FRCA primary onexamination 6

Question: 1 of 100

Time taken: 41 secs

Are the following factors taken into account in the APACHE II scoring system?

True	False	
◉	○	Alveolar-arterial oxygen gradient ✓Correct
◉	○	Immunocompromised status ✓Correct
○	◉	Platelet count ✓Correct
◉	○	Rectal temperature ✓Correct
○	◉	Serum urea ✓Correct

The APACHE II score is a form of physiological scoring system which devises a score by taking the following three factors into consideration:

(i) Acute physiological score

(ii) Age of the patient and

(iii) Previous health condition.

The acute physiological score takes into account the following factors

- Rectal temperature (°C)
- Mean blood pressure
- Heart rate
- Respiratory rate
- Alveolar-arterial oxygen gradient if FiO_2>0.5 or PaO_2 if FiO_2 <0.5
- Arterial pH
- Serum Na+
- Serum K+
- Serum creatinine
- Haematocrit in %
- Leucocyte count and
- The Glasgow coma scale.

The age points are graded from less than 44 to more than 75 years with less than 44 years scoring '0' points and more than 75 scoring '6' points.

One of the factors in previous health condition (chronic health points) includes immunocompromised status.

There are also scores for post-operative admission, non-operative admission and emergency operation.

Increasing APACHE II score is associated with an increasing risk of hospital death.

Question: 2 of 100

Time taken: 1 mins 51 secs

Which of the following are true of a cervical rib?

True / False		
○	◉	All of these options. ←This is the correct answer
○	◉	It commonly causes compression of the subclavian artery and brachial plexus ✓Correct
○	◉	It is apparent on palpation in the supraclavicular region. ✓Correct
◉	○	It originates from the seventh cervical vertebra. ✓Correct
○	◉	Occurs in approximately 5% of the population. ✓Correct

In 0.5-1% of individuals, the costal elements of the seventh cervical vertebra form projections called cervical ribs.

Commonly they have a head, neck, and tubercle, with varying amounts of body. They extend into the posterior triangle of the neck where they may be free anteriorly, or be attached to the first rib and/or sternum.

Usually these ribs cause no symptoms, and are diagnosed after incidental finding on CXR.

In some cases, the subclavian artery and the lower trunk of the brachial plexus are kinked where they pass over the cervical rib.

Compression of these structures between this extra rib and the anterior scalene muscle may produce symptoms of nerve and arterial compression, producing the "neurovascular compression syndrome".

Often the tingling, numbness, and impaired circulation to the upper limb do not appear until the age of puberty when the neck elongates and the shoulders tend to droop slightly.

Question: 3 of 100

Time taken: 6 mins 46 secs

Which of the following is/are true regarding the left phrenic nerve?

True / False		
◉	○	Carries sensory afferents from the pleura and the pericardium ✓Correct
◉	○	Is anterior to the left scalenus anterior muscle ✓Correct
○	◉	Is anterior to the termination of the thoracic duct ✓Correct
◉	○	Is posterior to the internal jugular vein ✓Correct
◉	○	Is posterior to the prevertebral fascia ✓Correct

The left phrenic nerve passes inferiorly down the neck to the lateral border of scalenus anterior.

Then it passes medially across the border of scalenus anterior, parallel to the internal jugular vein which lies inferomedially. At this point it is deep to the prevertebral fascia, the transverse cervical artery and the suprascapular artery.

It descends between the left subclavian and the left common carotid arteries, and crosses the left surface of the arch of the aorta.

It then courses along the pericardium, superficial to the left auricle and left ventricle, piercing the diaphragm just to the left of the pericardium.

It carries sensory fibres from the pleura, pericardium and a small part of the peritoneum.

Question: 4 of 100

Time taken: 9 mins 19 secs

Which of the following is/are true regarding endotoxins?

True / False

○	◉	Are found in the vesicle of bacterial cytoplasm ✓Correct
○	◉	Are involved in botulism ✓Correct
○	◉	Are produced mainly by Gram-positive bacterial ✓Correct
◉	○	Can often survive autoclaving ✓Correct
○	◉	Elicit an antibody response which may protect the host from future attack ✓Correct

Endotoxins:

- are lipopolysaccharides derived from the cell wall of Gram-negative bacteria
- are heat stable (cf. exotoxin)
- are antigenic but the response is often directed against the lipopolysaccharide (LPS) component of the cell wall so this is not as effective as antibodies to exotoxins. They are only partly neutralised by specific antibodies. Future repeat infection may still take place
- cause septicaemia and fever
- activate the alternative complement pathway.

- ### Question: 5 of 100

- **Time taken:** 12 mins 30 secs

which of the following statements concerning an epidural set is true?

