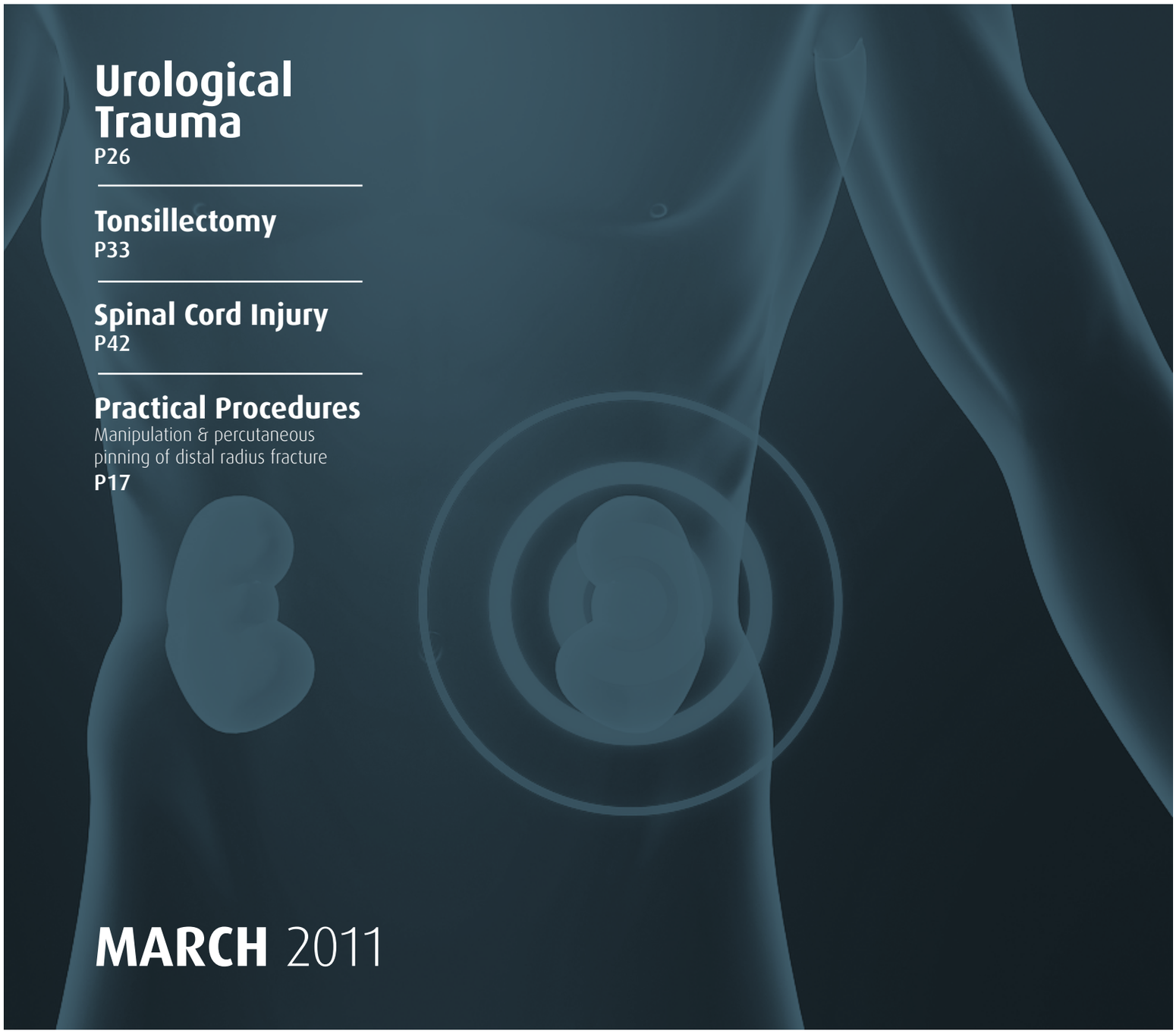
123 Doc EDUCATION

CORE SURGERY JOURNAL

Volume 1, Issue 3



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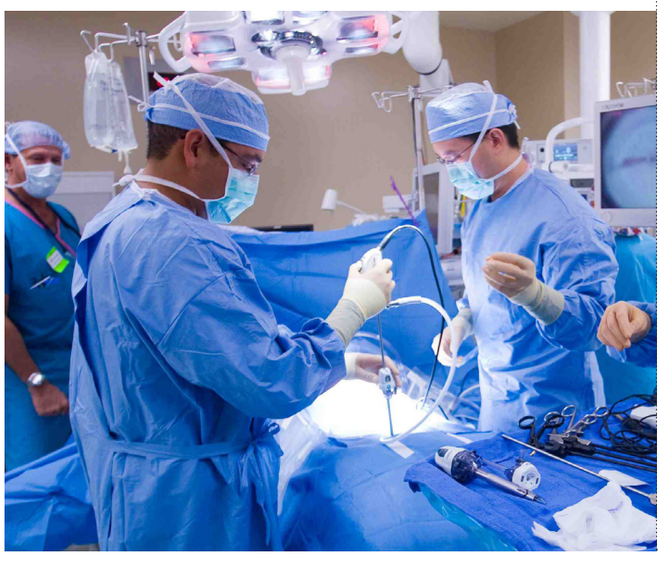

Consultant Reviewers

CORE SURGERY JOURNAL

Volume 1, Issue 3

Prospective Authors

Thank you for considering the submission of an article to 'Core Surgery'. This is a new journal aiming to educate and inform junior surgical trainees about relevant 'core' subject topics. Each issue will cover a topic from each of eight selected subspecialty fields; General Surgery, Orthopaedics and Trauma, Plastic Surgery, Ear Nose and Throat Surgery, Neurosurgery, Urology and Paediatric Surgery. 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. A list of core topics in each subspecialty has therefore been agreed by the editors based on a selection of key topics in the MRCS curriculum. Articles will be commissioned from this list and authors are advised to agree a topic before writing an article.

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

Submission of Manuscript

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

Submissions should follow the style of the Vancouver agreement detailed in the International Committee of Medical Journal Editors' revised 'Uniform Requirements for Manuscripts Submitted to Biomedical Journals: Writing and Editing for Biomedical Publication', as found at **http://www.ICMJE.org/**

References

All articles must be referenced appropriately. The Vancouver system of referencing should be used. References should be cited using superscript numerals in the order in which they appear. The list of references should reflect this order and names of journals should be abbreviated in the style used in Index Medicus **ftp://nlmpubs.nlm.nih.gov/online/journals/ljiweb.pdf.**

Copyright

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Format of Articles

Guidelines for the format of respective article types are as follows:

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

Audit

Articles should be 1000-1500 words long and of high quality. Completed audit cycles are strongly preferred as are audits which have led to guideline development.

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Review articles

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)

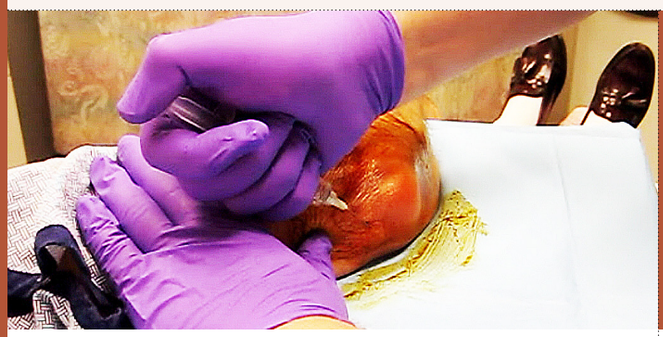
Please note that all articles should be submitted with five multiple choice questions (MCQs) or extended matching questions (EMQs) attached, in the style of the Member of the Royal College of Surgeons (MRCS) 'Part A' examination. These questions should have answers and brief teaching notes/discussion 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 junior surgical trainees. We wish you every success with your submission. Please contact the editorial team with any questions.

PREOPERATIVE SKIN PREPARATION

E Yeap & V Soon



The concept of antiseptics was introduced by Joseph Lister in 1867 when he advocated the use of carbolic acid to eradicate microbes. Almost 150 years on, antiseptics are now a part of the whole preoperative skin preparation process.
Back to Basics.

Abstract

The concept of antiseptics was introduced by Joseph Lister in 1867 when he advocated the use of carbolic acid to eradicate microbes. Almost 150 years on, antiseptics are now a part of the whole preoperative skin preparation process. Surgical site infections are a source of increased morbidity, hospital stay and financial burden as it composes up to 20% of all healthcare associated infections.

Care bundles comprising of various practices have been introduced in the aim of reducing surgical site infections and improving surgical outcomes. Such bundles include recommendations on antibiotic prophylaxis, hair removal, glucose control and temperature regulation.

Measures such as showering prior to surgery, adequate hair removal and choosing appropriate antibiotics can be employed in the preoperative phase. The choice of antiseptic and use of incise drapes aid in the maintenance of sterility of the operative field. The surgical trainee should have a thorough knowledge of methods to enhance the care of their patient.

Clinical Vignette

SK, a 32 year old gentleman, was brought to Casualty after sustaining an injury to his right leg in road traffic accident. He had lost control of his motorbike and skidded off the road, ending up in the field. After careful assessment by the casualty staff, his only injury is a Grade IIIa open fracture of his distal tibia and fibula. Being first on for orthopaedics, you are called to see him.

You perform an initial washout of the wound as it is contaminated with mud and grass, and apply an above knee backslab. You ensure that he is commenced on intravenous antibiotics as per local hospital guidelines, check his tetanus status and prepare him for theatre later that day. A few hours later, he is in theatre and you have been called to provide assistance. Your consultant has asked you to position the patient and prepare the skin. After positioning the patient and removing the backslab, you request that the patient's knee is shaved and another wash of the wound is performed. You inform the scrub nurse that you shall be using Betadine and alcohol to prep his skin. You also check with the anaesthetist that antibiotics have been given at time of induction prior to scrubbing up. Your consultant is pleased when he arrives, and allows you to perform parts of the surgery. The surgery goes smoothly, and the patient goes on to make a full recovery.

Introduction

Antisepsis is derived from the Greek word avri-anti, '"against" and ANTTTIKOC-septikos, "putrefactive". It is the general term used to describe substances applied to the skin/tissue to reduce the possibility of infection and sepsis. The use of antiseptics in surgical methods was introduced and led to a global revolution in surgical practice following the publication of the Antiseptic Principle of the Practice of surgery in 1867 by Joseph Lister[1]. In his paper, he advocated the use of carbolic acid as a method of ensuring that any microbes that are present are eradicated.

It is known that about 75% of nosocomial infections occur in surgical patients and it is imperative for a surgeon to first identify and recognise sources of wound contamination to reduce the morbidity of their patients[2]. The surgical procedure itself is carried out in an aseptic technique which includes the use of sterile instruments, gloved no touch technique in a clean environment with the surgical team adequately scrubbed.

Preoperatively direct inoculation is one of the first sources of wound contamination that can be prevented. This includes the patients' own skin flora or skin contamination, the surgeons' hands, contaminated instruments, and contaminated procedure or wound. Bacterial flora of the patient is usually the principle source of surgical wound infection and hence focal sources of sepsis should be treated prior to surgery. It is also good practice to consider delaying the surgery in patients with active infection. Surgical site infections (SSIs) have been shown to compose up to 20% of all of healthcare-associated infections[3]. At least 5% of patients undergoing a surgical procedure develop a surgical site infection[3]. SSIs are associated with increased morbidity and hospital stay which results in a considerable financial burden to healthcare providers. In addition, SSIs significantly affects the quality of life for the patients.

In order to improve post surgical outcome and reduce surgical site infections (SSI), SSI prevention bundles have been introduced. A 'care bundle' is a collection of interventions that may be applied to the management of a particular condition. The aim of a 'bundle' is to tie together best practices based on evidence into a cohesive unit that must be adhered to for all patients at every time. The objectives of surgical site infection prevention bundles are to optimise pre-operative care, minimising the risk of SSI and to ensure quality peri-operative care in the clinical area4. A SSI prevention bundle includes antibiotic prophylaxis, instructions on appropriate hair removal, adequate glucose control and monitoring of the patient's core body temperature to ensure normothermia[4].

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Preoperative phase

In the preoperative phase, there are three main recommendations - preoperative showering, hair removal and antibiotic prophylaxis.

Preoperative Showering

With regards to preoperative showering, one randomised controlled trial (RCT)[5] compared patients having a chlorhexidine detergent shower before elective surgery with patients having showers using detergent. This study did not find that chlorhexidine was associated with a statistically significant reduction in wound infection. Lynch, et al. concluded that preoperative whole body disinfection with a chlorhexidine detergent was not a cost-effective treatment for reducing wound infection, being more costly and showing no statistically significant clinical benefit[4]. Hence the current recommendation is that it is advisable for patients to shower or bathe using soap, either on the day before or on the day of surgery.

Hair Removal

The removal of hair may be necessary to adequately view or access the operative site and is sometimes undertaken because of a perceived increased risk of microbial contamination of the operative site from the presence of hair. However, micro-abrasions of the skin caused by shaving using razors may support the multiplication of bacteria, within the skin and on the skin surface, particularly if undertaken several hours prior to surgery. Therefore, when hair removal is indicated, the method used should minimise damage to the skin. Methods of hair removal include shaving using razors, clipping and depilatory cream. However there is no evidence that hair removal in general, influences the incidence of SSI, but it might be appropriate in some clinical circumstances[7]. If hair has to be removed, there is evidence from a review of three trials[8] (n=3193) that shows shaving using razors increases the risk of SSI (RR 2.02 95% CI 1.21 to 3.36) and the use of single use electric clippers are recommended. It is also recognized that electric clippers with single-use disposable heads are the most cost effective.

Antibiotic prophylaxis

Prophylactic antibiotics are recommended for clean surgery involving the placement of a prosthesis or implant, clean-contaminated and contaminated surgery[3]. It is not routinely used for clean non prosthetic uncomplicated surgery. They are usually given to the patient intravenously, close to the time of surgery. A single intravenous dose is routinely administered on starting anaesthesia or earlier if a tourniquet is used. If the duration of the operation performed is longer than the half-life of the antibiotics given, a repeat dose of prophylactic antibiotic is necessary. Common antibiotics chosen as prophylaxis are penicillin and cephalosporins[3]. It is imperative to reduce inappropriate use of antibiotics, inform the patient and check for allergies prior to administration of antibiotics to ensure optimal management. The choice of antibiotics should be influenced by local antibiotic formulary, the strength of the antibiotic used and C. Difficile diarrhoea. The use of prophylactic antibiotics also carries a risk of adverse drug reaction and increased prevalence of antibiotic resistant bacteria.

Intraoperative Phase

In the intraoperative phase, it is imperative to ensure and maintain the sterility of the operating field.

Incise drapes

Incise drapes are routine in some operations including orthopaedic and skin grafting surgery. These are adhesive films used to cover the skin at the site of the incision with the intention of minimising the contamination of the operative field by microorganisms colonising the skin of the patient around the operative site. A meta-analysis of five trials (n = 3082) comparing the effect of the use of incise drapes (without added antimicrobial properties) versus no use of incise drapes, showed statistically significant higher incidences of SSI events in the incise drape group9 (RR 1.23, 95% CI 1.02 to 1.48, p=0.05). Following the meta-analysis of eight trials (n=1113), there is evidence to suggest that there is no statistical difference in the risk of SSI between iodophor-impregnated incise drapes and no incise drapes9 (RR 1.03, 95% CI 0.66 to 1.60, p=0.89). Hence if an incise drape is required, it is recommended that an iodophor-impregnated drape is used unless the patient has an iodine allergy[3,9].

Skin antiseptics

Skin antiseptics are commonly used to reduce the number of microorganisms on the skin around the incision. Resident flora that reside in the crevices that are not readily removed by soap and water can be reduced by the use of antiseptics. Hence the most essential step in the intraoperative skin cleansing and preparation phase is the selection of the most appropriate antiseptic product. The efficacy, immediate action and persistence of the product are crucial and must also be balanced with the avoidance of tissue injury. It is imperative to remember that many skin antiseptics contain ingredients that can cause a direct or indirect injury to the surgical patient. Common direct injuries include skin irritation, ophthalmic damage, and even anaphylaxis. Indirect injuries can occur especially with alcoholic skin preparations which can ignite and cause burns to the patient or even fires in the operating room.

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Iodine

Iodine has been used as a skin disinfectant since 190510,[11]. It possesses good bactericidal properties against bacteria, fungi, viruses and protozoa. The Iodophors are preparations containing iodine complexed with a polymer (e.g Betadine®, Povidone-Iodine). These were synthesised in an attempt to reduce the incidence of skin sensitisation which occurs with free iodine in about 15% of patients[10]. The most commonly used form is Povidone-iodine (PVI). Povidone-iodine has an excellent immediate anti-microbial effect and has good local tolerability[12,13]. It does not cause skin irritation or pain but pooling of product should be avoided. This product is also effective against gram-positive and gram-negative bacteria, fungi and protozoa. With appropriate concentration and length of exposure time, iodophors are effective against spores of bacillus, clostridium and also mycobacterium[13]. However, its activity is reduced in the presence of blood, necrotic or purulent tissue. Another form of iodophor is infused with isopropyl alcohol which maybe be left on postoperatively for continued bactericidal effects, but like all alcohol products, it is flammable and may cause injury to the eyes, and ears. However, it is important to ensure that the patient is not allergic to iodine prior to any usage of any products containing iodine.

Chlorhexidine gluconate

Chlorhexidine gluconate (CHG) is a chemical antiseptic that is bactericidal to gram-positive but less effective with some gram-negative microbes[14]. It was introduced in 1954 and has been widely used in Europe since then[11]. Combining the broad-spectrum antibacterial activity of the Iodophors, this product has immediate, persistent and residual anti-microbial properties, with a strong tendency to bind the tissue which contributes to its extended anti-microbial action. However in higher concentration it can cause serious injuries to eyes and ears[12,14]. It is contraindicated for use in open wounds, on the face, head, ears, meninges and mucous membranes. The effectiveness of chlorhexidine, like iodophors, in the presence of blood, pus and soap is reduced[14].

Alcohol

Alcohol is a broad spectrum, fast acting antimicrobial, effective against most pathogenic bacteria except dried spores but is of limited use against fungi15. However, alcohol when added to other antiseptic solutions enhances their activity and extends its persistence (e.g. Povidone-iodine)[13]. Combination of iodophor and isopropyl alcohol results in an antiseptic with immediate efficacy that requires less time for application in comparison with typical iodophor preparations. With the combination of alcohol and CHG there is an improvement in the immediate anti-microbial properties which provides a superior clinical efficacy as a skin antiseptic agent. It is important to remember the dangers of using alcohol in conjunction with electrosurgery, especially under occlusive drapes where pooling can occur[16,17]. When a preservative such as zinc pyrithione (ZPT) is added to alcohol, its persistence is improved with a rapid reduction of resident and transient flora[13,18].

Summary

Reviewing the literature there has been no conclusive evidence to support the claim that one antiseptic solution is better than another. Hence the NICE guidelines recommend that the skin at the surgical site should be prepared immediately before incision using an antiseptic (aqueous or alcohol-based) preparation: povidone-iodine or chlorhexidine are most suitable. If diathermy is to be used, ensure that antiseptic skin preparations are dried by evaporation and pooling of alcohol-based preparations is avoided. However one should keep in mind that there are many antiseptic solutions which are selected according to surgeon preferences.

Surgical site infections are a significant cause of morbidity for patients; hence eradication of the greatest number of pathogenic bacteria should be the goal of surgical skin preparation. Antiseptic agents for skin disinfection must be carefully selected based on efficacy and patient safety. Hence it is important that surgical trainees should have a thorough knowledge of basic methods and products available to enhance the care of the surgical patient.

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MCQ questions

1. These are common direct injuries from skin antiseptics to the surgical patient except
a. skin irritation
b. ophthalmic damage
c. anaphylaxis
d. skin burns

2. Which of the following regarding iodine is true
a. has good bactericidal properties against bacteria, fungi and viruses
b. Povidone-iodine has an excellent immediate anti-microbial effect but poor local tolerability
c. iodophors are highly effective against spores of bacillus, clostridium and mycobacterium especially in presence of pus
d. free iodine causes skin sensitisation in 25% of patients

3. Which is the following is not part of the SSI prevention bundle
a. antibiotic prophylaxis
b. glucose control
c. skin antiseptics
d. temperature control

4. Which of the following is false regarding antibiotic prophylaxis
a. They should be given 60 minutes prior to the surgical procedure or on starting anaesthesia
b. Preferred choices include penicillin and cephalosporins
c. It is recommended for uncomplicated inguinal hernia repair
d. It is not routinely used for femoral popliteal bypass surgery

5. During the intraoperative phase, which of the following is false
a. Incise drapes should be used for all major abdominal surgery
b. The effectiveness of chlorhexidine in the presence soap is reduced
c. Alcohol is of limited use against fungi
d. When zinc pyrithione is added to alcohol, its persistence is improved

Answers

1. d **2. a** **3. c** **4.c** **5. a**

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CARPAL TUNNEL SYNDROME: A CASE-BASED DISCUSSION

M Rodrigues

Carpal Tunnel Syndrome: A Case-Based Discussion. Plastic and Reconstructive Surgery.

Case History

Mrs JB is a 48 year old woman. She has been referred to the orthopaedic clinic by her GP with a three month history of "tingling" affecting her right hand. On further questioning the paraesthesia occurs predominantly at night and she finds some relief by shaking her hand. Mrs JB cannot localise which fingers are affected. She denies any weakness and there are no symptoms out-with the hand. She does not experience any symptoms in her left hand. There is no history of trauma.

Her past medical history includes type 2 diabetes mellitus and asthma. She works as a secretary, is a non smoker and drinks 10-12 units per week. On examination the right hand is warm and well perfused. There is no muscle wasting in the hand. Power in the hand and other muscles of the right upper limb is 5/5, there is no sensory deficit and the reflexes are preserved. Mrs JB has a full range of movement in the right hand and wrist.

The symptoms are reproduced by tapping over the site of the median nerve at the carpal creases (Tinel's test) and by forced maximal flexion of the right wrist (Phalen's test). Examination of the neck, left upper limb and lower limbs is unremarkable.Having reviewed the history and examination findings, a diagnosis of carpal tunnel syndrome is made without any further investigations. After discussing the options, Mrs JB decided to try conservative management, opting for a splint at night.

