14. Post-Operative Complications

A complication is an adverse event which may increase the morbidity of a patient following any treatment, most commonly, but not necessarily, a surgical operation. As surgeons we seek to minimise the risk of complications by good pre-operative planning, sound surgery and meticulous post-operative care. You will be part of this.

Complications may be classified as local or systemic and as immediate, delayed or late. We will discuss delayed or late systemic complications. Immediate complications will occur in the operating theatre where there will be a Consultant or Registrar present to deal with the. Local complications, (i.e. at the operation site) will be part of your learning within the job. The next paragraph is the most important in this chapter.

We will thus be discussing mostly medical complications of surgery that OMFS patients are likely to sustain. The reason for discussing these is to allow you to understand what may go wrong and the principle of dealing with them. You will be part of the surgical team and will assist in post-operative management but at no stage must you, as a dentist, initiate the treatment of medical complications or manage them without the full intervention of the responsible Consultant or medically qualified Registrar. Very occasionally we have come across junior trainees who describe themselves as the 'Max-facs' doctors and, full of their imagined importance, attempt to deal with all matters that come to their attention; this is potentially dangerous. The writers still shudder with stress at the thought of the trainee who once supervised the deterioration of a patient with respiratory complications overnight without involving her seniors. Most OMFS junior trainees keep the boss informed of any complications they become aware of, either as a result of their own direct observation or more commonly by being informed by the nursing staff.

The patients most at risk of developing systemic complications after surgery are the elderly and medically unfit, such as those who have pre-existing cardiovascular or respiratory disease or are immunocompromised, such as diabetics. The risks are increased for those having major surgery, cancer, reduced mobility or whose discharge from hospital is delayed for any number of reasons.

Most of the patients we operate on in the speciality of OMFS are medically fit and benefit from routine elective and non-urgent surgery. They can be assessed and their medical status optimised to reduce the risk of complications. Furthermore their stay in hospital is frequently brief; even patients having routine orthognathic surgery or fixation of facial fractures may be admitted for only one or two nights. The obvious exceptions to these are those with poly-trauma with facial injury; their stay in hospital is often prolonged by their other injuries. The patients we treat who are most likely to develop complications are those receiving surgery for cancer.

Respiratory Complications

Smokers and those with pre-existing Chronic Obstructive Pulmonary Disease (COPD) are those who are at greatest risk of respiratory complications; generally speaking anaesthetists are able to deal well with those with asthma.

During anaesthesia there is a decrease in action of the cilia lining the respiratory tract causing a decrease in clearance of secretions. This, combined with the inability to cough and a decrease in ventilation, will lead to an accumulation of secretions which may cause some obstruction and collapse of the peripheral airways called atelectasis. Atelectasis is most usually apparent as early and transient mild pyrexia; it usually resolves. Resolution is aided by early mobilisation, breathing exercises and, if necessary, chest physiotherapy to clear mucous accumulation; nebulised bronchodilators may help. Resolution is compromised by the cigarette smoking, COPD, obesity and immobility.

If atelectasis does not resolve adequately then the mucous accumulation will pre-dispose to secondary infection, often with nosocomial (hospital) organisms i.e. pneumonia. The signs and symptoms may include pyrexia, cough, discoloured sputum on coughing, chest pain on breathing (pleuritic), tachypnoea, a dull note on percussion of the affected part of the chest accompanied by reduced breath sounds on auscultation of that part. Treatment may involve physiotherapy and breathing exercises, oxygen, and antibiotics against organisms cultured from the sputum. In severe cases the patient may need ventilation.

A potential respiratory complication of OMFS is

Signs of Respiratory Complications

Pyrexia
Dyspnoea
Tachypnoea
Altered chest sounds

aspiration. The reason we see it so infrequently is because we take such care to avoid it. When operating on an anesthetised patient the anaesthetist uses a cuffed endo-tracheal tube or laryngeal mask airway to prevent aspiration of saliva, blood, tooth or bone fragments etc. and we pack off the pharynx and use suction for the same purpose. Patients are only anaesthetised if they have been starved to reduce the risk of aspiration of stomach contents into the lungs; in an emergency a naso-gastric tube will be passed by the anaesthetist to suction out stomach contents. Gastric acid can cause a chemical pneumonitis if it contaminates the lungs which can produce a secondary infection and pneumonia.

