Severn Deanery

F2 Regional Study Day
CLINICAL SKILLS
COURSE HANDBOOK
& pre-read material


"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."


"Whoa! That was a good one! Try it, Hobbs — just poke his brain right where my finger is."

Introduction

This is a practical course covering the clinical skills required by the F2 Curriculum.

This handbook provides a brief outline of what will be covered during the day with some useful facts, top tips and references. Try to be familiar with the information in the handbook as it will greatly increase your learning on the day itself. There won't be time to go through the theory again on the day. The course has been designed to include all the clinical skills listed in the F2 Curriculum. We hope that by the end of the day you will feel much more confident to attempt practical procedures in the workplace under the supervision of your seniors and you will be able to demonstrate competency in the skills when you complete your DOPS.

Where appropriate you will have the opportunity to practice the skills on specially designed models which are as representative of real tissue as possible. There will be demonstrations by the Faculty and then you will be expected to undertake the skills with their supervision. **The emphasis of the day is on "having a go"** and we are keen you have as much time as possible to perform the clinical skills. This is a great opportunity to familiarize yourself with all the equipment available to you and ask any questions.

This is your chance to practice and gain confidence without any of the problems that may crop up at work!

There is an optional MCQ available afterwards if you want to test the knowledge that you have gained
http://www.ruh.nhs.uk/For_Clinicians/education/foundation/f2_clinical_skills_post_course.asp

Outline of the Day

There are 8 stations covering the following clinical skills:

1. Non-Invasive Ventilation
2. CPAP
3. Tracheostomy care
4. Pleural Aspiration & Chest Drain (Seldinger) insertion and management
5. Lumbar Puncture
6. Suturing
7. Therapeutic paracentesis
8. Musculoskeletal injection skills – the knee

We hope you find the day useful and enjoyable. Please arrive promptly as there is a lot of material to cover in the day. Feel free to ask lots of questions as you go and try to get as much hands on practice as possible. Don't forget to give your feedback at the end of the day in order for us to make improvements.

After you have gone home & reflected on what you have learnt, there is the opportunity to test your knowledge. There are a series of MCQs available, purely as a self-directed learning exercise. This will not form part of your ARCP but is recommended to see what you have remembered! Please follow the instructions found at:

Link

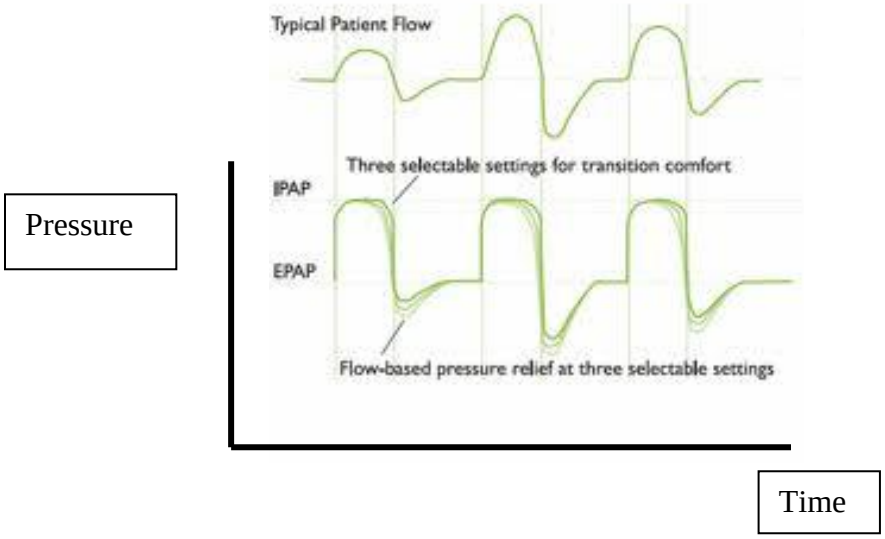
You will be able to download your certificate from:

Non-Invasive Ventilation

Definitions

NIV – Non-invasive ventilation. This includes all forms of assisted breathing as long as it is not delivered by an endotracheal tube. Some of the nomenclature is confusing as ventilator manufacturers have patented their own terminology. Rather than remembering who calls what mode by which title, it is better to understand the principles listed here.

BiPAP – Bi-level positive airway pressure. Provides higher pressures on inspiration to ventilate patient. Has an expiratory pressure to maintain alveolar opening by splinting open small airways which helps expel expiratory gases. In a ward setting is used as an assist to ventilate awake patients and is triggered by the patients own respiration. It consists of IPAP & EPAP. Used for CO_2 management.



IPAP – Inspiratory positive airway pressure. The inspiratory pressure set on a BiPAP machine;

EPAP - Expiratory positive airway pressure. The expiratory pressure set on a BiPAP machine. Is the same as PEEP.

CPAP – Continuous positive airway pressure. Although this is not technically a form of ventilation it does *assist* ventilation. The same pressure is applied throughout the respiratory cycle. It is generally used for hypoxia as it reduces V/Q mismatch & shunting.

Introduction

BiPAP is an increasingly common tool used for the treatment of type 2 respiratory failure. Well used, it can reduce both the need for intubation and mortality in acute COPD by 50%. It should be administered rapidly (within 1 hour of arrival) to **ALL** patients with acute acidotic exacerbations (pH<7.35 and pCO2 > 6.5).The following is advice on how to use it in a **ward based setting**. It is also used in an ICU/HDU setting where the indications and uses are different and should not be confused with what is described below.

Most of the patients you will review for BiPAP will have COPD and is what the bulk of the text below refers to

BiPAP for Type 2 Respiratory Failure Secondary to COPD

Pre BiPAP:

- Oxygenation should be corrected **first** (SaO_2 88-92%).
- Then ABG taken to assess pCO_2 and pH.
- **Don't** use ABG's to correct pO_2 (use SpO_2)
- Look at pH:
    - Are they acidotic?
    - If not acidotic but raised pCO_2, probably chronic
- If acidotic look at pCO_2 **AND** BE
    - Not all acidotic patients benefit from BiPAP - May be a metabolic acidosis or mixed picture
- If pH <7.35 **AND** pCO2 >6.5 then consider BiPAP

Indication

- Diagnosis consistent with COPD;
- Acute Type 2 respiratory failure (pH<7.35, $PaCO_2$ >6.5);
- On maximal, appropriate medical therapy
    - SaO_2 88-92%, nebulisers, steroids, physiotherapy etc;
- Potential for recovery to quality of life acceptable to patient;
- *Able to protect airway;
- *Conscious and cooperative (although some patients can be managed through their hypercarbic encephalopathy once the BiPAP starts working)

***Consider NIV if not candidate for intubation**

Documentation

Prior to starting NIV a RESUSCITATION and ITU decision must be documented. The patient should be stratified into one of the following groups:

1. Requiring immediate intubation and ventilation;
2. Suitable for NIV and escalation to ITU/intubation/ventilation if required. Failure of NIV and need to escalate to intubation normally apparent within 4 hours; delaying intubation leads to an increase in mortality
3. Suitable for NIV but not for escalation to ITU/intubation/ventilation;
4. Not suitable for NIV but for full active management;
5. Palliative care.