Two months later Mrs JB returns to the orthopaedic clinic. The symptoms have worsened despite using a splint, with very early evidence of thenar wasting and mild weakness of thumb abduction. After further assessment the diagnosis remains unchanged. Mrs JB is now keen for surgical management.

Mrs JB undergoes an open surgical release of the transverse carpal ligament. She has an uneventful post-operative period and returns to work after four weeks. She is reviewed in clinic two month after the surgery. Her symptoms have resolved. There is no evidence of infection of the wound or bowstringing of the flexor tendons and she is discharged from the clinic.

Discussion

Carpal tunnel syndrome is the most common peripheral nerve compression syndrome. It has an estimated incidence of 100 per 100,000,[1,2] with the majority of patients being over 40 years of age. There is a marked female preponderance.

Carpal tunnel syndrome arises secondary to compression of the median nerve within the semi-rigid carpal tunnel. The tunnel contains the nine digital flexor tendons, as well as the median nerve; there is little free space. Therefore any process which increases the volume of the contents or reduces the volume of the tunnel can increase the pressure within the tunnel, leading to carpal tunnel syndrome.

Carpal tunnel syndrome can be both an acute and chronic phenomenon. Acutely it is often related to distal radius fractures, haemorrhage or infection[5,6]. The chronic version is by far the more commonly encountered type. The exact mechanisms involved are not fully understood, however, it is likely non-specific tenosynovitis plays an important role.[2]

Chronic carpal tunnel syndrome has been associated with many conditions (Table 1). These conditions increase the volume of the contents of the carpal tunnel by a variety of mechanisms, including inflammation (rheumatoid arthritis), oedema (hypothyroidism, pregnancy) and the formation of masses (ganglion, neuroma). Conditions that cause generalised neuropathies, such as diabetes and alcoholism, render the median nerve more sensitive to the effects of compression.

Category	Condition
Anatomic	Ganglion Neuroma Lipoma Myeloma
Neuropathic	Diabetes Alcoholism Amyloidosis
Inflammation	Tenosynovitis Rheumatoid arthritis Gout Scleroderma Systemic lupus erythematosus
Oedema	Pregnancy Hypothyroidism Obesity Haemodialysis

Table 1. Common conditions associated with chronic carpal tunnel syndrome[7]

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Nerve compression disrupts epineural blood flow, impairing axonal conduction. In the early stages these changes are reversible, as there is no histological damage to the nerve. However with time the neuronal ischaemia can cause permanent demyelination with target muscle atrophy.

The clinical features of carpal tunnel syndrome include paraesthesia, numbness, burning pain and muscle weakness. The differential diagnosis of carpal tunnel syndrome is varied (Table 2). It is important to take a targeted history and perform a thorough examination (from the neck to the fingers) to exclude the differentials.

Classically the sensory symptoms of carpal tunnel syndrome occur at night and involve the area of the hand supplied by the median nerve (namely the first three and a half digits). However the distribution of pain and paraesthesia is variable, with many patients reporting symptoms in all the digits. Some patients experience elbow, shoulder and even neck pain.

Motor involvement can result in thenar atrophy, with resultant weaknesses of thumb abduction and opposition. Other complaints include reduced finger strength, decreased manual dexterity and dropping objects.

The diagnosis of carpal tunnel syndrome is a contentious issue. Tinel's test, Phalen's test and carpal tunnel compression are clinical tests which have traditionally been used to diagnosis carpal tunnel syndrome. However the usefulness of these tests is questionable. A recent study comparing these tests in patients with nerve conduction proven carpal tunnel syndrome demonstrated the sensitivity of Tinel's, Phalen's and carpal tunnel compression tests was 30%, 47% and 46% respectively, with specificities of 65%, 17% and 25% respectively. Interestingly all three tests were more sensitive and specific for diagnosing tenosynovitis. Therefore some of the patients who have undergone surgical treatment for carpal tunnel syndrome based on these clinical tests may have benefited from medical rather than surgical therapy.

Nerve conduction studies are considered by some to be the gold standard for defining carpal tunnel syndrome. However approximately 1 in 6 people have evidence of median nerve mononeuropathy on nerve conduction studies but do not have any hand symptoms. Furthermore nerve conduction studies are not accurate for predicting which of these patients will develop carpal tunnel syndrome. In addition electrodiagnostic tests have a limited ability to predict which patients will benefit most from surgery compared with conservative treatments.

Condition	Distinguishing features
Cervical radiculopathy[14]	• Pain in the distribution of the involved nerve root (e.g. C6 or C7), paraesthesia predominantly distally. • Potentially reduced or absent biceps and/or brachioradialis reflexes. • Weakness of C6/C7 innervated muscles.
Thoracic outlet syndrome[15]	• Neurological symptoms (most commonly C8/T1 roots). • Pain involving the neck, shoulder, anterior chest wall. • Atrophy of forearm flexes and thenar muscles. • Venous congestion (arm swelling, cyanosis). • Digital and hand ischaemia.
Pronator teres syndrome[16]	• Pain in the median nerve distribution. • Tinel's sign in mid forearm. • Wasting of the thenar muscles plus the muscles supplied by the anterior interosseous branch of the median nerve (pronator quadratus, flexor digitorum profundus and flexor pollicis longus) may occur.
Ulnar neuropathy[17]	• Many patients cannot accurately describe the location of their numbness. • Weakness and wasting of ulnar innervated muscles. • Sensory changes in the ulnar distribution (medial one and a half digits plus medial side of the hand). • Positive elbow flexion test.
Generalised neuropathy	• Bilaterally symmetrical and widespread muscle weakness and sensory loss, starting peripherally • Progressive • History plus blood tests to identify cause

Table 2. Differential diagnosis of carpal tunnel syndrome

Treatment of carpal tunnel syndrome can be conservative or operative depending on aetiology and patient preference. For example only conservative measures are required for pregnancy related carpal tunnel syndrome, whereas surgical options will be needed if the cause is anatomical.

Conservative options include the use of splints, oral anti-inflammatory drugs and corticosteroid injections. Splints worn at night help maintain the wrist in a position which least compromises the median nerve, and significantly improves symptoms and function over a short term period. Oral diuretics and nonsteroidal anti-inflammatory drugs have no significant benefit compared to placebo in carpal tunnel syndrome. A two-week course of oral steroids can significantly improve symptoms.

Corticosteroids injected into the carpal tunnel can be an effective short term measure, and are more effective than oral steroids. Two injections versus one does not provide further clinical improvement.

Surgery has been shown to be more effective than splinting for the treatment of carpal tunnel syndrome at 3, 6, 12 and 18 months. Furthermore a recent randomised controlled trial demonstrated that in patients without denervation, surgical treatment leads to a better outcome than non-surgical intervention in terms of both symptoms and function at 12 months.

Surgical options include open and endoscopic decompression procedures. There is no good evidence to support one form of procedure over the other. Endoscopic procedures do not result in significantly better symptom relief in either the short or long term compared to open operations. However, endoscopic releases lead to earlier return to work and activities of daily living, on average by 6 days, compared with open procedures. The choice of operation should therefore be guided by the surgeon's and patient's preferences.

CARPAL TUNNEL SYNDROME: A CASE-BASED DISCUSSION

M Rodrigues

Post-operative complications include recurrent symptoms, pillar pain, bow-stinging of flexor tendons and infection. The common causes of surgical failure include the incomplete division of the carpal ligaments and scarring of the median nerve.

Multiple choice questions

(Select the one most appropriate answer)

1. The carpal tunnel contains all of the following except:
a. Tendon of flexor digitorum profundus
b. Median Nerve
c. Tendon of flexor pollicis longus
d. Tendon of flexor digitorum superficialis
e. Palmaris longus

2. Features of carpal tunnel syndrome include all of the following except:
a. Reduced sensation over the index finger
b. Positive Tinel's test
c. Pain in the forearm
d. Hypothenar wasting
e. Positive Phalen's test

3. Which of the following is not a recognised association of carpal tunnel syndrome:
a. Palmar ganglion
b. Rheumatoid arthritis
c. Pregnancy
d. Gout
e. Sudeck's atrophy

4. The following features are suggestive of a diagnosis other than carpal tunnel syndrome except:
a. Pain in the forearm
b. Reduced upper limb reflexes
c. Wasting of flexor digitorum profundus and flexor pollicis longus
d. Bilateral sensory loss and weakness progressing proximally
e. Digital ischaemia

5. In which of the following cases would conservative management be the most appropriate first option?
a. Carpal tunnel syndrome secondary to a ganglion
b. Evidence of wasting and weakness of the hand muscles innervated by the median nerve
c. Pregnancy
d. Carpal tunnel syndrome secondary to a non-reducing distal radius fracture
e. Carpal tunnel syndrome secondary to a neuroma

Answers

1. e **2. d** **3. e** **4. a** **5. c**

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COLONIC POLYPS

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Colonic Polyps.
General Surgery.

Abstract

Colonic polyps are a common finding in the lumen of the bowel. Colorectal carcinoma is the second commonest cause of cancer related death in the UK, hence surveillance and management of colonic polyps has become a significant public health issue to reduce the risk of death from colorectal carcinoma. There two major types of colonic polyps non-neoplastic and neoplastic, which can be further classified as flat and pedunculated. The gold standard for diagnosis of colonic polyps is via colonoscopy. Other methods include barium enema, faecal occult blood and CT colonography. The management of polyps depends on the size, type and size. This can range from electrocautery to bowel resection. Patients are followed up according to British Society of Gastroenterology guidelines.

Introduction

Colonic polyps are a common finding in the lumen of the bowel. Studies of autopsies(1) and screening colonoscopies(2) suggest that that the prevalence of colonic polyps is approximately 30-40% in people over the age of 60. The majority of resected polyps (70-80%) are found to be adenomas. There is a well documented relationship between polyps and colorectal carcinoma with an estimated 95% of colorectal carcinomas arising from benign- neoplastic adenomas.(2) Colorectal carcinoma is the second commonest cause of cancer related death in the UK, hence surveillance and management of colonic polyps has become a significant public health issue to reduce the risk of death from colorectal carcinoma.

Types

There are two major types of colonic polyps: non-neoplastic (hyperplastic, inflammatory and hamartomatous) and neoplastic (benign adenomas and malignant adenocarcinomas). In addition to histological features a polyp can be classified as flat (sessile) and pedunculated (has a stalk). Inflammatory and hyperplastic polyps have no malignant potential and do not require further intervention. Hamartomatous polyps do not have a malignant potential except those associated with Peutz-Jeghers Syndrome and Juvenile Polyposis. These patients require more aggressive intervention and surveillance.

Neoplastic adenomas are further classified by the World Health Organisation depending on the presence and volume of villous tissue in to three classes:

- Tubular (65%)
- Tubulovillous(25%)
- Villous (10%)

In addition, some degree of dysplasia exists within adenomas and they can also be classified as low grade or high grade dysplasia. The risk of malignancy increases with patient age, polyp size, degree of epithelial dysplasia and villous component.(3)

Symptoms

The majority of polyps are asymptomatic. The introduction of the NHS Bowel Cancer Screening Programme has increased the number of patients presenting as a result of a positive faecal occult blood test. In addition, asymptomatic patients can enter the surveillance programme as a result of screening colonoscopy/flexible sigmoidoscopy, barium enema and CT colonography.

Symptomatic patients may present with:

- Lower GI bleeding, ranging from iron deficient anaemia to frank rectal bleeding. However, the blood is often mixed with the stool and not just on the toilet paper.
- Passing mucus from the rectum in low rectal polyps
- Change in bowel habit, especially profuse watery diarrhoea in large villous polyps
- Abdominal pain
- Tenesmus

Diagnosis

There are many methods available to diagnose polyps. Colonoscopy is the gold standard as the whole colon can be visualised and any polyps biopsied and/or removed and therapy. Current guidelines from the NHS bowel cancer screening recommend that patients who test positive on faecal occult blood testing should undergo colonoscopy(5).

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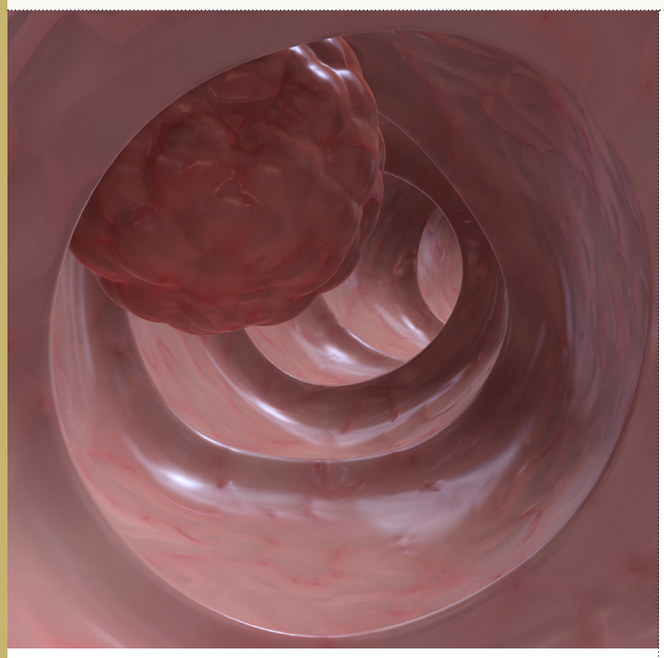

However, colonoscopy is an invasive procedures with risks (see box below) and requires a skilled operator. It has been estimated up to 25-30% of small adenomas and 6-12% of larger adenomas are missed(5) at colonoscopy. Given that 50% of patients will have a second adenomatous polyp at the time of initial colonoscopy, it is important that after inadequate or incomplete examinations either a repeat colonoscopy or another mode of imaging, such as barium enema. The choice of investigation depends on the patient's age, co-morbidities, difficulty of the examination and potential risks of repeating the colonoscopy. A randomised control trial reported an accuracy of 94% and 67% for diagnosing polyps for colonoscopy and barium enema respectively. (7) This observation has more recently been re-enforced by the 'National Polyp Study' which showed barium enema missed 52% of polyps that were <1cm during post polypectomy surveillance.

Other standard methods are faecal occult blood testing (although has low sensitivity for adenomas), sigmoidoscopy and double contrast barium enema. CT colonography is a modality which is becoming more common in practice. The advantages are shorter acquisition time, ability to visualise the whole colon and no need for sedation. Disadvantages are exposure to radiation, difficulty in detecting flat lesions and further intervention if lesions are discovered. It is especially useful in evaluating the colon in cases when an optical colonoscopy is either incomplete or not practical (e.g. significant co-morbidities). One study showed the per-patient sensitivity of CT colonography and optical colonoscopy for adenomas ≥10 mm and ≥6 mm to be similar (87.5% vs 93.8% and 92.3% vs 88.7%)(6).However, this decreases significantly for lesions <6mm. Currently evidence does not support its use in routine clinical practice.

Management

The majority of polyps are removed during colonoscopy using electrocautery techniques. Patients will require bowel preparation before colonoscopy to ensure maximum visualisation of the polyps and complete resection. Colonoscopy polypectomy has an overall complication rate of 1-2% (see box).

Colonoscopy complications:
- bleeding
- free perforation of bowel
- microperforation
- electrocautery burn
- splenic capsular tear
- avulsion of mesenteric blood vessel
- pneumatosis cystoides intestinalis

Most small pedunculated polyps can be removed via snare polypectemy using electrocautery. Small sessile polyps < 1cm can be resected using hot /cold biopsy (with or without cautery), hot/cold minisnare or cold biopsy followed by fulguration. It is important to excise all the tissue to reduce further risk form colorectal cancer, however polyps however polpys <0.5cm can be treated with biopsy and fulgeration alone.

Large polyps (>2cm) have a higher malignant potential and are more likely contain villous material. They have a higher recurrence rate and are less likely to be fully excised during initial resection. It is essential the patient undergoes further colonoscopy after 3-6 months to determine if resection was complete. Patients may need to undergo surgical resection if 2-3 attempts of resection via colonoscopy are unsuccessful. During repeated surveillance of an area it is useful to tattoo the polypectomy site to aid relocation during colonoscopy or to locate the section if it needs to be surgically resected.

Endoscopic resection is the definitive treatment for benign adenomatous polyps and pedunculated polyps containing invasive carcinoma in the presence of favourable prognostic factors (no lymphatic/vascular spread, clear margin and well-differentiated). Those patients with carcinoma will need a follow-up colonoscopy within 3 months to check for residual disease or recurrence. For patients with unfavourable prognostic factors further investigation maybe needed to stage the carcinoma (CT and/or endoscopic USS) followed by definitive surgical resection of the affected section of bowel.

Patients with unresectable polyps will need to undergo surgical resection following the principles of colorectal surgery, as they are considered high risk. Transanal endoscopic microsurgery maybe an option for patients with endoscopically unresectable polyps of the upper rectum in specialist centres.

Patients with high risk genetic disorders, such as Familial Adenomatous Polyposis, Hereditary Non-Polyposis colorectal cancer and Peutz-Jeghers syndrome will most likely need to undergo prophylactic surgery. In addition, they should be referred to a regional genetics centre for assessment, genetic counselling and mutation analysis of relevant genes where appropriate.

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Surveillance

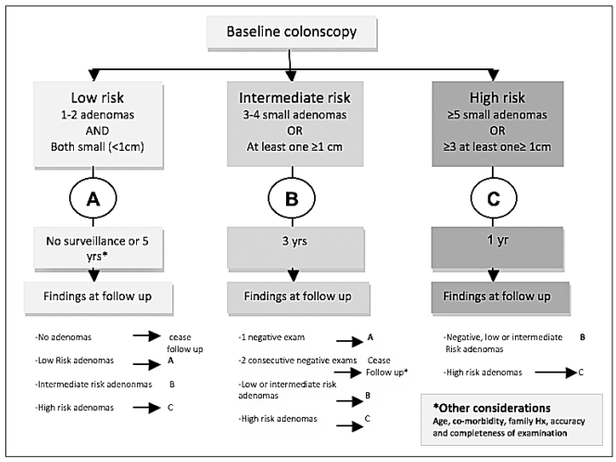
The purpose of post polypectomy surveillance is to detect and resect synchronous adenomas missed during the initial colonoscopy and all subsequent metachronous advanced adenomas, before they become malignant .A large American prospective study observed a 70-90% lower than expected incidence of colorectal cancer in patients undergoing surveillance when compared with 3 reference populations(3).

The British Society of Gastroenterology published guidelines on adenoma surveillance in 2002, which were updated in 2009. After initial baseline colonoscopy patients are divided into low, intermediate and high risk groups depending on the number and size of adenomas. This dictates the interval to the first follow up.

The following has been advised, which has been summarised in the diagram below(5):

- Patients with only one or two small (<1cm) adenomas are at low risk, and need no colonoscopic surveillance or 5 yearly until one negative examination then cease surveillance.
- Patients with three or four adenomas or at least one adenoma ≥1 cm are at intermediate risk and should be screened 3-yearly until two consecutive examinations are negative.
- If either ≥ five adenomas, or ≥ three adenomas at least one of which is ≥1 cm, the patient is at high risk and an extra examination should be undertaken at 12 months before returning to 3 yearly surveillance.It has been observed 9% of patients with >3 adenomas and 5% of patients with an adenoma >1cm removed at initial colonoscopy developed an advanced adenoma by their first follow up compared with 1% of patients with one adenoma.(3)
- Patients can be offered surveillance until 75 years and thereafter continue depending on relative cancer risk.
- Patients with failed colonoscopy should undergo repeat colonoscopy or an alternative complete colonic examination.
- The site of large site of large sessile adenomas removed piecemeal should be re-examined at 2-3 months. Small areas of residual polyp can be endoscopically treated, with a further re-examination in 2-3 months. If there is any residual polyp at this point surgical resection is required. If there is complete healing of the resection site, then there should be a colonoscopy at 1 year before returning to 3-yearly surveillance.
- Patients with a family history of familial adenomatous polyposis undergo varied surveillance depending on their risk. Mutation carriers have annual flexible sigmoidoscopy and alternating colonoscopy from diagnosis till polyp load indicates surgery. Those with 50% risk should have annual surveillance form age 13-15 until age 30 years and every 3-5 years until 60 years.
- Patients with a family history of hereditary non-polyposis colorectal cancer should commence surveillance colonoscopy at age 25 every 18 months until age 70-75. A positive family history is classified according to the modified Amsterdam criteria. These criteria comprise: 3 or more family members affected by colorectal cancer or HNPCC syndrome cancer (endometrium, small bowel, ureter or renal pelvis) in >2 generations; at least one affected relative must be no more than 50 years at diagnosis and one of the affected relatives must be a first-degree relative of the other two, while FAP must be excluded(9). If a causative mutation is identified in a relative and the patient is a non-carrier, surveillance should cease and measures to general population risk should be applied.
- Patients with Peutz-Jeghers syndrome are recommended to have 2-yearly surveillance colonoscopies from the age of 25 years.

Surveillance following adenoma removal



Case study

A 63 year old lady presented to her GP with intermittent rectal bleeding. The bleeding was noted to be both mixed in with the stool and on the toilet paper. She denied any change in bowel habit, abdominal pain or recent weight loss. There was no family history of inflammatory bowel disease or colorectal cancer. Abdominal examination was unremarkable, but she did have evident haemorrhoids on PR examination. She was subsequently given Anusol HC for her haemorrhoids. She returned to her GP several times with rectal bleeding, eventually she was referred to a colorectal surgeon for further investigation.

Blood tests revealed a microcytic anaemia, with normal U&E and LFT. A subsequent colonoscopy showed 2 small pedunculated polyps and 1 larger(1.5 cm) polyp within the sigmoid colon. All three polyps were removed with a snare during the colonoscopy and sent for histology. The two smaller polyps proved to be well differentiated tubular polyp with low dysplasia. However, the larger polyp showed tubulovillous histology with moderate dysplasia.

She was categorised as being at high risk of developing colorectal and scheduled for a further colonoscopy in 1 year time.