True / False

◉	○	19G Tuohy needles have 0.5 cm markings ✓Correct
○	◉	An 18G Tuohy needle is 8 cm in length ✓Correct
○	◉	The distal end of the catheter has an open rounded tip and two or more side ports ✓Correct
○	◉	The filter has a 0.55 micron mesh ✓Correct
○	◉	The transparent catheter is 100 cm in length ✓Correct

- In the United Kingdom 16G and 18G Tuohy needles which are commonly used in adult practice are 10 cm in length with an 8 cm shaft (which has 1cm markings).
- A 15 cm version exists for obese patients and a 5 cm 19G needle (with 0.5 cm markings) is available for paediatric use.
- The catheter is made of biologically inert Teflon or nylon and is transparent. The distal end has a rounded tip which is closed (not open) to reduce the risk of dural or vascular puncture. Two or more side ports are also found in the distal end.
- Catheters are usually 90 cm in length. There are markings at 5 cm intervals at the distal end and from 5-15 cm there are additional 1 cm markings.
- The filter has 0.22 micron mesh (not 0.55) that acts as a bacterial, viral and foreign body filter.

Question: 6 of 100

Time taken: 22 mins 32 secs

Regarding the APACHE II scoring system, which of the following statements is/are true?

True / False

○	◉	Involves the assessment of 34 physiological measurements ✓Correct
○	◉	Is a widely used method of evaluating the condition of a neonate ✓Correct
○	◉	Points are awarded as the age increases above 50 years ✓Correct
○	◉	Systolic blood pressure and heart rate are cardiovascular measurements which are included in the physiological assessment ✓Correct
○	◉	The Glasgow coma score is added to the physiology score ✓Correct

The APACHE scoring system (Acute Physiology And Chronic Health Evaluation) is used on ICU to assess the severity of illness in individual patients, and allows stratification of patient groups in order to compare different therapies.

APACHE scores may be weighted according to illness to give a mortality prediction for a specific patient. The APGAR scoring system is used to evaluate the condition of newly born neonates.

In 1981 the APACHE I system was introduced, and then in 1985 this was replaced by the APACHE II system. The APACHE II score is the sum of the acute physiology score (APS), the numerical assessment of chronic health and the points allocated for increasing age.

The acute physiology score assesses 11 physiological variables, with each being awarded points from 0 to 4 depending on their deviation from the normal range. The greater the deviation the greater number of points allocated.

The sum of these 11 variables is then added to a numerical assessment of neurological function (15 minus the Glasgow coma score), which is the 12th variable, to make up the APS. Therefore, the APACHE II score assesses 12 physiological variables (the APACHE I assesses 34).

Points are assigned to age in the following manner:

- Less than 44 years is 0 points
- 45-54 years is 2 points
- 55-64 is 3 points

- 65-74 is 5 points and
- More than 75 years is 6 points.

Note that points are allocated at the age of 45 years or above (not 50 years).

Chronic health points are awarded for organ insufficiency (cardiovascular, respiratory, renal and hepatic) or immunosuppression (pharmacological, radiation and disease states, for example, lymphoma, AIDS) which were documented prior to the present hospital admission.

The points assigned are greater for non-operative or emergency postoperative patients than for elective postoperative patients.

The mean arterial pressure (not systolic) and heart rate are the cardiovascular measurements included in the physiological assessment of the APS.

Question: 7 of 100

Time taken: 28 mins 32 secs

The superior laryngeal nerve:

True / False

○	◉	is a terminal branch of the glossopharyngeal nerve ✓Correct
◉	○	the external branch is smaller than the internal branch ✓Correct
○	◉	can be blocked below the lesser cornu of the hyoid bone ✓Correct
◉	○	the internal branch supplies the cricothyroid muscle ✓Correct
◉	○	provides sensation to the larynx above the level of the vocal cords ✓Correct

The superior laryngeal nerve is a branch of the vagus nerve (not the glossopharyngeal nerve). It has two branches: the smaller external branch that supplies the cricothyroid muscle (not internal branch); and the larger internal branch that provides sensation to the larynx above the level of the vocal cords.

The superior laryngeal nerve can be blocked below and anterior to the greater cornu of the hyoid bone (not lesser cornu), which is where the nerve divides into its two branches.