Initial Settings

- **IPAP** - 10 cmH_2O - increased by 5cmH_2O until target 20 cmH_2O reached, therapeutic improvement or patient tolerability reached. Experienced users may alter the IPAP in smaller increments. The majority of patients can be controlled on an IPAP of <20 cmH_20.
- **EPAP** - 4 cmH_2O
- **Oxygen** – Aim for saturations 88-92% - i.e. **"Target sats of 90%"**
- **Back up rate** – 12 breaths/min

Arterial Blood Gases

When to take ABG's after initiation of BiPAP:

- 1 Hour after initiation and 1 hour after any setting change
- 4 Hours after initiation (earlier if no clinical improvement).
- Remember they are painful.
- You need a reason to take them – think what you are looking for **before** you take them. If you can't think of anything don't take them.
- Consider local anaesthetic – it's easier to take if the patient doesn't move!
- If abnormal don't just repeat 30mins after the next doctor starts. They will **still be abnormal** unless you have changed something! If your not sure what to do ask someone senior.

Other indications for BiPAP:

- Chest wall deformities
- Neuromuscular disease
- Decompensated Sleep Apnoea
- Obesity hypoventilation
- Pulmonary oedema
- Pneumonia, especially if associated with immunosuppression

The following RCP/BTS guidelines may be helpful:

http://www.rcplondon.ac.uk/sites/default/files/concise-niv-in-copd-2008.pdf

Management of the acutely unwell patient with high flow Continuous Positive Airway Pressure (CPAP)

Indications

- Most common indication is profound hypoxia not managed with reservoir bag mask plus nasal cannula or high flow oxygen
- Peak inspiratory flow usually exceeds 15 lpm that can be delivered by "wall" oxygen
- High flow devices can deliver oxygen at a rate greater than peak inspiratory flow
- CPAP will not usually affect $PaCO_2$ levels – to treat hypercapnia, the patient will require BiPAP
- Other indications for CPAP are:
    - Acute cardiogenic pulmonary oedema (ACPO) (CPAP is more appropriate where NIV cannot assure adequate oxygenation);
    - Occasionally patients who are acutely short of breath but not hypoxic may benefit from CPAP.

Need to exclude or consider absolute or relative contra-indications

(Need also to consider whether contra-indication is for CPAP itself or the mask)

- Recurrent pneumothoraces / untreated pneumothorax – may contribute to barotrauma.
- Severe post-operative pulmonary air leak (broncho-pulmonary fistula)
- Central Apnoea
- Significant hypercapnia and/or hypoventilation.
- Asthma (risk of gas trapping - although this paradoxically may be reduced as PEEP splints small airways open, allowing gas to escape)
- Bronchial tumour
- Lung abscess / active tuberculosis

- Recent oesophageal anastamosis
- Reduced conscious level (For CPAP by mask airway protection by the patient must be possible).
- Epistaxis; major haemoptysis
- Unstable facial fractures, extensive facial surgery or lacerations and facial burns.
- Laryngeal trauma, recent tracheal anastamosis.
- Recent ear, nose and throat surgery.
- Raised intracranial pressure
- Basilar skull fracture - risk of pneumocephalus.

All NIV should be used with caution in patients who are hypotensive and/or hypovolaemic.

Considerations in setting up High flow CPAP

- Interface – commonly two-port mask, but options are via T piece and tracheal (or tracheostomy tube), single port mask or helmet.
- Oxygen delivery – adequate flow generation
- Humidification
- Gastric inflation is rarely an issue with a conscious patient – consider NG tube insertion if obvious diaphragmatic splinting occurs as a result
- Pressure sores, especially bridge of the nose –consider a pressure dressing e.g. Duoderm
- Level of supervision/observation (including arterial or capillary blood gas sampling**)**

Pleural Aspiration (Thoracocentesis)

Pleural aspiration is a procedure whereby pleural fluid or air is aspirated via a system inserted temporarily into the pleural space. This may be for diagnostic or therapeutic reasons.

Indications:

Pneumothorax

- Primary spontaneous pneumothorax (Any size unless tension)
- Small secondary spontaneous pneumothorax in patients less than 50years.
- Effusions
- Small volume aspiration for diagnosis.
- Larger volumes to relieve symptoms.
- Pleural effusion associated with sepsis to guide decision regarding chest drain.

Contra-indications:

- Patient refusal
- Coagulopathy

Complications:

- Pneumothorax
- Visceral injury
- Procedure failure
- Pain
- Haemorrhage

Procedure:

Pre-procedure

- CXR
- Clotting

- Consent

Ideally ultrasound should be used to mark the site with the patient remaining in the same position for the aspiration.

Equipment

Pleural aspiration should be aseptic and therefore sterile gloves, a sterile field, skin sterilising fluid and a clean dressing are needed.

For a simple diagnostic aspiration a 21G (green) needle and 50 ml syringe is sufficient.

For larger therapeutic aspirations, there are a number of commercially available kits to perform the procedure. Available equipment could be also adapted for this purpose. Equipment consists of an intravenous cannula attached to a 3-way tap, tubing and syringe. Fluid is then drained into a suitable receptacle for sampling and disposal.

Patient position and site of insertion

Patient position is dependent on the operator preference and the site of pathology and patient comfort. It is however very important that the patient is in the same position he/she was when the site was marked by ultrasound.

In most cases the site of needle insertion is either in the **triangle of safety** (bordered by the lateral edge of pectoralis major, laterally by the lateral edge of latissimus dorsi, inferiorly by the line of the 5th intercostal space and superiorly by the base of the axilla

The patient may therefore either sat upright leaning forward with arms elevated but resting onto a table, thereby exposing the axilla, or lying on a bed with their arm behind their head or hand on hip to expose the axilla.

Technique

The skin should be cleaned with an appropriate cleaning solution e.g. chlorhexidine. Local anaesthesia is achieved by infiltrating the skin and pleura using Lignocaine up to 3/kg but 5- 10ml 1% Lignocaine is usually sufficient

The pleural space should be reached with the local anaesthetic needle – this also determines the depth of the pleural space.

Advance the pleural aspiration needle perpendicular to the chest wall just above the rib to avoid the neurovascular bundle. Continually aspirate till fluid is aspirated. The needle is withdrawn and the cannula left in situ if doing a therapeutic tap. This is connected to the 3 way tap system.

The procedure should be stopped when no more fluid can be aspirated, the patient develops symptoms of cough or chest discomfort or 1.5 l is withdrawn.
If larger amount of fluid is aspirated there are increased risk of re-expansion pulmonary oedema and pneumothorax.

Record volume of fluid and appearance (serous, blood tinged, frankly bloody or purulent).

If diagnostic aspiration, fluid should be sent to:

- **Microbiology**
    - MCS,
    - AAFB
    - TB Culture
- **Biochemistry**
    - protein
    - LDH (to determine if transudate or exudate)
- **Cytology**.
- A serum sample should be send at the same time for protein and LDH.

A fluid protein > 30g/l is indicative of an **exudate** and < 30g/l a **transudate**. It is however advisable to use Light's criteria for fluid protein levels between 25-35 g/l.

Light's criteria:

The pleural effusion is an **exudate** if one or more of the following criteria are met:

Pleural fluid protein divided by serum protein >0.5

Pleural fluid LDH divided by serum LDH >0.6

Pleural fluid LDH more than two-thirds the upper limits of normal serum LDH

The fluid pH should be measured if the effusion is associated with an infection. A pH of < 7.2 indicates an empyema and is an indication for a chest drain.

