease of constructing sequential grafts. In practice, although this is my preferred method, it takes at least twice as long as mobilisation of a pedicled IMA, and it is technically irrelevant as there is only really one way to harvest an internal mammary artery; the way your consultant harvests it.

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Free Arterial Conduits

The most commonly employed free arterial conduits are right internal mammary artery and radial artery. We have already discussed the IMA harvest technique and so will focus exclusively on radial artery harvest.

Ideally, the radial artery should be taken from the non-dominant hand. Assessment for suitability begins with an Allen test: ask your patient to make a tight fist and using both hands occlude both ulnar and radial arteries, ask your patient to open the hand slowly, you should notice that the palm is now blanched. Release the ulnar artery and note the time it takes for the palmar surface to regain its colour, A normal or negative Allen test is return of normal colour within less than 10 seconds, we tend not to use radial arteries from a hand with a reperfusion time of greater than five seconds. Record the result of the Allen test for both hands clearly in the notes. If the Allen test for the non-dominant hand is positive, try the dominant hand.

Harvesting Technique

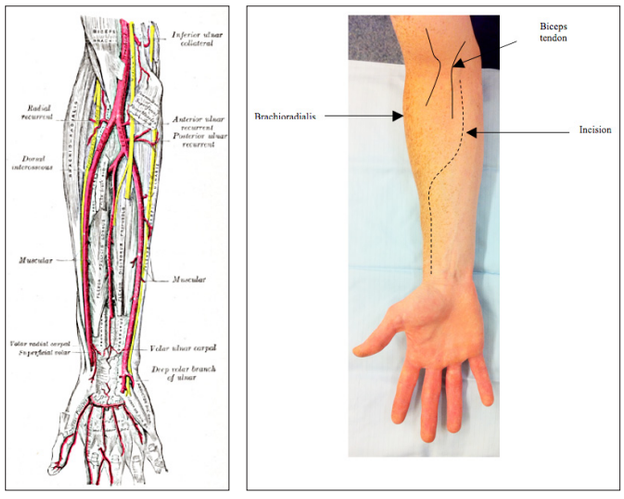

Figure 5: Arteries of the forearm and hand, Courtesy of Gray's Anatomy of the Human Body[7] ; incision.

At operation, the arm should be abducted to 90° and supported on an armboard. The arm is prepared circumferentially with antiseptic and the hand wrapped with a secure hand towel. This towel can now be fastened to the arm board.

The incision is a curved incision over the course of the artery (figure 5), this allows easy retraction of brachioradialis muscle laterally and the resultant soft tissue flap will contain the lateral antebrachial cutaneous nerve. Initial dissection after skin incision can be undertaken with low-current electrocautery but be aware that at the wrist, there is virtually no subcutaneous tissue between the radial artery and the skin, fine dissecting scissors are probably safer. Divide brachioradialis fascia and retract laterally to expose the radial artery.

The artery is mobilised with its venae comitantes and a small amount of the adjacent fatty tissue. The radial artery is especially sensitive to handling and susceptible to spasm so a no-touch technique is essential here. Branches are controlled with small and medium clips. Dissection should begin in the mid section, extend proximally to the origin and then distally to the wrist crease. You may encounter the superficial radial nerve lateral to the proximal and middle thirds of the artery, like the lateral antebrachial cutaneous nerve, it is sensory to the dorsum of the forearm and hand.

Once the full length is mobilized, ligate proximally and distally with a heavy silk ligature, mark the proximal end of the graft with a clip or suture and divide the artery cleanly with fine dissecting scissors. Place the artery in a basin containing room temperature saline, heparinised blood and papaverine. Skin is closed with a single layer of 3.0 Vicryl and clips to skin. Distal neurovascular status must be ascertained at this point and on return to intensive care.

HARVESTING CONDUITS FOR CORONARY ARTERY BYPASS GRAFT SURGERY

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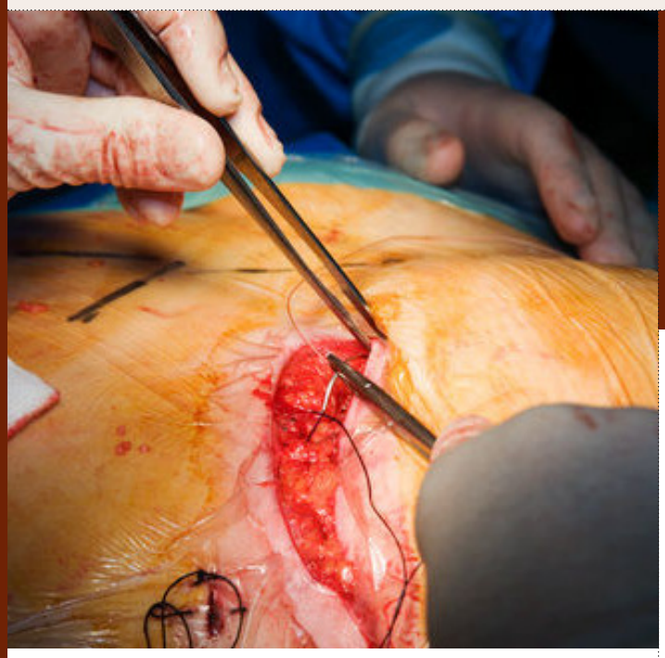

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Multiple Choice Questions

1) The Internal Mammary Artery is a branch of which artery?

a) Innominate b) Subclavian c) Axillary d) Femoral

2) Allen's test is a bedside test assessing the flow in which artery?

a) Radial b) Brachial c) Ulnar d) Popliteal

3) Which nerve is frequently encountered during greater saphenous vein harvest?

a) Femoral b) saphenous c) Superficial Peroneal d) Sciatic

4) From which hand should the radial artery be harvested ideally?

a) non-dominant b)dominant c) doesn't matter d) shouldn't be harvested

5) Other arterial conduits include

a) Gastroepiploic Artery b) Inferior Epigastric Artery c) both d) neither

Answers

1.b 2.c 3.b 4.a 5.c

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FLEXIBLE CYSTOSCOPY

E Lee

Flexible Cystoscopy. Urology.

Case Vignette

Mrs A is a 56 year old pub landlady who presents to her GP with a 2 day episode of painless macroscopic haematuria one week ago which settled spontaneously. She has not had any previous or further episodes since. She does not have any lower urinary tract symptoms, no symptoms of urinary tract infection, no recent weight loss or respiratory problems and systemically well. She is normally fit and well, on no regular medication and there is no past medical history of urinary tract infections or renal calculi or urological history. She is a smoker with a 40 pack year history. There is no family history of urological malignancies. Her MSU shows >100 red blood cells per high power field (HPF) but no growth. Urine cytology shows no malignant cells. Her ultrasound scan of the urinary tract shows normal kidneys with no masses, calculi or hydronephrosis and a thin-walled bladder which empties completely on voiding. She has been referred by her GP urgently via the 2-week wait to the haematuria clinic where she has attended today for her flexible cystoscopy.

Introduction

Flexible cystoscopy is a key skill in urology and one you will have the opportunity to learn during your urology placement and is one of the procedures assessed by surgical DOPs. It is a common day case procedure performed usually on an outpatient basis under local anaesthetic. Every urology department will have a flexible cystoscopy list, which may form part of a 'one-stop' haematuria clinic. It is minimally invasive, safe, quick, relatively painless and useful diagnostic tool for urethral and bladder pathology, and surveillance of bladder cancer. Here we give an overview of what the procedure involves, the indications, equipment required, consent and how to perform and document the procedure.

1) History

The word cystoscopy comes from the Greek words 'cysto' for bladder, and 'scopy' to look. It allows direct visualisation of the urethra and bladder, hence it is also known as cystourethroscopy. The prostatic urethra can also be visualised in men. There are two types of cystoscope, flexible and rigid, which refer to whether the cystoscope is bendable or not. The advantages and disadvantages of flexible cystoscopy compared with rigid cystoscopy are shown in Table 1.

Advantages	Disadvantages
Smaller calibre cystoscope	Poorer quality image
Less discomfort	Orientation more difficult
Performed under local anaesthetic	Not suitable if heavy haematuria or bladder washout required
Deflectable tip allowing inspection of bladder areas inaccessible by rigid cystoscope	Limited therapeutic applications due to smaller working channel

Table 1 Advantages and disadvantages of flexible cystoscopy compared with rigid cystoscopy[1,2]

Routine use of flexible cystoscopy for diagnostic purposes under local anaesthetic in the UK was first piloted by Fowler in April 1983[3]. Flexible cystoscopes use fibreoptics to transmit both light (by total internal reflection) and images. This is possible because the glass fibres are coordinated, which means the fibres have the same orientation at both ends. The fibres are bound together at the ends only therefore allowing flexibility. This is in contrast to rigid cystoscopes which use a fibreoptic light source and the Hopkins rod lens system for light transmission[4]. The glass fibres are easily damaged by rough handling so flexible cystoscopes should be handled with care. There are 2 types of flexible cystoscope, one where the surgeon looks directly into the eyepiece or can attach a camera system onto the eyepiece, and the newer cystoscopes with an integrated camera in the handpiece.

2) Indications and contraindications

Flexible cystoscopy is normally performed for diagnostic purposes, and the most common indication is haematuria. It can be used for therapeutic purposes, but rigid cystoscopy is preferable as it has a larger working channel to accommodate ureteric stents, diathermy leads and biopsy forceps, improved views due to better optics and faster irrigation, especially when there is heavy haematuria and washouts may be required, and technically easier for example in ureteric stenting. The indications for flexible cystoscopy are divided into diagnostic and therapeutic (Box 1).

FLEXIBLE CYSTOSCOPY

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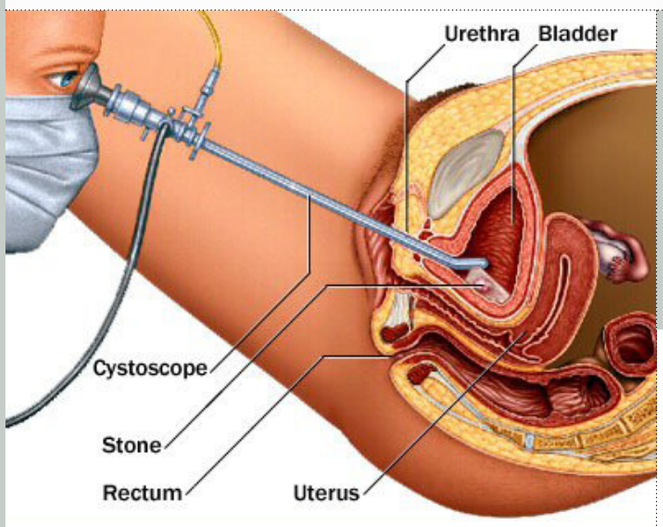

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Diagnostic
- **Haematuria**
- **Bladder tumour surveillance 'check cystoscopy'**
- **LUTS (irritative/obstructive)**

Therapeutic
- **Removal/Insertion of ureteric stents**
- **Bladder biopsy/fulguration/vapourisation**
- **Catheterisation (urethral/suprapubic)**

Box 1 Indications for flexible cystoscopy[4]

Contraindications are few, but the major contraindication is genitourinary infection such as cystitis or prostatitis as instrumentation may precipitate urosepsis[5]. Patients unable to tolerate rigid cystoscopy as they cannot lie flat or in the lithotomy position will be able to have a flexible cystoscopy.

3) Gaining informed consent/explaining procedure to patient

Always check patient details before proceeding. Explain the indication, what the procedure entails and the associated risks. Key things to mention are:

1) Sterile procedure performed under local anaesthetic

2) Flexible instrument inserted via urethra into bladder

3) Bladder filled with sterile fluid so may feel urge to void

4) Quick, 5-10 mins

5) Minimal discomfort and well tolerated

Take informed consent either written (consent form) as recommended by the British Association of Urologists (BAUS), or verbal depending on your hospital policy. BAUS have recently produced online information for patients undergoing flexible cystoscopy[6] which have replaced the procedure specific consent forms[7] which were previously available online. Both recommend discussing the following complications:

- **Mild burning/bleeding on passing urine for short time post-procedure**
- **Biopsy of bladder abnormality**
- **Bladder infection requiring antibiotics**
- **Temporary catheter insertion**
- **Urethral injury causing delayed scar formation (stricture)**
- **Delayed bleeding requiring removal of clots or further surgery (clot retention)**
- **If investigating haematuria, may find bladder cancer requiring further treatment**

Before the procedure, patients are required to empty their bladder and provide a urine specimen for urinalysis to look for infection, and in some units, cytology as well if malignancy is suspected. If infection is found the procedure may be postponed due to the risk of urosepsis[5]. There are differing opinions regarding prophylactic antibiotics. The most recent edition of the BNF does not recommend using antibiotic prophylaxis[8], BAUS however suggests prophylaxis with Ciprofloxacin 500mg orally[6], so check your hospital's guidelines.

** LUTS – lower urinary tract symptoms.*

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4) Equipment required

The equipment required is listed in Box 2 and shown in Figures 1 and 2.

- Plastic apron
- Sterile gloves
- Sterile gauze
- Sterile drape
- Cleaning solution e.g. Tisept® (chlorhexidine) to prepare skin
- 6 or 11ml of Lignocaine gel/lubricant e.g. Instillagel®
- Irrigation fluid e.g. sterile saline
- Irrigation tubings
- Flexible cystoscope (size 16/17Fr)
- Light source
- (Camera system and monitor if using videoscope)

Box 2: Equipment required for flexible cystoscopy.