Cardiovascular Complications

You may be called by a ward nurse to tell you that a patient has post-operative hypotension. This should be reported to your superior; some of the causes may be serious but equally it can be benign. Patients may have a slightly low blood pressure as a result of medication such as ß-blockers or opiate analgesics given for pain. They may be slightly low on fluids and respond to having the end of the bed raised slightly or given some additional intra-venous fluid.

However it is necessary to consider that the patient has shock which is the term for inadequate tissue perfusion and oxygenation leading to cellular damage and organ dysfunction. This is serious.

Hypovolemic shock, where there has been a large blood loss, is an unusual complication in our speciality, although it must be considered. It is unlikely that a large blood loss would go unnoticed as we are usually operating within the mouth and blood loss will be noticed at the time. The patients must be assessed as a whole, particularly as young and fit patients have a high 'cardio-vascular reserve' and can compensate for a large blood loss before their pulse rate increases and blood pressure drops from loss of blood. Other signs of shock should be looked for, which include a cold clammy skin and poor capillary refill when squeezing an extremity. Shock will also produce a decrease in core body temperature, decreased urinary output and in the case of hypovolemic shock a decreased central venous pressure. All these are measured during major cancer surgery to monitor the consequence of blood loss.

The management of hypovolemic shock will be to resuscitate with intravenous Hartmann's solution and find and arrest the bleeding. In the unlikely event you are first on the scene you should 'peek and shriek' i.e. you should rapidly assess the situation and call for help. In most cases the ward nurse will have realised the situation and already informed the intensive care out-reach team or the medical emergency team depending on the arrangements in your hospital.

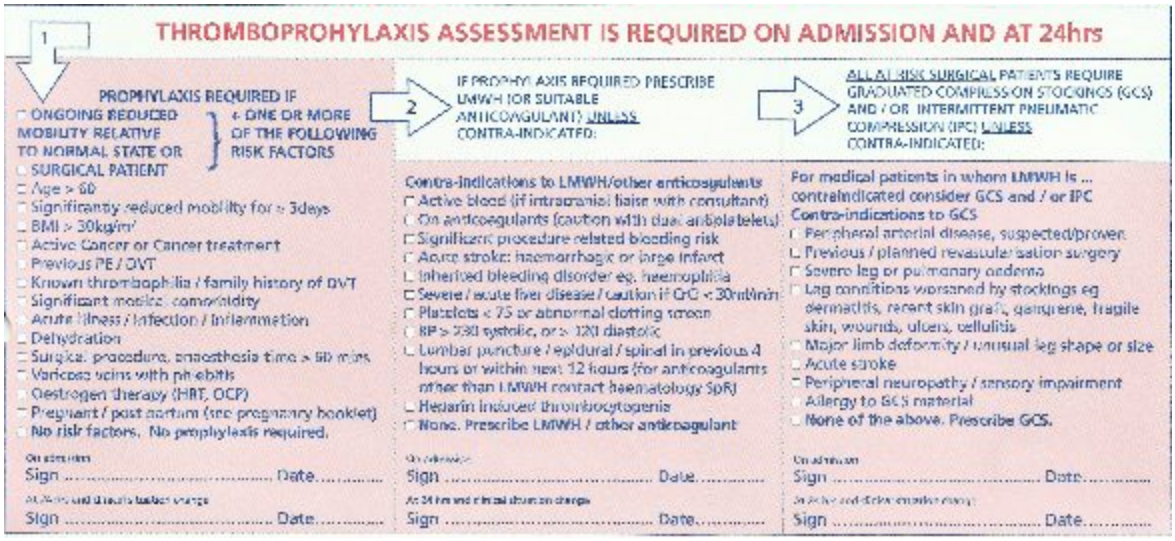
Shock may be caused by inadequate cardiac output: cardiogenic shock. This may be caused by a myocardial infarct (MI), cardiac arrhythmias or left ventricular failure (LVF) as a consequence of coronary artery disease, previous MI or in elderly patients just from fluid overload. In most cases the patient will be elderly, have a cardiac history and be taking cardiac medication. The patient should be assessed by examination of the cardiovascular system looking for the signs of shock and ventricular failure. An ECG should be carried out and bloods tested for cardiac enzymes. This is a job for the medical emergency team or emergency physician on duty.