Post-Procedure

- Routine observations.
- CXR (check for resolution of pathology and any evidence of pneumothorax.

Simple analgesia may be required.

Chest Drain (Seldinger) insertion and management

A chest drain describes a tube which is placed in the pleural space to drain its contents (fluid or air) and remains in place until drainage is complete.
Small bore Seldinger drains are most commonly used and will be discussed in this section. Large bore drains are indicated in some circumstances, but is not within the remit of this course.

Indications

- Pneumothorax
    - In any ventilated patient;
    - Tension pneumothorax after initial needle relief;
    - Persistent or recurrent pneumothorax after simple aspiration;
    - Large secondary pneumothoraces
- Malignant pleural effusions
- Empyema

Complications

- Pain
- Intra-pleural infection
- Wound infection
- Visceral injury and serious bleeding
- Drain blockage
- Drain dislodgement

Consent

As insertion of a chest drain is a procedure associated with significant risk, consent should be obtained in writing and should include the most common and serious complications as outlined above.

Equipment:

- Sterile gloves and gown;
- Skin antiseptic solution;
- Sterile drapes;
- Gauze swabs;
- A selection of syringes and needles (21-25 gauge);
- Local anaesthetic e.g. Lignocaine 1% or 2%;
- Seldinger drain pack which includes:
    - Introducer needle with syringe
    - Guide wire and dilator
    - Scalpel
    - 12 F chest tube with 3 way tap and tube connectors
- Suture material 1.0 or 2.0 silk;
- Dressing;
- Connecting tube;
- Underwater drainage system with sterile water.

Patient position and site of insertion

The preferred position is on the bed, with the arm on the side of the lesion behind the patient's head or on the hips to expose the axillary area.
Insertion should be in the "triangle of safety" (described in the pleural aspiration section). This position minimises risk to underlying structure and avoids damage to muscle and breast tissue resulting in unsightly scars.

Confirming the site of insertion

Immediately prior to the procedure the identity of the patient should be checked and the site and side for insertion confirmed by reviewing the clinical signs and chest radiograph. Ultrasound could also be used. Prior to insertion of the drain, the expected pleural contents (air or fluid) should be aspirated with a small needle whilst administering local anaesthesia. If none is forthcoming then further imaging is required.

Local anaesthesia

Chest drain insertion is very painful and correct and ample application of local anaesthesia is required:

Lignocaine (up to 3mg/kg) is infiltrated, paying particular attention to the skin and then the periostium and pleura which are the most sensitive areas.

Insertion technique

A needle is introduced into the pleural space and the guide wire is passed down the needle. The depth of the needle when it enters the pleural space is noted. The needle is then withdrawn and a small skin incision is made. The dilator is the passed gently over the guide wire using a slight twisting action.

Very important to always have the wire firmly in one hand to ensure it does not dislodge or disappear into the pleural space. The depth of the dilator only need to be passed 1cm beyond the depth of the pleura as measured with the introducer needle. Some dilators have depth markers.

Once the tract is dilated the drain is inserted over the wire. The depth should be enough to ensure that the last drainage hole is well within the pleural space, but does not require insertion to the hilt. The drain is then connected via a 3 -way tap connector to the tubing and underwater seal drainage system.

The drain is secured to the skin with a suture to prevent it falling out and dressing is put over it to keep the drain in place. An omental tag of tape allows the tube to lie a little away from the chest wall to prevent tube kinking and tension at the insertion site. Large amount of tape and padding to dress the site is unnecessary and may restrict chest wall movement.

Drain position

If possible the tip of the drain should be aimed apically to drain air and basally for fluid. However successful drainage can still be achieved despite the drain not in an ideal position. Therefore a functioning drain should not be repositioned simply because of sub-optimal radiographic appearance.

If a drain needs repositioning, it could be withdrawn, but **never** be pushed further in as this could introduce infection.

Chest drain management

Do's and Don'ts of Chest drain Management

Do	Don't
Perform a CXR after insertion	Allow more than 1.5l to be drained in the first hour – may lead to re-expansion pulmonary oedema
Manage the patient in a specialist ward with experienced nurses	Ever clamp a bubbling chest tube
Seek senior advice if a patient with a clamped tube suddenly becomes breathless or develops subcut. emphysema	Clamp a chest tube sited for pneumothorax
Make sure that the drain swings on breathing, indicating correct site and tube patency	Allow the underwater seal to be raised above the level of insertion
Remove if stops bubbling or condition resolved on CXR	Remove if draining > 200mls/day
Remove a chest drain in expiration or with the patient performing a Valsalva	Remove if drain still bubbling
Perform a CXR after removal	
Ensure that documentation occurs at ***all*** stages – some Trusts have pre-printed stickers to fill out	

- If suction is required, a high volume low pressure system should be used

Further information on the insertion & management of chest drains is available at:

http://thorax.bmj.com/content/58/suppl_2/ii53.full

Tracheostomy Management

1. Safe Routine Change of a Tracheostomy Tube

Bedside equipment (Use Checklist)

I. Basic Airway Equipment (present at bedside)
   a. Oxygen masks
   b. Self-inflating bags
   c. Oropharyngeal & Nasopharyngeal airways

II. Humidification Equipment

III. Clean pot for spare inner cannula

IV. Suction with selection of appropriate suction catheters

V. Sterile water (for cleaning the suction tube)

VI. Spare tracheostomy tubes
   a. 1 same size
   b. 1 size smaller

VII. Scissors (& stitch cutter if tracheostomy tube is sutured)

VIII. Water soluble lubricating jelly

IX. Sterile dressing pack

X. Tracheostomy dressings

XI. Tracheostomy tapes / ties

XII. Personal protective equipment (gloves, aprons, eye protection)

XIII. Sterile gloves (for performing deep suction)

XIV. Nurse call bell (the patient may be unable to call for help)

XV. Communication aids (the patient may not be able to verbalise)

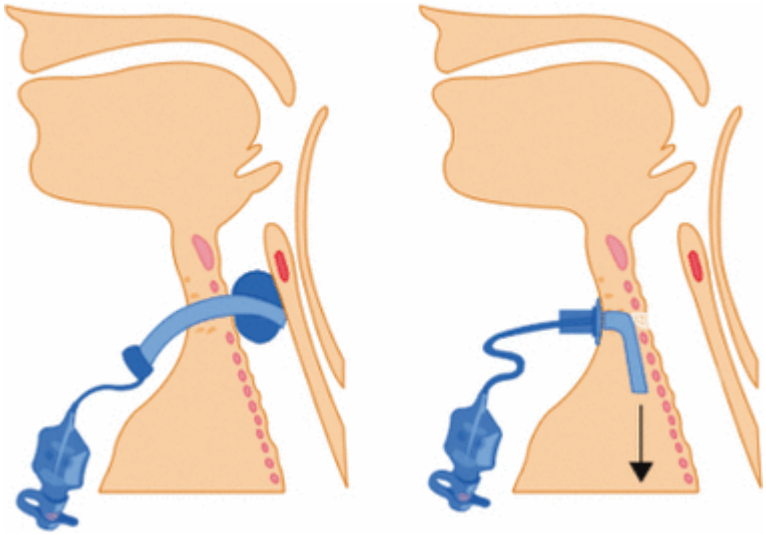
Advanced Airway Equipment (know where to obtain)

i. Laryngeal Mask Airway
ii. Laryngoscopes
iii. Endotracheal Tubes
iv. Capnography
v. Fibreoptic Bronchoscope
vi. Bougies/Airway exchange Catheters
vii. Tracheal Dilators