Figures 1 and 2 Equipment for flexible cystoscopy (courtesy of Olympus)

The flexible cystoscope is sterilised before use. It is smaller than a rigid cystoscope and usually 16 or 17Fr in size. The tip can be deflected up and down through 180-220° by using the thumb control (deflector) on the handpiece[1] (Figure 3). Pushing up moves the tip down and vice versa.

Figure 3: Deflector on handpiece of flexible cystoscope (courtesy of Olympus)

**The French (Fr) or Charrière (Ch) scale is used to size cystoscopes and urinary catheters and refers to the outer circumference in millimetres, where 1Fr = 0.3mm or the outer diameter in mm multiplied by 31.*

The handpiece has a single channel for irrigation which can also be used as a working channel for the passage of instruments such as guidewires, diathermy and biopsy forceps, an eyepiece for visualisation which can be connected to a camera so images can be seen on a monitor, and a lead which connects to the light source. After connecting everything, the irrigation fluid is run through to eliminate any air bubbles. Saline is the irrigation fluid of choice unless diathermy is planned in which case 1.5% glycine is used as it is a poor conductor of electricity.

5) Draping/Sterile field preparation

This is an aseptic procedure and sterility is important. Wear a plastic apron and sterile gloves. Prepare as for catheterisation, cleaning the urethral meatus with sterile skin preparation such as Tiosept® (chlorhexidine) and drape the area.

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6) Patient positioning and relevant anaesthetic points

Position the patient as for catheterisation, supine with legs flat and slightly abducted for males, frogs-leg position with legs abducted and knees flexed for females. The procedure is performed under local anaesthetic using lignocaine gel e.g. Instillagel® which is instilled into the urethra. This is a sterile gel containing 2% lignocaine and 0.25% chlorhexidine gluconate[8]. Its use is 3-fold, as a lubricant, local anaesthetic and antiseptic. It stings so warn the patient. It takes approximately 5 minutes to take effect, and a penile clamp may be used in males to prevent leakage and allow the anaesthetic to work.

7) Technique

Inspect the urethral meatus for stenosis which may hinder the passage of the cystoscope or preclude the procedure. Hold the cystoscope handpiece in your right hand with your thumb on the deflector (Figure 4). Passing the flexible cystoscope is similar to inserting a urethral catheter but with direct vision. In males, grasp the penis behind the glans and straighten the penis and hence urethra with your left hand so that it is almost perpendicular to the abdominal wall. Place the tip of the scope into the urethra and ask your assistant to start the irrigation. Advance the cystoscope using your index finger and thumb to guide it and aim to keep the lumen in the centre of the field. Note any mucosal abnormalities or strictures. Figure 5 shows the urethra as viewed from a cystoscope.

Figure 4: Correct handling of cystoscope.

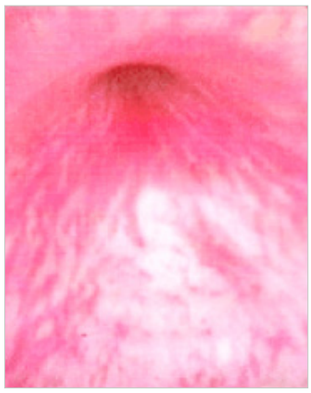

Figure 5: Normal urethra as seen through cystoscope (courtesy of Olympus).

When you reach the external sphincter, you may encounter some resistance. Ask the patient to try to void and you should be able to negotiate it. You are now in the prostatic urethra and will see a 'bump' at 6 o'clock – the verumontanum (Figure 6). Beyond this are the lateral lobes of the prostate on either side, and a median lobe inferiorly if present (Figure 7). Advance the cystoscope past the bladder neck and you will enter the bladder. Once the bladder is sufficiently distended ask your assistant to stop the irrigation fluid to avoid over distension and discomfort to the patient. Perform a systematic examination of the bladder. First identify the interureteric ridge then follow it to each side in turn and look for a 'slit-like' opening – this is the ureteric orifice (Figure 8). Identify both ureteric orifices. Now examine the anterior, posterior and lateral walls and dome of the bladder. If you get disorientated, come back to the bladder neck. Use the deflector to look up and down and rotate the scope to look laterally.

FLEXIBLE CYSTOSCOPY

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Figure 6: Verumontanum (V)

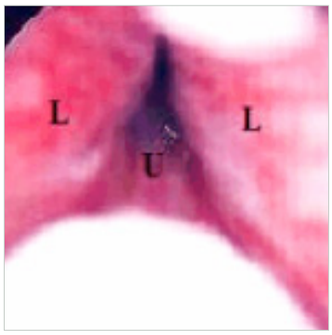

Figure 7: Lateral lobes of prostate (L) and prostatic urethra (U)

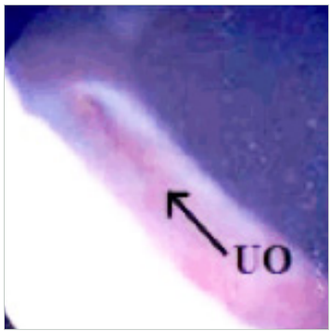

Figure 8: Right ureteric orifice (UO)

Note the presence and location of mucosal lesions, areas of erythema and scarring, calcification, bladder tumours (Figure 9), bladder stones, foreign bodies including stents and if the bladder is trabeculated. Finally perform the 'J manoeuvre' to look at the bladder neck. To do this, fully deflect the scope and advance it into the bladder so that you are looking back on yourself (Figure 10). Large prostates which protrude into the bladder can be seen as a bulge into the bladder. To look closer at this area pull the cystoscope back. When you have finished your examination, restart the irrigation and withdraw the cystoscope under direct vision whilst examining the prostate and urethra again.

Figure 9: Papillary bladder tumour (courtesy of Olympus)

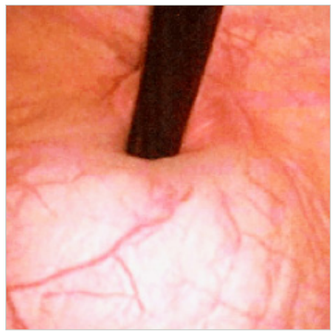

Figure 10: Bladder neck as viewed by the 'J manoeuvre' (courtesy of Olympus)

The procedure is simpler in females as the urethra is shorter and the same systematic approach is used.

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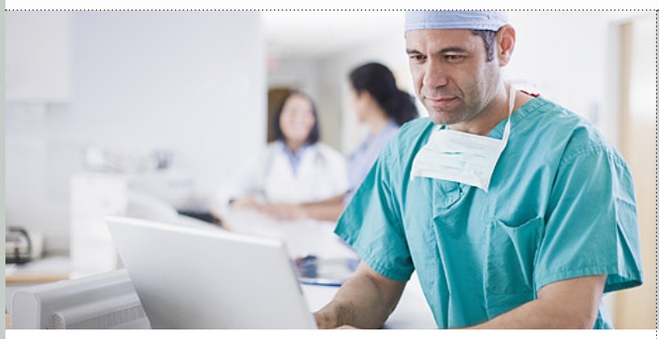

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8) Documentation of procedure

After completing the cystoscopy document your findings in a systematic fashion in the medical notes. Many units use software to generate computerised reports similar to those used for GI endoscopy. If a handwritten documentation is required, we suggest using the headings urethra, prostate and bladder, drawing a diagram and a management plan. An example is shown in Box 3. Things to note are:

- **Urethra – strictures, mucosal abnormalities**
- **Prostate - size, occlusive or open cavity, vascularity, length of prostatic fossa**
- **Bladder – ureteric orifices, trabeculations, scarring, turbid urine, mucosal lesions, erythema, bladder tumours/stones**

07/06/2010 Mr Urologist's Flexible Cystoscopy List (local anaesthetic)

Verbal consent obtained

Indication: Painless macroscopic haematuria

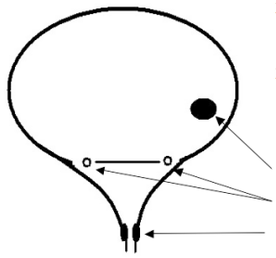
Findings:

Urethra: Normal

Prostate: Small, non-occlusive lateral lobes, short prostatic fossa

Bladder: Both ureteric orifices seen, normal

Solitary superficial papillary bladder tumour (TCC) left lateral wall



Plan: Add to waiting list for TURBT# (urgent)

Box 3: Example of recommended documentation.

9) Recording of Complications and Management

Explain your findings and subsequent management plan to the patient. Advise them they may notice haematuria and burning on voiding but this will settle within a day. Prescribe a short course of oral antibiotics (following your hospital's protocol) if they have experienced urinary tract infection following cystoscopy in the past. Infection occurs in about 8-9% of patients[4]. Most patients can be managed with oral antibiotics, but if systemically unwell send off a mid-stream urine (MSU) and admit for intravenous antibiotics. Patients who develop clot retention will require catheterisation with a 3-way catheter and irrigation and/or bladder washouts depending on the degree of haematuria, and admission.

 # Transurethral resection of bladder tumour

Questions – True or False

1. Indications for flexible cystoscopy include:

A – Haematuria
B – Irritative lower urinary tract symptoms (LUTS)
C – Active urinary tract infection
D – Difficult catheterisation
E – Check cystoscopy

2. Rigid cystoscopy is better than flexible cystoscopy because:

A – Better quality images are obtained
B – The 'J-manoeuvre' can be performed
C – It doesn't use the Hopkins rod lens system
D – A smaller cystoscope is used
E – It has a bigger working channel

3. Flexible cystoscopy requires:

A – A full palpable bladder
B – Careful asepsis
C – Written consent
D – Antibiotic prophylaxis is always used
E – General anaesthetic

FLEXIBLE CYSTOSCOPY

E Lee

4. Performing flexible cystoscopy:

A – Pushing the deflector up will deflect the cystoscope tip upwards
B – Glycine is the irrigation fluid of choice
C – White balancing is necessary
D – The Y-manoeuvre is used to look at the bladder neck
E – Lignocaine gel is used

5. For flexible cystoscopy BAUS recommend discussing these complications:

A – Haematuria
B – Bladder perforation
C – Dysuria
D – Cystitis
E – Urethral stricture

Answers

1. True ABDE.

Active infection is a contraindication to flexible cystoscopy

2. True AE.

The 'J-manoeuvre' can only be performed with a flexible cystoscope

3. True BC.

An empty bladder is needed, but the bladder is filled to enable the bladder mucosa to be inspected. Antibiotics are indicated in certain circumstances, advice is conflicting so check your hospital guidelines.

4. True E.

Pushing the deflector up moves the tip down. White balancing is not normally necessary. Glycine is the irrigant of choice for electrosurgery. It is the 'J-manoeuvre'.

5. True ACDE.

Bladder perforation is associated with rigid cystoscopy and bladder biopsies.

Questions – Select the single best answer:

1. Urological referrals: Options:

A Urgent urological referral
B Non-urgent urological referral
C Nephrological referral
D Referral to emergency department
E No referral needed
F Blood tests
G Ultrasound scan of urinary tract
For each patient select the single most appropriate next step:

1) A 45 year old man is having episodes of painless macroscopic haematuria. He has no difficulty passing urine, and has not passed any clots. He is otherwise fit and well.

2) A 30 year old women with dysuria, frequency, fever and suprapubic pain. Her urine dipstick is positive for leucocytes, blood and nitrites.

3) A 68 year old man who is on Warfarin for atrial fibrillation, has not been able to pass urine for 12 hours and has lower abdominal pain and a palpable tender bladder on examination. Prior to this he has been having macroscopic haematuria.

4) A 28 year old man who is hypertensive, has microscopic haematuria and proteinuria and renal impairment.

5) A 40 year old woman who is normally fit and well who sees her GP for a medical check up for insurance purposes is found to have microscopic haematuria.

FLEXIBLE CYSTOSCOPY

E Lee

2. Causes of haematuria
A. Bladder cancer
B. Renal cell carcinoma
C. Polycystic kidney disease
D. Renal colic
E. Goodpasture's Syndrome
F. Urinary tract infection
G. Decompression haematuria
H. Posterior urethral injury
I. IgA nephropathy (Berger's disease)
J. Schistosomiasis

For each of the patients below, select the single most likely diagnosis from the list above.

6) A 28 year old man with haemoptysis, frank haematuria and proteinuria. His chest x-ray shows bilateral basal infiltrates.

7) A 55 year old man who is a heavy smoker with painless macroscopic haematuria.

8) A 18 year old man with episodic frank haematuria occurring a few days after a viral illness. He is normally fit and well and examination is normal.

9) A 30 year old woman with right loin to groin pain, nauseated, rolling around in pain and has microscopic haematuria.

10) A 40 year old man involved in a road traffic accident sustains a pelvic fracture and has blood seen at the meatus and unable to pass urine.

11) A 45 year old man with bilateral loin masses, hypertension, renal failure and haematuria. His father and sister has renal problems.

3. Investigation of haematuria
A Urinalysis
B Urine cytology
C Flexible cystoscopy
D Ultrasound scan KUB
E X-ray KUB
F CT KUB (non-contrast)
G CT abdomen and pelvis with contrast
H Full blood count

From the options select the most appropriate next investigation from each patient:

12) A 29 year old diabetic man on Metformin presents to the emergency department with left loin to groin pain. His abdomen is soft and non-tender. His urine dip shows blood +++. His WCC is 6 and Hb 15. Renal function is normal.

13) A 62 year old man with 2 episodes of painless frank haematuria is referred to the urology clinic. He is normally fit and well but smokes 20 cigarettes a day. He has had a USS KUB which is normal and his urinalysis is negative for blood.

14) A 50 year old woman is referred to the urology clinic with microscopic haematuria, dysuria and frequency. Her MSU shows red blood cells and leucocytes but no significant growth. Her USS KUB is normal.