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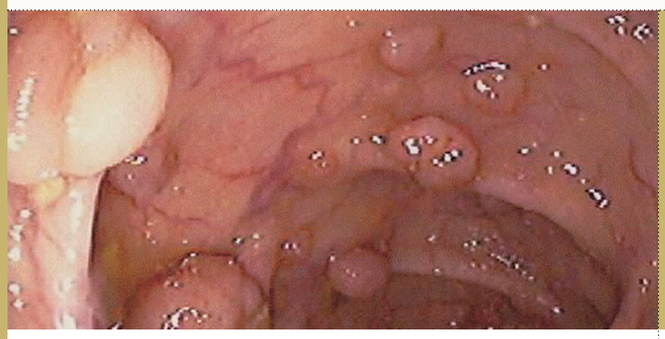

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MCQ Questions

1. A 60 yr old lady was found to have 2 adenomas at initial colonoscopy and one of which measured 1.6 cm. According to the British Society of Gastroenterology which risk category should she be placed in for surveillance and how often should she be followed up:
a) High risk and yearly follow up
b) Low risk and 3 yearly follow up
c) Intermediate and 5 yearly follow up
d) Intermediate risk and 3 yearly follow up

2. Which of the following is NOT a complication of colonoscopy:
a) Avulsion of mesenteric blood vessel
b) Bowel perforation
c) Nerve damage
d) Splenic capsular tear

3. A patient in the intermediate risk surveillance has subsequently had two consequent negative colonoscopies. How should they be further managed?

a) Cease follow up
b) Follow low risk surveillance protocol
c) 5 yearly follow up
d) 3 yearly follow up

4. At what age should a patient who has a family history of Familial Adenomatous Polyposis and a 50% risk commence annual surveillance?
a) 18-20
b) 13-15
c) 15-18
d) 20-25

5. Which of the following is NOT a method for diagnosing colonic polyps?
a) CT colonography
b) Barium enema
c) Barium meal
d) Optical colonoscopy
e) Faecal occult blood

Answers

1. D 2. C 3. A 4. B 5. C

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PRACTICAL PROCEDURES: MANIPULATION AND PERCUTANEOUS PINNING OF DISTAL RADIUS FRACTURES

NG Farrar, J Kurian

Practical Procedures: Manipulation and percutaneous pinning of distal radius fractures. Trauma & Orthopaedic Surgery.

History and Pathology

Abraham Colles, Professor of surgery at the Royal College of Surgeons in Dublin described the features of a typical distal radius fracture in his classic paper in 1814[1]. His findings were based purely on clinical observation as it wasn't until 1895 that Roentgen discovered x-rays. The description of the deformity is in beautiful detail and his method of closed treatment discussed. Colles felt that despite the deformity, patients would invariably go on to regain good function, "One consolation only remains, that the limb will at some remote period again enjoy perfect freedom in all its motions and be completely exempt from pain: the deformity, however, will remain undiminished through life."

A basic knowledge of the normal anatomy is essential. In the antero-posterior plane the radius will typically exhibit an inclination of 22 degrees and the tip of styloid process will be 11 millimeters distal to the distal ulnar articular surface (figure 1A). In the lateral plane, the radius will exhibit an 11 degree volar tilt (figure 1B). Typically a distal radius fracture will result in loss of these features, length, radial inclination and volar tilt.

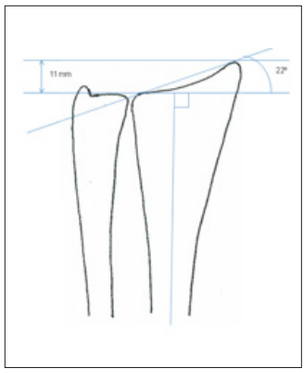

Figure 1A

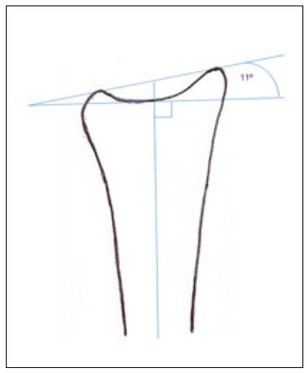

Figure 1B

Despite Colles' observations that results are always favourable, there are many patients with less satisfactory results. There is some evidence that radiological malunion results in poor function and therefore we should strive to correct the deformity where possible[2]. There is little high quality evidence to separate the different treatment methods and percutaneous pinning remains as a valuable option, with very favourable results reported in case series[3].

Indications

Extra-articular fractures

Simple intra-articular fractures

As a general principle, the anatomy of the distal radius should be restored as close to normal as possible, but it is difficult quantify what equates to an acceptable deformity because of a combination of variations in radiographic projections, inter and intra observer variability in observation, and a lack of definitive evidence.

Biomechanical studies have demonstrated that increased dorsal tilt increases the load borne by the distal ulna articulation4 and that loss of radial inclination increases the stress across the lunate fossa of the distal radius5. In intra-articular fractures, a step off in the joint surface of greater than 1mm increases the incidence of late radiographic features of arthrosis, although this doesn't necessarily equate to a poor clinical outcome6. Patients have to be managed on an individual basis, but as a general guide what represents unacceptable radiographic position5:

More than 5mm radial shortening

Radial inclination of less than 15º

More than 15º dorsal tilt.

Contra-indications

Volar displaced fractures (more appropriately managed with a volar buttressing plate)

Significant intra-articular comminution

Significant dorsal metaphyseal comminution

Gaining Informed Consent

It should be explained to your patient that the aim is to restore the normal anatomy and to the preserve the function and movement of their wrist. A general or regional anaesthetic technique will be required.

PRACTICAL PROCEDURES: MANIPULATION AND PERCUTANEOUS PINNING OF DISTAL RADIUS FRACTURES

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Patients should be aware of immediate complications such as median nerve compression. Any symptoms or signs of this should be picked up pre-operatively and if so then your patient should also be consented for a carpal tunnel decompression as an additional procedure. Other immediate complications include skin damage from manipulation (especially elderly patients) and compartment syndrome (very rare). Significant bleeding is also rare.

Early complications can include problems with the cast, such as pressure points and compartment syndrome (appropriate cast advice should be provided). Loss of reduction should be mentioned, as should the possibility of infection. Infection can occur and is usually superficial at the pin sites. Carpal tunnel syndrome and tendon rupture can occur early.

Late complications can include carpal tunnel syndrome, stiffness, mal-union, delayed or non-union, rupture of extensor pollicis longus, chronic regional pain syndrome and neuroma formation (if the superficial branch of the radial nerve is injured).

Equipment Required

Operating table with radiolucent arm board
Image intensifier
Basic digital instrument tray
Power drill with K-wire driver
1.6 mm single ended K-wires

Patient Positioning and Anaesthetic points

Patient is positioned supine with the arm resting on the arm board. The image intensifier is on the same side and it should be checked that there are no impediments to gaining good images. The operating surgeon has a stool positioned in between the arm and the patient's body with the instruments along side. First assistant will have a stool on the opposite side of the arm board at the head end of the table.

General anaesthesia, brachial plexus block and intra-venous regional block (Bier's) can all be safely employed.

Draping/Sterile Field Preparation

A tourniquet is not normally required. The skin is prepared with an antiseptic solution (aqueous/alcoholic povidone-iodine or chlorhexidine) and the extremity is draped to allow free elbow motion. Sterile drapes should also be placed over the image intensifier.

Surgical Technique

Initially a closed reduction manoeuvre is performed. The surgeon applies traction by grasping the thumb and hand, whilst the assistant provides counter traction proximally. After a few minutes of gentle, progressive traction the main fracture fragments should dis-impact. Now, whilst grasping the wrist from the radial side to maintain traction the surgeon's thumbs should be applied to the dorsal side of the radius on either side of the fracture, before increasing the dorsal deformity. This should free any remaining impaction on the dorsal side. At this point the deformity can be corrected by manipulating the distal fragment in a palmar and ulnar direction and then pronating the forearm to lock the fracture in place. The image intensifier can now be used to check the reduction in both the antero-posterior and lateral planes by simply rotating the forearm by 90 degrees. In some cases it can be difficult to maintain the length of the reduction by this method and the assistant would have to maintain traction and the initial reduction manoeuvre whilst the surgeon inserts the first wire.

Wires can be inserted using either an extra-focal pinning (interfragmentary) pinning technique, in which the wires cross the fracture site, or an intra-focal pinning technique, where wires are introduced into the fracture site. Intra-focal pinning is often referred to as Kapandji technique[7].

In the extra-focal technique, it is easiest to first introduce a wire through the radial styloid to maintain the length of the reduction and the radial inclination. A small incision is required just distal to the tip of the radial styloid and a surgical clip or scissors can be used to bluntly dissect onto the bone. This reduces the chances of damaging the superficial branch of the radial nerve. The assistant stabilised the forearm by grasping the thumb and at the elbow, whilst the wire is introduced into the tip of the radial styloid (figure 2A).

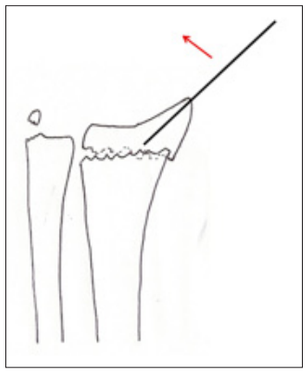

Figure 2A

Once through the first cortex, the wire can be advanced to the level of the fracture site, before levering distally to help restore the radial inclination and then advancing the wire through the far cortex (figure 2B).

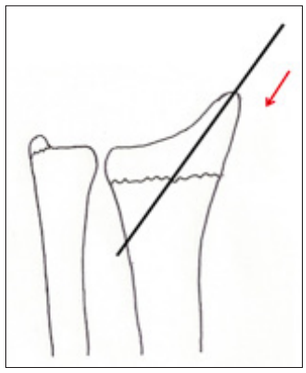

Figure 2B

PRACTICAL PROCEDURES: MANIPULATION AND PERCUTANEOUS PINNING OF DISTAL RADIUS FRACTURES

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A second wire can be introduced through Lister's tubercle on the dorsum, again with an incision just distal to this, before introducing the wire through the first cortex and using it as a lever to help restore the palmar tilt before advancing through the far cortex (figures 3A and B).

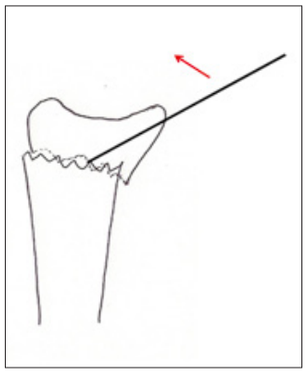


Figure 3A

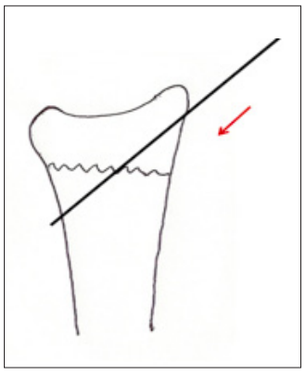
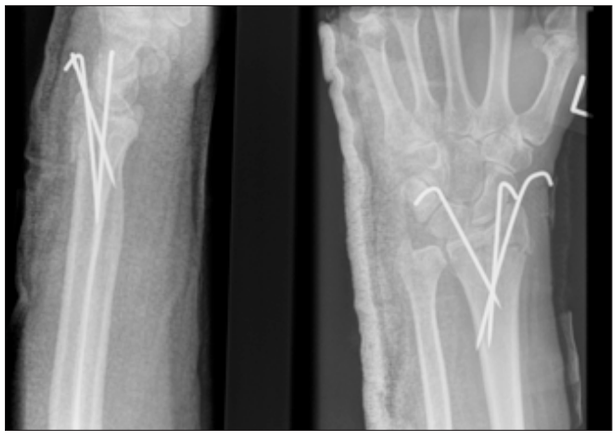


Figure3B

A third wire can be used for additional stability and be introduced through the dorso-ulnar corner of the distal radius. The wires should cross proximal to the fracture site to aid stability. Picture 1 illustrates how a 3 wire extra-focal technique can control the fragments in a simple intra-articular fracture.



The intra-focal pinning technique was originally described by Kapandji, in which 2 wires were introduced into the fracture site from the dorsal side and used as a lever to buttress the distal fragment, before being advanced through the far cortex (figures 4A and B). An additional wire can be introduced into the fracture site from the radial side in a similar fashion, or using an extra-focal technique.

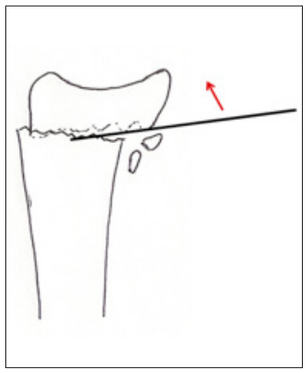


Figure 4A

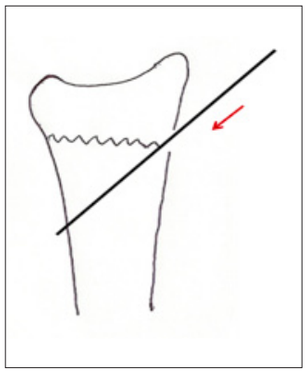


Figure 4B

Check x-rays should now be taken using the image intensifier. The pin sites should be checked and the incisions extended distally if necessary to avoid pressure on the skin, which could increase the chances of infection. The wires are bent and cut and the pin sites dressed with paraffin gauze, before applying a short arm back-slab.

Post operative management

The arm is elevated initially in a Bradford sling, then a high arm sling once mobile. Observations of the circulation and neurological status are monitored. Follow up radiographs are obtained at 1 and 4 weeks. If satisfactory at one week, the plaster is completed. At week 4, the wires can be removed if there is evidence of fracture healing, before reapplying a well moulded Colles cast for a further 2 weeks. At this point the patient is examined for signs of clinical union, the function of extensor pollicis longus is checked and hand therapy initiated.

Management of complications

If there are paraesthesiae or pain in the distribution of the median nerve then the hand should be elevated and the dressings/backslab should be released if tight. Regular observations are taken and if the symptoms do not settle, a carpal tunnel decompression is performed.

Pin site infection may require a course of antibiotics and sometimes removal of the wires.

Any signs of possible chronic regional pain syndrome should be managed with early, aggressive hand therapy.

Symptomatic malunion may require a corrective osteotomy and internal fixation with a plate. This can be performed using a volar or dorsal approach.

Rupture of the extensor pollicis longus tendon can be effectively managed by transferring the extensor indicis tendon to its distal remnant.

PRACTICAL PROCEDURES: MANIPULATION AND PERCUTANEOUS PINNING OF DISTAL RADIUS FRACTURES

NG Farrar, J Kurian

Reference

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EMQs

1. Which of the following is not an anatomical feature of the distal radius?
A: Sigmoid notch
B: Lunate fossa
C: Lister's tubercle
D: Insertion of brachioradialis
E: Radial attachment of the transverse carpal ligament

2. Which structure is not routinely exposed in the volar radial approach for the open reduction and internal fixation of distal radius fractures?
A: Median nerve
B: Flexor carpi radialis
C: Radial artery
D: Insertion of brachioradialis
E: Pronator quadratus

3. How many dorsal extensor compartments are there at the wrist?
A: 7
B: 3
C: 5
D: 6
E: 4

EMQs Answers

1. Answer: E
The transverse carpal ligament forms the roof of the carpal tunnel. It's radial attachment is to the scaphoid tubercle and trapezial tuberosity. Ulnarly it attaches to the hook of the hamate and to the pisiform.

2. Answer: A
The approach is through the bed of the flexor carpi radialis tendon sheath. The tendon is retracted ulnarward to protect the median nerve, which is not routinely explored.

3. Answer: D.
There are 6 dorsal compartments. From radial to ulnar, the 1st doral compartment contains EPB and APL, the 2nd dorsal compartment contains ECRB and ECRL, the 3rd dorsal compartment contains EPL, the 4th contains EDC and EIP, the 5th contains EDM and the 6th contains ECU.

MCQs

1. Eponymous names referring to distal radius fractures include:
A: Davies'
B: Colles'
C: Smith's
D: Pott's
E: Barton's

2. Indications for the percutaneous pinning of distal radius fractures include:
A: Fractures with significant articular surface comminution
B: Extra-articular fractures
C: Malunited fractures
D: Simple intra-articular fractures
E: Fractures with significant dorsal metaphyseal comminution

MCQs Answers

1. Answers:
A: F B: T C: T D: F E: T

2. Answers:
A: F B: T C: F D: T E: F

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ATRIAL FIBRILLATION: A COMMON COMPLICATION POST-CARDIAC SURGERY

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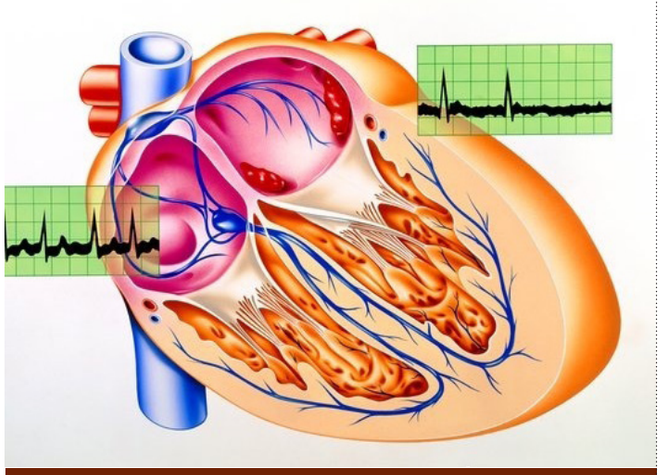

Atrial fibrillation: a common complication post-cardiac surgery. Cardiothoracic Surgery.

Introduction

A 76 year old gentleman undergoes triple vessel coronary artery bypass graft (CABG) surgery and is stepped down to the cardiothoracic ward post-operatively. His background includes diet-controlled diabetes and hypertension, in addition to his ischaemic heart disease. His post-operative recovery is uneventful until day two, when telemetry shows atrial fibrillation (AF) at a rate of 130 beats per minute.

Cardiac surgery results in significant insult to the cardio-respiratory system, and the development of arrhythmia is a common post-operative feature. Atrial fibrillation is most commonly associated; a recent prospective study revealed an incidence of 32.2% following CABG surgery[1]. Atrial flutter and ventricular tachyarrhythmia are less frequent, and when encountered, they warrant management as per Advanced Life Support (ALS) guidelines[2]. This article will focus on atrial fibrillation; the reader is referred to separate guidance for further details of other arrhythmias.

Atrial fibrillation is associated with a variety of complications, which include congestive cardiac failure (CCF), stroke and acute kidney injury (AKI); these contribute to a 9.7% overall increase in mortality[3]. Additionally, the presence of post-operative AF is associated with a median of two further days in hospital and longer stays in intensive care, as well as increased rates of re-hospitalisation[3] and healthcare expenditure4. It has also been reported that a significantly higher proportion of patients with AF are discharged to extended care facilities than those with no post-operative dysrhythmia[2].

This article will highlight the risk factors associated with occurrence of atrial fibrillation after cardiac surgery, in the context of a case vignette. There will also be focused discussion on prophylaxis and acute management, which may include rate or rhythm control.

Risk factors

Several factors have been linked with the development of post-operative AF (Table 1). Pre-operative associations include age: in one multi-centre study, every ten year increase in age was associated with a 75% increase in the odds of developing AF[1]. This is postulated to be related to degenerative changes in the atrial substrate, such as connective tissue remodelling, atrial dilatation and altered electrical conduction. Similarly, the risk has been found to increase in association with disturbance in left heart structure and function. In one study, increased left atrial (LA) diameter and reduced LA ejection fraction on pre-operative echocardiography were associated with AF[5], whilst in another cohort, LA volume was a risk factor[6]. Leung et al also found that post-operative left ventricular (LV) diastolic dysfunction was predictive of AF in a multivariate analysis[5]. Along similar lines, higher pre-operative plasma levels of B-type natriuretic peptide have been found in patients developing post-op AF, though the retrospective design of this study may limit the applicability of these findings[7]. Previous AF has also been implicated, as has the presence of other co-morbidities such as chronic obstructive pulmonary disease (COPD), congestive cardiac failure (CCF) and peripheral vascular disease (PVD)[1].

Further insight into the pathogenetic mechanisms of post-operative AF can be inferred from the response to cardiac drug withdrawal. For example, Mathew et al showed that discontinuation of beta blocker therapy was a risk factor for AF[1]. There is a suggestion that over-activation of the sympathetic nervous system or a heightened response to adrenergic stimulation can predispose to AF[8], and this may explain the potentially protective role of beta blockers. Similar effects have been observed with angiotensin converting enzyme inhibitor (ACEI) withdrawal; the protective effect of these agents has been postulated to relate to reduced angiotensin-mediated atrial fibrosis, a potentially arrhythmogenic alteration in the myocardial substrate[9].

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Intra-operative factors may also have an impact on AF risk. Firstly, the specific type of surgery can be important, with higher incidence after valve surgery than CABG[10], and lower rates following heart transplantation[11]. This may relate to increased left atrial pressure and size as well as surgical trauma during valvular operations[12]. Prolonged aortic cross-clamp time and duration of cardiopulmonary bypass have also been implicated[10], and two meta-analyses have suggested reduced occurrence of AF in patients undergoing off-pump CABG[13,14]. The bypass process presents significant stress to the heart, including a degree of reperfusion injury and inflammation. Histological evidence of inflammatory atrial infiltrates[15] and raised serum acute phase reactants such as C-reactive protein (CRP)[16] have been documented in patients with atrial fibrillation (albeit outwith the context of cardiac surgery), suggesting a potential role for atrial inflammation in its pathogenesis. Furthermore, the use of non-steroidal anti-inflammatory drugs (NSAIDs) was found to reduce the incidence of AF in a surgical population[1].

Pre-operative	Peri-operative	Post-operative
Increased age	Type of surgery	Intra-aortic balloon pump
Male sex	Bicaval cannulation	Q-wave MI
Co-morbidities	Pulmonary vein stenting	Pericarditis
Left atrial enlargement	Volume and type of cardioplegia	Hypokalaemia
Left ventricular hypertrophy	Duration of aortic cross-clamp	Hypomagnesaemia
Previous atrial fibrillation	Duration of bypass	Red cell transfusion
Withdrawal of beta-blocker or ACE inhibitor	Myocardial temperature	Respiratory compromise

Table 1: Risk factors associated with post-operative atrial fibrillation. (MI = myocardial infarction; ACE = angiotensin converting enzyme).