Occasionally you will see shock in an anaphylactic reaction; this should be managed as in the medical emergency chapter with the medical emergency team being called as necessary.

Deep vein thrombosis (DVT) within the deep veins of the legs is a particular later complication of surgery that you should know about and hopefully will never see as it is largely avoided though careful planning and prevention. After surgery there may be a slight hypercoagulability which may lead to a thrombosis in the deep veins of the leg. It is pre-disposed by immobility. Patients who are elderly, have cancer and

Signs of Cardio-Vascular Complications

Chest pain
Dyspnoea
Tachycardia
Confusion
Ankle swelling



Thromboprophylaxis assessment form

have received major surgery are particularly at risk. The consequence may be varicose veins but more particularly a breaking off of the clot to produce an embolus in the lung leading to right sided heart failure and death. Prevention starts at the pre-operative assessment where all patients are considered for their risk. All hospitals have a thrombo-prophylaxis assessment check list form used for all patients who are admitted and receive general anaesthesia. You will be involved in completing these either electronically or manually.

Pneumatic compression of the calves during the operation prevents stasis within the veins of the legs. Thrombo-embolic deterrent (TED) stockings are worn by the patient while in hospital and low molecular weight heparin given after surgery to reduce the risk of clotting. You should be aware of the risks of the individual patients on the wards with whose care you are assisting and double check that they are getting the DVT prophylaxis they need.

DVT is usually silent with no physical signs but there may be an oedematous swelling of the affected leg or pyrexia; this usually occurs 5 -7 days after surgery. A pulmonary embolus may present as chest pain, shortness of breath, tachypnoea, acute right sided heart failure or sudden death.

Enoxaparin (Clexane). 40 mg in a pre-filled syringe is a low molecular weight heparin usually given subcutaneously after surgery to help prevent DVT

Urinary Complications

The principal urinary problems that you are likely to come across in OMFS patients are decreased urinary output (oliguria), urinary tract infection and urinary retention.

Most of our patients are medically fit with normal renal function so the most likely cause of oliguria is that the patient has decreased output consequent upon inadequate fluid intake. In many of our major cases, particularly the long cancer cases which may involve significant blood loss, a urinary catheter will be placed in the operating theatre before surgery. Apart from the convenience of collecting urine when the patient is unconscious during surgery or in the post-operative period it allows the output to be measured which will help in calculating the fluid balance during surgery and beyond. Back on the ward one would normally expect a normal patient to produce 1.5 litres of urine a day i.e. about 60 mls. per hour; this will vary slightly. If several hours go by during which significantly less urine is produced then something is wrong and in the

Deep Vein Thrombosis Prevention

Pneumatic compression stockings
TED stockings
Low molecular weight heparin
Mobilise early

Causes of Confusion

Hypoxia
Trauma
Drugs
Sepsis
Pain
Electrolyte imbalance
Dementia
Alcohol withdrawal

absence of renal disease it is most likely that they are 'dry' and need additional fluid.

Where there is complete obstruction of urine output then the urine will build up in the bladder and eventually the patient will be in pain and be distressed. The bladder will be distended and easily palpable above the pubis as a supra-pubic mass; palpation or pressure will be acutely uncomfortable or painful. If the patient has a catheter then it will be blocked and should be flushed with saline or replaced. The most likely cause, however, will be benign hypertrophy of the prostate gland which occurs commonly in elderly men. The patient will give a history of 'prostatic' symptoms indicating pre-existing outflow obstruction. These will include a poor stream on passing urine, hesitancy - delay in starting to micturate, dribbling - urine still leaking after stopping micturition and a feeling that the bladder has not properly emptied after micturition. The patient with urinary retention will be pleased to have a urinary catheter passed as this will give immediate relief of the pain and discomfort. They should then be referred to a urologist.

Urinary catheters should be removed as soon as possible after their function is no longer needed; otherwise they will act as a portal of infection into the urethra and bladder leading to discomfort and pyrexia. Where patients have had them inserted in theatre for major cancer cases they should be removed within a couple of days after surgery or as soon as measurement of urinary output is not needed. They should not be left in for the convenience of not having to help the patient to the bathroom. Apart from facilitating infection a catheter will predispose to ulceration of the lining of the urethra and adhesions leading to permanent urinary outflow obstruction. Patients' mobility is usually reduced by the presence and discomfort of a urinary catheter.