15) A 60 year old woman presents with fever, weight loss, macroscopic haematuria and loin pain. On examination you can feel a mass in the right loin.

4. Management of haematuria
A Antibiotics
B Urology referral
C Diclofenac
D 3-way catheter and irrigation
E Bladder washout
F Advice and discharge
G Remove ureteric stent
From the options above select the single most appropriate line of management

16) A 78 year old man who has been having intermittent frank haematuria with clots has been unable to pass urine for 12 hours. He is complaining of lower abdominal discomfort and has a palpable bladder and blood at the urethral meatus. There is no history of trauma.

17) A 18 year old woman with suprapubic pain, dysuria and frequency. Her urinalysis is positive for blood, nitrites and leucocytes. Her WCC is 14 and CRP 30. Her renal function test is normal. She is normally fit and well.

18) A 36 year old man who had a left ureteric stent inserted 4 weeks ago presents to the emergency department with intermittent left loin pain, haematuria, frequency and urgency. He is apyrexial and otherwise well but is anxious. A KUB x-ray shows no calcification of the stent and it is in the correct position. Blood tests are normal and urinalysis is positive for blood and leucocytes.

FLEXIBLE CYSTOSCOPY

E Lee

5. Post-operative and catheter problems

A – Change 2-way catheter
B – 3-way catheter
C – Continuous irrigation
D – Manual bladder washout
E – Theatre for rigid cystoscopy +/- bladder washout +/- proceed
F – Flush catheter
G – Stop irrigation
H – Suprapubic catheter

Select the most appropriate next step in the management of the following patients

19) A 60 year old man is day 2 post-TURP. His urine was clear on continuous irrigation so this was stopped this morning but you are called to see him as his urine is now dark red and there are small clots in the bag but the catheter is draining. He is haemodynamically stable and his Hb is 12g/dL.

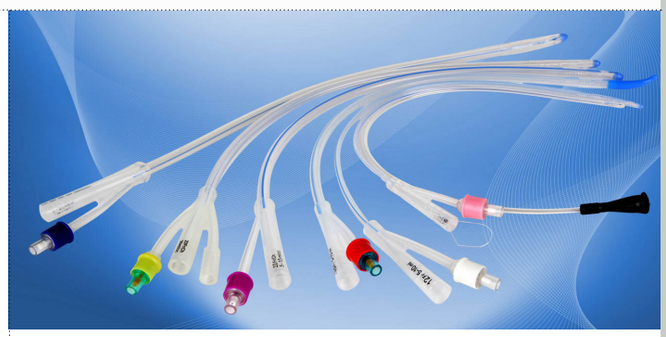
20) A 72 year old man with prostate cancer has an indwelling long term urethral catheter. He presents to you as he has been having haematuria with clots and has noticed the bag has been empty for the last 6 hours and he has lower abdominal pain and a palpable bladder.

21) A 55 year old woman is day 1 post transurethral resection of a large bladder tumour. She has a 3-way catheter in situ and has slow irrigation running, but the catheter has stopped draining, she is complaining of suprapubic pain and there are clots in the catheter.

22) A 70 year old man admitted with clot retention 3 days ago has been having irrigation via a 3-way catheter but each time it is slowed the urine becomes dark red with clots. He has had several bladder washouts and required a blood transfusion.

Answers

1. A	2. E	3. A	4. C	5. B	6. E
7. A	8. I	9. D	10. H	11. C	12. F
13. C	14. C	15. G	16. D	17. A – after MSU is sent	
18. F	19. C	20. B	21. D	22. E	



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PERI-TONSILLAR & PARAPHARYNGEAL ABSCESS: A REVIEW OF DIAGNOSES & INTERVENTIONS

H Salem & S El-Shunnar

Peri-Tonsillar & Parapharyngeal Abscess: A Review Of Diagnoses & Interventions. Otorhinolaryngology & Neck Surgery.

MJ is a 23 year old gentleman referred to the Emergency Otolaryngology Clinic with a 7 day history of progressively worsening sore throat. He presents to you unable to swallow his own saliva, and systemically unwell with fatigue and fevers. Head and neck examination reveals a diffuse left level II neck swelling, and an erythematous left tonsillar swelling with a right deviating uvula. Flexible nasolaryngoscopy did not reveal any further pathology.

A provisional diagnosis of left peritonsillar abscess is made. (Figure 1)

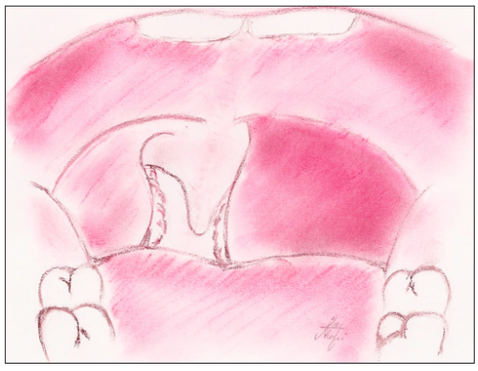

Figure 1: Diagrammatic representation of peritonsillar abscess appearance

Peritonsillar Abscess

Epidemiology:

One of the commonest reasons for acute otolaryngology admission in the UK[2], with a typical UK Otolaryngology department treating on average 29 cases per year[3].

Anatomy:

The peritonsillar space is a potential space between the palatine tonsil and its capsule. It is located between the anterior and posterior tonsillar pillars. The Torus tubarius (cushion behind the pharyngeal opening of the auditory tube) forms its superior boundary, and the piriform fossa limits it inferiorly.

Aetiology:

It is almost always secondary to palatine tonsillitis secondary to group A Ð haemolytic Streptococci. Other implicated organisms include gram positives such as S. aureus, Pneumococci and H influenza and anaerobes such as Lactobacilli, Neisseria species, Diphteroids and Bacteroids.

Management:

1. ABC: Only proceed once you are happy you have a safe airway. If you do not have a safe airway you need to take immediate action to ensure one.
2. Intravenous Penicillin and Metronidazole: Studies show that 99.2% of organisms can be successfully covered with a course of Penicillin V or Cephalosporin with Metronidazole[1].
3. Analgesia: Paracetamol, NSAIDs and Codiene
4. Bloods: FBC,U+Es, LFTS, Blood cultures & Monospot
5. Needle aspiration: This is considered the gold standard in diagnosis and management, with some evidence suggesting it is as effective as incision and drainage[4,5].

How do I aspirate?

1. Consent:

a. Risks
i. Pain
ii. Bleeding (Carotid artery is near - a guarded needle is best)
iii. Aspiration of pus
iv. Failure and need for re-aspiration
b. Warning
i. Bad taste of local anaesthesia
ii. Avoid hot drinks for a hour.

2. Preparation

a. Equipment: (Figure 2)
i. 10 mls syringe
ii. Wide bore needle (14-18G) needle
iii. tongue depressor
iv. local anaesthetic spray e.g. Xylocaine 1%
v. Head light.
b. Position: Sitting position

3. Procedural Steps

a. Ask the patient to open his mouth fully.
b. Use the tongue depressor to visualise the palate.
c. Spray the peritonsillar area with local anaesthesia.
d. Allow a few minutes for the anaesthesia to work.
e. Connect the needle to the syringe.
f. Aim with your needle above the upper pole of the tonsil.

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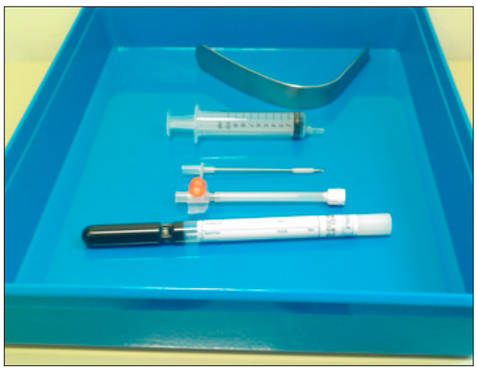

Figure 2: Equipment tray with metal tongue depressor, syringe, 14G cannula and microbiology swab (from top to bottom of picture)

An easy way to find it is to draw to two imaginary lines. The first is a transverse line crossing the base of the uvula. The other longitudinal line lies just medial to the retro molar trigone. (Figure 3)

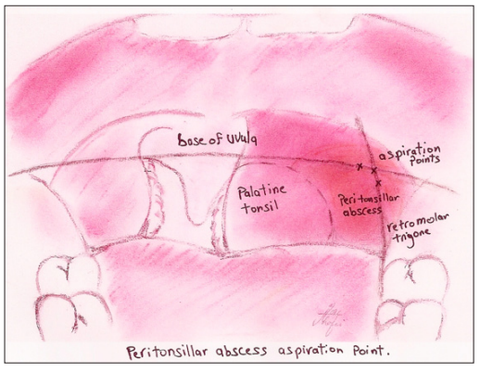

Figure 3: Where to insert your needle when attempting aspiration of quinsy

4. Post-procedure:

a. Encourage eating and drinking

b. The majority of patients are admitted post aspiration however, there are studies suggesting similar outcomes with oral antibiotics[5,6].

Next day ward round:

MJ had a successful needle aspiration in clinic, and was admitted to the ward for intravenous antibiotics and rehydration. He is reviewed the following day by the team on the ward round, and to your dismay they notice a left peritonsillar swelling. In view of the re-accumulation your Consultant advises you to incise and drain the abscess this time.

Peritonsillar abscess incision and drainage:

This is first line management in 25% of cases and used as a second line in 52% of cases after failed needle aspiration[3].

Steps

1. Consent & Preparation (same as aspiration)
2. Same technique as in aspiration
3. Use a guarded scalpel (Figure 4) to incise at the same point of needle aspiration
4. A 0.5cm transverse oblique incision is usually enough.
5. Open the pus loculi with a Tilley's forceps.
6. Prevent aspiration of pus by using oral suction.

Figure 4: Equipment tray with microbiology swab, tilleys forceps, guarded blade and tongue depressor (from top to bottom of picture)

Further Reading & Controversy:

Immediate tonsillectomy is safe and an effective method of managing peritonsillar abscess[7,8]. 'Hot tonsillectomy' is not routine practice in most otolaryngology units in the UK; however it is done in certain circumstances. Steroids can provide better symptom control when combined with the antibiotics[9]. This is not as controversial as the first statement and many otolaryngologists will support a one off stat dose of dexamethasone.

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Peri-Tonsillar & Parapharyngeal Abscess: A Review Of Diagnoses & Interventions. Otorhinolaryngology & Neck Surgery.

The Unfortunate MJ

You receive a call from the nurse looking after Mr Jones, who is worried about his temperature spikes. On examination you find his neck swelling has enlarged and he now has restricted neck movement. After discussion with your team a CT scan is organised; this shows a left parapharyngeal abscess.

Para pharyngeal abscess

Anatomy: (Figures 5 & 6)

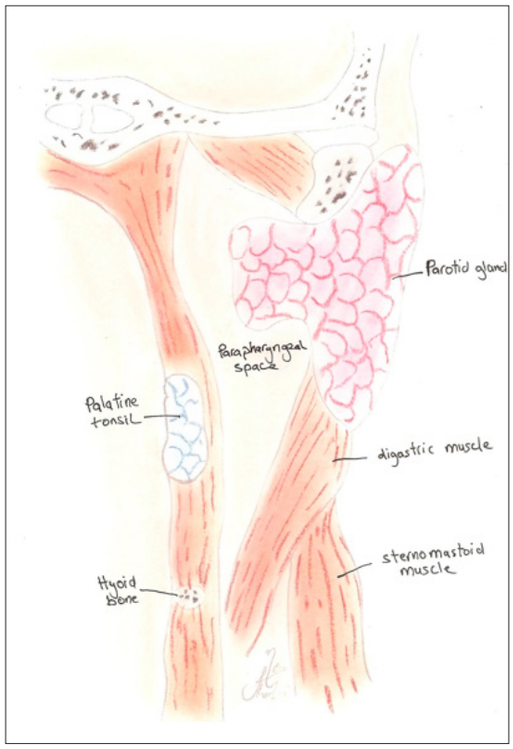

Figure 5: Coronal view of parapharyngeal space.

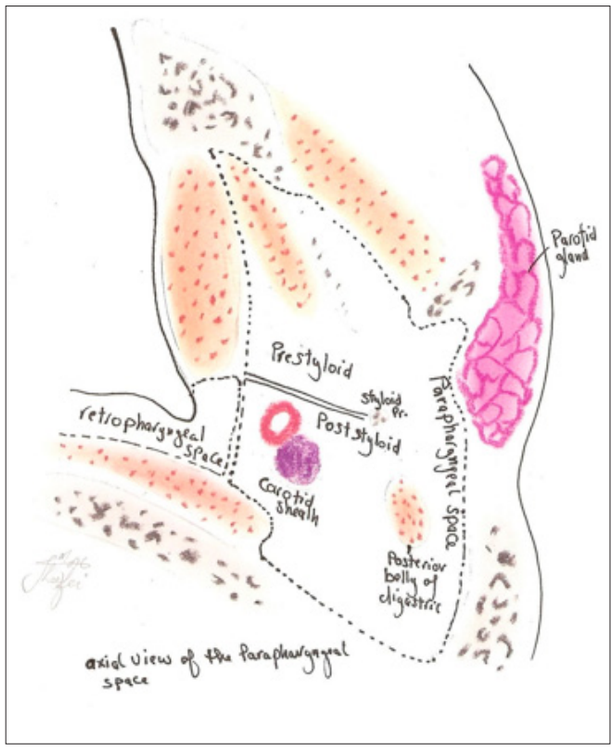

Figure 6: Axial view of parapharyngeal space.