Procedure

1) Establish reason for tube change (routine or emergency)
2) Check notes for age of tracheostomy & any problems noted at time of insertion or during previous change
3) Establish method of tracheostomy formation (Percutaneous versus Surgical or Laryngectomy). Some percutaneous methods may make change awkward
4) Do not change within 5 days of the tracheostomy formation as the stoma will not be established (refer to expert)
5) What are the specifics of the Tracheostomy Tube;
    a. Size
    b. Type
    c. Cuffed or Uncuffed?
    d. Solid or fenestrated?
6) Check tube introducer & cuff before use
7) Explain procedure to patient
    a. Ensure empty stomach
    b. Ensure adequate oxygenation before proceeding
8) Position patient correctly
9) Check original tube for sutures
    a. Wound sutures
    b. Anchor suture
    c. Tracheostomy Tube Fixation Suture
10) Check airway above tracheostomy to ensure that unprotected airway won't be compromised
11) If tracheostomy tube is cuffed, deflate cuff to check for cuff leak
12) **DO NOT PROCEEED IF NO CUFF LEAK**
13) Always have an assistant
14) Know where to get help from in an emergency
15) Insert bougie, railroad old tube off & new tube on
16) Confirm with capnography (Risk of false passage & subcutaneous insertion)
17) Ensure tracheostomy inner tube is in situ
18) Encourage cough & deep breathing
19) Dress & secure the new tube
20) Document the procedure
21) Standard observations

2. Management of a Displaced Tracheostomy Tube



This picture demonstrates the end of the tracheostomy tube in the pre-tracheal fascia, making it impossible for the patient to breathe through the tracheostomy tube. If not promptly and accurately recognised, this will lead to life threatening hypoxia very quickly.

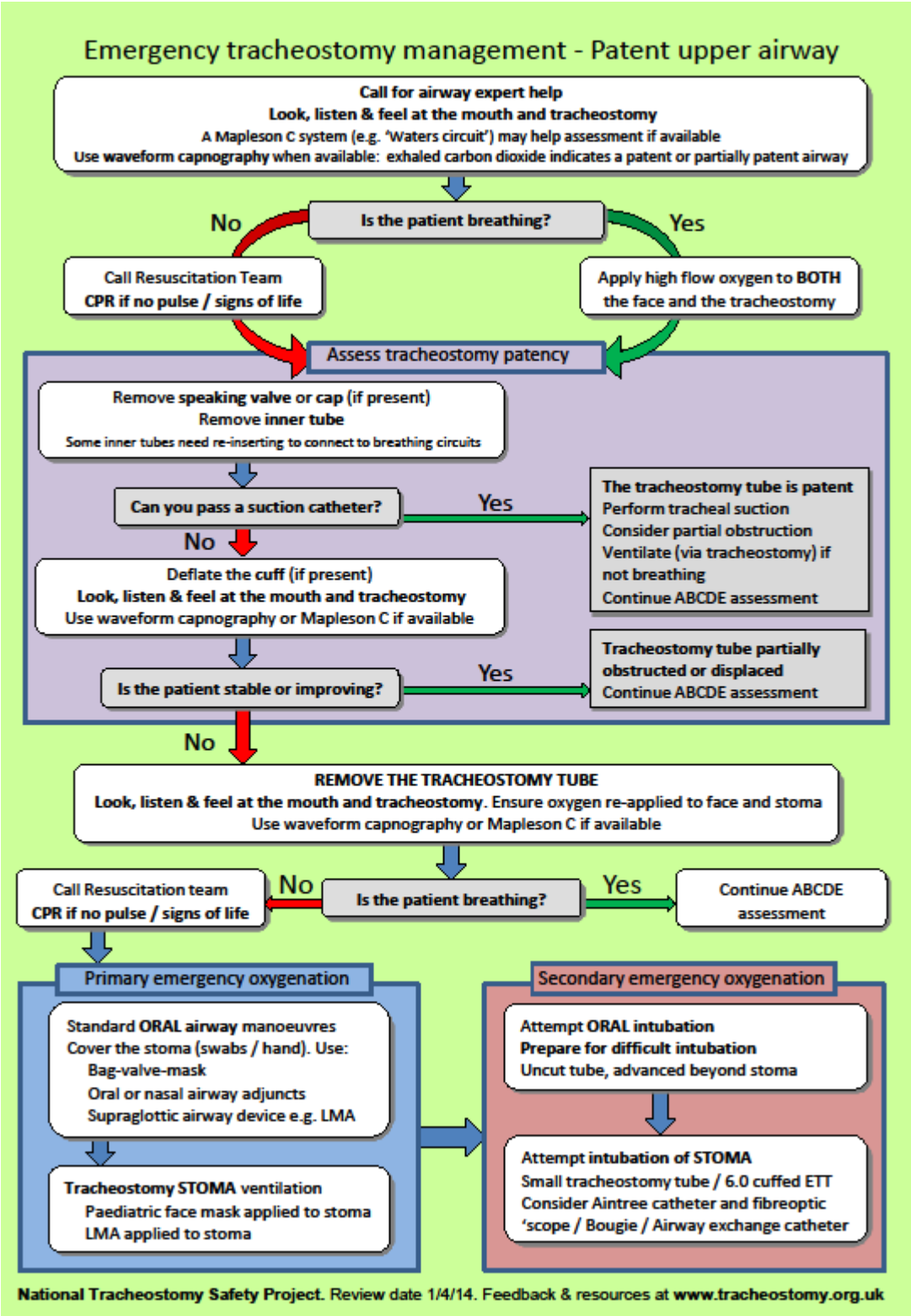
It is a medical emergency.