Assessment reveals that the patient has intermittent palpitations. Examination is otherwise unremarkable, with a blood pressure of 140/85 mmHg and urine output of 40ml/hr. Biochemistry reveals a potassium of 4.4 millimoles/litre, but the remainder of the electrolytes are normal. On review of his prescription chart, it is noted that bisoprolol and ramipril were discontinued the day before his surgery and have not yet been restarted.

Acute Management

Acute management of post-operative AF is the same as that of any other dysrhythmia: particular attention should be paid to airway, breathing and circulation (ABC) in the first instance. Immediate electrical or chemical cardioversion should be considered in unstable patients, i.e. those with adverse features such as chest pain, acute heart failure, reduced Glasgow Coma Scale (GCS) score, heart rate over 150/minute or hypotension. For more detailed guidance, the reader is referred to ALS guidelines[2]. The patient above lacks these adverse features and so presents less immediate risk. The evidence base for management of stable AF is poor, but certain recommendations have been published by the European Association for Cardiothoracic Surgery (EACTS) based on available literature[17]:

- Confirm AF with a twelve-lead electrocardiogram (ECG)
- Evaluate fluid status clinically and correct any disturbance
- Assess oxygenation and maintain saturation > 95%
- Assess renal function and electrolyte levels, especially looking for hypokalaemia and hypomagnesaemia
- Maintain serum potassium in the range 4.5-5.0 mmol/L using oral or intravenous potassium supplementation; measure electrolytes daily

Hypokalaemia can increase the risk of any cardiac dysrhythmia, and thus standard practice after cardiac surgery is to maintain the serum potassium within the higher end of the reference range. This strategy is based on anecdotal evidence and a "common-sense" approach rather than clinical trials, partially due to the ethical implications of performing a randomised study of a commonly accepted intervention[17].

It is difficult to recommend the use of specific rate and rhythm control medications as very few have been compared with placebo. Options for management include beta blockers, amiodarone, propafenone, digoxin and calcium channel antagonists. Beta blockers have been shown to be superior to digoxin and diltiazem in equivalence studies, with the caveat that they can cause hypotension (especially esmolol) and bradycardia: for a summary of the relevant literature, see the EACTS guidelines[17]. Amiodarone has also been shown to be effective, with fewer haemodynamic complications and equivalence demonstrated with digoxin and propafenone[18,19].

Pharmacological Prophylaxis

Given the relative paucity of evidence regarding management of established AF, it is important to implement preventative strategies. More robust evidence is available regarding prophylaxis, including several meta-analyses, and EACTS guidelines therefore exist for this area of post-operative management[17]. The strongest evidence appears to involve the use of beta-blockers: in meta-analyses and a Cochrane review, their pre-operative and immediate post-operative use has been consistently associated with reduced AF incidence[25-27]. This effect has been noted regardless of regimen or dose, and the results corresponded to a number needed to treat (NNT) of seven in one study[25]. Thus, EACTS recommends routine use of beta-blockers, either before or after surgery. If a patient is already on a beta-blocker, the guidelines suggest continuation until the morning of surgery, with re-introduction on the first post-operative day[17]. There is a suggestion that sotalol is more effective than other beta-blockers[25], with a NNT of 10 to prevent an additional case of AF[25]. However, insufficient evidence exists to justify any firm recommendations regarding the choice of agent[17].

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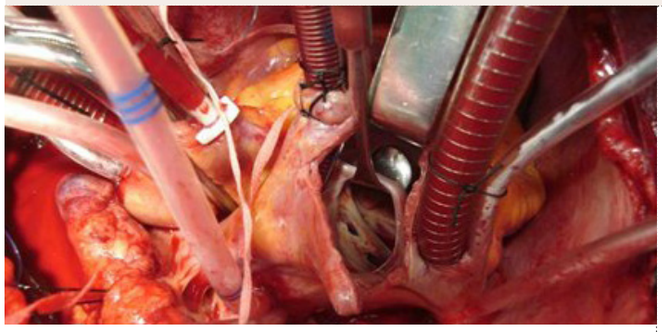

Amiodarone therapy has also been associated with reduced rates of AF. In one meta-analysis, a NNT of seven was calculated[25]. This was shown to be independent of the dosing regimen and initiation time[28]. Additionally, the side-effect profile is favourable, but in two earlier studies, higher rates of bradycardia and pauses were found in patients taking amiodarone[29]; indeed, the drug had to be withdrawn from 18% of patients in one study[30]. Current advice from EACTS is to use amiodarone as prophylaxis in patients intolerant to beta-blockers, and as an additional agent in high-risk patients. In the latter scenario, intra-operative implantation of temporary pacing wires acts as a safeguard against bradycardia[17].

Magnesium is known to stabilise the myocardium by acting as a co-factor for trans-membrane sodium-potassium adenosine triphosphatase[3]. Supplementation is recommended as a treatment modality in patients with low serum magnesium[3], and its prophylactic use has also been studied in large meta-analyses. In 2004, one such study showed a NNT of 13 to prevent AF and 14 to prevent ventricular tachycardia[31]. Multiple infusion regimens exist, none of which have shown clear superiority. There have been no reports of significant adverse effects, and EACTS guidelines advocate magnesium as a safe and effective additional prophylactic strategy[17].

The role of statins as a preventative measure has been moderately explored. Its function as an anti-arrhythmic may be explained by effects on ion channel stabilisation and angiotensin-II mediated structural remodelling[32-33]. A randomised controlled trial showed a decrease in the occurrence of AF and reduced hospital stay following pre-operative administration of atorvastatin[34]. Similar findings have been noted with the administration of corticosteroids[35]. Other pharmacological interventions have been less extensively researched; however, it should be noted that digoxin does not appear at present to play any role in prophylaxis[36].

Temporary Pacing

Temporary epicardial pacing wires are routinely implanted during cardiac surgery in order to minimise the risk of post-operative heart block and arrhythmia[37]. There is meta-analysis evidence to suggest that bi-atrial pacing reduces the rate of AF[11,17]. This was not found to be the case with right atrial pacing. The risk of morbidity is low, but adverse effects relate to suboptimal wire placement and consequent aberrant sensing or pacing of inappropriate structures such as the ventricles or diaphragm[4,17]. Peak development of AF is on the second post-operative day, so EACTS recommends three to five days of bi-atrial pacing at 80-90 beats per minute[17].

Anticoagulation

Atrial fibrillation in any setting is associated with intra-cardiac thrombosis and systemic embolism, with a risk of stroke in the longer term. This has been observed within cardiac surgery patients as well: in one cohort, the incidence of stroke was 5.2% in patients with AF versus 1.7% in those without20. Therefore, as with AF in any other setting, a risk assessment for stroke is carried out according to the CHADS2 score (congestive heart failure, hypertension, age, diabetes and stroke; see Figure 1)[21]. Anticoagulation with warfarin can be commenced for patients at high risk: there is strong evidence to suggest increased survival in AF patients with an international normalised ratio (INR) greater than 2.0,22 so current recommendations are to aim for a target INR between 2 and 3, as with non-surgical patients23. When prescribing warfarin, it is important to consider complications such as pericardial effusion: in one study of cardiac surgical patients, 32% of those treated with warfarin developed echocardiographic evidence of pericardial effusion compared with 4% in the control group[24]. In this series, cardiac tamponade developed in 50%[24].

Criterion	Points
Congestive heart failure	1
Hypertension (BP consistently > 140/90 or prior hypertension)	1
Age over 75	1

Table 2: CHADS2 score for cerebrovascular disease risk stratification in atrial fibrillation21. Score 0 = aspirin; Score 1 = aspirin or warfarin; Score > 1 = warfarin

(BP = blood pressure; TIA = transient ischaemic attack)

Conclusion

Atrial fibrillation, along with other dysrhythmias, is a common complication of cardiac surgery, and is associated with significant morbidity, mortality and economic burden. Several preventative strategies exist: of note, prophylactic beta-blocker or amiodarone therapy is recommended by the European Association for Cardiothoracic Surgery, and several other strategies such as magnesium supplementation and bi-atrial pacing also reduce incidence. If AF develops, after initial stabilisation, patients should have serum potassium maintained within the high end of the reference range and treatments such as beta-blockers and amiodarone should be considered. For long-term management, a cerebrovascular disease risk assessment should be performed using the $CHADS^2$ scoring system in order to determine appropriate anticoagulation.

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MCQs

1. Based on recent literature, during what post-operative period is atrial fibrillation most likely?

A first day
B second day
C fifth day
D seventh day
E tenth day

2. What is the mechanism by which magnesium is thought to stabilise myocardium?

A Competitive inhibition of Na+ K+ ATPase
B Down-regulation of cGMP
C Agonist of PDE
D Co-factor for Na+ K+ ATPase
E None of the above

3. According to ALS (Advanced Life Support) guidelines, which of the following is not an adverse feature of tachyarrhythmias?

A Chest pain
B Heart failure
C Drowsiness
D Heart rate > 140 beats per minute
E Confusion

4. A 76 year old patient develops atrial fibrillation post-operatively. His past medical history is relevant for diet-controlled diabetes, osteoporosis and gout. Regular prescriptions include aspirin, vitamin D, alendronic acid and allopurinol. What is his calculated CHADS2 score?

A 2
B 3
C 4
D 5
E None of above

5. According to EACTS guidelines, in patients with post-operative atrial fibrillation, at what target range should potassium levels be maintained?

A 3.5-5.0 mmol/L
B 3.0-2.5 mmol/L
C 4.5-5.0 mmol/L
D 5.0-5.5 mmol/L
E 4.0-5.0 mmol/L

Answers

1. B.
According to recent guidelines outlined by EACTS (European Association for Cardiothoracic Surgery), post-operative atrial fibrillation is most likely on the second day. For this reason, in those patients considered for prophylactic temporary epicardial pacing, a prolonged period of three to five days of bi-atrial pacing at 80-90 beats per minute is often preferred.

2. D.
Magnesium acts as a co-factor for trans-membrane Na+ K+ ATPase, which contributes to resting potential and regulation of cellular volume. Supplementation is therefore recommended in prophylaxis of post-operative atrial fibrillation.

3. D.
A heart rate greater than 150 beats per minute is deemed to indicate an adverse presentation. In such instances, immediate synchronised electrical cardioversion is warranted. After three failed attempts, chemical cardioversion with amiodarone can be justified. This involves a loading dose of 300mg followed by a maintenance regime of 900mg over 24 hours.

4. A.
He scores 1 point each for age and diabetes. Appropriate management in this situation would therefore be to commence the patient on warfarin. His annual risk of stroke without warfarinisation would be in the region of 4.0%.

5. C.
Guidelines state that a target range of 4.5-5.0 mmol/L should be attained in such patients, using oral or intravenous supplementation as required. Hypokalaemia is strongly associated with cardiac dysrhythmia, so this rationale is based on anecdotal evidence and logical processing rather than specific trial outcomes.

ATRIAL FIBRILLATION: A COMMON COMPLICATION POST-CARDIAC SURGERY

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MANAGEMENT OF UROLOGICAL TRAUMA

F Burge

Management of urological trauma. Urology.

Introduction

Urological trauma is not common. Renal trauma is the most common injury and can be life threatening but injury to any part of the genitourinary tract can carry significant morbidity, especially if complications arise.

Renal Trauma

Renal trauma complicates approximately 1-5% of all trauma cases[1]. The incidence of renal injury is estimated at 5 per 100,000 population per year[2]. The protected location of the Kidneys in the retroperitoneum explains why only major forces result in injury and why isolated renal injury is uncommon (up to 40% of renal injuries are associated with concomitant intra-abdominal injuries[3]).

Renal trauma is classified according to mode of injury: either blunt or penetrating. In the UK 90% of renal trauma is caused by blunt force[4] (motor vehicle accidents, falls, assault). The incidence of penetrating trauma is less common but can be as high as 20% in urban communities[5].

Assesment

Assessment of the patients haemodynamic status and resuscitation, if required, should take priority. History of the mechanism of injury is important. Past renal surgery/renal pathology should be recorded as pre-existing renal abnormalities increase the risk of injury following trauma.

Physical examination may reveal entry/exit wounds of penetrating injuries, flank eccymosis, rib fractures, masses, abdominal pain or abdominal distension indicating possible renal trauma.

Baseline blood tests for renal function and haematocrit should be taken.

Haematuria, although indicative of renal injury, gives no indication as to the severity of injury in penetrating trauma. In blunt trauma however, there is a relation between gross/microscopic haematuria and severity of injury. Haemodynamically stable patients with microscopic haematuria only have a 0.2% chance of major renal injury[6]. Importantly, absence of haematuria does not rule out significant injury including disruption of the pelviureteric junction.

Imaging

Indications for radiographic evaluation include:

- Gross haematuria
- Microscopic haematuria and shock (BP<90 mmHg systolic)
- Major associated injuries, penetrating injuries
- Rapid deceleration injuries and clinical signs of renal trauma (to rule out ureteric transection or renal pedicle injury).

Computed Tomography (CT) with contrast is the gold standard for evaluating renal injury in the haemodynamically stable patient. Arterial and delayed images are required for accurate assessment of vascular, parenchymal and renal pelvis injuries. (Figure 1)

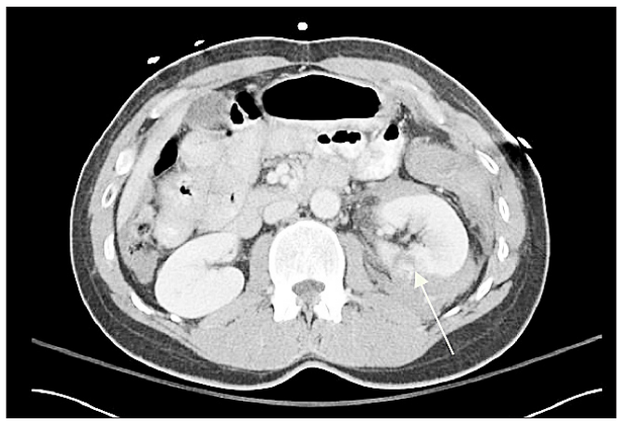

Figure 1. CT showing a renal laceration with extravasation of contrast.

Ultrasonography, although operator dependant, can be used in the primary survey of trauma patients and can demonstrate gross injuries or free fluid (Figure2). It cannot however give information as to renal function or urinary extravasation and cannot accurately assess grade of injury.

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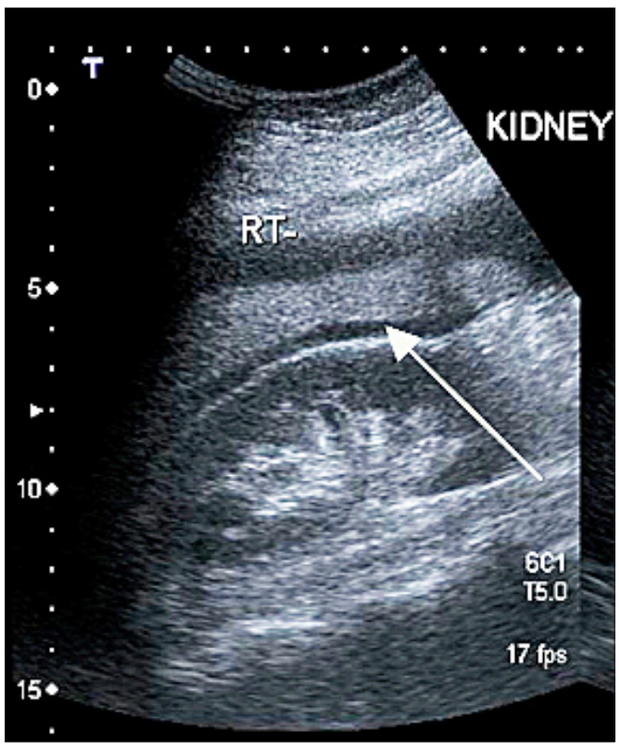


Figure 2. USS showing free fluid surrounding the right kidney.

Intravenous Urography (IVU) is used as a second line investigation or as a 'single shot' study in patients having immediate surgical exploration. Angiography can be used for diagnosis and selective embolisation of bleeding vessels. The American Association for the Surgery of Trauma (AAST) scaling system for organ specific injuries can be found at www.aast.org.

Grade	Description
I	Contusion or non-expanding subcapsular haematoma
II	Non-expanding perirenal haematoma <1cm cortical laceration, no extravasation of urine
III	>1cm cortical laceration, no extravasation of urine
IV	Laceration involving cortex, medulla and collecting system Segmental artery/vein injury, contained haemorrhage
V	Shattered kidney Renal pedicle injury/avulsion

Figure 3 shows an adapted version for the classification of renal injury.

Treatment

Most grade I-III renal injuries can be treated conservatively. Those who present with gross haematuria should have bed rest until this settles. Selective angiography and embolisation may be useful in haemodynamically stable patients with evidence of ongoing bleeding or those who are transient responders to fluid resuscitation and in whom a laparotomy is not required for other injuries.

Indications for renal exploration include:

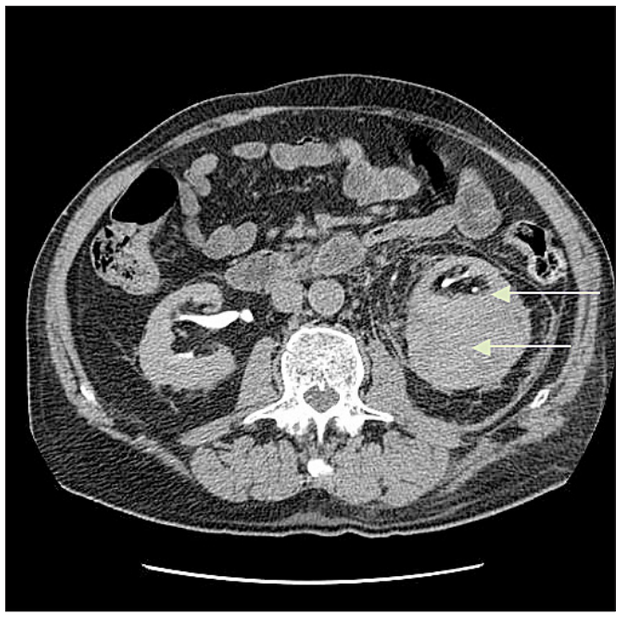
- Haemodynamic instability. (If the intraoperative 'one shot' IVU is normal a period of observation is appropriate).
- Expanding or pulsatile perirenal haematoma found at laparotomy for concomitant injuries.
- Main renal artery avulsion/thrombosis in a single kidney.

Complications

Urinomas formed by the extravasation of urine usually resolve spontaneously, the small minority that persist, are symptomatic or form abscesses can usually be drained percutaneously. Secondary haemorrhage can occur up to 4-5 weeks following deep corticomedullary lacerations. They are more common following stab wounds. Renal artery injury resulting in stenosis or compression of the parenchyma causing ischaemia can increase renin secretion and result in hypertension. Post traumatic hypertension affects approximately 5% of patients[7].

Follow up

Patients should have urinalysis, serum electrolytes and blood pressure monitored. The role of repeat imaging is not clear and should be tailored to the individual.



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Renal trauma can also be iatrogenic in nature. Usually following stenting, nephrostomy insertion, percutaneous nephrolithotomy or angiographic procedures. This 78yr old gentleman presented with frank haematuria. A flexible cystoscopy excluded bladder TCC. Renal USS demonstrated a 1cm renal calculus which was confirmed on KUB. He opted to have Extracorporeal shock wave lithotripsy (ESWL) and his first two treatments were uneventful. He was admitted the day of his 3rd EWSL treatment with left sided colicky loin pain. Plain KUB demonstrated a remnant of calculus in the left renal pelvis. The evening of admission he felt dizzy and collapsed. His vital signs were normal and his Hb was 12.3. Symptomatically he improved but on the 3rd day of admission he developed bruising of his left hemiscrotum and his Hb had fallen to 9.5. His CT scan shows (uppermost arrow) the residual, non-obstructing calculus fragment and (lower arrow) the large perirenal haematoma resulting from a grade III renal laceration. He was treated conservatively and had an uncomplicated recovery.

Ureteric Trauma

Ureteric injuries are uncommon and can be difficult to identify. Recognition is often delayed and this can significantly increase the risk of complications including fistula or urinoma formation or sepsis.

75% of ureteric injuries are iatrogenic in nature, commonly the distal third is affected. Injuries usually most commonly occur during gynaecological surgery. Surgeons experience and technical difficulty of the procedure influence the risk of injury. Injuries from external trauma are rare. Deceleration injuries can cause disruption of the pelviureteric junction (PUJ) (Figure 4). Penetrating injuries such as gunshot wounds can cause direct or indirect damage and are usually associated with other intraabdominal injuries.

Presentation:

Haematuria is an unreliable indicator of ureteric injury. In the case of external injury, penetrating wounds or flank tenderness should prompt further investigation. Sepsis, prolonged ileus, renal impairment, high drain output and flank tenderness/mass may indicate a missed ureteric injury.

Imaging:

In the acute trauma setting CT's with delayed images can accurately diagnose extravasation of contrast. An intraoperative 'one-shot' IVU may be used in patients who are too unstable to have preoperative imaging.

If presentation has been delayed a CT should detect both the injury and associated complications. Retrograde pyelography is accurate at detecting the presence, location and degree of injury. USS is unreliable in the context of ureteric injury.

Figure 4: RTA , deceleration injury resulted in PUJ disruption. This is a delayed CT showing extravasation of contrast from the renal pelvis.

Management:

Early intervention is preferred and treatment is dependent upon the site and severity of injury (figure 5).

Grade	Description
I	Contusion/Haematoma
II	Laceration <50% of circumference
III	Laceration >50% of circumference
IV	Complete tear <2cm devascularisation
V	Complete tear >2cm devascularisation

Figure 5: Injury severity score for the ureter, Adapted from the AAST guidelines.

Contusions: Small contusions require stenting. Large contusions or those secondary to high velocity gunshot wounds are more likely to develop complications (stricture/fistula) and should undergo surgical repair.