The Parapharyngeal space is an inverted pyramidal space extending from the skull base to the hyoid bone. It is limited medially by the superior constrictor of the pharynx and laterally by the medial pterygoid, parotid gland and mandible. The styloid process divides the space into two compartments. The anterior compartment (pre styloid) contents include the internal maxillary artery, inferior alveolar nerve, lingual nerve and the auriculo-temporal nerve. The Internal Carotid artery, Internal Jugular vein, cranial nerves IX-XII comprise the posterior (post-styloid) compartment

PERI-TONSILLAR & PARAPHARYNGEAL ABSCESS: A REVIEW OF DIAGNOSES & INTERVENTIONS

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Aetiology

1. Local spread of infection:

a. Upper airway and dental sources are responsible for greater than 70 % of cases[10].
b. salivary glands infection
c. cervical lymphadenitis
d. thyroiditis
e. mastoiditis (bezold abscess).

2. Direct inoculation:

a. Trauma
b. iatrogenic
c. intravenous drug abuse

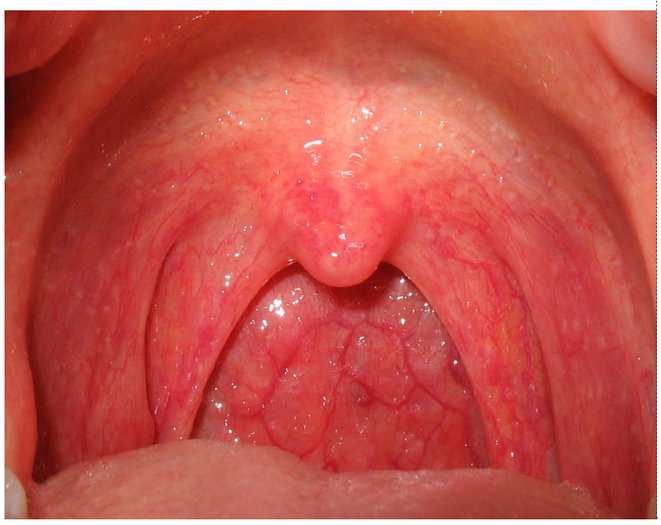
The most common organism in deep neck space infection is group A Ð heamolytic Streptococcus. Other common gram positives include Staph aureus and H influenza. Anaerobic bacteria can be isolated from most abscesses, with the predominant anaerobes being Prevotella, Porphyromonas, Fusobacterium and Peptostreptococcus[11]. Klebsiella pneumoniae is the most commonly cultured organism in diabetic patients[12, 13].

Imaging

1. Ultrasound: can suggest the presence of pus. It has the advantage of being radiation free and will not require sedation in children. It is however, poor in defining the neck spaces, and hence unreliable as a single diagnostic tool[14].

2. CT scan: Highly sensitive in detecting deep neck space infection and pus collection (sensitivity up to 100 %, specificity 50 %)[15,16]. Radiological findings should be combined with clinical picture before deciding whether to go to theatre. Pre-operative CT is helpful in planning surgical approach.

3. MRI scan: While being superior to CT scan in defining the soft tissues, it is not frequently done due to the difficulty in performing in emergency situations.



Management

1. ABC: Any evidence of airway compromise (biphasic stridor, inability to speak in full sentences or narrow airway on flexible nasolaryngoscopy) should prompt immediate measures to secure the airway by either endotracheal intubation or tracheostomy. These patients often have severe trismus, which can lead to failed intubation and result in the need for emergency cricothyroidotomy or immediate tracheostomy. There is some evidence that use of tracheostomies can reduce intensive care unit costs and have similar outcomes to endotracheal intubation[17].

2. High dose broad spectrum antibiotics: these should cover beta lactamase producing organisms. You will have to consult your local microbiology department for a preferred regime. There is evidence that small localised abscess can be aspirated and treated with intravenous antibiotics[18].

3. Surgical drainage: advised if there is respiratory distress or no response to medical treatment for 48 hours or more[19, 20]. If the abscess is small and above the myelohyoid muscle, it may be amenable to intra oral drainage; otherwise an external neck incision will be necessary.

Surgical Drainage

1. Consent: All the parapharyngeal space contents (carotid artery, jugular vein, Cranial nerves IX-XII) as well as the marginal mandibular branch of the facial are at risk of damage.

2. Position: Supine with neck extension (head ring and shoulder sand bag for support)

3. Incision: A horizontal neck incision in the upper cervical skin crease may be enough. Otherwise you can use an apron incision (from mastoid process curving downwards then horizontal at thyroid cartilage) for more exposure. Try to avoid the marginal mandibular nerve.

4. Operation:

a. Cut through skin and platysma.
b. Retract the sternocleidomastoid muscle backwards. (Figure 7)
c. Identify the submandibular gland and the carotid sheath.
d. Gently retract both so you can visualise the posterior belly of digastric. Most of the important contents of the parapharyngeal space are posterior to this muscle.
e. Use your finger to open the space anterior to the muscle. Open the pus loculi and obtain a bacteriology sample for gram staining and culture. The retropharyngeal space can be accessed by aiming with your finger backwards towards the other ear.
f. It is recommended that drains are left behind. You can use Jackson Pratt or a corrugated drain.
g. Close the wound in layers.

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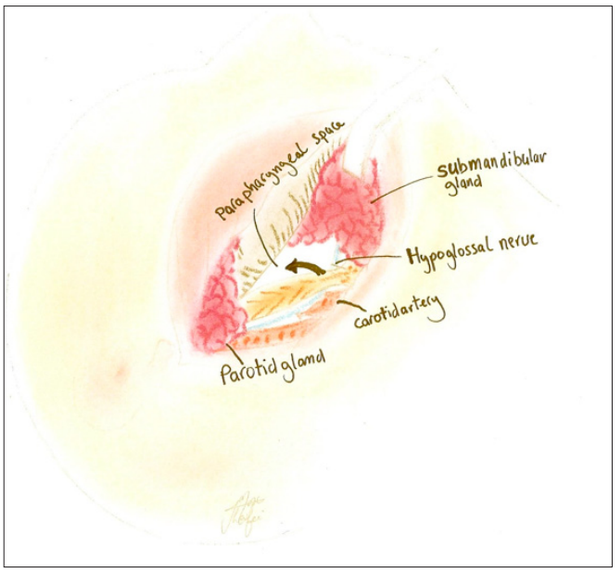

Figure 7: Access to the parapharyngeal space and surrounding structures.

Post operative

Continue on broad spectrum antibiotics while waiting for the bacteriology results. MJ will need close airway observation in the first 48 hours. The drains should remain until the wound is dry and usually for at least 48 hours. After the drains are removed and the swelling has regressed you can convert the patient to oral antibiotics and discharge them home.

Questions

Theme: Peritonsillar Abscess

1. Regarding the peritonsillar space, which of the following statements is true?

a. Torus tubarius forms its medial boundary
b. S. aureus is the commonest abscess forming organism in this space
c. Ultrasound guided drainage is the best modality for draining peritonsillar space abscesses
d. The palatine tonsil is its only content
e. It is limited inferiorly by the piriform fossa

2. A 16 year old girl presents to emergency clinic with a sore throat. Oral Examination reveals a Peritonsillar swelling. She is febrile (38.8°C) and tachycardic with a resting heart rate of 110 beats/min. Your next step of management will be:

a. Needle aspiration of the peritonsillar space under local anaesthesia
b. Assesses the airway according to ATLS principles and perform flexible nasolaryngoscopy
c. Get intravenous access to start fluids and antibiotics
d. Arrange for an urgent lateral neck X-ray
e. Take blood cultures and perform an ECG before starting treatment

Theme: Parapharyngeal abscess

For each of the patients described below, select the single most likely management from the options listed below. Each option may be used once, twice or not at all.

Options

A. Open incision and drainage
B. Intraoral abscess drainage
C. Broad spectrum intravenous antibiotics and close monitoring for 48 hours
D. Urgent tracheostomy and neck abscess drainage
E. Ultrasound guided aspiration of pus
F. MRI scan to confirm findings

PERI-TONSILLAR & PARAPHARYNGEAL ABSCESS: A REVIEW OF DIAGNOSES & INTERVENTIONS

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3. A 45 year old gentleman presented with a 4 day history of left sided progressive neck swelling. Clinical assessment revealed a tender left sided swelling with reduced neck movement. A CT scan was performed which was reported as follows 'there is a small localised collection in the parapharyngeal space above the myelohoid.'

4. A 68 year old lady was admitted with a parapharyngeal abscess 3 days ago. She has a complex medical history that includes type two diabetes, COPD, a recent MI and hypothyroidism. You review her on the ward round and note a persistent swinging pyrexia despite intravenous antibiotics. Further examination demonstrates an audible biphasic stridor from the end of the bed, in addition to marked neck stiffness and tenderness.

Answers

1. (e)

The peritonsillar space is a potential space between the palatine tonsil and its capsule. (no contents) It is located between the anterior and posterior tonsillar pillars. The Torus tubarius (cushion behind the pharyngeal opening of the auditory tube) forms its superior boundary, and the piriform fossa limits it inferiorly. S. Aureus is implicated in peritonsillar abscess but the commonest is group A Ð haemolytic Streptococci. Needle aspiration is the best 1st line modality for drainage.

2. (b)

Always assess all patients with an ABC approach. Once this is complete then further management options can be considered.

3. (E)

Ultrasounded guided aspiration of single small collections is minimally invasive and can save a patient a General Anaesthetic and Neck scar.

4. (A)

This lady has had more than 48 hours of conservative management, and is getting worse with a compromised airway. Despite her co-morbidities, the priority should be to secure her airway with anaesthetic assistance and open drainage of parapharyngeal abscess.

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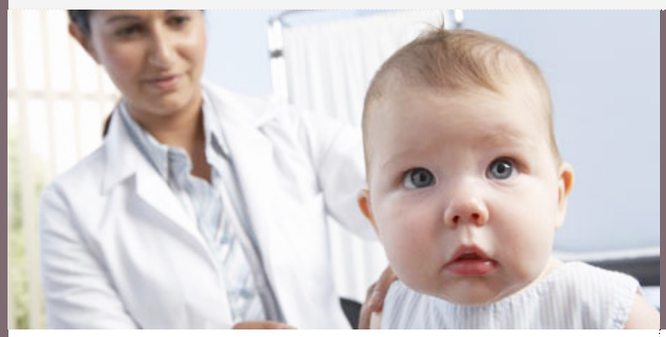
INTUSSUSCEPTION

Louise Adamson



Intussusception.
Paediatric Surgery.

Introduction

You are the Paediatric Surgery SHO on call. You are called to the Emergency Department to see a 7 month old baby girl who has been brought in by her parents. She has been crying all day and on changing her nappy blood was seen mixed with the stool. The ED SHO thinks that a mass was palpable in the abdomen and suspects intussusception. How will you assess and further investigate this baby? What treatment can be offered?

Intussusception is the commonest cause of intestinal obstruction in children between three months and six years of age[1] and is second only to incarcerated inguinal hernia as a cause of acute abdomen in infants[2]. The highest incidence is in infants between three and twelve months of age. A prospective surveillance study to determine the rate of intussusception in the UK is underway[3].

Intussusception occurs when an area of bowel wall invaginates distally into the lumen of its adjacent segment. This may occur because of a pathological "lead point" such as a Meckel's diverticulum, a polyp in Peutz Jegher syndrome, or a submucosal haematoma such as those occurring in Henoch-Schonlein purpura. More commonly a lead point is not demonstrated and the intussusception is deemed idiopathic. It is thought that idiopathic intussusception may result from a reactive enlargement of lymphoid tissue in the ileum following a viral illness.

As intussusceptions progress, the invaginating segment (the intussusceptum) becomes further telescoped into the receiving segment (the intussuscipiens). This results in a colicky pain, and in some cases the intussusceptum can even prolapse from the anus. The venous drainage of the invaginating bowel becomes impaired and swelling and oedema occur, increasing the pressure further and compromising arterial blood supply to the bowel wall. This results in bleeding and sloughing of the mucosa and can be seen clinically as "redcurrant jelly" stools. Intestinal obstruction leads to vomiting, which together with incipient gangrene of the intussusceptum leads quickly to a dehydrated, sick child.

Awareness of the signs and a high index of suspicion are therefore vital in the assessment of infants presenting acutely with abdominal pain, vomiting or bloody diarrhoea.

Clinical presentation

Our patient has presented with a day's history of crying and a recent discovery by the parents of blood in her nappy. Abdominal colic in infants usually manifests itself as short episodes of crying and drawing up of the knees to the chest. A pain free interval is common, this shortens as the intussusception progresses until the pain is constant. A history of vomiting may be present. Blood in the stool is typically described as of a "redcurrant jelly" nature. The presence of these symptoms is not universal, however. One study demonstrated that only one quarter of children with intussusception present with the classic triad of abdominal pain, vomiting and bloody stools[1].

On questioning the parents, as well as a detailed history of the presenting symptoms, it is important to ask about any recent viral illnesses or other medical history which may predispose to intussusception. The differential diagnosis includes gastroenteritis, so a social and family history is obviously relevant. Examination begins with a general assessment of the child's hydration, pulse, respiratory rate and temperature. Inspection and palpation of the abdomen may reveal a "sausage-shaped" mass, most typically in the right hypochondrium. Inspection of the anus is performed to look for any prolapsing intussusceptum. Examination of the groins is performed to exclude incarcerated inguinal hernia, which may present similarly. Rectal examination is rarely performed in children, and if required, should be performed once only, by the most senior surgeon available.