Question: 8 of 100

Time taken: 34 mins 59 secs

In a burned patient the following pharmacological changes occur:

True / False

◉	○	the proportion of diazepam bound to albumin is reduced ✓Correct
◉	○	the proportion of alfentanil bound to alpha-1-acidglycoprotein is increased ✓Correct
◉	○	there is resistance to non-depolarizing muscle relaxants ✓Correct
○	◉	the clearance of gentamicin is reduced ✓Correct
◉	○	the clearance of cimetidine is increased ✓Correct

The pharmacokinetic and pharmacodynamic profiles of many drugs are altered in burned patients. These changes include altered cardiovascular dynamics, protein binding (reduced albumin and increased alpha-1-acid glycoprotein binding), the volume of distribution and drug clearance.

Diazepam and drugs predominantly bound to albumin have a higher unbound fraction, whereas alfentanil and drugs mainly bound to alpha-1-acidglycoprotein have a lower unbound fraction.

Resistance to non-depolarizing muscle relaxants occurs, and may be due to an increase in density of the nicotinic acetylcholine receptors.

The clearance of both gentamicin and cimetidine (during the hyperdynamic phase of the burn injury) is increased and monitoring of the serum levels is necessary to guide dosage.

Question: 9 of 100

Time taken: 37 mins 1 secs

The following statements regarding full term neonates are/is true:

True	False	
◉	○	they are homeothermic and vasoconstrict in response to cold ✓Correct
◉	○	the mean for haemoglobin at birth is about 18 g/dl ✓Correct
○	◉	the surface area:body weight ratio of a neonate is 4 times greater than that of an adult ✓Correct
○	◉	basal oxygen consumption is 150 ml/min ✓Correct
○	◉	the metabolism of brown fat is under control of the parasympathetic nervous system ✓Correct

At birth the haemoglobin concentration is about 18g/dl, and this rises slightly in the first few days as excess extracellular fluid is removed. By the age of 3 months the haemoglobin concentration has fallen to 10g/dl (physiological anaemia of infancy), and by one year it should be 12g/dl.

The basal oxygen consumption of a neonate is 7-8 ml/kg per minute, which is 2-3 times that of an adult (if the birth weight was 3kg, then the oxygen consumption would be 21-24 ml/min, not 150ml).

The surface area:body weight ratio of a neonate is around 2 times greater than that of an adult (not 4 times greater). Together with reduced subcutaneous adipose tissue and immature heat producing mechanisms (e.g. shivering), they are particularly susceptible to heat loss and hypothermia. Neonates are homeothermic and vasoconstrict in response to cold. There is also an increase in triglyceride metabolism in brown fat stores, which is under sympathetic nervous system control.

Question: 10 of 100

Time taken: 40 mins 45 secs

The following statements regarding the blood supply to the brain are true:

True	False	
◉	○	the internal carotid arteries provide two thirds of the blood supply ✓Correct
○	◉	the ophthalmic artery is a branch of the anterior cerebral artery ✓Correct
◉	○	the internal carotid arteries divide into the anterior and middle cerebral arteries ✓Correct
○	◉	the posterior cerebral arteries are branches of the vertebral arteries ✓Correct

○	◉	the posterior communicating artery links the two posterior cerebral arteries ✓Correct

The arterial blood supply to the brain is provided by the two internal carotid arteries (two thirds) and the two vertebral arteries (one third).

The internal carotid artery divides into the anterior and middle cerebral arteries that supply the anterior two thirds of the cerebral hemispheres. The ophthalmic artery is a branch of the internal carotid artery (not anterior cerebral artery).

The vertebral arteries unite to form the basilar artery, which supplies the brain stem and cerebellum. The basilar artery then divides into the two posterior cerebral arteries that supply the posterior one third of the cerebral hemispheres.

The circle of Willis is formed by anastomoses linking the carotid arterial system to the vertebrobasilar system. The anterior communicating artery links the anterior cerebral arteries and the posterior communicating arteries link the vertebrobasilar system to the carotid system. This provides a collateral blood supply should one or more of the four extracranial arteries supplying the brain become diseased.

Work Smart Session - FRCA Primary

Question: 11 of 100

Time taken: 48 mins 45 secs

Regarding the anatomy of the heart:

True / False

○	◉	the atrioventricular node is situated below the coronary sinus ✓Correct
○	◉	the sympathetic nerve supply is from the upper four thoracic sympathetic ganglia ✓Correct
○	◉	the right border of the heart is formed by the right ventricle ✓Correct
○	◉	the aortic valve is normally bicuspid ✓Correct
○	◉	the mitral valve is tricuspid ✓Correct

The atrioventricular node is situated above (not below) the opening of the coronary sinus.

The sympathetic nerve supply to the heart is provided by the superficial and deep cardiac plexuses. The superficial cardiac plexus is formed by branches from the left superior cervical sympathetic ganglion and the left vagus. The deep cardiac plexus is formed by branches from both the left and right inferior and middle, cervical sympathetic ganglia, both vagi and the upper four thoracic sympathetic ganglia.