Lacerations and transections: Adequate debridement and mobilisation of the injured ureter should be performed in order to create a spatulated, tension free and watertight anastomosis. This should be formed around a stent, some patients may need proximal urinary diversion. Repairs in the presence of faeculant contamination are more likely to dehisce. Some would advocate ureteral exteriorisation in this circumstance[8].

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Methods of repair according to location:

- PUJ/ proximal ureter: ureteropyelostomy or uretero-ureterostomy.
- Mid-ureter: ureteroureterostomy or Boari flap and reimplantation (not acutely)
- Distal ureter: direct reimplantation, psoas hitch or Blandy cystoplasty.
- Complete loss: tie off ureter, place nephrostomy. Delayed ileal interposition or renal autotransplantation.

Bladder Trauma:

Bladder injuries can be categorised by mechanism of action: Blunt, penetrating or iatrogenic. Injuries usually occur following blunt trauma to the lower abdomen and damage is caused by shearing forces on fascial attachments of the bladder or increased intravesical pressure. 1.6% of blunt abdominal trauma cases sustain bladder injuries9. 80% of these are associated with pelvic fracture[10]. Bladder rupture may be classified as intraperitoneal (38-40%)11 or extraperitoneal (54-56%)[11]. Rupture of the dome of the bladder causes intraperitoneal extravasation of urine. Extraperitoneal rupture is almost exclusively seen associated with pelvic fractures which cause disruption of the fascial attachments at the base of the bladder. Penetrating injuries have been described secondary to gunshot wounds, penetrating rectal and buttock injuries. Spicules of bone from pelvic fractures may also cause lacerations. Iatrogenic injuries occur most commonly during cystoscopic and pelvic surgery. Poor visibility and anatomical distortions increase the risk. If there is intraoperative suspicion of injury the bladder should be inspected. Dilute methylene blue dye instilled through a foley catheter may help identify the area of leakage in difficult cases.

Clinical Signs:

Gross haematuria, suprapubic pain and an inability to void are classical signs of injury. Suprapubic ecchymosis, abdominal distension and swelling of the perineum and anterior abdominal wall may occur.

Clinical signs of missed injury include elevated serum urea and creatinine, abdominal pain, distension, ileus, sepsis or fistula formation.

Imaging:

The following warrant further investigation with either a retrograde cystogram or CT cystography:

- Pelvic fracture with gross haematuria
- Anterior ramus fracture with microscopic haematuria.
- Malgaigne-type severe ring disruption. (vertical shear fracture involving SI joint and pubic rami).

Figure 6: CT showing extraperitoneal leak of contrast following bladder rupture. Typical cystogram appearances of extraperitoneal leaks are of flame-shaped areas of extravasation. An intraperitoneal leak will outline loops of bowel and fill the paracolic gutters.

Management:

Contusions, extraperitoneal ruptures and small iatrogenic injuries may be treated conservatively. Relative contraindications to conservative management include open pelvic fractures, associated rectal injuries and injuries due to bony spicules. A urethral catheter is preferable to suprapubic catheterisation as it is associated with fewer complications and days of catheterisation[12].

Patients with intraperitoneal rupture, rupture involving the bladder neck, penetrating bladder injures, concomitant intraabdominal injuries requiring exploration and patients undergoing internal fixation of pelvic fractures should have formal surgical repair of the bladder injury. Post operatively a urethral catheter should be placed and a cystogram performed on day 10 post op to ensure there is no residual leak prior to removal of catheter.

Urethral trauma

The male urethra can be divided into anterior (bulbar and penile) and posterior (prostatic and membranous) sections, separated by the genitourinary membrane. It is important to remember that within the posterior urethra is the distal sphincter mechanism.

Injuries can range from contusions (no loss of integrity of the epithelium) to partial or complete urethral transection. Injuries can be caused by external or internal mechanisms.

Anterior urethral injuries can be caused by external blunt trauma (fall astride injuries/assault), penetrating trauma (GSW/stabbing), sexual trauma (penile fracture, foreign body insertion, constriction bands), and iatrogenic injury (endoscopic procedures, penile surgery, catheterisation).

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Posterior urethral injuries classically occur in association with pelvic fractures. 3-25% of patients with pelvic fractures[13] have posterior urethral injuries and these can be associated with life-threatening trauma. Complications following endoscopic TURP and radical prostatectomy are responsible for most iatrogenic injuries to the posterior urethra.

Urethral injuries in women are less common as the female urethra is short, mobile and has no significant attachments to the pubic bone.

Presentation:

The classic triad of urethral injury is blood at the external meatus, inability to void and a palpable bladder. Other signs include:

- Perineal urinoma
- Perineal haematoma (Rupture of buck's fascia, leaving Colle's fascia as the limiting tissue results in the typical 'butterfly' bruising of the perineum.)
- High riding prostate on PR (not reliable as the anatomy can be distorted by a pelvic haematoma.)
- Pelvic haematoma
- Pelvic fracture: typical injury patterns include a fall astride injury with diastasis of the SI joint or fracture involving the pubic rami relative to the rest of the pelvis.

Imaging:

The Gold standard investigation is retrograde urethrography. USS may be useful to assess pelvic haematomas or the position of a high riding prostate. In experienced hands endoscopy may help diagnosis. MRI is usually reserved for evaluation of complex posterior urethral injuries in the delayed setting.
A simple classification of injury as recommended by the Consensus on Genitourinary Trauma is outlined in Figure 7.

Position of injury:	Description of injury:
Anterior urethra	Partial disruption
	Complete disruption
Posterior urethra	Stretched but intact
	Partial disruption
	Complete disruption
	Complex – involving bladder neck/rectum

Figure 7

Management:

Timing of surgical management of urethral injuries is dependent upon the clinical state of the patient. Resuscitation and treatment of life threatening injuries must take priority. The risk of converting a partial into a complete tear is low and an attempt may be made at passing a urethral catheter. If this does not pass easily, urinary diversion should be achieved with insertion of a suprapubic catheter. This may require ultrasound guidance or open insertion.

Immediate primary repair should be reserved for a patient with penetrating injures, minimal haematoma, no other significant injuries and in whom a primary closure is sufficient.

Delayed elective repair at > 3 months has been shown to reduce post operative complications of stricture formation, incontinence and erectile dysfunction. Pre operative assessment of the anatomy should include a simultaneous cystogram and urethrogram, endoscopic examination via the suprapubic route and MRI scan. A perineal approach usually gives adequate exposure to create a primary anastomosis of the posterior urethra. A transpubic or combined abdomino-perineal approach may be necessary in injuries complicated by fistulous tracts or injuries at the prostatic apex. Anterior urethral repairs can usually be performed via a circumferential, subcoronal incision. Defects up to 2cm in the bulbar urethra and 1.5cm in the penile urethra can often be repaired with a primary anastomosis over a urethral catheter, longer injuries may require a urethroplasty with grafting.
Iatrogenic injury usually results in stricture or fistula formation (Figure 8). These can be variable as to their site and severity. Dilatation and endoscopic optical incision are usually adequate but some may require urethral reconstruction. Traumatic catheterisation resulting in a false passage should be treated with endoscopy, placement of a guidewire and insertion of urethral catheter.

Figure 8: This gentleman underwent a laparoscopic radical prostatectomy. He developed a late complication of a fistula between the vesicoureteric anastomosis and his rectum. This required surgical repair.

The rarity of urethral injuries and the variety of injury pattern makes their management a challenge. Immediate treatment should be directed at urinary diversion and treatment of associated injuries. Deferred, definitive surgery in a specialised unit is preferred.

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External Genital Trauma

Injuries to the male genitalia are rarely life threatening but carry significant psychosexual morbidity.

Scrotal trauma:

Although exposed, the scrotum and testicles are mobile, a characteristic which offers protection from severe injuries. 85% of scrotal injuries result from accidental blunt force trauma but some are caused by penetrating injuries, self-mutilation or assault[15].

Images above: This accidental injury required urgent surgical exploration and debridement in order to prevent subsequent infection. There was very little skin loss and it healed well. Where there is extensive skin loss, grafting or local flaps may be used for coverage. This can be primary or delayed. If it is deferred, testicles may be protected in thigh pouches until the time of surgery.

Clinical features:

Patients usually present with acute pain, swelling and eccymosis.

Imaging:

Although operator dependant, ultrasonography is the imaging modality of choice to assess the integrity and vascularity of the testicle. Heterogeneity of the echotexture of the testicle is considered diagnostic of testicular rupture.

Treatment:

Localised scrotal haematomas may be treated conservatively. Testicular rupture, large intratesticular haematomas, traumatic torsion and testicular translocation require prompt exploration. Testicular salvage should be attempted in the case of ruptured testicles in order to preserve endocrine function.

Complications of late presentation or treatment include chronic pain, infection, testicular loss, impaired fertility and altered self image.

Penile injury:

Penile fractures are uncommon. Excessive bending forces applied to the erect penis during intercourse result in rupture of the tunica albuginea. The patient describes a cracking sound, pain and rapid detumescence. Bruising may be confined to the penis (eggplant sign) but may extend into the perineum if buck's fascia is disrupted. 20% have an associated urethral injury[16]. Imaging should not delay surgical repair in patients who present with a typical history and examination findings with no suspicion of urethral injury.

Complications of non-operative treatment include fibrosis, penile curvature and erectile dysfunction.

Penetrating genital injuries require immediate exploration. Treatment of skin loss is dependent upon the amount of tissue damage. Coverage can be performed primarily or by delayed reconstruction with skin grafting.

Penile amputation is uncommon and usually seen in patients with acute psychoses. Attempts should be made to reimplant the penis within 24hrs. Resuscitation and urinary diversion are required prior to reimplantation. A perineal urethrostomy is the alternative to reimplantaion.

Questions

1. Which one of the following patients requires renal exploration?

A: 65yr old restrained front seat passenger involved in RTA – left side impact. Haemodynamically stable, microcytic haematuria.
B: 26 yr old, stab wound to right flank, CT demonstrates a 1cm cortical laceration with non-expanding haematoma.
C: 34yr old female fell off horse onto right hand side landing on a jump. Previous treatment for left sided Wilm's tumour. Gross haematuria and grade IV laceration found on CT.
D: 19yr old admitted following a fall from a second story window. Haemodynamically stable. CT demonstrates grade III laceration with extravasation of contrast from a segmental vessel.
E: 25yr old skateboarder falls down flight of stairs. Examination findings: fractured left lower ribs, microscopic haematuria, haemodynamically unstable. Immediate surgical exploration, splenic injury found. Normal intraoperative 'one-shot' IVU.

2. For the patient described below select the single most appropriate initial imaging modality.

A: Ultrasound scan
B: 'One-shot' IVU
C: Urethrogram
D: Contrast CT with delayed imaging.
E: CT cystogram

55yr old male, known renal cysts, restrained driver in head on collision at 50mph. Haemodynamically stable, no haematuria, significant left loin tenderness.

3. Which of the following is not a sign of delayed presentation of a bladder rupture?

A: Prolonged ileus
B: Suprapubic eccymosis
C: Vesico-vaginal fistula
D: Elevated serum urea and creatinine
E: Sepsis

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4. A 47 yr old male motorcyclist is admitted following an RTA. A witness saw him drive into the back of a van and thrown forwards. On examination he had suprapubic tenderness, blood at the urethral meatus and a high riding prostate. A pelvic xray demonstrated fracture of both the superior and inferior pubic ramus on the left and disruption of the left sacroiliac joint. Which of the following injuries is most likely?

A: Fractured penis
B: Bladder rupture
C: Anterior urethral injury
D: Posterior urethral injury
E: Ureteric transection

5. A 26yr old male is admitted following an alleged assault. He complains of swelling and pain in his left hemi scrotum. Examination revealed scrotal eccymosis, a tender, swollen testicle and USS demonstrated heterogenous echotexture of his left testicle. Choose the most likely diagnosis from the list below.

A: Ruptured testicle
B: Scrotal haematoma
C: Traumatic testicular torsion
D: Epididymoorchitis
E: Intra testicular haematoma

Answers

1. C.
In blunt trauma gross haematuria can indicate significant injury and this is confirmed on the CT scan. There is a lower threshold for exploring patients with single kidneys in order to preserve renal function. Patient D is a candidate for selective angiography and embolisation. Patient E has pathology to explain his haemodynamic instability and as the IVU is normal, does not require formal exploration of the kidney.

2. D.
This patient has had a significant deceleration injury and may have bulky kidneys due to his cystic disease. This puts strain on the attachments around the renal pelvis and despite the lack of haematuria he may have a PUJ injury.

3. B.
Suprapubic eccymosis is usually seen at the time of injury and should increase suspicion of a bladder injury.

4. D.
The signs and fracture pattern are suggestive of a posterior urethral injury.

5. A.
Heterogenous echotexture of the testicle on USS is diagnostic of testicular rupture.

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TONSILLECTOMY: TIPS FOR A CORE SURGICAL TRAINEE STARTING A POST IN ENT

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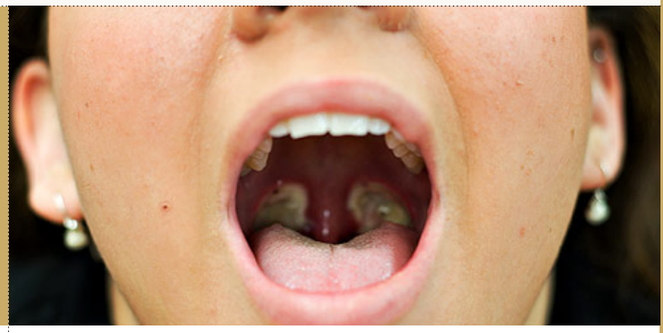

Tonsillectomy: Tips for a core surgical trainee starting a post in ENT. Otorhinolaryngology & Neck Surgery.

Tonsillectomy is by far the most common operation that a junior in ENT performs. Both the procedure and its complications can be a challenge to the ENT surgeon. This article is aimed at equipping the junior trainee in ENT with tips on performing a tonsillectomy. This article is not a substitute to watching and learning it firsthand in theatre. This is a guide to help direct you to assist your learning curve for this procedure.

History

The first description dates to 1st century BC by Cornelius Celsus, a Roman physician, who used a hook to grasp the tonsil then used his finger to incise it. Further information on the anatomy of the tonsil and pharynx became available in the 16th and 17th centuries. It is then that the importance of exposure was considered. That brings up a good point. Tonsillectomy was then a painful procedure and patients could not tolerate it for a long period of time. An instrument called the tonsillotome was developed to remove the tonsil quickly. It could both grasp and remove the tonsil in one swift move. McKenzie further developed it turned it into the modern day tonsil guillotine. The major problem with using the guillotine to remove the tonsil was incomplete removal.

In the last century, the tonsillectomy techniques have undergone a revolution with development of instruments in an effort to reduce postoperative pain and haemorrhage.

A number of tonsil dissection techniques are available and are named below:

1) Cold steel dissection ± Snare and haemostasis with ties or diathermy mono or bipolar;
2) Hot dissection with diathermy using an electrically heated instrument to cut, dissect and coagulate tissues using monopolar or bipolar;
3) Radiofrequency tonsillectomy where the instrument itself does not get hot but produces a current flow that generates heat within the tissues and these include coblation, bipolar thermal radiofrequency ablation and argon plasma coagulator tonsillectomy;
4) Harmonic scalpel dissection;
5) Laser dissection with CO2, KTP or Nd-YAG laser.

Non-dissection tonsillectomy techniques include guillotine tonsillectomy and intra-capsular partial tonsillectomy.

Anatomy

The tonsils are in the oropharynx. The anterior pillar is the palatoglossus muscle. The posterior pillar is the palatopharyngeus muscle. The superior constrictor muscle forms the base of the tonsil. The tonsils are most active from ages 4-10 years old. However, any healthy adult can active tonsil tissue. The blood supply is classically described by Hollingshead with inferior pole and superior pole vessels. The facial artery has the major contribution to the tonsillar fossa. Cranial nerve number nine is located deep to the superior constrictor muscle, and that is important because it can be injured during a dissection as well as it can cause postoperative referred otalgia. I included this slide just to remind everyone that deep to the superior constrictor muscle; the internal carotid artery is located.

Indications:
- Obstructive sleep apnoea in children (in conjunction with adenoidectomy)
- Asymmetrical adult tonsil
- As part of uvulopalatopharyngoplasty procedure in adults with gross tonsillar hypertrophy and OSA or snoring
- Severe tonsillitis with upper airway obstruction
- large symptomatic tonsiloliths
- Long term management of IgA nephropathy

Recurrent tonsillitis: SIGN guidelines suggest that patients considered for this indication should meet the following criteria:
a) Sore throats are due to tonsillitis
b) 5 or more episodes per year
c) There are symptoms for at least a year
d) Episodes of sore throat are disabling and prevent normal function

Contra-indications:
- Bleeding diathesis
- Acute Tonsillitis in an elective procedure
- Cleft palate

Other relative contraindications may include:
- Professional voice users for example singers
- Professional food and wine tasters

The relative contraindications should be considered very carefully as the surgical procedure will have a significant impact on their professional abilities. Patients should be counselled before the consent process.

TONSILLECTOMY: TIPS FOR A CORE SURGICAL TRAINEE STARTING A POST IN ENT

T Kamani

Consent

Patients should be given options of surgery versus other available treatment and their outcomes. For patients where surgery is considered, risks of the procedure should be explained.

Consent should include:

- Name, date of birth and identification number of patient
- Name and grade of the consenting surgeon (preferably by surgeon operating)
- Name of procedure
- Indication for the procedure
- Risks related to anaesthetic

(tonsillectomies are performed under general anaesthetic)

- General risks of any type of surgical procedure: Infection and bleeding
- Risks specific to the procedure: risk of bleeding varying from 0-5%, dental injury, temporary numbness to tongue, altered taste (especially important in professional food or wine tasters), pain in jaw or neck for sometime postoperatively and altered resonance of voice in patients who are singers or actors.

Consent should be revisited with the patient and confirmed on the day of surgery. It is important to ascertain whether the patient is fit for surgery on the day.

Some useful tips during the pre-operative assessment on day of surgery include:

- Patients with recurrent tonsillitis less than 2 weeks before surgery should be postponed to a later date.
- Identify patients that may have had a Quincy. It gives you the information that this may be a difficult dissection due to fibrosis.

Operating

Observing the procedure before undertaking it for the first time is a must. Requesting the surgeon to talk you through the procedure is very helpful. Each time a tonsillectomy is performed, observe how the instruments are handled.

Tonsillectomy is performed under general anaesthetic. The patient is intubated with an endotracheal tube. This is also the area through which a tonsillectomy is performed. It is vital that before commencing the procedure, the anaesthetist is informed. One should always be aware of the shared airway. Laryngeal masks can also be used instead of endotracheal tubes. They provide the patient with a faster recovery period. They are slightly bulkier than ET tubes and therefore best avoided in patients with a crowded oropharynx where exposure may be an issue for the junior trainee.

The national prospective tonsillectomy audit was performed in England and Northern Ireland (2003-2004). In summary, the results confirm that hot tonsillectomy techniques carry a substantially elevated risk of postoperative haemorrhage when diathermy is used as a dissection tool in tonsillectomy. Junior trainees are encouraged to perform cold steel dissection tonsillectomy with multiple ties for haemostasis. This technique is therefore detailed below.

Instruments and equipment:

The surgeon should also have a head light which should be adjusted by focusing the beam onto the centre of their palm at the most comfortable position of their head and neck to avoid straining whilst operating.

Instruments required should be sterile and are shown in figure 1.

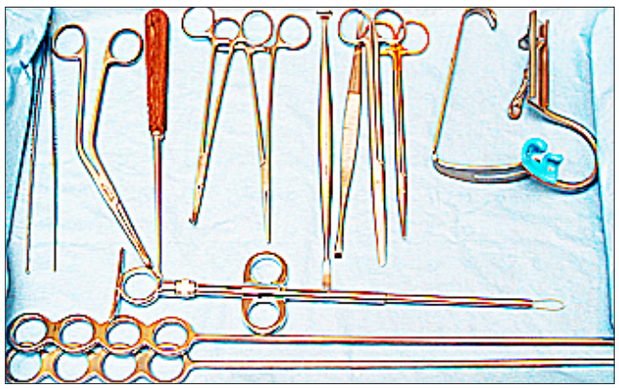

Figure 1: Tonsil tray

Instruments Left to right, top to bottom.

• Long tooth forceps • Denis Brown Forceps • Knot pusher
• Negus Forceps • Burkitt's Forceps • Pillar retractor
• Dissector • Mackindol Scissor • Suture Scissor
• Boyle Davis Gag • Snare • Draffin rods

TONSILLECTOMY: TIPS FOR A CORE SURGICAL TRAINEE STARTING A POST IN ENT

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Draping

Patient should be positioned lying supine with a under the shoulder roll for exposure. They should be covered with sterile drapes exposing only the nose and mouth as shown in figure 2.

Figure 2: Nose and mouth exposed

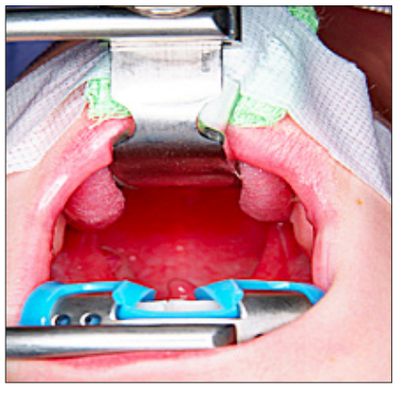

Figure 3: midline tongue position

Performing a cold steel tonsillectomy

1) Exposure of tonsils using the Boyle Davis gag. Be careful of lips, teeth and tongue. Inform anaesthetist when introducing gag to ensure the endotracheal tube does not kink or displace. It is important that the tongue sits in the midline for adequate exposure. Occasionally this is not possible and this problem is overcome by exposing one tonsil during its removal before re-positioning to expose the other. Secure the gag with the Draffin rods. See figure 3.

2) Using Dennis Brown forceps, grasp tonsil and retract towards midline. This helps identify the intended plane of dissection. Shows where the tonsil capsule ends and the constrictors start. See figure 4.