If intussusception is suspected, initial management involves obtaining intravenous access, at which point bloods may be taken for assessment of the haemoglobin, urea and electrolytes, and a group and save. Fluid resuscitation is commenced, and adequate analgesia provided. A plan for further investigation may then be made.

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Imaging

Ultrasound scan of the abdomen is the investigation of choice in suspected intussusception[4]. It has a high sensitivity (97.9%) and specificity (97.8)[5] and is non invasive and usually well tolerated provided the child has received adequate analgesia. A "donut" sign is characteristic (Fig.1). Plain abdominal film may be performed, although this is more likely to show non-specific features, a normal gas pattern, or dilated loops of obstructed small bowel.

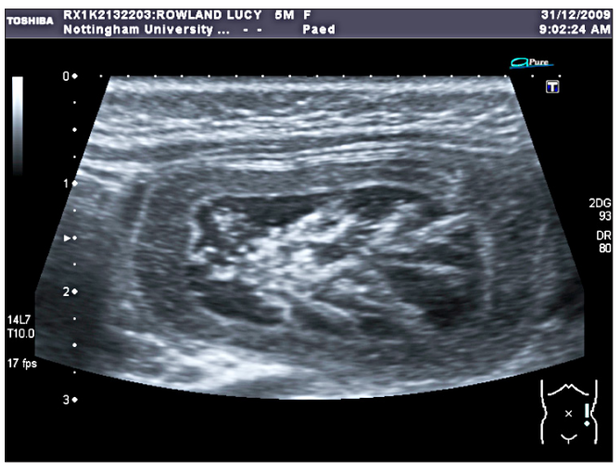

Fig 1. Donut sign characteristic for Intussusception with an abdominal ultrasound

Management

In most children, the first-line treatment for intussusception is air enema. This involves the passage of a rectal catheter through which a pressure-regulated flow of air is passed. This is done under fluoroscopic guidance, and the reduction of the apex of the intussusceptum can be easily visualised (Fig.2 a-c).

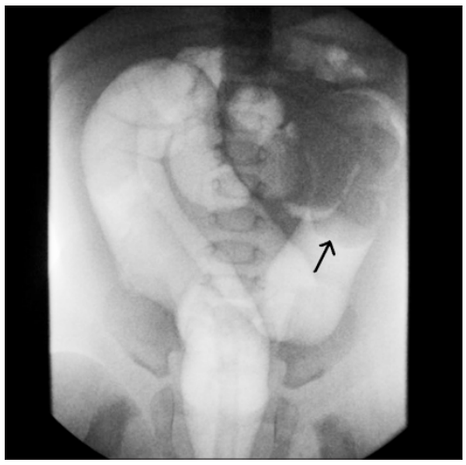

Fig 2 (a) Sequential Air enema Series

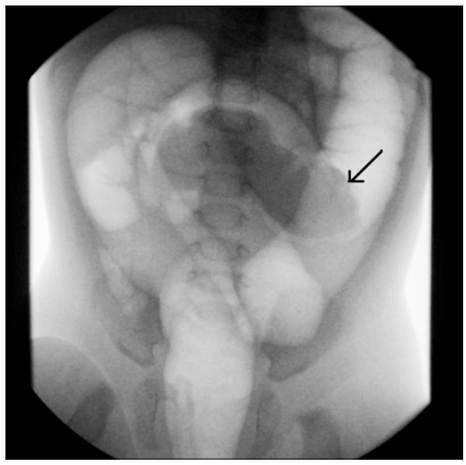

Fig 2 (b) Sequential Air enema Series

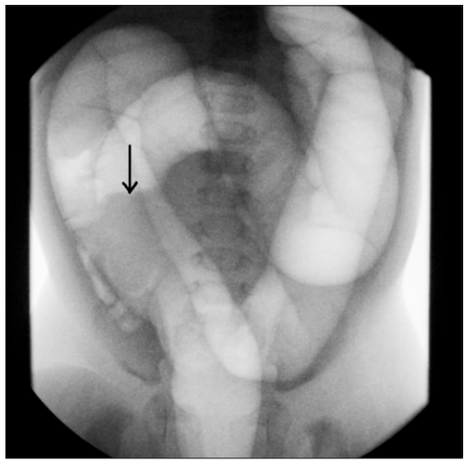

Fig 2 (c) Sequential Air enema Series

A study of 179 patients undergoing air enema found a success rate of 89%[6]. The success of air enema in this study was reduced by the prior presence of small bowel obstruction or prolapsing intussusceptions. Contraindications to attempted air reduction include signs of perforation or peritonitis – in such cases surgery is mandated. Recurrence of intussusception is possible following either air enema or surgery, occurring in approximately 5-10% of cases, however it is more likely following air reduction. Complications of air enema are incomplete reduction or perforation (Fig.3); such patients then require surgical management.

INTUSSUSCEPTION

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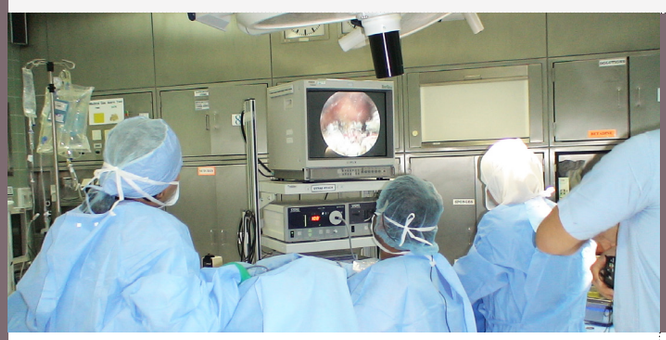

Intussusception.
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Fig. 3 Bowel perforation following air enema

To refer back to our case, if air reduction is to be attempted, it is necessary to ensure that a surgeon is available to go with the child to the radiology department. The child should be appropriately resuscitated and have adequate analgesia, usually morphine, prior to the procedure. A dose of intravenous antibiotics is given and the child should have oxygen saturation and heart rate monitoring throughout the procedure. Theatres should be informed and on standby so that the child can be transferred directly to the operating theatre in the event of complications, and the surgeon should be prepared, in the event of perforation, to decompress the abdomen with a needle. The consenting process with the parents should reflect this.

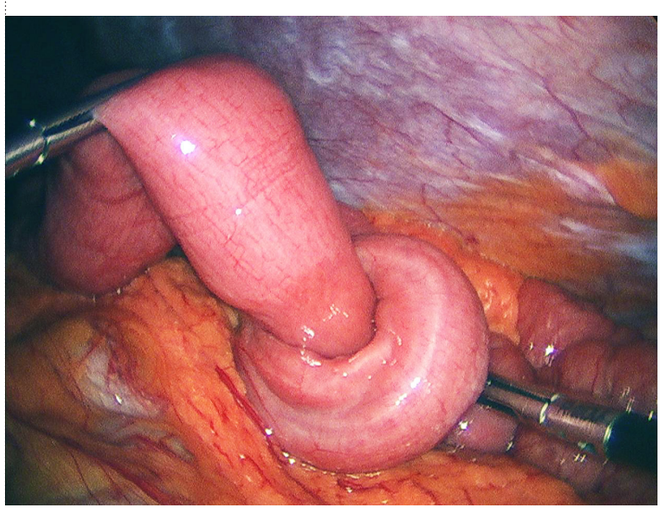
Surgery: laparoscopy vs open

Indications for surgical intervention in intussusception are listed above. The major current controversy is whether surgery should be open, or whether laparoscopy may play a role. Some studies argue that a high conversion rate to open surgery makes laparoscopy ineffective[7], others counter this with a claim that in a selected group of patients, such as those presenting early and without signs of peritonism, laparoscopy can be very successful[8]. It is accepted that laparoscopy reduces the surgeon's tactile stimulus and as a result a lead point may be missed, leading to a higher recurrence rate. These points should be discussed with the parents when deciding which approach to take for an individual child.

In summary

Intussusception is a common condition of infancy and early childhood, and requires a high index of suspicion to diagnose early and optimise outcome. A careful assessment of the history and a thorough examination will in most cases differentiate intussusception from the major differential diagnoses, and early discussion with the radiology department is vital, as specialist paediatric radiologists will need to be called in if air reduction is to be attempted out of hours.

We have discussed a typical presentation of abdominal pain and rectal bleeding in our five month old baby girl: the assessment and management described above should be applicable to any child presenting to the emergency department with suspected intussusception.



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EMQs

Options:

a) Discuss with radiology regarding air enema reduction of intussusception
b) Consent and arrange for theatre for laparotomy and operative reduction of intussusceptions +/- bowel resection
c) Admit for observation
d) Discharge with advice and appropriate safety net

For each of the patients described below, select the single most appropriate line of management from the options listed above. Each option may be used once, more than once or not at all.

1) A five month old boy is seen in the Emergency Department. He has a 72 hour history of intermittent crying episodes where the knees are seen to be drawn up to the chest. Today he has had bilious vomiting and the parents have noticed blood in the nappy. On examination his temperature is 37.6 and heart rate 160. The abdomen is rigid and he cries on any attempt at palpation. An ultrasound scan has revealed a mass on the right side of the abdomen consistent with intussusception.

2) A six month old girl is seen in the Emergency Department. She has a 72 hour history of intermittent crying episodes where the knees are seen to be drawn up to the chest. Today she has had bilious vomiting and the parents have noticed blood in the nappy. On examination her temperature is 37.6 and heart rate 160. The abdomen is soft but a tender mass is palpable in the right upper quadrant. An ultrasound scan has revealed a mass on the right side of the abdomen consistent with intussusception.

3) A six year old boy is referred by his GP. He has a two day history of colicky, intermittent abdominal pain and crying. He has vomited twice this morning and not opened bowels for 3 days. An ultrasound scan reveals a mass on the right side of the abdomen consistent with intussusception. On discussion with the Consultant Radiologist, they are reluctant to perform air reduction given the patients age and size.

4) An eleven month old girl is seen in the Emergency Department. She underwent air enema reduction of intussusception ten days ago, and was discharged from hospital eight days ago. Since discharge, she has been feeding and stooling normally. Today the parents are concerned as she has had episodes of 10-20 minutes crying which are similar to the symptoms she displayed prior to her previous admission when she had been found to have intussusception. An ultrasound scan performed by the on call radiology registrar is reported to be normal.

5) An eighteen month old boy is referred by his GP. He has had 24 hours of intermittent crying episodes and vomiting. When asked about pain he points to his umbilicus. On examination his temperature is 37.3 and heart rate 130. The abdomen is soft and not tender to palpate, no masses are found. Examination of the testes, chest, ENT and neurological systems are normal. Whilst on the ward, he has two episodes of loose, watery stools. No blood is seen.

Answers

1) b 2) a 3) b 4) c 5) d

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HYDROCEPHALUS

MG Hart

Hydrocephalus.
Neurosurgery.

Hydrocephalus is the abnormal accumulation of CSF in the ventricles and Subarachnoid space. It is often associated with ventriculomegaly and raised Intra-Cranial Pressure (ICP). Ventriculomegaly may not be observed in the early stages of the disease or with low ventricular compliance. Raised ICP is usually but not always present and can potentially be low depending on the balance of CSF secretion and absorption.

Hydrocephalus can be congenital or acquired. Antenatal screening has led to a decreased incidence of congenital hydrocephalus whereas improving neonatal care has improved the survival of pre-term infants resulting in increasing rates of intraventricular haemorrhage and secondary hydrocephalus. Hydrocephalus is one of the most common developmental abnormalities occurring in approximately one per five hundred births (1). Data from the UK shunt registry show that 3000 procedures are performed each year for hydrocephalus (2). This article will cover the pathophysiology, clinical assessment and surgical treatment of hydrocephalus. For detailed management of normal pressure hydrocephalus and idiopathic intra-cranial hypertension the reader is referred to other sources (3).

CSF Anatomy and Physiology

Production of approximately 80% of total CSF is from the choroid plexus (almost exclusively from within the lateral ventricles) with the remainder being produced from the interstitial space and ependyma; in the spine the dural roots also produce CSF. The CSF is a product of ultra-filtration of plasma with active secretion in the choroid plexus. The rate of CSF production is approximately 0.3ml per minute, with maximal rates at two am and lowest rates at six pm, resulting in 450ml of CSF per day. The production of CSF is independent of ICP but reduced with advanced age, ventriculitis or low cerebral blood flow. Absorption of CSF is mainly through arachnoid granulations, with lesser contributions from the choroids plexus and lymphatics, and is dependent on CSF pressure. Constituents of CSF are detailed and compared with plasma in table 1.

Constituent	CSF	Plasma
Osmolarity	290-300→	290-300
H_2O content	99%↑	93%
Sodium	135-145→	135-145
Potassium	2.8↓	3.5-5
Chloride	119↑	102

Table 1: CSF constituents compared with plasma (mmols)

The total volume of CSF in circulation at any time is approximately 150ml with this volume renewed approximately once every eight hours. Distribution of CSF is within the ventricles (20%) and the sub-arachnoid spaces of the brain (60%) and spinal cord (20%).

The functions of CSF are diverse and include a buoyancy effect whereby the effective weight of the brain is reduced by 95% to only 50 grams due to the lower specific gravity of CSF compared to the brain. The CSF also allows transport of macronutrients, clearance of debris and cellular waste, buffering of the extra-cellular space and contributes to overall brain compliance.