The right border of the heart is formed entirely by the right atrium; the left border is formed mainly by the left ventricle; and the inferior border by the right ventricle, the lower part of the right atrium and the apex of the left ventricle. The tricuspid, pulmonary and aortic valves have three cusps, the mitral valve has two.

Question: 12 of 100

Time taken: 52 mins 55 secs

Which of the following are true regarding the first rib?

True / False

○	◉	The scalenus medius muscle is attached to the scalene tubercle ✓Correct
◉	○	The upper surface bears a groove for the subclavian vein ✓Correct
○	◉	The lower trunk of the brachial plexus lies behind the first rib ✓Correct
○	◉	The subclavian artery lies in front of the scalene tubercle ✓Correct
◉	○	The stellate ganglion lies anterior to its neck ✓Correct

The scalene tubercle provides the insertion for the tendon of scalenus anterior, not medius.

The lower trunk of the brachial plexus lies on the upper surface of the first rib (not behind).

The upper surface of the first rib (in front of the scalene tubercle) bears a groove for the subclavian vein.

The subclavian artery runs in a separate groove behind the scalene tubercle (not in front).

The stellate ganglion does lie anterior to the neck of the first rib.

Question: 13 of 100

Time taken: 56 mins 7 secs

Metoclopramide:

True / False

◉	○	Is an antagonist at the 5-Hydroxytryptamine (5-HT) receptor ✓Correct
◉	○	Causes side effects which are treated with antimuscarinic drugs ✓Correct
◉	○	May cause drowsiness. ✓Correct
◉	○	Increases barrier pressure. ✓Correct
○	◉	Increases pyloric tone. ✓Correct

Although it primarily has an antagonistic action at dopamine receptors, metoclopramide is a 5-Hydroxytryptamine (5-HT) antagonist at higher doses. Its extrapyramidal side-effects can be treated with procyclidine which has antimuscarinic properties.

Metoclopramide is relatively free of side-effects, apart from oculogyric crises (an extrapyramidal effect) and drowsiness. The peripheral effects of metoclopramide inhibiting the action of dopamine are illustrated by its enhancement of antral and fundal contractility and relaxation of the pylorus. The net effect is to increase the rate of gastric emptying. The lower oesophageal sphincter pressure is, however, increased and this leads to an increase in barrier pressure.

Question: 14 of 100

Time taken: 58 mins 17 secs

The Coomb's antiglobulin test is characteristically positive in haemolytic anaemia associated with

True / False

●	○	chronic lymphocytic leukaemia ✓Correct
○	●	thalassaemia ✓Correct
●	○	systemic lupus erythematosus ✓Correct
●	○	methyldopa therapy ✓Correct
○	●	administration of primaquine ✓Correct

Coomb's positive haemolytic anaemia The Coombs' tests detect the antibodies responsible for the destruction of the red blood cells. A direct Coombs' test detects the two different antigens that might induce hemolysis in the patient's red blood cells. An indirect Coombs' test looks for antibodies to someone else's red blood cells in the patient's serum (the blood without the cells). Combining the two tests gives clues to the origin of the hemolysis.Causes os a positie Coomb's test include

Drugs- Penicillin, methyldopa, quinidine (not primaquine)

Cancers, Hodgkin's disease, NHL

collagen disorders

mismatched blood transfusions and ABO incompatibility

Question: 15 of 100

Time taken: 1 hrs 1 mins 23 secs

Characteristic features of acute intermittent porphyria include

True / False

○	●	Excessive faecal protoporphyrin excretion ✓Correct
○	●	Excessive urinary porphobilinigoen between acute attacks ✓Correct
○	●	Hypernatraemia during attacks ✓Correct
○	●	Photosensitivity ✓Correct
○	●	Autosomal recessive inheritance ✓Correct

Acute intermittent porphyria is a autosomal dominant disorder caused by a defect in porphobilinogen deaminase activity.

Many cases exist in latent form, but in manifest cases it is more frequently seen in women. The estimated prevalence of the disorder is 5-10 cases per 100,000 population.

The latent form of the disease may exist indefinitely, but certain drugs, infections, and excessive dieting (starvation) can precipitate attacks. The most common drugs are sulfonamides and barbiturates (often seen when given phenobarbital for pain relief with dental surgery). The defect in porphobilinogen deaminase causes a build up of ALA and porphobilinogen (PBG) which causes their increased secretion in the urine.

Attacks of neurological dysfunction are associated with increased levels of ALA and PBG excretion in the urine, with the levels dropping as the patient's condition improves.