3) Enter the surgical plane using scissors or a tonsil dissector. Cut along the mucosa of the anterior pillar from upper pole to lower pole as shown in figure 5.

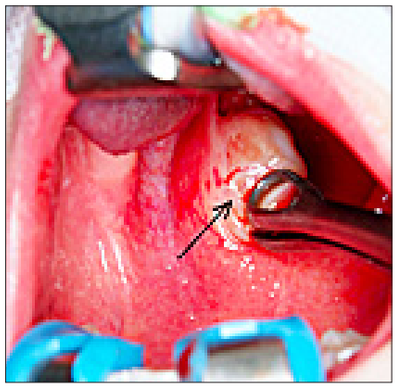

Figure 4: Arrow indicating anterior pillar

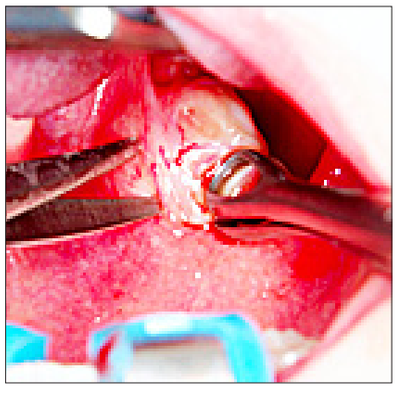

Figure 5: Making the 1st incision, left tonsil.

4) Once the plane is found (capsule appears white), the tonsil is dissected off its bed using dissectors, scissors or with a finger. Work from the upper pole towards the lingual pole. All instruments used are directed facing the tonsils to avoid injury to the glossopharyngeal nerves and internal carotid arteries.

5) At the lingual pole identify the plane where the palatine tonsil ends. Using a Negus forceps, clamp this end and cut the tonsil away.

6) Secure a tie using silk or vicryl 0/0 under the Negus to prevent bleeding. The Negus is released when the first knot is tightly secured.

7) Before commencing dissection of the next tonsil, a dry gauze swab is tightly packed between the anterior and posterior pillars to perform haemostasis by pressure.

8) Repeat steps 2-7 for the opposite tonsil.

9) When both sides are dry, loosen the gag to reduce the tension. This helps identify any blood vessels that were splinted by tension. Address these bleeds.

10) Clear the postnasal passage either intra-orally using a Yanker suction or intra-nasally using an endotracheal suction catheter.

11) Remove the gag gently with care to the endotracheal (ET) tube by holding it down with one finger as you withdraw the gag.

12) Check the teeth, lips and tongue for any injury. Reposition the jaw and make sure the temporomandibular joint is not dislocated.

TONSILLECTOMY: TIPS FOR A CORE SURGICAL TRAINEE STARTING A POST IN ENT

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Approaches to the lingual end:
1) Using Negus forceps and ties.
2) Use of a snare.
3) Use of these and mono or bipolar diathermy to arrest further bleeds.
4) A vicryl suture 2/0 can be used through the mucosa to achieve haemostasis when bleeding persists. This is rarely required.

Haemostasis: identify the bleeding vessels systematically moving from one pole of the tonsil to the other, each tonsil at a time.

1) Using ties: Trainees are encouraged to use ties. This is performed by catching the bleeder with surrounding tissue using a Burkitt's forceps. A Negus forceps is then placed under the tip of the Burkitt's forceps securing the tissue in its grip. A tie is then placed tightly around this tissue before the Negus forceps is released. The best tip here is practice. Before performing a tonsillectomy for the first time, it is important to be able to perform ties in deep holes. Many departments have a tonsillectomy practice kit. Get extra ties from scrub nurses at the end of a procedure and practice with. For simulation and practice, create a deep hole by nailing a plastic cup to a board with the nail head protruding into the hollow of the cup to act as your bleeder!
2) Mono and bipolar diathermy is frequently used.
3) Suture

Postoperative care

The patients should be advised to take their analgesia regularly for the next week to 10 days. They should be encouraged to eat and drink as usual. Most fit and well patients can have their tonsillectomies as a day case procedure. Patients with OSA postoperatively need overnight oxygen saturations monitoring for their airway.

Dealing with complications

Start with the basics of Airway, Breathing and Circulation.
1) Primary Haemorrhage: This is a reactionary bleed and usually occurs within 6 hours after surgery. Haemostasis usually performed in theatre.
2) Secondary Haemorrhage: Usually presents between 4-7 days postoperatively. Patients presenting with these are resuscitated, admitted and started on intravenous antibiotics. Examination may show bleeding which can initially be treated with adrenaline 1:10000 soaked gauze swab pressed against the tonsillar bed in compliant patients. These patients should be observed closely and if bleeding recurs or persists, consider haemostasis in theatre.
3) Postoperative pain: Patient will usually present with inability to eat and drink and occasionally dehydrated as a result. Treat symptomatically with analgesia and intravenous fluids.
4) Postoperative infection: Patients present with systemic illness and excessive pain. Treat with supportive treatment and antibiotics.

MCQ

1) Which of the following is not an absolute indication for a tonsillectomy?
A) Obstructive Sleep apnoea
B) Severe tonsillitis with airway obstruction
C) Immunoglobulin A nephropathy
D) Snoring
E) Recurrent sore throats

2) Which of the following is the most common risk of a tonsillectomy?
A) Pain
B) Infection
C) Dental injury
D) Painful Jaw
E) Pharyngitis

3) What is the most important thing a surgeon has to do when introducing the gag?
A) Exposure of the tonsil to dissect
B) Placing the tongue in midline position
C) Informing the anaesthetist the he/she is going to do so
D) Making sure that the lips are not caught in the gag
E) Ensuring that they are using the correct blade size for the gag

4) Around which of the instruments listed below would you tie a knot at the lingual end?
A) Bipolar forceps
B) Burkitt's forceps
C) Dennis Brown forceps
D) Negus forceps
E) Straight toothed forceps

5) Which technique is recommended for trainees learning to perform a tonsillectomy?
A) Bipolar dissection and diathermy
B) Cold steel dissection and diathermy
C) Cold steel dissection and ties
D) Monopolar dissection and diathermy
E) Coblation tonsillectomy

Answers

1. E **2. A** **3. C** **4. D** **5. C**

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PAEDIATRIC CIRCUMCISION

G Shepherd

Paediatric Circumcision.
Paediatric Surgery.

A 6 month old boy has been referred to the outpatient clinic because mum is concerned the opening to his foreskin looks tight and the foreskin balloons on urination.

1. When does the normal foreskin become retractile?

2. What indications are there for circumcision?

3. What are the contraindications to circumcision?

Introduction

Circumcision is the most common operation performed in the world. Indeed 30% of the world male population are circumcised. The majority of these are for cultural or religious reasons (70% are Muslim). In the UK the rate of circumcision has steadily decreased from 20-25% to around 5%. This has been predominantly due to growing knowledge within the medical community of the normal and pathological foreskin. Religious and cultural circumcisions are not performed on the NHS in England, Wales and Northern Ireland.

The Normal foreskin

The foreskin starts to develop as part of the developing penis at ¬around 8 weeks gestation. At this time prepucial folds form in the coronal sulcus. The base of this fold is called the glanular lamella. This actively proliferates, gradually rolling the prepucial folds over the glans. The glanular lamella is in continuity with the ventral urethral folds. As they fuse at the base of the glans they form the frenulum. The distal urethra has formed by 12 weeks by which time the glans is covered entirely by the prepucial folds. (Fig 1).

Essentially the inner foreskin shares a common epithelium with the glans at birth so is non-retractile. This gradually separates over the following years. At 6 months of age 80% are non-retractile, and at 6 years of age over 90% are retractile. This normal non-retracting foreskin is known as a physiological phimosis. This does not require a circumcision. Before this separation of the foreskin and glans, the foreskin can be seen to 'balloon' during micturition. This is also normal.

Once separation starts there is a potential space where old epithelium accumulates. This dry sterile cheesy-white material is called smegma. It is very similar to the contents of a dermoid cyst. It is normal and does not cause any pathology such as carcinoma. Unfortunately the myth of smegma being pathological or dangerous was formulated in Victorian society and is still propagated today despite all evidence to the contrary.

Hygiene in small boys does not require foreskin retraction. Traumatic retraction results in bleeding, scarring, pathological phimosis and psychological trauma. Normal elasticity of the foreskin is promoted during puberty under the influence of testosterone in combination with the first regular attempts at retraction as occur with early sexual experiences such as masturbation.

If beyond the age of 6 years, the physiological phimosis persists then a course of topical corticosteroid cream can be administered for 6-12 weeks (eg 0.05-0.1% betamethasone). This can be applied after washing in the morning and evening, but it should be made clear the ointment is applied to the narrowing part of the foreskin, revealed by partial retraction first. This treatment increases the elasticity of the foreskin, enabling retraction in over 70% of children. If despite good compliance the foreskin is still non-retractile then the possibility of prepuceplasty can be discussed with the patient and family. Often the foreskin is left for longer as there is still a good chance of the foreskin becoming retractile by the teenage years. Only after all these measures fail is circumcision considered.

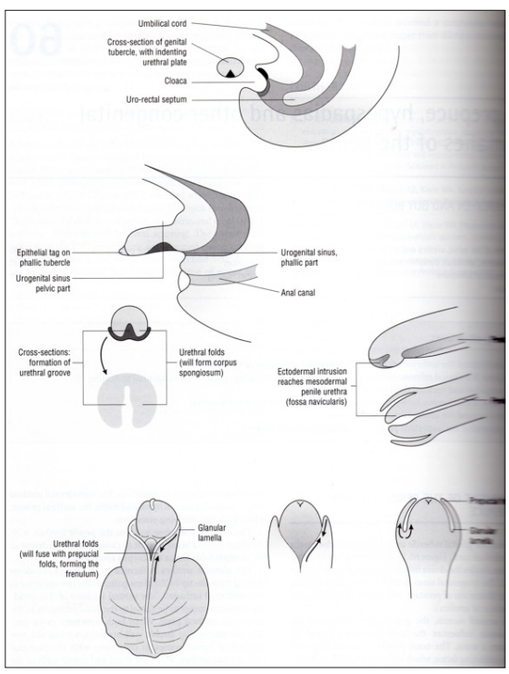

Fig 1 (fig 60.1 p532 Paediatric Surgery 2nd edition Burge, Griffiths ISBN 0-340-80910-8).

PAEDIATRIC CIRCUMCISION

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Foreskin Pathology

Pathological phimosis is a scarred non-retractile foreskin (Fig 2). This may be due to trauma or Balanitis Xerotica Obliterans (BXO).

BXO

BXO is the only absolute indication for circumcision. The cause of it is unknown, but it has been compared to, and may even be the same pathology as lichen sclerosus in the female. It is rarely seen under the age of 5 years. In BXO there is progressive scarring of the foreskin, preventing retraction. (Fig 3). This scarring can extend from the prepuce onto the glans affecting the urethral meatus, and sometimes the entire urethra. The only effective treatment is circumcision. Usually if the BXO is affecting the penis beyond the foreskin, this will regress once the foreskin is excised.

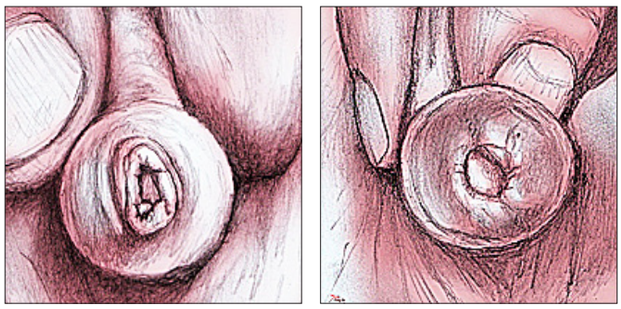

Fig 2 – A Physiological Phimosis B - Pathological Phimosis
(Image reprinted with permission from eMedicine.com, 2010. Available at: http://emedicine.medscape.com/article/442883-overview.)

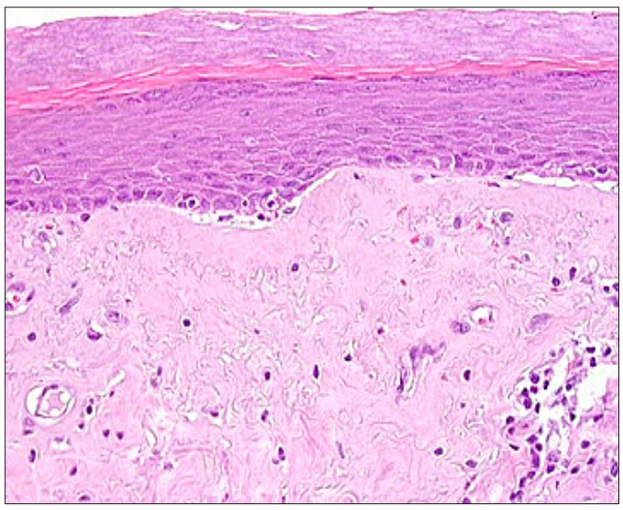

Fig 3. BXO - The upper dermis contains abundant homogenized collagen and a lympho-plasmacytic infiltrate. (webpathology.com/image.asp?n=2&Case=43)

Balanoposthitis

This is essentially a cellulitis infection of the penis, usually involving the foreskin but can extend to involve the entire penis. This includes swelling, redness and discharge. A red foreskin tip does not constitute balanoposthitis. Most occurrences are self resolving or respond to topical antibiotics (Fucidin 2% cream) or systemic antibiotics. Recurrent episodes occur in 20% but only rarely is it necessary to perform circumcision. However it should be noted that cases of balanoposthitis have also been reported in circumcised males.

Paraphimosis

If the foreskin is left in the retracted position for an extended period, especially if there is a tight foreskin; then the venous return is inhibited which results in oedema of the foreskin. This causes pain and in itself makes it more difficult to replace the foreskin forward. As it becomes more swollen then the penis too swells. This swelling and accompanying pain may make it difficult to urinate. In most cases this can be reduced manually. In children this should be done under general anaesthetic, although on occasion a teenager may make the decision to have it done under local anaesthetic. There are varying techniques, but the principles are similar. First the oedema should be compressed, by squeezing and then the foreskin can be replaced. One technique involves pressing on the glans with both thumbs whilst placing both index and middle fingers of each hand behind the trapped foreskin (like pushing socks into a roll) (Fig 4). The patient should be reviewed in clinic to assess if a prepuceplasty is necessary for a persistant phimosis. If this becomes a recurrent problem a circumcision may be necessary.

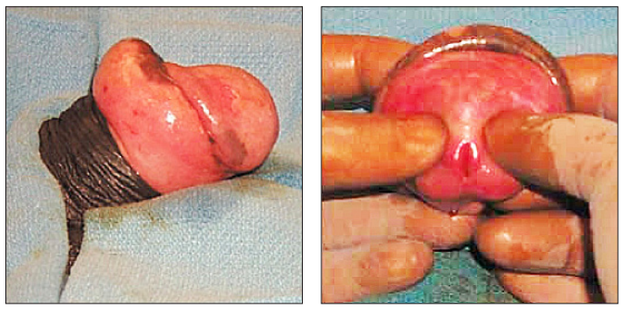

Fig 4. A - Paraphimosis B - Manual Reduction

UTI

Evidence shows over 100 boys need to be circumcised to prevent one UTI and so this is not standard practice. However in children with pre-existing urinary tract anomalies the number to treat is reduced to 4 and so many surgeons advocate circumcision in these patients, but this is not universal.

Contraindications to Circumcision

Generally for conditions where the foreskin is used in reconstructive surgery circumcision is contraindicated such as:

Hypospadias
Epispadias
Chordee

PAEDIATRIC CIRCUMCISION

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Consent for Circumcision

For a medical circumcision, usual rules apply regarding parental consent, however if a religious/cultural circumcision is being performed, consent must be obtained from both parents for it to be legal.

Benefits
Treatment of BXO/recurrent Balanitis/Paraphimosis

Risks
Bleeding, infection (1%)
Meatal Stenosis

Operation

Skin prep
Chlorhexadine solution
To include area from pubis to perineum

Drape
Usually a specially made drape with a hole in it is available otherwise exposure of the penis is all that is required

Anaesthetic
GA with a caudal or dorsal penile block

Initially as the foreskin is non-retractile, it is necessary to pass the tip of an artery clip into the foreskin meatus and spread to split the scar tissue. Once this is done the foreskin can be retracted to expose the glans and cleaned with chlorhexadine. Any adhesions can be broken down with the tip of a clip to sweep the foreskin away or a swab with a dry and wet end, the dry to hold the glans in one hand and the wet to sweep the foreskin off the glans with the other. The foreskin is then pulled forward again.

The Guillotine (Fig 5) or Forceps Guided technique involves placing one clip on the ventral edge of the forekin and one on the dorsal edge, both in the midline. The foreskin is held vertically using the clips, by the assistant. Debakey forceps are then placed with its prongs either side of the penis just above and parallel to the corona. The forceps are then slid up over the glans and opposed, pulling the skin with them so that they now lie in front of the glans protecting it. This can be checked by palpation. The foreskin above the Debakeys can be excised with a knife, scissors or bipolar (never use monopolar on the penis). The skin can again be retracted and any obvious bleeding vessels can be cauterised if bipolar was not used. Pay particular attention to the frenulum. The inner cuff of skin around the corona now needs trimming. This can be done either with scissors or bipolar.

Fig 5. (http://www.icon.co.za/~hugot/circum/images/Feb22.jpg)

The assistant should hold the glans out of the way and can use forceps to help hold the inner cuff taught away from the shaft to aid trimming. If using scissors effort should be made to cut each half in one bite of the scissors to minimise a ragged edge. Try to preserve at least 4-5mm of cuff to allow suturing. Meticulous haemostasis must now be performed with bipolar. Full retraction and eversion of the outer skin edge reveals any retracted vessels that will inevitably bleed later if not cauterised now. Once haemostasis is achieved closure can be performed. An absorbable suture such as 5/0 vicryl rapide is used for closure. A box suture is usually utilised for opposing the frenulum to the shaft skin. By opposing the median raphe of the shaft to the frenulum, a torsion of the penile skin can generally be avoided. The second suture should be at the 12 o'clock position. Left long, these 2 sutures can be held with clips by the assistant to aid placement of the lateral sutures. Usually a total of 6 to 8 sutures are sufficient. Care should be taken not to tie the sutures too tight, but to simply oppose the edges. The meatus should be examined for any sign of BXO or narrowing. If it can admit the tip of a clip this is usually adequate. Once cleaned some sort of vaseline based or topical antibiotic ointment can be applied to avoid clothing sticking to the wound.
If BXO has extended onto the glans then a course of betamethasone ointment is prescribed for 6 weeks.

Variants of this procedure

The initial incision can start as a dorsal slit (Fig 6). This involves placing a clip on the foreskin at 10 and 2 o'clock positions and cutting with scissors in between, in the midline. Retraction then enables one to judge how far to cut, the incision should allow the outer skin to sit comfortably at the corona. The outer foreskin is then cut with scissors circumferentially, followed by the inner cuff. Some surgeons like to draw their incisions first as 2 circumferential dotted/solid lines parallel to the corona; one on the outer layer of foreskin and one on the inner. This helps prevent excessive skin being excised.

PAEDIATRIC CIRCUMCISION

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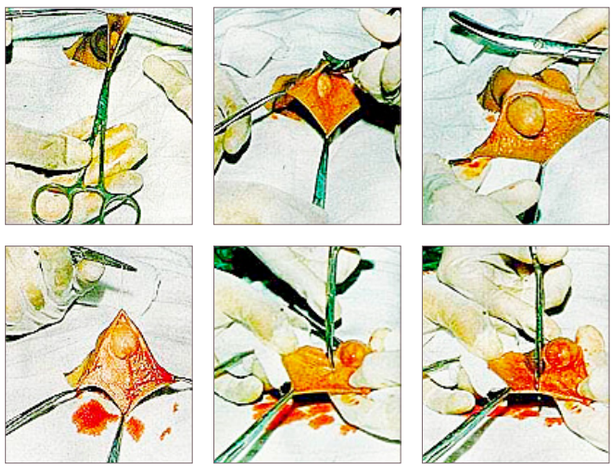

Fig 6 http://www.icon.co.za/~hugot/circum/images/cut5.jpg

Neonatal Circumcision (Fig 7)

The Plastibell device is most commonly used although there are variants. This essentially is a plastic bell of the appropriate size which is fitted over the glans after fully retracting the foreskin and releasing the adhesions (occasionally requiring a dorsal slit). The foreskin is pulled forward again over the device and a ligature is tied around the foreskin into a circumferential groove on the plastibell. The redundant foreskin is excised. After approximately 10 days the edge of the foreskin separates from the ligature due to necrosis and the plastibell falls off.

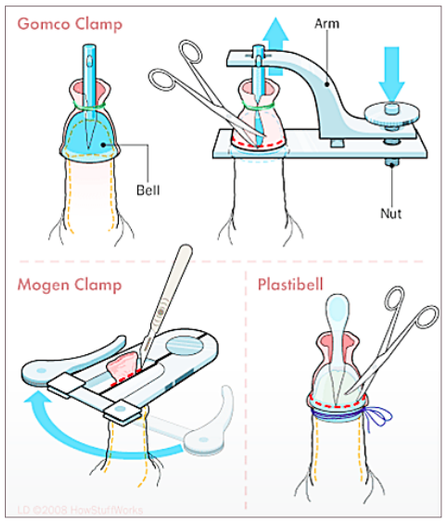

Fig 7 health.howstuffworks.com/circumcision4.htm

The Gomco clamp is similar but instead is a steel bell that is placed in a similar fashion and once the foreskin is replaced the clamp is applied crushing the foreskin to provide haemostasis for excision.

Postop

Notation should include which technique, haemostasis and suture material. Documentation should include specifically the presence and extent of any BXO as well as the condition of the urethral meatus. Patients are discharged the same day once recovered from the anaesthetic and passing urine. Specific warning should be made to the patient and family that the penis will start, relatively quickly, to look very swollen, red and cosmetically poor; and this will last for several weeks. This should help minimise unnecessary attendance to hospital for a normal healing penis. Follow up is in 6-12 weeks, by which time swelling should have subsided, histology results will be available and any topical steroid treatment will be complete; enabling an accurate assessment of the success of treatment.