Aetiology of Hydrocephalus

It has been traditional to describe the aetiology of hydrocephalus based on a patho-physiological model where the cause can arise from either over-production of CSF (usually from choroid plexus tumours), physical obstruction to CSF flow from intra or peri-ventricular lesions, or a defect in the re-absorption of CSF (also known as communicating hydrocephalus). Some authors have disputed the validity of this classification, arguing that communicating hydrocephalus represents a form of obstruction that occurs outside the ventricular system. Another caveat arose from studies using a rat model of congenital hydrocephalus where it was demonstrated that aqueductal stenosis and a picture of tri-ventricular enlargement suggestive of obstructive hydrocephalus could occur as a late feature of communicating hydrocephalus due to temporal horn enlargement and midbrain/aqueduct compression. If it is taken that all hydrocephalus is in some way obstructive, then the aetiology can be defined as in table 2.

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Site of Obstruction	Aetiology	Radiological Findings
Lateral ventricle	Choroid plexus papilloma (with associated absorptive defect) Intra-axial tumour	Uni-ventriculomegaly
Foramen of Munro	Colloid cysts Foraminal gliosis Intra-axial tumours	Uni or bi-ventriclomegaly
Third Ventricle	Optic pathway gliomas Suprasellar pituitary adenomas Craniopharyngiomas Arachnoid cysts	Bi-ventriculomegaly
Aqueduct of Sylvius	Tectal plate gliomas Pineal lesions Primary aqueductal stenosis Secondary aqueductal stenosis Aqueductal forking Sub-epedymal gliosis X-linked congenital	Tri-ventriclomegaly
Fourth Ventricle	Post-operative Tumours	Tri or Quad ventriculomegaly
Basilar obstruction	Chiari malformations (type 1 or 2 +/- spina bifida) Arachnoiditis	Quad-ventriculomegaly
Sub-arachnoid space	Infectious Haemorrhagic	
Venous outflow	Venous thrombosis Venous hypertension	

Table 2: Aetiology of hydrocephalus

Clinical Presentation

The clinical features of hydrocephalus depend on the rate of development of hydrocephalus and the age of the patient at presentation and are detailed in table 3. The plasticity of the cranial vault allows the observation of specific features of raised ICP; growth of the cranial vault effectively ceases by age 2 years when the sutures inter-lock and by age 2.5 years the anterior fontanelle is closed. In pre-verbalising and pre-mobilising children it may also be difficult to ascertain some details of the history such as that of headache, visual obscuration or gait disturbance and symptoms may be more manifest as developmental delay or behavioural difficulties.

Distendable cranial vault and acute hydrocephalus	Rigid cranial vault and acute hydrocephalus	Chronic hydrocephalus
Irritability	Headache	Empty sella
Bulging and tense fontanelles	Vomiting	Atrophy of the corpus callosum
Enlarging orbito-frontal circumference	Coma	Macrocrania
Suture diastasis	Gait disturbance	Beaten copper cranium
Irregular respirations and apneic spells	Papilloedema	Developmental delay
Upward gaze palsy	Abducens palsy	

Table 3: Clinical features of hydrocephalus

Investigations and differential diagnosis

The occipital-frontal circumference (OFC) forms part of routine well-baby checks and is a key investigation in all growing children (figure 1). Macrocrania can be diagnosed as an OFC of two standard deviations or more above normal. Other indices of suspicion include OFC growth crossing the percentile lines, disproportionate OFC growth to body length or weight, and OFC growth of over 1.5 cm per week. The differential diagnosis of macrocephaly in an infant is described in table 4.

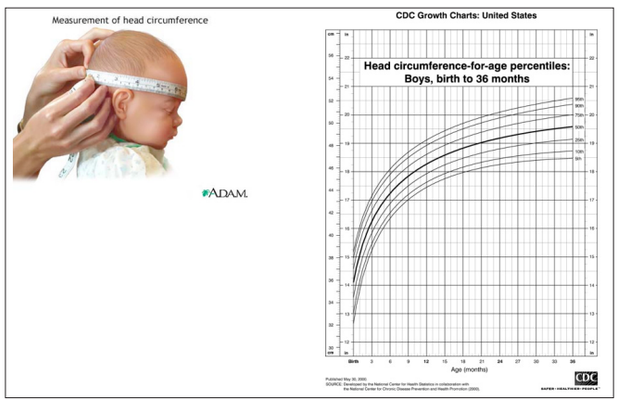

Figure 1: Orbito-frontal circumference measurement and chart

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Ventricular enlargement	Hydrocephalus
	Hydraencephaly
	Constitutional
	Ex-vacuo
Normal ventricular size	Cerebral oedema
	Subdural collections
	External hydrocephalus
	Arachnoid cyst
	AVM
	Neoplastic
	Familial
	Genetic
	Idiopathic
Thickening of skul	Anaemia
	Dysplasia

Table 4: Differential of macrocrania

Imaging with computed tomography (CT) is particularly useful for assessing ventricular size and is usually the first line investigation in adults (figure 2). Ventriculomegaly can be measured by a variety of means, such as Evan's ratio, which is positive if the ratio of frontal horn dimension to the maximal bi-parietal diameter is over 30%. The observation that ventriculomegaly involves either single lateral ventricle, both lateral ventricles or triventricular hydrocephalus involving the third and lateral ventricles. Pan-ventricular hydrocephalus is found in communicating hydrocephalus is helpful in establishing where any obstruction may arise. Additional findings on CT include temporal horn diameter of over 2mm and peri-ventricular lucency.

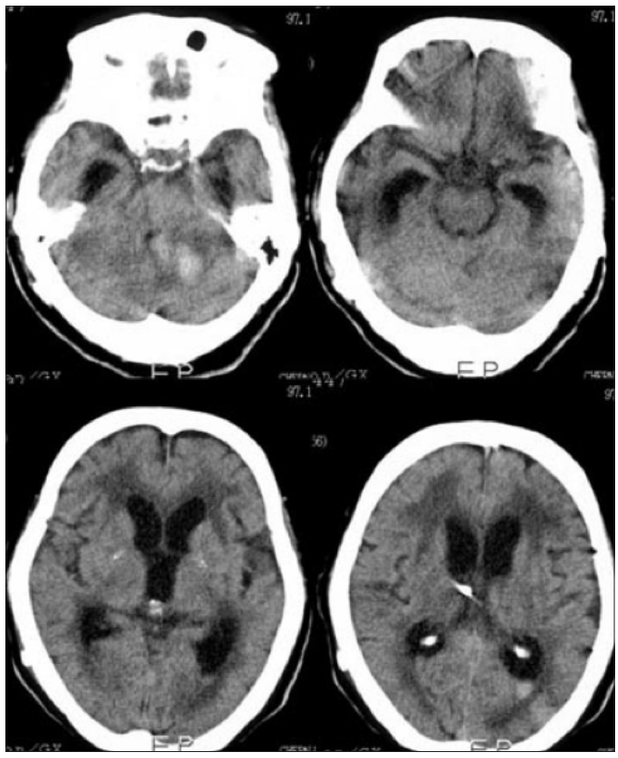

Figure 2: Computed Tomography of Tri-ventricular Hydrocephalus.
Note features of temporal horn enlargement, an enlarged bi-caudate ratio and per-ventricular lucency. The aetiology is the mixed density lesion in the cerebellum effacing the fourth ventricle

Magnetic Resonance Imaging (MRI) can provide further important information on hydrocephalus and in particular is the most sensitive modality for detecting lesions obstructive to the CSF pathways such as tectal plate gliomas. Other features usually best identified on MRI include atrophy of the corpus callosum or an empty and eroded sella turcica. Specific sequences that can be useful include constructive interference in steady state (CISS) to demonstrate thin membranes that may interrupt the flow, or Inversion Recovery Turbo Spin Echo (IRTSE) and cine MRI that can assess aqueduct patency.

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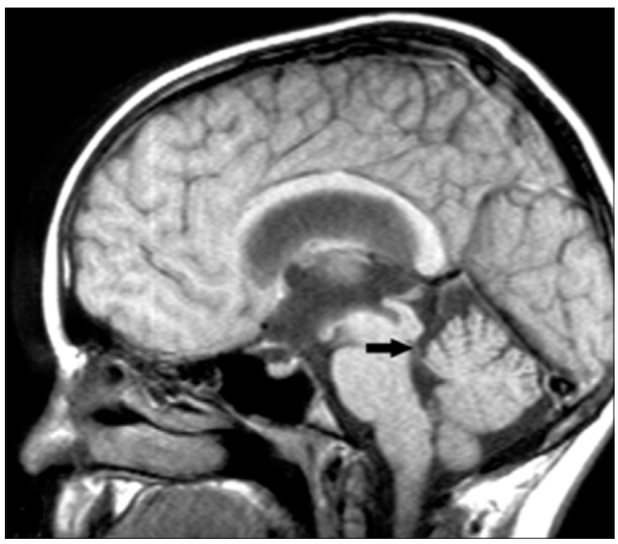

Figure 3: Magnetic Resonance Imaging of Chronic Hydrocephalus.
Note empty sella turcica and atrophy of the corpus callosum. The aetiology is the narrowed aqueduct (black arrow).

The differential diagnosis of hydrocephalus in an infant is essentially the same as that for macrocrania and is detailed in table 4. In an adult the differential diagnosis of ventriculomegaly is hydrocephalus ex-vacuo due to brain atrophy, although developmental abnormalities such as atrophy of the corpus callosum may also appear like hydrocephalus. When in doubt over a diagnosis of hydrocephalus a period of observation may be employed, and this is particularly the case in children without features of acute hydrocephalus or raised ICP. Serial head circumferences, cranial ultra-sounds or imaging can be used as non-invasive monitoring. Infusion studies (after the fontanelle is closed) and ICP monitoring are more invasive but can provide additional information such as demonstrating how the CSF dynamics varies over time (4).

Treatment

Although acetazolomide reduces CSF production and is commonly used in the treatment of idiopathic intracranial hypertension medical therapy is rarely effective in other causes of hydrocephalus and treatment is almost exclusively surgical. For acute hydrocephalus in an emergency setting, insertion of an external ventricular drain (EVD) is the established treatment of choice, albeit temporary. Long term management involves either insertion of a shunt or an endoscopic procedure.

A shunt is a device that drains CSF from one space to another and usually incorporates a valve. A ventriculo-peritoneal shunt is usually the preferred option. Contra-indications for peritoneal catheter placement include infants less than 2.5kg in weight due to a high incidence of shunt infection and the paucity in subcutaneous fat to allow tunnelling of the distal catheter, and patients with active gastro-intestinal disease that make the peritoneum unsuitable for drainage. Specific complications of peritoneal catheter placement include tip migration into a viscus or scrotum, CSF ascites, hydrocele, peritonitis or intestinal complications.

Ventriculo-atrial shunts are the next most common and are useful in the presence of abdominal disease, questionable peritoneal absorption or highly proteinaceous CSF. Atrial shunts are associated with unique complications such as shunt emboli, pulmonary hypertension and shunt nephropathy. If both the peritoneum and the atrium are unsuitable as drainage locations the pleural cavity is a valuable alternative although they have problems with effusions and siphoning. Other drainage locations including the gallbladder, ureter, bladder, cerebral venous sinuses and sub-arachnoid space (Torkildsen's shunt) are rarely used and mainly of historical interest.

The ventricular catheter is usually in the lateral ventricle inserted from either a frontal, parietal or occipital approach. In patients with idiopathic intra-cranial hypertension and compressed ventricules a lumbo-peritoneal shunt can be used although there can be problems with siphoning, assessing patency, post-operative arachnoiditis and nerve root pain; it is contra-indicated in children due to a high incidence of post-laminectomy scoliosis and descent of the cerebellar tonsils.

Valves for shunts are designed to regulate the drainage of CSF to allow relief of symptoms whilst preventing over-drainage. Pressure control valves can involve either a diaphragm such as the PS Medical Delta® or ball-in-cage mechanism to couple drainage rate to pressure. Flow control valves such as the Orbis Sigma® are designed to provide a constant flow by increasing resistance with pressure but with rapid drainage once a safety threshold has been reached. Theoretically these can help prevent minimise the risk of developing slit ventricle syndrome and might be particularly useful in patients with gross ventriculomegaly. Variable pressure valves such as the Polaris®, Hakim® and PS Medical Strata® can be adjusted non-invasively if a patient is symptomatic of either under or over-drainage. All valves show some degree of hysteresis. Randomised controlled trials of different valves have failed to prove any notable difference in rates of complications (5). Research is on-going to develop improved valves which could involve coupling drainage rates to the rate of production of CSF (6).

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Endoscopic techniques have become more common with advances in equipment technology (7). A variety of CSF diversionary techniques can be performed with the endoscope including septum pellucidum fenestration, temporal ventricolostomy, foraminoplasty, aqueductoplasty and aqueduct stenting but by far the most common and best studied procedure is the endoscopic third ventriculostomy (ETV).

An ETV involves perforating the floor of the third ventricle to allow a direct connection to the basal cisterns. Indications for the technique are still evolving with success and failure rates varying depending on patient selection. In general it should be considered for obstruction distal to the floor of the third ventricle with the best indication being aqueductal stenosis. Indications such as ventriculitis, slit ventricle syndrome and normal pressure hydrocephalus – although previously thought to have low success rates – are currently the subject of further research, with the only real contra-indications being completely collapsed ventricles that fail to expand sufficiently to allow safe endoscope insertion.

The procedure itself involves performing a burr hole approximately 3cm from the midline on the coronal suture. The endoscope is inserted into the lateral ventricle then navigated through the foramen of Munro into the third ventricle (figure 4). The site for fenestration depends on the individual anatomy although it is usually between the infundibular recess and mamillary bodies. After perforating the floor and enlarging the defect with a Fogarty balloon catheter the endoscope is passed onwards into the inter-penducular and pre-pontine cisterns; Lillequist's membrane or any adhesions are divided at this point. After haemostasis, an Ommaya reservoir is often left in-situ at the pre-coronal burr hole; this allows for emergency drainage or infusion studies at a later date if required.