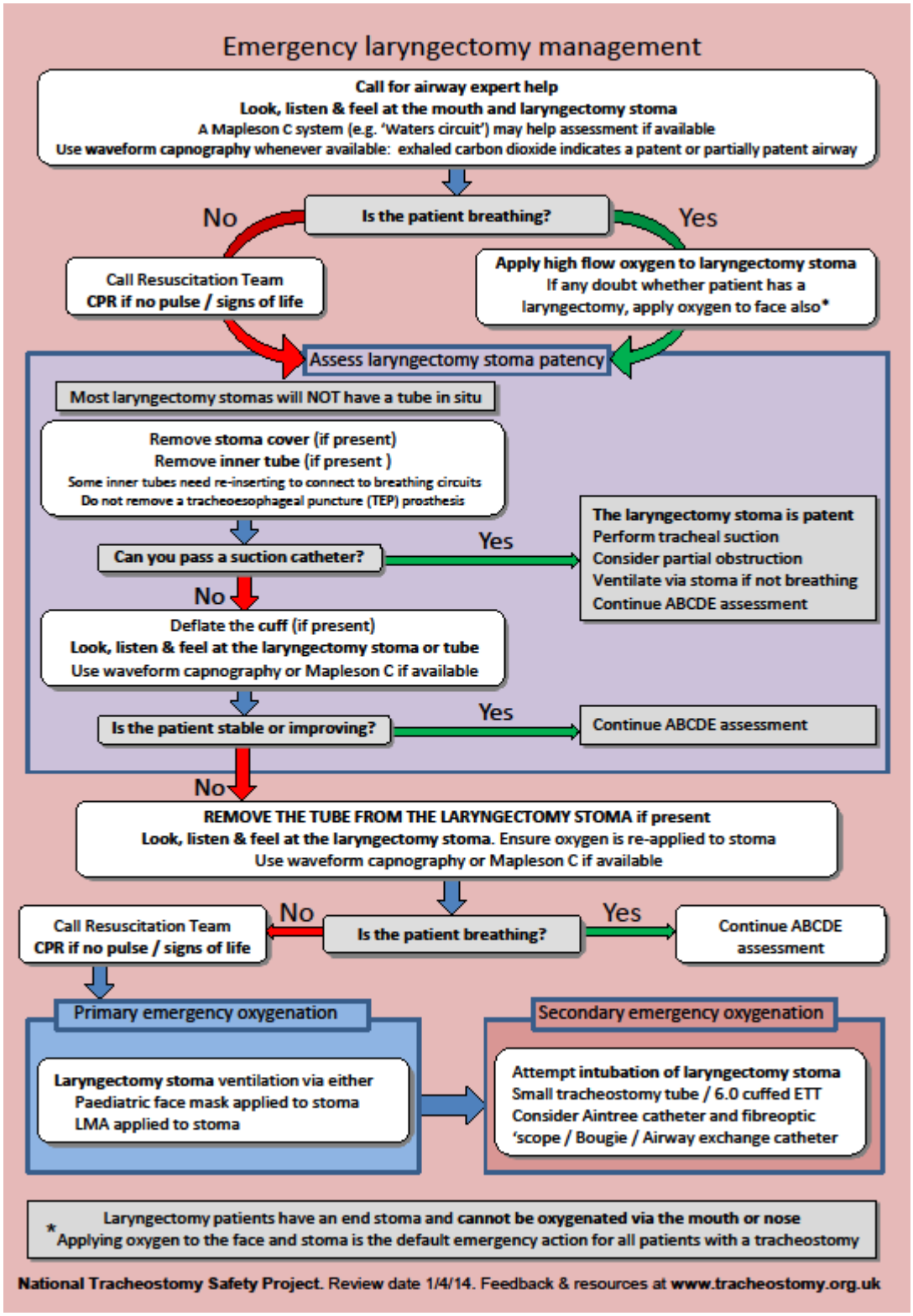
Following a recent National Audit (NAP 4) run by the Royal College of Anaesthetists, flow charts have been produced that document the correct management of a suspected displaced tracheostomy tube.

One of these charts should be at the bedside of every patient with a tracheostomy.

Further information is available at:

www.tracheostomy.org.uk


Emergency tracheostomy management - Patent upper airway
Call for airway expert help
Look, listen & feel at the mouth and tracheostomy
A Mapleson C system (e.g. 'Waters circuit') may help assessment if available
Use waveform capnography when available: exhaled carbon dioxide indicates a patent or partially patent airway
Is the patient breathing?
No
Yes
Call Resuscitation Team
CPR if no pulse / signs of life
Apply high flow oxygen to BOTH the face and the tracheostomy
Assess tracheostomy patency
Remove speaking valve or cap (if present)
Remove inner tube
Some inner tubes need re-inserting to connect to breathing circuits
Can you pass a suction catheter?
Yes
The tracheostomy tube is patent
Perform tracheal suction
Consider partial obstruction
Ventilate (via tracheostomy) if not breathing
Continue ABCDE assessment
No
Deflate the cuff (if present)
Look, listen & feel at the mouth and tracheostomy
Use waveform capnography or Mapleson C if available
Is the patient stable or improving?
Yes
Tracheostomy tube partially obstructed or displaced
Continue ABCDE assessment
No
REMOVE THE TRACHEOSTOMY TUBE
Look, listen & feel at the mouth and tracheostomy. Ensure oxygen re-applied to face and stoma
Use waveform capnography or Mapleson C if available
Call Resuscitation team
CPR if no pulse / signs of life
No
Is the patient breathing?
Yes
Continue ABCDE assessment
Primary emergency oxygenation
Standard ORAL airway manoeuvres
Cover the stoma (swabs / hand). Use:
Bag-valve-mask
Oral or nasal airway adjuncts
Supraglottic airway device e.g. LMA
Tracheostomy STOMA ventilation
Paediatric face mask applied to stoma
LMA applied to stoma
Secondary emergency oxygenation
Attempt ORAL intubation
Prepare for difficult intubation
Uncut tube, advanced beyond stoma
Attempt intubation of STOMA
Small tracheostomy tube / 6.0 cuffed ETT
Consider Aintree catheter and fibreoptic 'scope / Bougie / Airway exchange catheter
National Tracheostomy Safety Project. Review date 1/4/14. Feedback & resources at www.tracheostomy.org.uk


Emergency laryngectomy management
Call for airway expert help
Look, listen & feel at the mouth and laryngectomy stoma
A Mapleson C system (e.g. 'Waters circuit') may help assessment if available
Use waveform capnography whenever available: exhaled carbon dioxide indicates a patent or partially patent airway
Is the patient breathing?
No
Yes
Call Resuscitation Team
CPR if no pulse / signs of life
Apply high flow oxygen to laryngectomy stoma
If any doubt whether patient has a laryngectomy, apply oxygen to face also*
Assess laryngectomy stoma patency
Most laryngectomy stomas will NOT have a tube in situ
Remove stoma cover (if present)
Remove inner tube (if present)
Some inner tubes need re-inserting to connect to breathing circuits
Do not remove a tracheoesophageal puncture (TEP) prosthesis
Can you pass a suction catheter?
Yes
The laryngectomy stoma is patent
Perform tracheal suction
Consider partial obstruction
Ventilate via stoma if not breathing
Continue ABCDE assessment
No
Deflate the cuff (if present)
Look, listen & feel at the laryngectomy stoma or tube
Use waveform capnography or Mapleson C if available
Is the patient stable or improving?
Yes
Continue ABCDE assessment
No
REMOVE THE TUBE FROM THE LARYNGECTOMY STOMA if present
Look, listen & feel at the laryngectomy stoma. Ensure oxygen is re-applied to stoma
Use waveform capnography or Mapleson C if available
Call Resuscitation Team
CPR if no pulse / signs of life
No
Is the patient breathing?
Yes
Continue ABCDE assessment
Primary emergency oxygenation
Laryngectomy stoma ventilation via either
Paediatric face mask applied to stoma
LMA applied to stoma
Secondary emergency oxygenation
Attempt intubation of laryngectomy stoma
Small tracheostomy tube / 6.0 cuffed ETT
Consider Aintree catheter and fibreoptic
'scope / Bougie / Airway exchange catheter
* Laryngectomy patients have an end stoma and cannot be oxygenated via the mouth or nose
Applying oxygen to the face and stoma is the default emergency action for all patients with a tracheostomy
National Tracheostomy Safety Project. Review date 1/4/14. Feedback & resources at www.tracheostomy.org.uk