Post-Operative Confusion

Occasionally a patient may become confused after surgery. The causes of confusion are many; these include hypoxia, trauma, medication, sepsis, pain, dementia, electrolyte imbalance and alcohol withdrawal.

A full physical examination should be carried out to exclude hypoxia or sepsis and a review made of all the medication that the patient is taking. A new or recent full blood count and biochemistry profile should be considered for a significant decrease in haemoglobin or change in electrolyte balance. Pain control should be reviewed and medication adjusted to get optimal relief.

Patients should have had their alcohol intake considered at their pre-operative assessment. Those who have a very high intake and who are deprived for several days can become very confused and disorientated with both auditory and visual hallucinations; this can be very distressing for all concerned. The problem can be prevented by administering a small but regular amount of alcohol to the patient in the form of a few mls. of whisky if necessary through a gastrostomy or naso-gastric tube.

Most frequently confusion will be in an elderly patient with pre-existing dementia. Often an elderly patient will manage quite normally at home in their own environment but when admitted to hospital to an unusual noisy environment and then given additional medication and some pain they may become completely disorientated, confused, uncooperative and uncontrollable. In these cases assessment and management is best referred to a care of the elderly physician.

A radial forearm flap which has failed because the venous outflow has blocked. The patient will develop a severe pyrexia until the dead tissue is removed

Causes of Pyrexia

Early

Atelectasis
Blood transfusion

Intermediate

Infected catheters or lines
Tissue death
Chest infection

Late

All the above
Surgical wound infection
Venous thrombosis

Pyrexia

All hospital inpatients have their temperature recorded regularly. Temperature can be measured in several ways e.g. oral, rectal, vaginal. In the operating theatre during our major cancer cases it is now usually measured within the bladder by a probe attached to a urinary catheter or by inserting a flexible rectal probe. On the ward, however, the most popular way is tympanic temperature using a probe placed into an ear; this is both quick and hygienic.

Normally temperature will vary at different times of the day, menstrual cycle, ambient room temperature, clothing and after food or drink. It is therefore not the absolute temperature we are concerned about as much as the variation in the particular patient. The temperature will vary around 37.5°C.

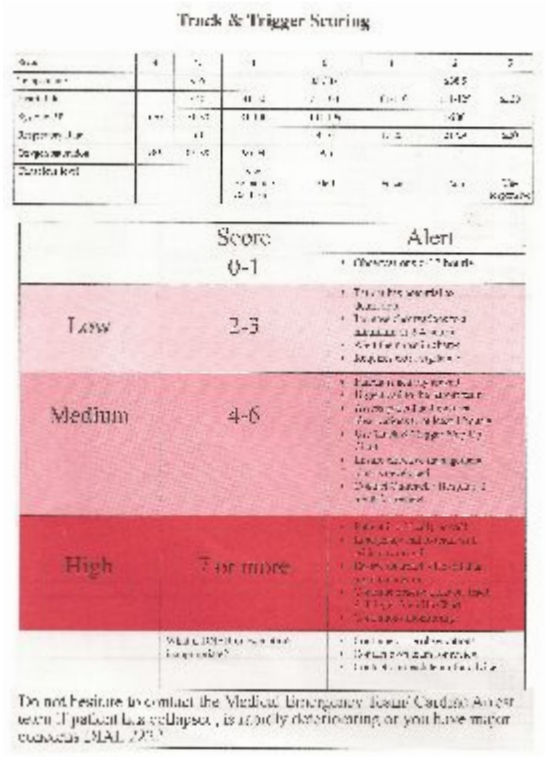
In the immediate post-operative period the most common causes of pyrexia will be atelectasis, as discussed above, or blood transfusion. Transfused blood is always matched for compatibility with the ABO and Rhesus systems. However there will be other antibodies which will cause a reaction in the host and hence a mild pyrexia.

In the intermediate period 3 to 5 days post-op a pyrexia is likely to be caused by infection particularly of in-dwelling catheters such as urinary catheters, central venous lines, peripheral venous lines etc. If the patient develops a wound infection at the site of operation it is unlikely to have developed enough to cause a rise in temperature by this stage. However tissue death such as a tissue flap used to reconstruct a defect caused during cancer resection may well cause pyrexia if it is starting to lose vitality. You should check all the sites of lines and catheters for signs of inflammation, the operation site and report the pyrexia and your findings for your superior to review. You should also examine the chest in case atelectasis is developing into a chest infection.