Specific complications of ETV include injury to the surrounding structures such as the basilar artery, hypothalamus, oculomotor or abducens nerves. Bleeding is usually managed with irrigation although it can be difficult to control. Cardiac arrest has been reported and is possibly due to hypothalamic compression. Late under-drainage can occur in a similar fashion to shunting with the rate varying depending on patient selection. The risk of infection is lower than for shunts due the absence of hardware left in-situ.

Shunt Malfunction

Evaluation of possible shunt malfunction is a common neurosurgical emergency and is often the subject of examination scenarios. General complications with all shunts include under-drainage, over-drainage, infection, seizures, skin erosion and silicone allergy. Under-drainage may arise from occlusion by choroid plexus, highly viscous CSF, haemorrhage, cellular debris or infection. The blockage can be localised to the ventricles, intervening hardware, disconnection or erosion of connections, or distal malabsorption.

The initial history should obtain details of the patient's neurosurgical background including time and indication for original procedure, current shunt hardware in-situ, date and reason for last revision. Symptoms of shunt blockage and acute hydrocephalus can vary between patients but are usually consistent for an individual so it is useful to ask if the current symptoms are similar to a previously confirmed shunt blockage. The speed of onset of symptoms can vary depending on the extent of under-drainage or complete obstruction, and also relates to the rates of CSF production, absorption and overall compliance. Acute symptoms of raised ICP include headache, nausea, vomiting, gait ataxia and lethargy. Visual symptoms may take the form of diplopia (particularly on lateral gaze), reduced visual acuity, enlarged blind spots, transient blindness or generalised visual field constriction. Seizures are rarely if ever the sole manifestation of shunt obstruction. Physical signs include papilloedema, abducens palsy and upward gaze restriction. Visual signs include papilloedema, reduced visual acuity, visual field constriction and enlarged blind spot. The shunt tubing should be evaluated carefully for CSF egress, localised trauma or skin dehiscence.

It is important to realise that in a patient with hydrocephalus deterioration may occur extremely quickly and a low threshold should be adopted to investigate patients. Some patients deteriorate particularly rapidly and a history of previous shunt obstruction with rapid decompensation, or the presence of an upgaze palsy, should be taken very seriously. Imaging with CT is the first line investigation; ideally a previous CT (taken when a patient was well) should be used as a comparison. Any increased ventriculomegaly is suspicious for shunt malfunction.

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A shunt series comprising plain radiographs of the entire shunt tubing should be performed to identify any obvious discontinuities in the tubing prior to revision surgery. In the case of an adjustable shunt valve the level the pressure is set at can be determined non-invasively; a simple maladjustment may be responsible for patient's symptoms and this may respond to re-setting the valve. In the instance of suspected shunt infection serum inflammatory markers are invaluable and if abnormal CSF sampling can be performed to confirm the diagnosis. If despite these investigations there is no clear cause for the patient's symptoms then infusion studies can be used to demonstrate shunt function in-vivo (8).

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Examination Questions

1. When recording the occipito-frontal circumference, what features are not suspicious for hydrocephalus:

a. Disproportionate increase in OFC compared to body length or weight;
b. Consistent growth but between the 75th and 90th centile;
c. Growth of over 1.5 cm per week;
d. Growth crossing the percentile lines;
e. An OFC size of over 2 standard deviations above the mean.

2. When viewing a CT head of a patient with hydrocephalus, what feature is most suspicious for shunt malfunction:

a. Peri-ventricular lucency;
b. A bi-caudate diameter greater than 2 standard deviations from the mean;
c. A previously documented obstructive cause to hydrocephalus (e.g. tectal glioma);
d. Intra-ventricular air;
e. Ventriculomegaly (in the absence of previous films taken when the patient was well).

3. When counselling a patient about the risks of VP shunt insertion, what complications should be mentioned:

a. Wound infection;
b. Bowel perforation;
c. A revision rate of around 30% at 6 months (in children);
d. Seizures;
e. All of the above

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4. In considering the technical details of performing an ETV, which statement is clearly false:

a. The site of third ventricular perforation into the sub-arachnoid space is usually between the pituitary infundibulum and the mamillary bodies;
b. The burr hole is cited 1cm posterior to the coronal suture and more posterior than that for a standard frontal approach VP shunt;
c. The placement of an Ommaya reservoir at the end is optional but could allow drainage in an emergency situation of acute hydrocephalus (and ETV malfunction);
d. Intra-ventricular antibiotics should be instilled if an Ommaya reservoir is left in-situ;
e. In the event of haemorrhage, simple irrigation is the first line management.

5. In the assessment of a patient with potential shunt malfunction, which investigation is not potentially useful:

a. Routine blood tests for inflammatory markers;
b. A shunt series XR (lateral skull & cervical spine, AP chest and upper abdomen);
c. A CT head;
d. CSF infusion studies (in the absence of infection);
e. Electro-encephalography (EEG).

Question Answers

1. The correct answer is (B): the patient in that instance has a congenitally large head but satisfactory growth that is not in keeping with progressive hydrocephalus. All the others are suspicious for hydrocephalus.

2. The correct answer is (A). This is suggestive of an acute rise in ICP with interstitial egress of CSF from the ventricles. The bi-caudate diameter is more useful as an objective measure of ventricular size over time than an absolute measure of hydrocephalus. A previously noted obstructive lesion is not necessarily a clue for shunt malfunction providing the shunt was working in the first instance. Intra-ventricular air is most likely iatrogenic in origin from shunt tapping (either for sampling or intra-thecal antibiotic administration) but rarely could be from a gas forming organism: by itself it is not suggestive of shunt blockage. Ventriculomegaly is not always pathological of hydrocephalus (e.g. ex-vacuo changes) and prior films should always be inspected to confirm the normal ventricular configuration.

3. The correct answer is (E). Infection should occur in <5% of shunts and in some units rates of <1% are reported. The revision rate at 6 months in children is high even when the procedure is technically correct and the child makes a good recovery. Seizures can occur in up to 5% of patients in the first year but it is unclear if these are all directly attributable to the shunt.

4. The correct answer is (B). The burr hole is usually 1cm anterior to the coronal suture or at least just on the suture: any further posterior and there is a risk of injury to the underlying motor cortex. An Ommaya reservoir is not mandatory but is commonly left in-situ in case emergency drainage is required: if it is placed then intra-thecal antibiotics are prudent. Haemorrhage can usually be controlled with simple irrigation.

5. The correct answer is (E). Inflammatory markers are critical in suggesting a shunt infection and usually mandate a shunt tap for microbiological examination if there is no other clear source. Routine radiology involves a CT head and shunt series which are helpful in determining if there is under-drainage and where this might be occurring. In selected centres CSF infusion studies have a role in identifying sub-optimal CSF drainage. However, EEG doesn't have a routine role in the investigation of shunt malfunction.

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THE HIGHER DEGREE

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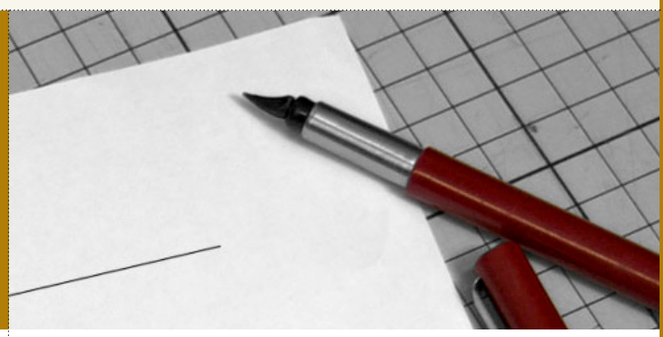
The Higher Degree.
Career Focus.



Introduction

Due to the stiff competition faced by aspiring surgical trainees, building a competitive curriculum vitae (CV) is crucial. The majority of surgical trainees, irrespective of their preferred surgical speciality will have a list of audits, national and international presentations, surgical and non-surgical courses, as well as publications. Although all the above will assist in career progression, it certainly does not make a surgical candidate a "stand-out" trainee. In previous applications for higher surgical training in surgical specialities such as General Surgery, Neurosurgery and Urology, a higher degree was a prerequisite to being short-listed. However, with centralisation of applications for higher surgical training, although research is still important, it is not a pre-condition for short-listing, neither for employment. It is in the interest of all surgical trainees to keep abreast with current changes or updates with regards to research leading to a higher degree and speciality training posts. In this article, the importance of a higher degree is discussed.

Research leading to a Higher Degree

In all surgical job applications, there is a section for research experience. The majority of trainees tend to state one or two of their audits or studies which have lead to a publication. In strict terms, this is not formal research.

Research will definitely give trainees the edge against their competitors. The majority of research jobs which lead to a higher degree tend to be in teaching hospitals and associated with the medical school. The most common higher degrees are Medicinæ Doctor (MD) or Philosophiæ Doctor (PhD). A MD can only be obtained from a medical school, while a PhD can be obtained from any school in the University.

Types of research projects

Prior to embarking in a research project it is important to discuss the project with the relevant supervisors. The majority of research projects leading to a higher degree tend to be laboratory-based, but there are also clinical-based projects. These projects tend to be two to three years in duration, hence make sure the project is relevant to your speciality and career aims.

Timing of research

Previous trainees use to spend two to three years doing a research project prior starting their higher surgical training, At present, research leading to a higher degree is best done during higher surgical training following obtaining a training number. One option is to do one or two years of surgical training prior to embarking on a research project. Following core training, trainees may start a research project if they have been unsuccessful in securing a training number. However, it is wise to discuss taking up a research post with the programme director.

Advantages

Surgical trainees that have a higher degree make them "stand-out" from their colleagues. Most consultants that have a higher degree will appreciate surgical trainees that also have a higher degree as this leads to an all-rounded CV.

a) Presentations and Abstracts

It is crucial to submit research or clinical projects to meetings. This helps the trainee develop presentation skills and gain knowledge from research meetings. There are various national and international meetings which is suitable for certain research projects, hence it is important to keep up to date with submission deadlines of meetings. National and international meetings tend to be speciality specific, and are represented by surgeons from various well-known clinical and academic centres. For presentations accepted in large national and international meetings, the abstracts are published in a surgical journal.

b) Publications

With research, the trainee's publication rate tends to significantly improve. In addition, trainees will have the opportunity to publish in all types of categories such as review articles, original papers and meta-analysis. Besides this, the trainee is likely to pursue publication in journals with a higher impact factor. Most presentations and abstracts should be converted into a paper, as one original article is worth more than ten presentations.

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c) Courses

Following registration for a higher degree, usually the trainee is expected to enroll into courses organised by the university specifically for students doing a higher degree. This includes presentation courses, statistical courses, teaching courses etc. These courses are highly educational and provide important practical experiences. In addition, all these courses are funded by the university.

d) Future contacts

Meeting "contacts" by far is the most important aspect of research. By attending meetings, the trainee will not only meet colleagues from other regions, but also meet consultants and professors who could be helpful in the future, especially when applying for Out of Programme experience, fellowships or even consultant jobs.

e) Fellowships

Towards the end of higher surgical training, most trainees are currently enrolling into fellowships to acquire additional surgical skills. Among Colorectal trainees, one of the most popular fellowships is the Laparoscopic Colorectal fellowship sponsored by Ethicon Endo-Surgery in association with the Association of Coloproctology of Great Britain and Ireland.

In general, most Fellowship applications require completion of higher surgical examinations and research experience, usually research which has led to a higher degree. This is crucial especially for trainees who are considering fellowships abroad.

Drawbacks

Unfortunately, not all research posts come with a full salary and clinical commitments. Although a full salary is provided in some posts, laboratory fees may require payment. Some research posts are funded and hence there are no clinical commitments. This does have its advantages, especially it allows the trainee to focus on research full-time and get involved in other projects. Clinical sessions can actually have a negative impact on the quality of research.

The Higher Degree.
Career Focus.

Due to the length of time required for research, it is essential to find out funding and clinical commitments. A substantial pay cut may not suit a single earner caring for their family. Following obtaining a research project, trainees should ensure that all the experiments are completed and thesis written up to obtain the higher degree. Leaving a research project without completion shows lack of commitment and will have a negative impact on career progression.

Personal Experience

Following the completion of basic surgical training in Leeds, I was appointed as a Research Fellow in the Department of Hepatobiliary Surgery and Transplantation Unit, St James's University Hospital, Leeds. My two-year research project was a laboratory-based project assessing cytokine and growth factor production on liver regeneration involved in liver cells.

The first hurdle is to apply for ethics, and hence familiarising myself with the Human Tissue Act, laboratory protocols and consent requirements. Following this, the next step was registration of the research project with the Leeds Medical School for a MD. During this time, I learned various research and generic skills. My research was funded by the department, as I was part of the on-call rota for donor-retrieval and ward management of transplant patients. My research led to various national and international presentations and numerous publications. Following completion of my laboratory experiments, I wrote my thesis and received my MD in April 2011. Based on my experience, I would always recommend research leading to a higher degree as the benefits have been endless.

Conclusion

Obtaining a higher degree is the best way to be a "stand-out" trainee. In an era of stiff competition and fewer consultant posts, a higher degree will help you rise to the top.

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SURGICAL REPRESENTATION: WHY YOU SHOULD GET INVOLVED

An Interview with Ewen Harrison

Surgical Representation: Why You Should Get Involved. Current Training Issues.