Managing Complications

The most common complication following circumcision (any technique) is that of bleeding. This is still rare, but occasionally a revisit to theatre is required for diathermy or suturing of the bleeding vessel. Most instances however can be controlled with simple pressure. This should be sustained compression for 20-30 minutes and not 20-30minutes of 2-3 minute episodes of pressure interspersed with visualisation and confirmation of continued bleeding. The use of adrenaline soaked gauze to apply pressure with is a useful and effective adjunct.

Meatal stenosis is a possible complication of any circumcision, not just those for BXO. The newly exposed glans is vulnerable to trauma and ulceration due to insufficient keratinisation to withstand the friction of clothing etc. If this heals with scar tissue near or at the urethral meatus, then narrowing and stenosis occurs. BXO can also affect the meatus and in turn this scarring can have the same effect. This will usually require a further surgical procedure, either as a dilatation of the meatus, or more effectively a formal meatoplasty.

Female Circumcision

Technically, female circumcision should mean the excision of the clitoral hood in much the same fashion as the prepuce. However in reality this practice involves the excision of the clitoris and often other parts of the female external genitalia. This practice is agreed to be a form of genital mutilation and therefore outlawed in the vast majority of countries worldwide.

PAEDIATRIC CIRCUMCISION

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MCQs (choose the most appropriate answer)

1. Dad attends clinic with his 6 week old son. The family are muslim and wish to have their son circumcised. On examination his foreskin is nonretractile.

A Put the patient on the daycase list for elective circumcision for his physiological phimosis.

B Put the patient on the daycase list for elective circumcision, but explain that mum must be present during the consent.

C Explain that the NHS only provides circumcision for medical indications, and that they will need to find a private practitioner to perform the procedure.

D Put the patient on the daycase list for a religious circumcision.

2. A 9 year old boy presents to clinic with a history of recurrent pain to the foreskin on urination. He has never admitted to this before, but now he is starting to have difficulty urinating. It takes him several minutes to empty his bladder. On examination, his foreskin is nonretractile, and there is evidence of pale scar tissue to the foreskin. It is difficult to identify the meatus.

A Explain to parents this is balanitis, prescribe some topical fucidin and reassure that this should settle down in time and arrange to see him in 6 months time to review his progress.

B Explain to parents that this is phimosis, prescribe a six week course of topical steroid cream and arrange to see him in 3 months.

C Explain to parents the diagnosis of balanitis xerotica obliterans. Add him to the daycase waiting list for a circumcision.

D Reassure this is normal for his age and discharge him back to the GP

3. A 3 year old boy attends clinic with his mum. She is very concerned that his foreskin does not retract. She believes he is in pain because he often holds his foreskin and she notices it is sometimes red. Mum wants a circumcision to cure his problems. On examination, the foreskin retracts approximately 25% of the way. The meatus is easily visible, and the foreskin is uniformly elastic. There is no sign of active infection.

A Explain that this is a phimosis and put the patient on the daycase waiting list for a circumcision

B Explain this is a physiological phimosis, prescribe some topical steroid cream, and explain that if this fails to make the foreskin retractile, he will need a circumcision.

C Explain that this is a physiological phimosis and that a circumcision is therefore not indicated as you would expect his foreskin to become retractile on its own in time.

D Prescribe a course of fucidin cream for any future infections, review him in 6 months time.

4. A 13 year old boy attends clinic with one episode 3 months ago of a painful red foreskin with a pus discharge which responded to a course of augmentin by the GP. He has no difficulty urinating. On examination his foreskin is elastic, no signs of active infection. When the patient attempts retraction, it goes back approximately 25% of the way. The glans beneath appears healthy.

A Explain that this is balanitis xerotica obliterans and add him to the daycase waiting list for a circumcision

B Explain he had an episode of balanitis and has a physiological phimosis, prescribe a six week course of topical steroid cream and instruct him to retract the foreskin daily in the bath or shower. See him in 3 months to review his progress.

C Explain this is balanitis xerotica obliterans and prescribe him a course of fucidin cream, then review him in clinic in 6 months time.

D Explain he had an episode of balanitis due to a physiological phimosis and add him to the daycase waiting list for a circumcision.

5. A 2 year old boy attends A&E with a 24 hour history of swollen red penis. He is passing urine ok. There have been no previous episodes. The boy is otherwise well, no fevers and feeding normally. On examination his foreskin is swollen and painful to the root of the penis. He urinates on examination, and you witness ballooning of his foreskin.

A This is a phimosis and requires circumcision

B This is BXO and requires circumcision

C This is balanoposthitis and requires topical antibiotics, he will require circumcision after this has settled down

D This is balanoposthitis, it can be treated with topical or systemic antibiotics. Circumcision is not indicated.

Answers

1. C 2. C 3. C 4. B 5. D

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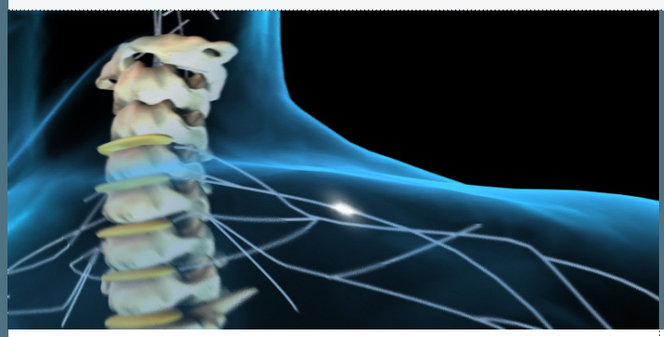
SPINAL CORD TRAUMA

MG Hart & RA Trivedi



Spinal Cord Trauma.
Neurosurgery.

Trauma to the spinal cord can result in significant disability and requires methodical management to optimise recovery. This review aims to consolidate and expand upon the principles covered by in Advanced Trauma Life Support (ATLS®) course thereby providing an introduction to working in a specialist spinal injuries unit. It will focus on the initial resuscitation, detailed neurological assessment, indications and interpretation of imaging, and the management of early complications of spinal cord injury. Detailed discussion on the management of sports related spinal cord injuries, whiplash, paediatric spinal injuries and pre-hospital management can be found in other sources (1).

Epidemiology

The incidence of spinal column fractures is approximately 64 per 100 000 population per year and 10-30% will have an associated injury to their spinal cord (2). There is a bimodal age distribution with the first peak in young males due to high velocity accidents, and a later peak amongst elderly females resulting from low velocity injuries in the context of osteoporosis (3). The commonest aetiologies overall for traumatic spinal cord injuries are falls, motor vehicle accidents and accidents during recreational activities (3).

Emergency Assessment

The initial hospital assessment of any trauma patient should follow the ATLS® protocol (4). Immediate immobilisation of the spinal column must include a hard collar, sand bags and tape for the cervical spine; a spinal board should be used during transportation but must be removed as soon as practicable to prevent pressure sore formation. Approximately 5% of all trauma patients will have an injury to their spinal column (4) whilst 40% of those with spinal cord injuries will have associated systemic injuries (5). Injuries of particular relevance to spinal cord injury include those to the carotid or vertebral arteries, abdominal viscera in the context of Chance fractures, brachial plexus and head. The importance of early cardiovascular resuscitation to reduce potential on-going spinal cord ischaemia cannot be overemphasised.

Specific complications that can arise in the early management of patients with spinal cord injury include neurogenic shock due to a loss of vasomotor tone mediated by the sympathetic nervous system. This results in peripheral vasodilation, hypotension, bradycardia and a reduction in cardiac output. Neurogenic pulmonary oedema is also common due to impaired haemodynamics and can be exacerbated by overzealous fluid resuscitation for neurogenic shock. Gastric distension resulting from increased vagal tone should be managed with pre-emptive naso-gastric tube insertion to prevent aspiration of gastric contents. Acute urinary retention is common and an indwelling urinary catheter is mandatory to prevent bladder distension and to guide assessment of fluid balance status.

Examination

Following initial cardiovascular stabilisation a more detailed neurological evaluation should be completed as part of the secondary survey. A detailed history should identify the mechanism of injury and specifically whether the injury was sustained through flexion, extension, axial loading or distraction. Care should also be taken to identify any associated weakness or sensory symptoms that may have been transient or fluctuating since the injury.

The physical examination should follow the guidelines specified by the American Spinal Injuries Association (ASIA) who also provide a detailed proforma for documenting serial neurological assessment (figure 1). Motor examination should test each key myotome using the movements and power grading as specified in the ASIA proforma. Reflexes may be absent initially but later hyper-reflexia may develop. Examination of the sensory system should include pinprick, temperature and light touch to evaluate the anterior and lateral spinothalamic tracts, and proprioception and soft touch to evaluate the dorsal columns. A log roll of the patient must be performed to allow inspection for signs of trauma followed by vertebral palpation to identify tenderness and deformity. A per rectum examination is mandatory to evaluate S4-5 sensation and anal sphincter contraction. The autonomic nervous system can also be assessed using a similar ASIA proforma with specific testing of pulse, blood pressure, breathing, thermoregulation, and urinary control. Priapism can arise from unimpeded parasympathetic outflow.

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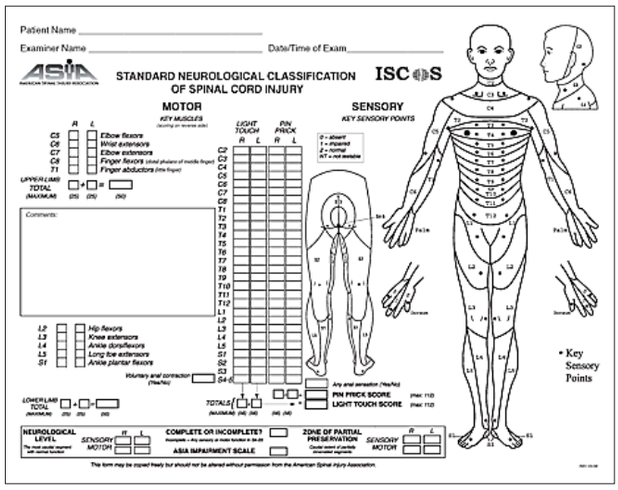

Figure 1: American Spinal Injury Association (ASIA) proforma for documentation of clinical examination in patients with spinal injury (American Spinal Injury Association: International Standards for Neurological. Classification of Spinal Cord Injury, revised 2000; Atlanta, GA. Reprinted 2008).

After this detailed neurological examination it is necessary to classify patients deficits using the ASIA impairment scale. Using the findings from the motor and sensory examinations the single neurological level can be identified corresponding to the most cephalad spinal segment with complete sensori-motor function. Injury below this level can be categorised as either complete or incomplete. A complete injury is defined as a level where there is no sensori-motor function preserved in S4-5 segments. Incomplete injuries by definition have either motor or sensory function at least 3 segments below the neurological level and are further subdivided depending on the degree of residual function. Detailed documentation of clinical findings is imperative to allow precise identification of improvement or deterioration in neurological function which can be used to accurately guide management. It also provides prognostic information and can be useful in comparing study populations in clinical trials.

Specific spinal cord syndromes can be identified that aid understanding of the pathophysiology of the injury (figure 2). An anterior cord syndrome involves spinal cord injury in the territory supplied by the anterior spinal artery. This may result from vascular occlusion of the anterior spinal artery – which is most at risk in the mid-thoracic spine due to poor radicular artery supplementation – or compression from either disc or bone.

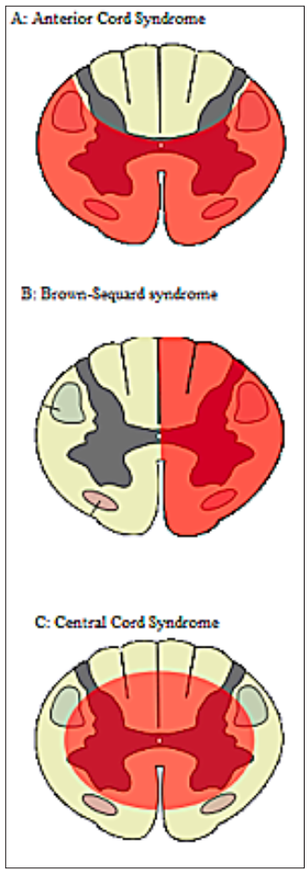

Figure 2: A – anterior spinal cord syndrome. B – Brown-Sequard syndrome. C – central cord syndrome.

Clinical findings include weakness of an upper motor neuron (UMN) pattern below the affected level and of a lower motor neuron (LMN) pattern at the level. There will be a dissociated sensory loss below the level comprising of diminished spinothalamic function (pain and temperature sensation) but preserved dorsal column function (two point discrimination, joint position sense and deep pressure sensation. A Brown-Séquard syndrome is also known as a cord hemi-section and can result from penetrating trauma, cervical disc herniation or an epidural haematoma. This produces ipsilateral weakness (UMN pattern below the lesion and LMN pattern at the lesion), ipsilateral dorsal column loss, and lateral spinothalamic (pain and temperature) loss at the level but preserved from around 3 levels below.

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Contra-lateral findings include lateral spinothalamic (pain and temperature) loss from around 3 levels below but preserved cortico-spinal and dorsal column function. Light touch is usually preserved due to redundant ipsilateral and contralateral anterior spino-thalamic pathways. A central cord lesion involves the central area of the spinal cord corresponding to the vascular watershed zone and the area most susceptible to oedema. It produces a syndrome of disproportionate motor deficit in the upper extremities versus the lower limbs due to the somatotopic organisation of motor fibres in the spinal cord whereby tracts arising form the cervical spine ascend centrally. Varying degrees of sensory disturbance may be present including burning pain or numbness in the hands. Rarely myelopathic changes can develop distally, usually in the context of a pre-existing spinal stenosis.

Imaging

It has reliably been proven that radiographic studies are not needed in patients if there are no mental status changes, no neck pain and no distracting pain, no neurological deficits and no significant distracting injuries that may mask an injury to the spine (6).

The National Institute for Health and Clinical Excellence (NICE) provides guidelines for the assessment of patients in all other scenarios (figure 3). Plane film x-rays of the cervical spine must be performed if safe assessment of cervical movement cannot be performed. Cervical movement can be performed if the patient was involved in a simple rear-end motor vehicle accident, has been mobilising since the injury, is comfortable sitting in the emergency department, has no midline tenderness or presents with a delayed onset of neck pain. If a patient cannot move their neck more than 45 degrees then plane films should be performed. If the patient has midline neck pain and is either aged over 65 or was involved in a dangerous mechanism of injury then x-rays must be performed. A dangerous mechanism of injury is defined as a fall from over 1 meter or greater than 5 stairs, they were ejected from a motor vehicle, they had an axial load to the skull, a roll-over accident, or a bicycle or recreational vehicle accident.

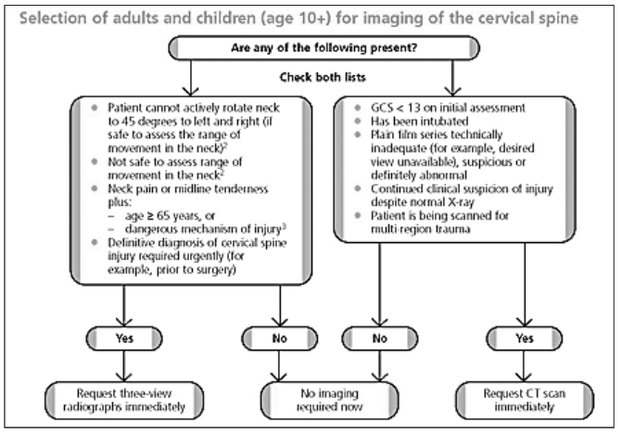
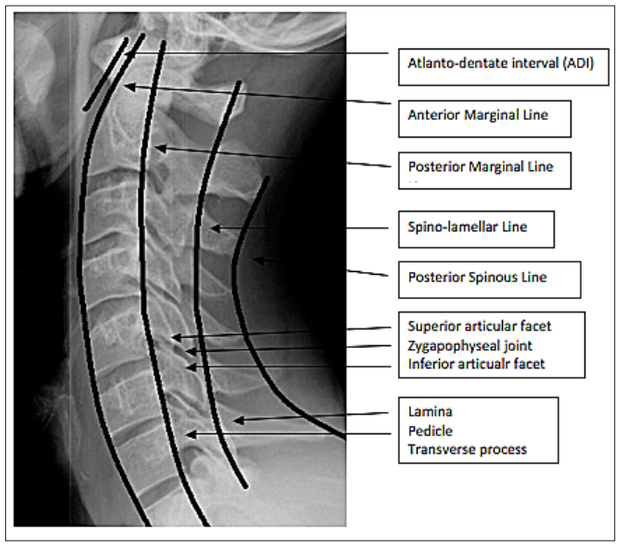


Figure 3: NICE guidance on cervical spine imaging (National Institute for Health and Clinical Excellence (2007) CG 56 Head injury: triage, assessment, investigation and early management of head injury in infants, children and adults. London: NICE. www.nice.org.uk/CG56. Reproduced with permission.)

Evaluation of plane films of the cervical spine must be done in a systematic manner. Films are considered technically adequate if they include Occiput to T1 and include 3 views. On the lateral radiograph there are four anatomical contour lines (figure 4); disruption of any of these lines can suggest a fracture or subluxation. The canal diameter can be determined by measuring the distance from the SLL to the PML and should be greater than 12mm The relationship of the atlas to the occiput can be performed using various methods; currently the basilar-axial interval and basilar-dentate interval (BAI-BDI) method is recommended (1) and is suggestive of atlanto-occipital subluxation (AOS) if either interval is above 12mm (figure 4b. The relationship of the atlas to the axis can be quantified using the atlanto-dentate interval and is suggestive of atlanto-axial subluxation when over 3mm (figure 4c). On the PEG view the overhang of the lateral masses of C1 on C2 should total less than 7mm and the PEG should be in the centre. On all radiographs the contours of the vertebral body, lateral mass and spinous processes must be delineated and the relationship to adjacent vertebrae defined. Finally the prevertebral soft tissue spaces are often increased in the presence of a vertebral fracture, subluxation or ligamentous injury.

A: Lateral Cervical Spine Radiograph



B: Occipito-atlanto subluxation

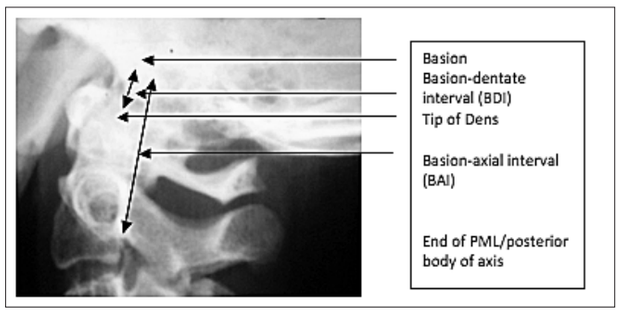


Figure 4: Cervical spine plane films

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Imaging of the cervical spine with computed tomography (CT) is favoured if the patient has a Glasgow Coma Score (GCS) less than 13 on initial evaluation, the patient has been intubated and the spine hasn't be cleared, plane films are technically inadequate, or if the plane films are normal and there is continued suspicion of spinal injury. Fractures detected by plain radiographs should be subsequently imaged with CT and subsequently reconstructed to provide axial, coronal and sagittal views to aid fracture classification and further management. If the patient is undergoing CT evaluation of another organ system consideration can be given to performing a CT of cervical spine at the same time.

Magnetic Resonance Imaging (MRI) provides additional information over CT (7) and can demonstrate pathology in the spinal cord such as haemorrhage or oedema (8). Demonstrable biomechanical instability and ligamentous disruption have been shown to correlate with cadaveric findings in up to 80% of patients (9). Alteration of decision making after MRI has been found in 25% of those with a neurological deficit (10).

Medical Management

Corticosteroids have been proposed for treatment of acute spinal cord injury and have been the subject of multiple clinical trials and reviews (11). Evidence suggests only selected patients may benefit but that this comes with significant risks; currently they are rarely used in the UK (1).

Venous thromboembolism is common amongst patients with spinal injury. Although there are no direct RCTs in spinal trauma, evidence from elective spinal surgery suggests early use of heparinoids within 24 hours is both safe and effective (12). Management of urinary dysfunction aims to reduce complications and achieve continence: previously urosepsis was the most common cause of mortality (13). Supra-sacral injuries usually develop detrusor hyper-reflexia leading to an automatic bladder with involuntary insensate detrusor contraction. Striated muscle dysynergia results in functional bladder outflow obstruction, poor emptying and high intra-vesical pressures. The urinary system has potential to be re-trained using bladder tapping and expression with temporary use of intermittent self-catheterisation (ISC) and condom drainage. Anticholinergics can help with reducing detrusor overactivity and aid continence although occasionally a sphincterotomy may be required. Intra-sacral spinal cord injuries usually develop detrusor areflexia. In this case ISC is usually the method of choice. Late complications of urinary dysfunction include vesico-ureteric reflux leading to chronic renal failure, recurrent urinary infections, pyelonephritis, and urinary calculi.

Bowel dysfunction after spinal cord injury can be of two patterns. An UMN lesion can result in reflex emptying that can be aided by suppositories or digital stimulation but which may not require aperients. A LMN lesion can result in a flaccid bowel that requires manual evacuation and aperients although contraction of abdominal musculature might be able to produce emptying; suppositories are not effective in this scenario.

Autonomic dysreflexia results in bladder distension causing reflex sympathetic overactivity below the level of the spinal cord injury. This produces systemic hypertension and bradycardia that requires urgent treatment to prevent intra-cerebral haemorrhage. Peptic ulceration is a rare but serious complication of spinal injury, occurring most commonly in severe injuries. Pressure sores arise from ischaemia over bony prominences from unrelieved pressure.

Late complications include deformity, syringomyelia, pain management, joint contractures, sexual dysfunction and pathological fractures (14).

Surgical Management

Principles of management are to decompress the neural elements and where necessary reconstitute the spinal column in as short a time as possible whilst minimising neurological injury and preventing deformity. Methods of achieving this include orthotic devices or surgery. Injury classifications have been proposed to aid in treatment planning (15). Specific C0-C2 injuries each have their own established classifications. In the sub-axial cervical spine the Allen and Ferguson system is favoured. In the thoraco-lumbar spine either the Denis 3 column or AO classification can be used. Detailed management guidance for each specific spinal injury is beyond the scope of this article (1).