A late pyrexia may be due to any of the above causes but in addition an infection at the operative site must be more seriously considered together with venous thrombosis.

Recognition of critical illness

In addition to recognising complications it is desirable that you should understand how to recognise someone who is 'going off' after surgery, i.e. becoming critically ill. However it is likely to be the ward nurse who raises the alarm. The nurse may alert the Intensive Care outreach team who will send one of their specialist nurses to assess the problem. The system will



Medical Early Warning Score* sheet. *Based on the patient's observation charts, these are used by the ward nurses to indicate when to call for help when a patient is deteriorating.

EWS/Observation History

Observation	Units	21 Sep 2018	20 Sep 2018			19 Sep 2018		
		05:55	21:02	10:24	06:24	21:28	17:12	11:31
Site	-	Lincoln	Lincoln	Lincoln	Lincoln	Lincoln	Lincoln	Lincoln
Location	-	Surgical Admissions Lounge	Surgical Admissions Lounge	Surgical Admissions Lounge	Surgical Admissions Lounge	Surgical Admissions Lounge	Surgical Admissions Lounge	Surgical Admissions Lounge
Bed	-	Bay 4 Bed 15	Bay 4 Bed 15	Bay 4 Bed 15	Bay 4 Bed 15	Bay 4 Bed 15	Bay 4 Bed 15	Bay 4 Bed 15
Pulse	BPM	79	75	75	79	70	72	72
Respiration	br/min	16	16	12	16	16	12	16
Temperature	Celsius	37.2	36.9	36.8	37.5	37.3	36.7	36.9
Systolic BP	mmHg	142	133	122	124	128	121	124
Diastolic BP	mmHg	83	76	72	71	81	72	73
O2 Saturation	%	96	96	96	95	96	96	94
O2 Supplement	L/min	0	0	0	0	0	0	0
CNS Response	-	Alert	Alert	Alert	Alert	Alert	Alert	Alert
Pain Score	Score	1	0	0	0	0	0	0
Hypercapnia (Scale 2)	-	No	No	No	No	No	No	No
NEWS Score	-	0	0	0	1	0	1	1
Observer	-							

Patient's 'obs' displayed on a screen in the ward. The computer has worked out the MEWS score. With a score now of 0 the main screen will inform the nurses that this patient will only need observations done 12 hourly. ***(This record reproduced with the patient's permission whose name and that of the nurses has been removed.)***

be different between hospitals; in some it may the medical emergency team who is alerted; in others it may be you who is called, in which case you should make a brief assessment but not delay passing the problem up the chain of command.

The onset of complications can often be followed by the nurses' observation records which used to be kept on a chart at the end of the patient's bed. Now the 'observations' (commonly referred to as 'obs') are more likely to be recorded onto a mobile phone at the patient's bedside and transferred to a computer record which will be visible to all the staff. The computer will work out the MEWS (modified early warning) score and a referral to the acute care practitioner, intensive care outreach team, medical emergency team or high dependency unit will be triggered by a score of 5 or more. The purpose of MEWS to to detect when a patient is becoming seriously ill at an early stage so that there can be early intervention. Whoever initiates this will vary between hospitals but initially it is likely to be a nurse as the medical staff are likely to be in clinics or operating.

The routine 'obs' include blood pressure, pulse rate, respiratory rate, temperature, oxygen saturation, level of consciousness, and pain score (from 1 to 3). After major surgery, such as a head and neck cancer resection and reconstruction, the patient will also have a fluid input and output chart; urine output measurement will be possible because of a urinary catheter.

The onset of problems will be predicted by a rising MEWS score. A patient's temperature or pulse rate may be consistently raised or their oxygen saturation decreased. Decrease in blood pressure is often a late change in hypovolaemia due to physiological compensation; it should always be treated seriously. A decrease in urine output is potentially a bad sign.

The most significant observational signs in terms of indicating critical illness are the respiratory rate and pulse with blood pressure. The normal respiratory rate should be between 12 and 20 per minute. If this rate is higher than this or is increasing this is a significant indication that all is not well. If the pulse rate is above the systolic blood pressure this too is serious and requires immediate medical attention. This is known as the 'Portsmouth' sign.