Ewen Harrison is a Clinical Lecturer and Specialist Registrar in hepatobiliary and transplantation surgery at the Royal Infirmary of Edinburgh. He was President of the Association of Surgeons in Training 2007-08.

Surgical representation. Meaning what?

Nice to meet you too! In the world beyond the cut-and-thrust of day-to-day medicine, a plethora of representative organisations exist, none more so than in surgery (the accompanying table lists some of these and provides links to more information). By surgical representation, I'm talking about communicating the opinion of surgeons to those with the power to make change. Different organisations have distinct functions. These might include voicing opinions to policy makers, providing education, organising conferences, standard setting/producing guidelines, or providing advice and support to members. The training of surgeons is an important aspect of the day-to-day work of these organisations. It is important that as trainees, we effectively convey our opinion in order to improve the lot of surgeons in training. Without doing this, we forgo our right to complain.

So how did you become involved in the Association of Surgeons in Training?

Like many of these things, I came to surgical representation in an indirect manner. I got involved in ASiT when a call went out looking for trainees to contribute to the website. A few years later, I sat down to chair my first council meeting as the president of the organisation. Looking back, it still surprises me as I did not set out with this ambition in mind. There are a great number of benefits to getting involved in such an organisation and I would wholeheartedly recommend it to anyone starting out in a career in surgery.

Sounds like a lot of work, benefits such as what?

I'd be lying if I said the year as president didn't take up a lot of time, but there are many opportunities to contribute that can easily be fitted around everything else. The job specification of a surgeon usually includes a list of required skills – the majority of these are improved by spending some time involved in a representative group. Representation provides a forum to enhance leadership, communication and presentation skills, whilst meetings sharpen your decision making, problems solving and organisational skills. In addition, it affords you a huge insight into the workings of the medical profession which is not only valuable for your professional career but particularly useful for the consultant interview. Management skills, diplomacy ...the list goes on! It's also quite enjoyable.

Can you now leap tall buildings in a single bound?

No, and neither am I faster than a speeding bullet. But I did make excellent jam the other day. Blackcurrant.

Sounds tasty. Ok, I'm interested, but your list of organisations is frighteningly long. I wouldn't know where to start.

All of the surgical specialties have a trainee organisation. Get in touch through the appropriate website, join and sign up to the email list/forum. Even better, get along to a meeting organised by the group and meet the members. If you like what you see and think you can contribute, get in contact with the administrator or someone on the committee/council and tell them that you would like to become involved. There may be a formal process, but this is usually straightforward. You will be surprised how easy it is to get involved. Naturally, I would recommend ASiT as the first port of call.

You've said the word. Committee. A group of people who individually can do nothing, but as a group decide that nothing can be done?

Nice. Did you get that off the internet?

I ask the questions, thanks. Aren't these committees just full of self-important bores purporting to speak on my behalf?

No, that's not my experience at all. The vast majority of those I've had contact with show a great respect for the opinions of others, even if they don't necessarily agree with them. Most organisations now make significant efforts to engage with members and ensure that their opinion is being accurately represented. In ASiT, we regularly survey trainee opinion on current issues, such as the effects of the full implementation of the European Working Time Directive (EWTD). This ensures that the position we take on a given issue is grassroots-based and effectively communicated to the numerous bodies we have representatives in.

Bodies such as?

Most of those mentioned in the table. From surgery-wide organisations such as the Royal Colleges and the Association of Surgeons of Great Britain and Ireland (ASGBI), to sub-specialty groups and the BMA. We also provide direct evidence to inquires, such as the Temple Review into the Impact of the EWTD on Quality of Training and the Tooke Inquiry into Modernising Medical Careers.

And have your efforts actually made any difference?

That is a good question and one that I struggle over myself! During my time with ASiT there was great deal of upset in the medical profession including the introduction of Modernising Medical Careers (MMC) and the disastrous Medical Training Application Service (MTAS). These both highlighted the necessity of trainee involvement in fundamental reform of our profession. Things are definitely better since then, but we still have a long way to go.

In other areas, such as all the trouble associated with the EWTD, the problem exists at such a high level – the integration of badly drafted European law into UK legislation – that it is difficult for one organisation alone to alter it. Overall, in recent years I think we have provided a clear voice on the opinion of surgical trainees and I think we have been listened to by other organisations.

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If I became involved what would I actually be doing?

Most get involved by becoming a region or specialty rep, but ASiT also has foundation training, core training and medical student reps. Reps will usually become involved in their local surgical training committee and are encouraged to organise meetings or courses locally. Medical student liaison is important, providing information and encouragement about careers in surgery. The ASiT Conference now attracts 400 delegates and you would be involved in its organisation. You may prefer to try your hand at attracting sponsorship, contributing to the running of the website, or writing for one of the many publications to which we contribute.

When you have a bit of experience, you will attend meetings held by other organisations, such as the Intercollegiate Surgical Curriculum Project (ISCP), to represent the views of the ASiT Council. ASiT Council meetings take place once every 3 months or so. These are held on a Friday night in London, so it is reasonably easy to get away from work after lunch and travel expenses are covered.

And your time as President, how did you fit this round your surgical training?

After being involved in ASiT for a number of years, I decided I would like to run for the position of President. I spoke to the head of my unit and the Training Programme Director who were both supportive of the idea. I ended up taking 3-4 days a month to attend meetings and deal with the paperwork. Good organisation was essential and I had to identify all the days I needed off about 6 months in advance to allow rotas to be covered. I don't think this impacted on my clinical training too much, and the time was certainly worth it.

Would you do it again?

Yes, definitely. And I would encourage anyone interested to do the same. It may be the start of a lifelong interest in the wider issues relating to the delivery of surgical services to patients. It will broaden your outlook, make you challenge your assumptions and ultimately allow you the opportunity to contribute to changing your specialty into what you want it to be.

If I want some more information?

Contact me directly (mail@ewenharrison.com) or through the websites in the table.

Surgical Royal Colleges & associated organisations	Royal College of Surgeons of England (RCSEng)	www.rcseng.ac.uk
	Royal College of Surgeons of Edinburgh (RCSEd)	www.rcsed.ac.uk
	Royal College of Physicians and Surgeons of Glasgow (RCPSG)	www.rcpsg.ac.uk
	Royal College of Surgeons of Ireland (RCSI)	www.rcsi.ie
	College of Emergency Medicine (CEM)	www.collemergencymed.ac.uk
	Royal College of Ophthalmologists	www.rcophth.ac.uk
	Academy of Medical Royal Colleges	www.aomrc.org.uk
	Surgical Forum of Great Britain & Ireland	www.surgicalforum.org
	Intercollegiate Surgical Curriculum Project	www.iscp.ac.uk
	Joint Committee on Surgical Training	www.jcst.org
	Intercollegiate Specialty Boards (ICB)/ Joint Committee on Intercollegiate Examinations (JCIE)	www.intercollegiate.org.uk
	Intercollegiate Committee of Basic Surgical Examinations	www.intercollegiatemrcs.org.uk
Surgical specialty umbrella associations	Association of Surgeons of Great Britain and Ireland (ASGBI)	www.asgbi.org.uk
	Federation of Surgical Specialty Associations	www.fssa.org.uk

SURGICAL REPRESENTATION: WHY YOU SHOULD GET INVOLVED

An Interview with Ewen Harrison

Surgical specialty associations	Association of Coloproctology of Great Britain and Ireland (ACPGBI)	www.acgbi.org.uk
	Association of Laparoscopic Surgeons of Great Britain and Ireland (ALSGBI)	www.alsgbi.org
	Association of Surgeons in Primary Care	www.aspc-uk.net
	Association of Upper Gastrointestinal Surgery (AUGIS)	www.augis.org
	British Association of Aesthetic Plastic Surgeons (BAAPS)	www.baaps.org.uk
	British Association of Day Surgery (BADS)	www.bads.co.uk
	British Association of Endocrine & Thyroid Surgeons (BAETS)	www.baets.org.uk
	British Association of Oral and Maxillofacial Surgeons (BOAMS)	www.baoms.org.uk
	British Association of Paediatric Surgeons (BAPS)	www.baps.org.uk
	British Association of Plastic, Reconstructive and Aesthetic Surgeons (BAPRAS)	www.bapras.org.uk
	British Association of Surgical Oncology (BASO)	www.baso.org
	British Association of Urological Surgeons (BAUS)	www.baus.org.uk
	British Hernia Society	www.british-hernia-society.org
	British Orthopaedic Association (BOA)	www.boa.ac.uk
	British Society for Surgery of the Hand (BSSH)	www.bssh.ac.uk
	British Society of Gastroenterology (BSG)	www.bsg.org.uk
	British Transplantation Society (BTS)	www.bts.org.uk
	British Association of Otorhinolaryngologists (ENT UK)	www.entuk.org
	Society of Academic and Research Surgery (SARS)	www.surgicalresearch.org.uk
	Society of British Neurological Surgeons (SBNS)	www.sbns.org.uk
	Society for Cardiothoracic Surgery in Great Britain and Ireland (SCTS)	www.scts.org
	Vascular Surgical Society of Great Britain and Ireland (VSSGBI)	www.vascularsociety.org.uk

Surgical trainee organisations	Association of Surgeons in Training	www.asit.org
	Association of Otolaryngologists in Training (AOT)	www.aotent.com
	Barrett's Club (Upper GI surgery)	www.augis.org
	British Neurosurgical Trainees Association (BNTA)	www.sbns.org
	British Orthopaedic Training Association	www.bota.org.uk
	Carrel Club (Transplantation Surgery)	www.carrelclub.org.uk
	Dukes' Club (Colorectal surgery)	www.thedukesclub.org.uk
	Maxillofacial Trainees Group	www.maxfac.me.uk
	Mammary Fold (Breast and oncoplastic surgery)	www.themammaryfold.com
	PLASTA (Plastic Surgery Trainees Association)	www.plasta.org.uk
	Rouleaux Club (Vascular surgery)	www.rouleauxclub.com
	Senior Urological Registrars Group (SURG)	www.surg-online.net
	Trainees in Paediatric Surgery (TRIPS)	www.trainee.baps.org.uk
Trade union/ professional organisations	British Medical Association	www.bma.org.uk
	Hospital Consultants and Specialists Association	www.hcsa.com
Pressure groups	Remedy UK	www.remedyuk.org

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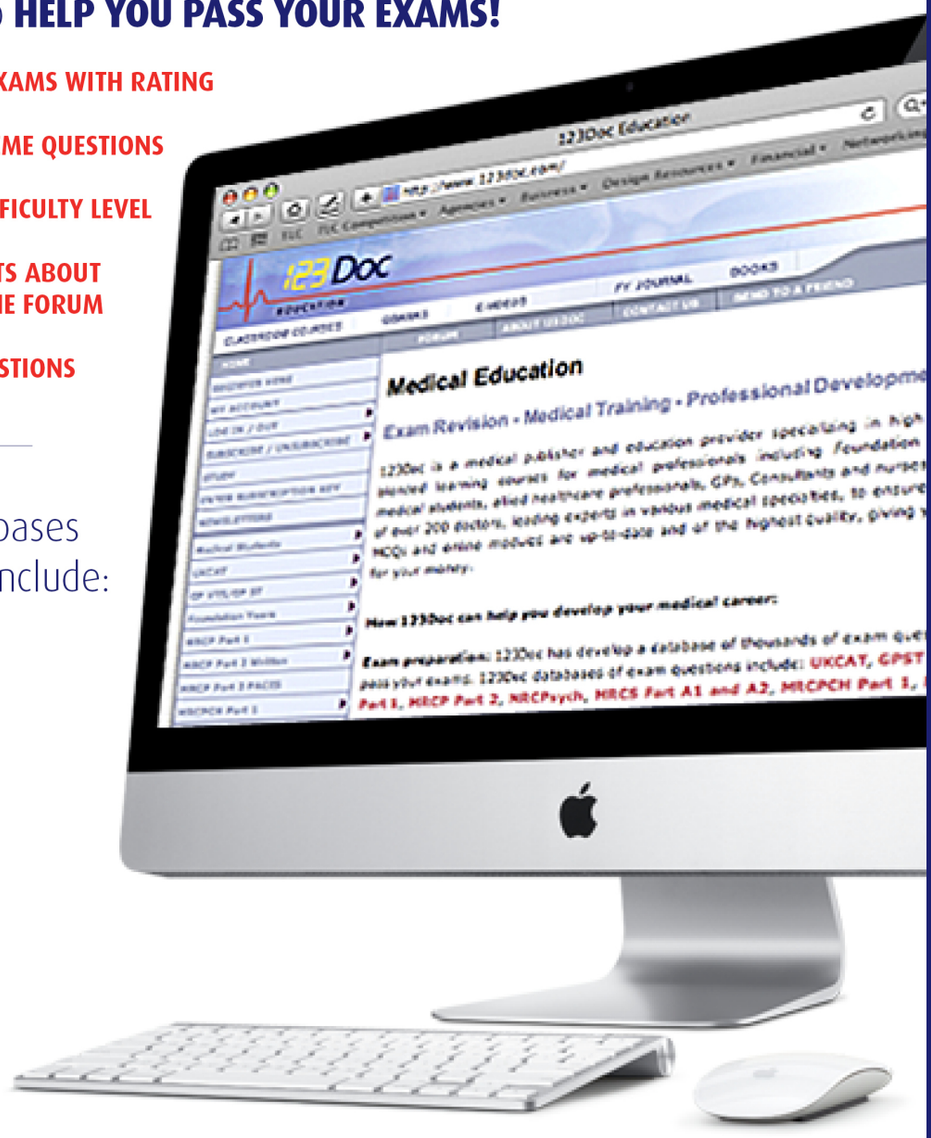

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