Lumbar Puncture

Indications

- **Diagnostic:**
  - Bacterial/Viral/Carcinomatous/TB meningitis
  - Subarachnoid haemorrhage
  - Demyelination Disease
  - Benign Intracranial Hypertension

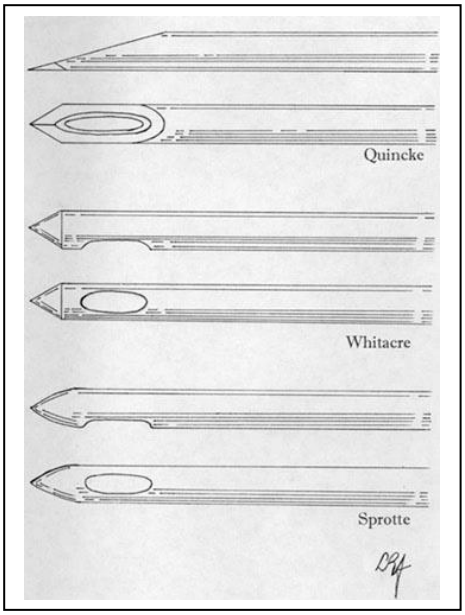
- **Therapeutic:**
  - Spinal anaesthesia
  - Benign Intracranial Hypertension
  - Intrathecal chemotherapy

Contra-indications

- Patient refusal;
- Signs of raised ICP (**reduced GCS**, papilloedema, focal neurology, seizures);
- Infected skin over needle entry site;
- Coagulopathy (INR>1.4) or thrombocytopenia (Plts < $50x10^9$ /L).

Complications

- Post LP headache



  - common, up to 30% of patients:
  - begins 24-48hrs post procedure
  - Worse with larger gauge needles & cutting tip (Quincke) versus blunt tipped (Whitacre, Sprotte)
  - probably due to CSF leak form puncture site
  - improves on lying down, hydration, simple analgesia, caffeine
  - May need epidural blood patch to completely resolve

- Haemorrhage
    - epidural, subdural or subarachnoid
    - presents as severe radicular back pain, progressive paraparesis and sphincter disturbance
    - Needs emergency MRI to quantify

- Infection
    - bacterial meningitis, discitis, epidural abscess

      - rare
- Neurological Injury
    - spinal cord or nerve damage – rare
- Post LP uncal herniation - rare
- Failure
    - can get falsely negative dry tap in dehydrated
    - May need a longer needle in obese patients

PROCEDURE

Pre-procedure:

Check clotting + platelet count. Ensure no contra-indications. Consent patient, explaining what and why you will be doing & that their co-operation is vital. They will need to know that the local anaesthetic will sting and that they may get shooting pains down their leg during the procedure.

N.B. A normal CT **does not** rule out raised ICP. Need to balance risk of uncal herniation against change in management from performing LP

Equipment:

I. Procedure pack;
II. sterile gloves;
III. chlorhexidine solution;
IV. 5-10mls 1% lignocaine;
V. 10ml syringe;
VI. yellow and green needles;
VII. spinal needle and manometer;
VIII. 3 / 4 sample bottles (label 1-4);
IX. fluoride tube (grey top) for glucose;
X. plaster

Position + insertion site

Left lateral – place patient on left side, back exactly aligned with the edge of the bed. Hips, knees + chin flexed to the chest. The central skin fold may not overlie the spinous processes in this position, particularly in obese patients.

Sitting – helpful in obese patients. Sit patient up, feet on stool, leaning over pillow on lap (2^{nd} line as unable to measure opening pressure).
Locate iliac crests, draw line between them to the midline. Usually marks interspace between L4/L5 (Spinal cord ends L1). Feel for dent in between spinous processes to locate the intervertebral space.

Technique

Aseptic technique, sterile gloves, mask, gown, sterile field. Ensure that your sample bottles and manometer are labeled and immediately to hand. Clean skin with chlorhexidine, circular fashion moving outwards. Use 10ml syringe to administer lignocaine. Raise skin wheal with orange needle then switch to green needle for deeper tissues. **Aspirate** before injecting.

Insert needle and stylet in the middle of the interspinous space. Angle towards umbilicus with bevel facing upwards. Feel resistance from the spinal ligaments + dura then a 'give' as needle enters subarachnoid space (usually 3-5cms in an adult). If you hit bone, pull out, reassess position + start again.

Remove stylet and check for CSF at needle hub. If successful connect manometer to needle with 3 way tap. Read height of fluid column from scale (normal pressure 5-20 cmH_20, can be up to 25cm H_20 in obese patients). Collect 5 - 10 drops of CSF in each of the sample bottles and fluoride tube. Reinsert the stylet to halt CSF flow and remove the needle. Reinserting the stylet reduces the risk of PDPH. Apply plaster.

Send fluid for cell count and differential, glucose (along with serum glucose) and protein, Gram stain + MC+S, may need fourth bottle for cytology, viral

PCR. Depending on indication may need oligoclonal bands (csf + serum sample- demyelination). Xanthochromia (CSF + serum bilirubin – subarachnoid haemorrhage).

Post procedure

Document in patient's notes.

No evidence that prolonged bed rest reduces post LP headache (PDPH).

Suturing

Learning Objectives

1. To appreciate the range of wound closure options.
2. To become aware of potential suturing pitfalls.
3. To choose appropriate type and size of suture.
4. To learn to apply simple sutures during your skills station.

Wounds can be closed using a number of techniques including steristrips and glue for superficial wounds, staples and sutures for deeper wounds.

Indications

- Closure of lacerations & surgical wounds

Contraindications

- Contaminated wound
- Delayed presentation
- Retained foreign bodies
- Injury to underlying structure

Complications

- Bleeding
- Wound infection
- Dehiscence
- Scarring

Preparation

- Full history & examination, including mechanism of injury, PMH, DH, tetanus, allergies and assessment of deeper structures eg. Neurovascular bundle, tendons

Tips for Simple Interrupted Skin Sutures

1. Infiltrate with local anaesthesia (avoid Adrenaline containing solutions in extremities eg digits)
2. Oppose the skin aiming for slight eversion of wound edges.
3. Use the finest non absorbable suture adequate for the wound (See table below) and a cutting needle.

4. Ensure knots lie to one side of the wound to reduce risk of infection
5. Tie sutures just tight enough for wound edges to meet. Excessive tension increases the risk of inflammation and infection.
6. Handle the skin edges with tooth forceps only to minimise skin trauma.
7. Use strategic initial suture to match up obvious points in irregular wounds.
8. Deep wounds may require an absorbable deep stitch or a mattress suture to bring gaping wound edges together.
9. If the suture does not look right, take it out and start again.
10. Other techniques include continuous, mattress & subcuticular sutures

Part of body	**Suture and size**	**Time to removal**
Scalp	3/0 non-absorbable, glue or staples	7 days
Trunk	3/0 non-absorbable	10 days
Limbs	4/0 non-absorbable	10 days
Hands	5/0 non-absorbable	10 days
Face	5/0 non-absorbable or glue	5 days
Lips, tongue, mouth	Absorbable	

Further Reading

NHS Clinical Knowledge Summaries: www.cks.nhs.uk/lacerations

McGregor AD, McGregor IA. Fundamental techniques of plastic surgery and their surgical applications. 10th ed.. London: Churchill Livingstone; 2000;40.