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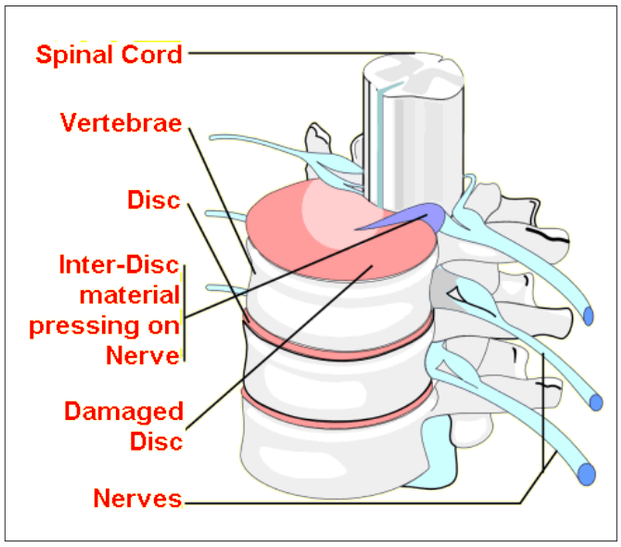

The main indication for surgical decompression is neurological deficit in the context of an incomplete injury, particularly in the presence of extrinsic compression, for example a haematoma or disc prolapse (15). Early surgical decompression for stable incomplete lesions has been proposed to lead to neurological improvement on the basis of animal models (16). A systematic review found that there was evidence for shortened hospital stay and fewer complications with surgery but a suggestion that mortality might be higher and no consistent evidence for improvement in neurological function (17). The difficulties with interpreting the trials include their retrospective nature, heterogeneity in patient population, variability in definition of early surgery (from <8 to <72 hours) and non-standardised patterns of injury. Decompression in complete spinal cord injury has consistently been shown not to have any benefit in improving neurological function (1).

Surgery can also provide biomechanical stability to the vertebral column, which will allow patients to sit upright with potential benefits in decreasing pulmonary complications and facilitate more aggressive rehabilitation. Continued instability of the spinal column has the potential to lead to worsening of neurological function and progressive deformity (15).

Surgical decompression and stabilisation can be performed using various methods that can be broadly grouped into anterior or posterior approaches (1). The decision of which technique to employ should be based on an understanding of the mechanism of injury with the aim to counteract instability and not impair any structures still providing stability. Indications for an anterior approach include extension injuries, fractured vertebral bodies and severe fractures of the posterior elements that preclude posterior stabilisation. Indications for a posterior approach include compromise of the posterior elements and for cervico-thoracic instability where posterior fusion avoids a thoracotomy necessitated by the anterior approach. Surgical complications include metalwork failure, fatigue fractures, screw loosening or neurovascular injury. Modern surgical techniques are now available which allow some of this to be done in a minimally invasive fashion.

Outcome

In incomplete lesions recovery may still occur up to 2 years after the injury (14). In complete injuries the persistence of absent motor power beyond 24 hours suggests no distal function will recover (1). Overall in-hospital mortality is now around 4%. Only around 50% will return to there previous level of employment (18).

Single Best Answer (SBA) Multiple Choice Questions (MCQs)

1. The initial resuscitation of a trauma patient with suspected spinal cord injury must include all features except:

a. Full spinal immobilisation
b. Completion of the American Association of Spinal Injuries (ASIA) proforma
c. Cardiovascular resuscitation
d. Cautious use of predominantly vasonstricting inotropes (e.g. metaraminol) to prevent reflex bradycardia
e. Removal of the spinal board once transportation is complete

2. The following are features of an anterior spinal artery syndrome:

a. Sensation reduction in a 'glove and cape' distribution.
b. Reduced light and sharp touch below the lesion
c. Reduced power and light touch below the lesion
d. Preserved light touch only below the lesion
e. Ipsilateral weakness and reduced light touch with contralateral sharp touch reduction

3. The following can be considered indications for Computed Tomography (CT) Imaging in a trauma patient with suspected spinal cord injury except:

a. Inability to fully rotate the neck in a patient without midline tenderness
b. Normal c-spine imaging to T1 but only using a 'swimmers view'
c. In a patient with a head injury and a GCS less than 13 who is undergoing a CT of their head
d. Whiplash injury with persistent delayed pain presenting a week
e. Acute radicular upper limb pain presenting in a delayed fashion after a whiplash injury and with normal cervical spine plane radiographs

4. The following answer is not part of the best initial medical management of patients with spinal cord injury:

a. Consideration of naso-gastric tube insertion to pre-empt gastric dilatation and vomiting
b. Urinary catheterisation to pre-empt acute urinary retention in patients with pain, instability, focal neurology or immobility
c. Administration of heparinoids for thromboembolic disease prevention
d. Transfer off the spinal board to a suitable mattress as soon as cardiovascular resuscitation is complete
e. Administration of IV methylprednisolone

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5. The following statement is false regarding surgical fixation after spinal cord injury:

a. Surgery is indicated to improve neurological function in complete cord injury

b. Surgical fixation should strongly be considered in a patient with a decline in ASIA score and an unstable fracture

c. Patients with anterior fixation after facet dislocation should be follow-ed up for signs of delayed instability requiring possible posterior fixation

d. Complications after surgical fixation include fatigue fractures and loosening of metalwork

e. Posterior rather than anterior fixation in the thoraco-lumbar spine is usually preferred, where possible, to prevent complications related to the anterior approach

Answers

1. Answer B

Whilst the completion of the ASIA proforma is mandatory in the management of patients with spinal cord injury its completion is not necessary as part of the initial resuscitation but can wait until initial stabilisation is completed. The importance of full cardiovascular resuscitation cannot be over-emphasised not least to protect a potentially ischaemic spinal cord. Full spinal immobilisation with hard cervical collar, sandbags and tape is mandatory. Over-zealous use of vaso-constricting inotropes can lead to a reflex bradycardia in spinal shock. A spinal board is only really necessary during transportation and should ideally be removed as soon as possible to prevent pressure sores.

2. Answer D

A 'glove and cape' sensory disturbance is typical of syringomyelia which can occur after trauma as a late feature. Completely absent sensation could be localised to the dorsal horn as well as the spinal cord depending on the clinical features. Reduced light touch only is more characteristic of the rare posterior spinal artery syndrome. Answer E is the characteristic syndrome of Brown-Sequard.

3. Answer C

In answer A and D plane film radiographs should be acquired in the first instance. A 'swimmers view' is technically adequate method of imaging providing T1 is imaged adequately. In answer E consideration of MRI for investigation of a sub-acute disc prolapse is probably the most logical next step in evaluation.

4. Answer E.

According to the results of the NASCIS 1 and 2 RCTs any potential benefit of steroids are at best negated by the significant risk of adverse events. Whilst the insertion of an NG tube and urethral catheter aren't strictly mandatory in all circumstances a low threshold should be adopted for using them. Maintaining patients on a spinal board for longer than is necessary for transportation is a risk for pressure sores. Although there is now level 1 evidence for VTE prophylaxis some form of heparin should be given to reduce what will be a very high risk.

5. Answer A.

There is no evidence that surgery improves neurological outcome in those with a complete spinal cord injury although it might be indicated to provide stability and allow mobilisation. An objective decline in ASIA score is one of the less disputed indications for surgery.

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OOPS, I DID IT AGAIN! ARRANGING TIME AWAY FROM YOUR TRAINING PROGRAMME

I Hunter

OOPs, I did it again! Arranging time away from your training programme. Current Training Issues.

Introduction

There are many reasons that a trainee may wish to take time out of programme (OOP). It may be to broaden experience in another part of the world or another deanery, it may be to undertake a research project, or perhaps to take a break from training completely and pursue another interest. In my own training I have arranged two periods out of programme. This article contains some advice on how to go about it based on my own experience.

Think about it early

Generally, you should probably start thinking about things at least a year in advance. There are a number of reasons for this. Firstly, your absence will create a vacancy in the training programme. Programme Directors do not like surprises and will need to know your intentions at least in advance of the recruitment process in March. Secondly, before you commit to withdrawing from your rotation for a period of time you will need a commitment from the institution you intend to go to. Clearly this does not apply if you are planning to spend your OOP period following the Inca trail or writing a novel. However if you are planning a Fellowship, research project or working in a recognised training post in another deanery be sure to have an offer in writing. Finally, you really would be surprised how long it takes to arrange something that, on the face of it, seems so straightforward.

In my experience, the best first step is to approach the Consultants that you wish to work for. If they don't seem interested it is probably for a good reason. Don't persist. If, however, they seem genuinely keen to have you then make sure that the Programme Director or equivalent is involved as soon as possible (see 'key players' later). An e-mail from a consultant saying that they would love to have you for a year does not constitute an offer letter. For an offer letter to mean something it must come from the Programme Director or the person responsible for allocating training posts in the case of an overseas fellowship.

Know the system

There are four categories of OOP. There is little point in covering in detail what is already outlined very clearly on the JCST website (www.jcst.org). However here is a very brief summary of each of these categories.

1) OOPT- time out of programme for approved clinical training

This is the only way to spend time out of programme without pushing back your CCT date. The key to this is gaining prospective approval from the Postgraduate Medical Education and Training Board (PMETB; another of the 'key players'- see later). Prospective approval from PMETB relies on having all of the other pieces of the jigsaw in place. Both of my OOPs were of this category and on both occasions PMETB approval arrived frighteningly close to (within a few days of) my start date. This was despite a fair degree of forward-planning on my part. However, I later discovered that for the approval to be regarded as prospective PMETB only need to receive the paperwork before your start date, the actual approval may be issued later.

OOPTs are broadly divided into four types:

- An approved training post in the UK
- A period in a post not approved for training in the UK
- An overseas training post
- 'Acting up' as a consultant (maximum 3 months)

If the post is not approved for training then you will require support from the relevant Specialty Advisory Committee (SAC). They will require an offer letter, educational contract, timetable, name of supervisor and some other signed paperwork from your Programme Director or Postgraduate Dean. You will also require support from the SAC for moving to an approved training post. Although fewer documents are supposedly required for this, in reality I was asked to provide all the documents listed above.

Of course, as this is a training period, you must complete all of the usual assessment forms and give evidence of having met educational objectives.

2) OOPE- time out of programme for clinical experience

OOPE usually refers to a period overseas gaining clinical experience. It will not count towards training and therefore your CCT date will be pushed back accordingly. Occasionally up to 3 months of an OOPE may count towards training with support from the relevant SAC.

OOPS, I DID IT AGAIN! ARRANGING TIME AWAY FROM YOUR TRAINING PROGRAMME

I Hunter

3) OOPR- time out of programme for research

A small proportion of trainees will be in Academic Clinical Fellowships (ACFs) or Clinical Lecturer posts and research will form part of their curriculum. For everyone else, time out of programme undertaking formal research will not count towards training unless at least 50% of the time is spent in approved clinical training. Having had a clinical commitment during my own research period I would personally not recommend this as the natural tendency is to spend more time in the operating theatre than in the laboratory. If you do feel that you want (or need) to spend time working towards a higher degree my advice would be to bite the bullet, drop out of clinical work and push your CCT date back.

4) OOPC- time out of programme for career breaks

Clearly a career break will not count towards training. There are many reasons that someone may wish to take a career break. The important thing to note is that the Programme Director, Postgraduate Dean and the SAC will all need to approve it. Also a prolonged period of time away from clinical duties may have implications in terms of the new GMC Licence to Practise and revalidation.

Know the key players

Depending on the category of OOP period you wish to apply for, there are a number of 'key players' that you will need to deal with. Below is a list of everyone you may need to deal with. My advice would be to correspond often, copy as many of them as possible into any e-mails regarding your OOP period and get to know their secretaries / personal assistants very well. The whole thing may hinge on an expediently typed letter...

Training Programme Director of 'home deanery'

Postgraduate Dean of 'home deanery'

SAC Representative

Training Supervisor for OOPT / Consultants you will be working for

PMETB

Training Programme Director of 'receiving deanery'

Postgraduate Dean of 'receiving deanery'

Summary

If you are thinking of spending time out of programme approach your programme director as early as possible. Log onto the JCST website and read the relevant pages. Discuss your intentions with all the 'key players' and once you have verbal agreement from all parties maintain the momentum until all of the paperwork is completed. It sounds simple, but you would be surprised...

OOPs, I did it again! Arranging time away from your training programme. Current Training Issues.

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A STAY IN SOUTH AFRICA (WORKING AS A MEDICAL OFFICER IN THE SOUTH AFRICAN HEALTH SERVICE POST-FOUNDATION TRAINING)

AL Capek

A Stay in South Africa (Working as a Medical Officer in the South African Health Service post-Foundation Training).
Career Focus.

Introduction

While modern medical training can appear inflexible it offers some natural junctures. The transitions from Foundation to Core training and from Core to Specialist training do not necessarily have to be made overnight and trainees are in a position at these points to make key career decisions.

After finishing Foundation training, I worked as a Medical Officer in Anaesthetics and Paediatrics in Pietermaritzburg, South Africa, from August 2008 to July 2009. In this year I found myself managing patients with presentations I had imagined consigned to textbooks and I learnt valuable skills which will stay with me for life. I experienced a team-spirit far stronger than any I had witnessed in the UK (in circumstances far more taxing), while I saw the best and worst of human character often in stark juxtaposition.

This article will look at the pros, cons, practicalities and potential pitfalls of a year in South Africa.

How I found a job

I initially contacted Africa Health Placements (AHP), a South African organisation recruiting medics into under-staffed hospitals. I then emailed the anaesthetic department in one of the hospitals they cover. The Chief of Anaesthetics looked at my CV and offered me a post (there are vacant positions to be filled in most departments in the country). It was that simple. AHP continued to offer support with visas and form-filling.

What are the Benefits of time away?

Gain specialty experience before applying to a training scheme –While a lack of experience as a foundation trainee should not hinder an application to core training in a given field1, a year away gives the chance to consolidate career plans while gaining valuable skills and tailoring one's CV.

The advantages of South Africa

South Africa offers huge exposure to a range of pathologies and trauma, with far greater responsibility than in the UK. There is a strong academic culture and although the health service is under-resourced it uses modern medicines and equipment so skills learnt are directly transferrable.

Experience a different health system

This allows a more rounded understanding of healthcare delivery giving a new perspective on work in the NHS, which benefits patients, colleagues and oneself.

Have no regrets and see the world

Better to qualify as a contented, settled and rounded consultant at 35 who has followed the path they wish, than a frustrated and regretful one at 33.

Do something different

When making future applications against colleagues with the same training, same exams, same courses and same audits and teaching, having something else to talk about in an interview may be the thing that decides a job one way or the other.

What are the Potential Pitfalls?

A holiday is fair enough, but will it enhance your CV?

A year learning to surf may take some explaining in the future. Go away with clear goals.

Will experience count towards training?

It may be better to gain experience that is acknowledged but not officially counted, thereby allowing application to CT1/ST1 (where there are the most available jobs) on returning home. Others may want training abroad to be counted but this is hard to achieve without the approval of a UK Deanery in which you already have a post.

Finding a job

While easier, the risk with giving a recruitment agency full control is that they may place you where you are most needed, not where you most want to be. Do you want a city or rural environment, a particular specialty or general work? These give very different experiences, suiting very different tastes. Remember you may only be granted a visa to work in an under-staffed hospital, hindering attempts to work in popular areas.

A STAY IN SOUTH AFRICA (WORKING AS A MEDICAL OFFICER IN THE SOUTH AFRICAN HEALTH SERVICE POST-FOUNDATION TRAINING)

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Career Focus.

South African hospitals Vary greatly in terms of senior support, teaching, equipment and duties. I was lucky in finding a hospital complex which gave intense exposure and responsibility with high-level teaching. I know of UK trainees in general surgery with the same experience. Others may not be so lucky, however, especially in very deprived settings.

What are you willing to do? In underfunded systems doctors may be expected to carry out procedures for which they are under-trained. Know your own limits as it is unlikely anyone else will define them for you. Establish your role before you go. Are you able to do it? If not, does the hospital know they will have to do some rapid teaching?

Language Though most South African medicine is carried out in English, many patients speak only their tribal language. Any preparatory work in the most common language of the area to which you are going makes a huge difference.

Safety South Africa has well-publicised dangers. Take advice from colleagues. Check hospital needle-stick policies and your own travel insurance.

Medical Indemnity As important there as here. Organise before you leave.

Paperwork There is a lot of it (job applications, visas, registration with Health Professions Council). Start earlier than you think necessary and chase up everything tenaciously.

To work or volunteer?

Some South African hospitals will only give you a paid job if you stay for a given period. Others may have you as a volunteer for a few months.

Get hospital contracts before leaving home Recently some UK doctors went to take up posts in South Africa to find that because of financial cuts their jobs were no longer available2. They did, however, get positions in another district.

Coming home for interviews Applying for a UK training scheme while abroad involves coming home at short-notice. Make sure your hospital knows this. Furthermore, most deaneries will not allow you to defer a position.

Doing something different Not everyone is in favour of stepping out of the system. Only those high up in deaneries, however, can give a truly informed opinion as to whether plans will count for or against you in the future.

Conclusions

I came back from South Africa a more competent doctor and a more confident individual. None of the "pitfalls" are insurmountable for someone committed to time away but they all need to be addressed to ensure you get what you want from the experience.

My personal view is that the minor risk involved in leaving the UK system is more than made up for by the benefits. We are privileged to have a degree that allows us to travel and, for those who are so inclined, we should not let the fear of non-conformity stop us from following our dreams.

References

1 NHS MMC. Medical Specialty Training. June 2010. **www.mmc.nhs.uk**
2 Mbanjwa B. Lost jobs: UK doctors to sue. The Witness, South Africa. 6th Oct, 2008

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Chris Roseveare,
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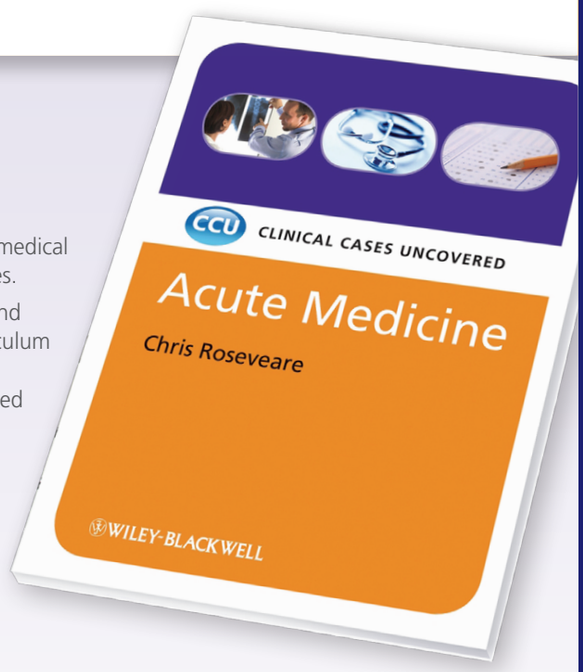

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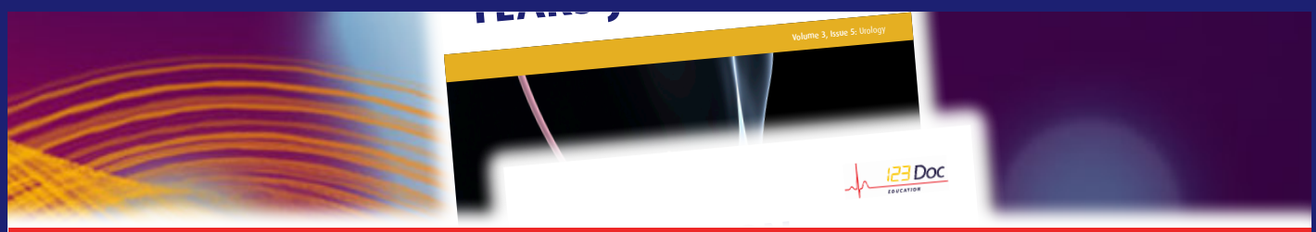

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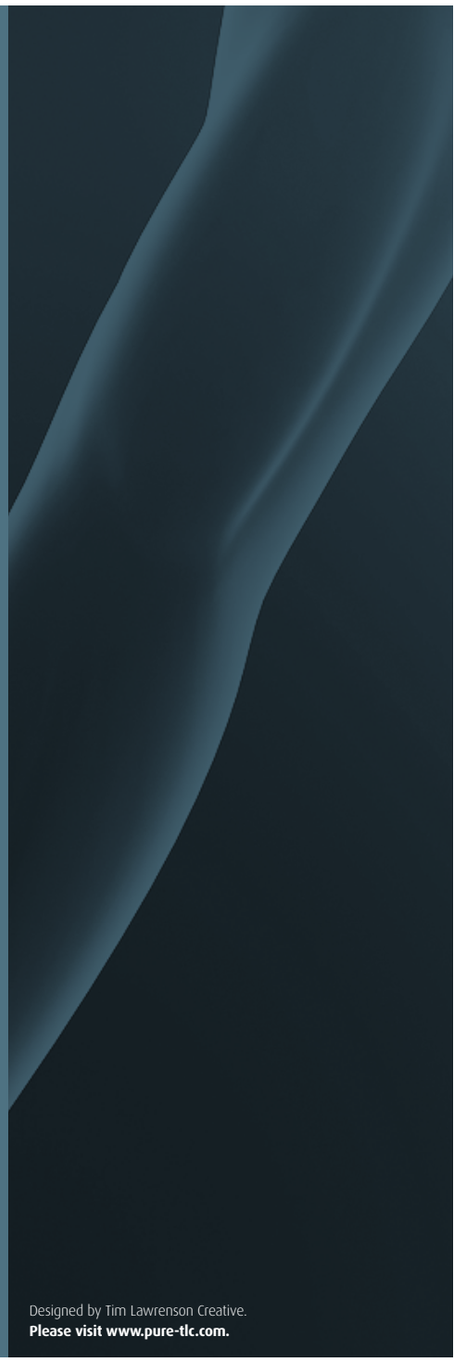

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