Therapeutic Paracentesis
A Simple Guide

Introduction

Over the next few pages we will review the indications and procedure for placing an abdominal drain. We will cover the pros and cons and things you should be aware of before placing a drain (or doing a diagnostic tap) so that you have good understanding of how it is done before you embark on some practice. It would be sensible if you can, to have a senior colleague observe you do this for the first time. We would recommend you use this as a DOPS for your portfolio or better still maintain a record of your experience. Like most things being familiar with the theory can help you build confidence in doing procedures. Feel free to ask questions that may not be covered in this booklet

Indications

There are only 2 indications really for ascitic drains:

1. Diuretic resistant/intractable ascites in liver disease
2. Malignant ascites

Either of these is usually for relief of symptoms though in liver disease there is some good evidence that drains reduce length of hospital stay and the incidence of renal failure compared to diuretic therapy. It is preferable beforehand to know why you are using a drain as the management is slightly different for these two indications.

Diagnostic Paracentesis

We will go through the findings on ascitic fluid analysis later however a short word on how and what to send samples for. The same positioning technique should be used as for a drain and the same site chosen. Again ideally this should be localised with USS if available. Use a 50ml Luer lock syringe and green needle to obtain a sample and send for the following:

Biochemistry	Serum ascites albumin gradient Amylase
Haematology	White cell count
Culture	Blood culture bottles – this doubles the chances of successfully growing a bug in SBP
Cytology	The more you give the cytologist the better but its yield in most centres is not good

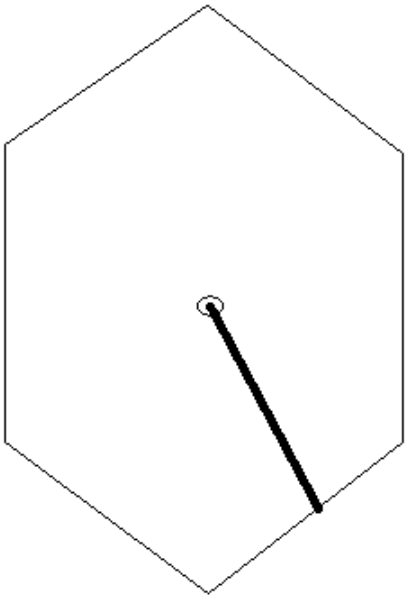
Patient preparation

The patient needs to have the procedure explained and understand why this is being done. Recording at least verbal consent in the notes is essential. You should record as part of that the relevant risks that you have told the patient about. This should include risk of bleeding, perforation of an organ or bowel, infection and leaking afterwards. In theory with liver patients they will be receiving a blood product (Human albumin solution) so they should be aware of the risk of reactions and infections related to this (as you would for a blood transfusion).

Checklist:

1. Ensure clotting OK – (INR 1.5 or less and platelets of 50 or more);
2. Lay them flat with their head slightly raised on a pillow;
3. Have them keep their arm out of the way either behind their head or if need be on the opposite shoulder. A collar and cuff can facilitate this if need be;
4. Select your position avoiding scars, obvious local infection, obvious caput medusae vessels, and importantly the inferior epigastric arteries. Use USS if available (ascites is black);
5. Use a sterile towel under the patients side to give you somewhere to rest your gloved wrists – the patient ideally needs to be 20cm or so from the edge of the couch or bed;
6. Prep the skin using Chloraprep and allow it to dry.

Course of epigastric vessels – from midpoint of inguinal ligament to umbilicus



What you need on the trolley:

1. Dressing pack;
2. 5ml syringe;
3. Blue or orange needle;
4. A couple of green needles;
5. 5mls 1% lignocaine;
6. A sharp pointed scalpel;
7. 2 or 3 venflon fixes (or suture);
8. Bonnano catheter

You will also need a catheter bag and a sharps bin (long enough to put the drain trocar in – bucket size).

Placing the drain

Having prepped the skin, infiltrate a tiny bleb into the dermis to make 'peau d'orange' effect using an orange or blue needle. Use a green needle perpendicular to the skin to infiltrate the peritoneum and subcutaneous tissue. Make a second pass with a 20 – 30 degree slant to the skin. Remember aspirate as you put the needle in until you aspirate ascites then infiltrate as you withdraw.

Make a tiny nick in the skin using the scalpel in a stabbing motion no more than 3mm across. Apply a little pressure to stop any bleeding.

Make sure you have prepared the drain!!

Initially insert the drain perpendicular to the skin via the nick. Change the direction to point slightly downwards by 20 – 30 degrees. Watch carefully for ascitic flashback into the chamber. Continue inserting the drain another centimetre or so (use the holes in the drain to guide you). This ensures the end of the drain is within the peritoneal cavity. Unscrew the drain from the trocar.

Hold the trocar still and slide the drain off the trocar until the fixator is flush to the skin. Remove the trocar remembering to cover the end with a thumb. Screw the rubber connecter to the drain. If you did not close the clamp before you now have a wet foot! Use 2 or 3 venflon 3000 to secure the drain or suture the drain in place.

Attach the catheter bag and open the clamp. Job done!

Prepare the drain

The drain comes in 3 parts

1. Trocar
2. Drain
3. Rubber connector

The drain itself is a pigtail so to insert the trocar it needs to be straightened. Push the straightener over the end to hold it straight and then insert the trocar. As you reach the end there will be some resistance – I find it helpful to gently wiggle the trocar through. The bevel should be facing the drainage holes on the inside of the edge of the pigtail. You can then remove the straightening device.

Never re-sheath the trocar – you risk shearing the end off the drain. Once you have started to push the drain off or pulled the trocar back you MUST continue to remove it fully. Secure the drain to the trocar by screwing it on.

Close the clamp on the rubber connector!

Aftercare

Tidy away your sharps.

Drains should ideally be removed at 12 hours and definitely at 24 hours otherwise you risk infection. If draining liver ascites you need to give 100ml of 20% HAS for every 2 litres of ascites removed after the first 4 litres (this prevents renal impairment and is not about volume replacement). This coincides with the volume in a catheter bag so every time the catheter bag is emptied a bottle of HAS can be put up. Make sure this is written up. It is not necessary to clamp the drain. Patients with malignant ascites do not need extra fluid but be sensible and stop it draining and give a little crystalloid if the blood pressure drops.

Make sure the nurses know to watch the patient obs and what to do with fluid replacement.

Ensure you document the procedure in the notes to include a record of consent taken, where the drain was sited, recommendations for fluid replacement and when it should be removed. Don't forget to put your name and contact details.

Interpreting ascitic fluid results

Cytology – usually will show mesothelial cells and often reactive cells. May not be diagnostic of origin of primary but will be able to confirm adenocarcinoma. Pick up rate is less than 10%.

Amylase – raised in pancreatic ascites eg after severe pancreatitis or injury to pancreatic duct.

Lipids – occasionally useful in chylous ascites.

White cell count – Total wbc > 500/mm^3 or neutrophils of 250/mm^3. (0.5 or 0.25 on the automated cell counter) is diagnostic of spontaneous bacterial peritonitis. Treat with oral ciproxin or iv ceftriaxone.

Red cell count – usually <1000/mm^3. Bloody ascites (> 50 000/mm^3) is seen in 2% of cirrhotic ascites – 30% of these have an underlying hepatocellular carcinoma.

Serum-ascites albumin gradient:

> or = 11g/l	< 11g/l
Cirrhosis	Malignancy
Cardiac failure	Pancreatitis
Nephrotic syndrome	TB

Joint Aspiration and Injection

Indication:

To diagnose septic arthritis

To reduce inflammation and pain from inflamed or degenerate joints, and soft tissue;

For entrapment neuropathies such as carpal tunnel syndrome;

To aspirate effusions for therapeutic relief and diagnosis (crystal arthropathy).

Frequency:

A single joint should not be injected more than three times per year.

Technique:

No touch technique: the appropriate injection site is located, marked and then not touched again.

Single use syringes, needles and medication ampoules are used.

Needles used:

25G x 25mm (Orange 1”)

23G x 25mm (Blue 1”

21G x 40mm (Green 11/2”)

Single use surface barriers are used for each patient.

In selected cases requiring aspiration a dressing pack and sterile gloves may be indicated.

Hands must be washed before and after injection.

Contra-indications:

Septic arthritis (diagnostic aspiration only)
Infected or damaged overlying skin
Prosthetic joint
Hypersensitivity to steroid or local anaesthetic
Significant systemic illness
Previous lack of improvement

Caution:

Recent trauma

Anticoagulant therapy
Bleeding disorders
Poorly controlled diabetes

Glucocorticoids:

Glucocorticoids act locally at the target tissue and intra-cellularly.

Steroids used for intra-articular injections in clinical practice are:

Methyl-prednisolone 40mg, 40mg with lidocaine 1%, and 80mg.

Triamcinolone 40mg

Triamcinolone is less soluble and longer acting and used for deep joint injections

They both have anti-inflammatory and immunosuppressive glucocorticoid effects but little mineralocorticoid effect.

Glucocorticoids affect all aspects of the inflammatory response

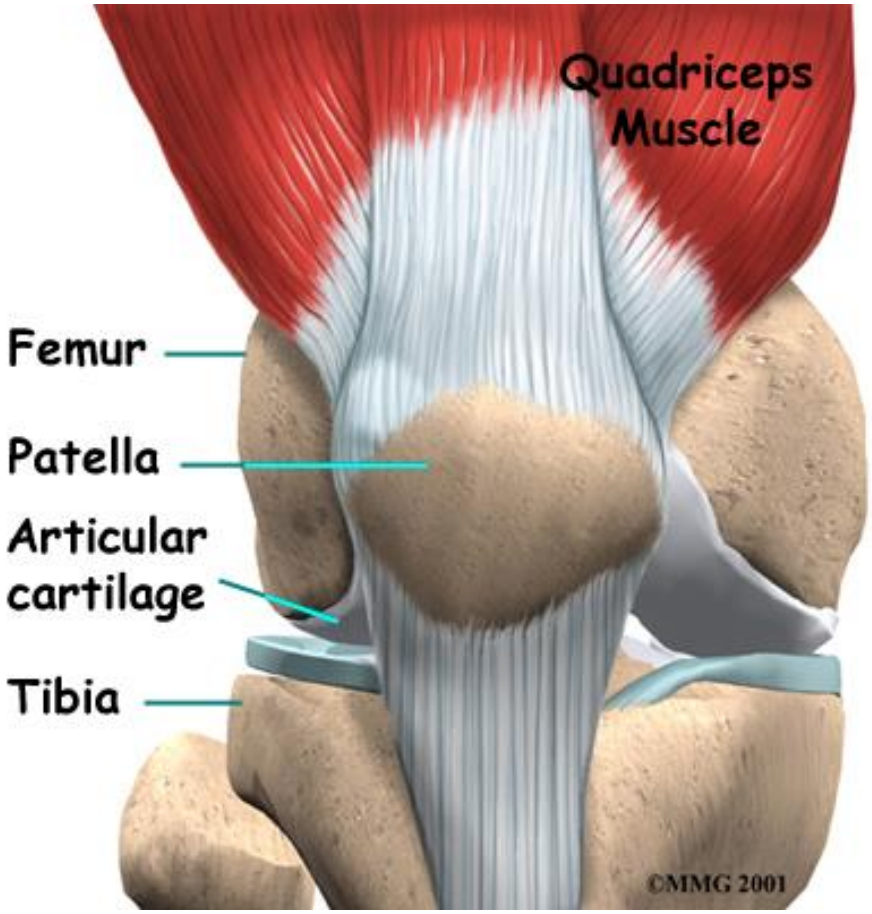
Complications:

- Infection 1:10-30,000.
- Post injection flare**.** Unpredictable and treated with rest, ice, analgesics/nonsteroidal anti-inflammatories. Should settle within 72 hours.
- Bruising.
- Soft tissue atrophy.
- Facial flushing 24 hours later.
- Simple faint – lay horizontal and elevate legs.
- Allergy to injection constituents.
- Anaphylaxis – rare. Medical emergency. An anaphylactic pack should be readily accessible and resuscitation facilities available.
- Steroid arthropathy
- Tendon rupture
- Tissue atrophy

Injecting the Knee

The knee is commonly involved in inflammatory and degenerative arthritis.

Following a careful history the knee should be examined to look for effusion with a possible associated Baker's cyst, both of which are more likely in inflammatory arthritis. Patello-femoral crepitus on manipulation of the knee is more consistent with degenerative disease.



Steroid used

Triamcinolone 40mg for degenerative disease, 40 – 80mg for inflammatory disease, mixed with 3 – 4mls Lidocaine 1%.

Patient position

Seated comfortably on the examination couch with the knee in a relaxed extended position.

Palpation

Locate the margins of the patella.

At the margin between the lower 2/3 and upper 1/3 of the patella, find a space c 1cm below the patella, and mark your planned point of entry.

Glide the patella medially to increase this space.

Technique

Clean the area with a chloroprep wipe.

Spray with ethyl-chloride.

Insert the needle directing medially and caudally towards the suprapatellar pouch.

Aspirate – if fluid is present, aspirate to dryness if possible.

Inject the steroid/anaesthetic mixture as a bolus.

Withdraw the needle, obtain haemostasis and cover with a small plaster.

Baker's cyst

The same technique should be used using the medial approach.

The steroid/lidocaine mixture will track to the posterior aspect of the knee and treat the Baker's cyst.

Post injection advice

Relative rest for 24 – 48 hours. Excess activity will result in rapid resorption of the steroid and reduced local efficacy.

Analgesia as required.

Bursae surrounding the knee which may require injection:

Prepatellar bursitis (housemaid's knee).

Superficial infrapatellar bursitis (clergyman's knee).

Pes anserine bursitis.

Refs:

1. Musculoskeletal Injection Skills. M.Kesson, E.Atkins, I.Davies. Butterworth Heinemann. London. 2002
2. A Practical Approach to Orthopaedic Medicine E.Atkins, J.Kerr, E.Goodland. Churchill Livingstone 2010
3. Oxford Textbook of Rheumatology, Oxford University Press, P.J.Maddison, David A. Isenberg, Patricia Woo, David N. Glass and Ferdinand Breedveld

http://www.medicalvideos.us/videos-200-Arthrocentesis-of-the-Knee#middle