At the time of an acute attack, screening tests like the Hoesch or Watson-Schwartz test for the detection of PBG in urine should be carried out. A positive screening test should always be confirmed by a quantitative test for PBG in the urine.

To discriminate acute intermittent porphyria from variegate porphyria and hereditary coproporphyria, which also can have increased PBG in the urine, a specific test for erythrocyte PBG deaminase activity is required.

Question: 16 of 100

Time taken: 1 hrs 4 mins 26 secs

Do drugs which can be given in near normal dosage in severe renal failure include the following?

True / False

○	◉	Benzylpenicillin ✓Correct
○	◉	Digitoxin ✓Correct
○	◉	Doxycycline ✓Correct
◉	○	Rifampicin ✓Correct
○	◉	Streptomycin ✓Correct

Drugs whose concentrations may accumulate in renal failure include

- Digoxin (digitoxin metabolised by liver)
- Streptomycin
- Penicillins
- Statins
- Furosemide.

Doxycycline can worsen renal function

Question: 17 of 100

Time taken: 1 hrs 6 mins 16 secs

Features compatible with hypertension include which of the following?

True / False

◉	○	A loud aortic second heart sound ✓Correct
◉	○	A fourth heart sound ✓Correct

○	◉	A tapping apex beat ✓Correct
○	◉	A third heart sound ✓Correct
○	◉	Retinal haemorrhages and soft exudates, indicating a grade 2 hypertensive retinopathy ✓Correct

Hypertensive patients usually have no specific symptoms or signs. Abnormal signs usually only appear after a period of prolonged, severe hypertension.

A fourth heart sound is due to increased atrial activity. It occurs in diastole, preceding the first heart sound and can occur in any form of left ventricular disease.

Hypertension is associated with left ventricular hypertrophy and causes a thrusting apex beat, in contrast to the tapping apex beat characteristic of mitral stenosis.

A loud aortic second heart sound is a classical finding in hypertension.

A third heart sound may be a normal finding in patients under 40 years of age. A pathological third heart sound occurs with:

- Mitral and tricuspid regurgitation
- Constrictive pericarditis
- A dilated left ventricle and
- Acute myocardial infarction.

Hypertensive retinopathy is graded as follows:

- **Grade 1** - arterial narrowing
- **Grade 2** - arteriovenous nipping
- **Grade 3** - haemorrhages and exudates
- **Grade 4** - all of the above plus papilloedema.

Question: 18 of 100

Time taken: 1 hrs 8 mins 18 secs

The following signs may be abnormal in mild dehydration in an infant:

True / False

○	◉	Intra-ocular pressure ✓Correct
○	◉	Capillary refill time ✓Correct
○	◉	Anterior fontanelle tension ✓Correct
○	◉	Systemic blood pressure ✓Correct
○	◉	Serum sodium concentration ✓Correct

Dehydration can be classified in two ways:

1. Tonicity

2. Natraemic state

Severity of dehydration is usually based on % body weight loss as mild (5%), moderate (5-9%) and severe (10%). From the history, frequency of micturition is very relevant. Clinical signs of dehydration include: Mild - Restlessness, slightly dry mucous membranes and normal skin elasticity, oliguria; Moderate - Sunken eyes, depressed fontanelle, decreased skin turgor and dry mucous membranes; Severe - Drowsy, irritable with signs of circulatory collapse, (e.g. rapid and weak pulses, delayed capillary refill time (CRT) and low blood pressure), sunken eyes and decreased skin turgor.

Certain indices are more reliable than others. Weight loss is useful, and palpation of the anterior fontanelle is also reliable. Sodium concentration is important as dehydration may be hypotonic, isotonic or hypertonic with low, normal or high concentrations of sodium respectively. High sodium is associated with 'doughy' skin turgor and the risk of cerebral oedema with over-rapid rehydration.

Note that a normal CRT is < 2 seconds.

Question: 19 of 100

Time taken: 1 hrs 10 mins 42 secs

With regards to Ischaemic Optic Neuropathy (ION):

True / False

○	●	Is made worse by polycythaemia ✓Correct
●	○	Is made better by fluid restriction ✓Correct
●	○	Is the commonest cause of visual loss after general anaesthesia ✓Correct
●	○	Is uncommon in the prone position ✓Correct
●	○	May have a congenital aspect ✓Correct

ION is indeed the commonest cause of visual loss after general anaesthesia and is aetiologically multifactorial. Anaemia, hypotension combined with at least one other factor (congenital abnormalities, increased venous pressure owing to obstruction, large amounts of fluid, prolonged head down, administration of vasopressors) contribute, but often a cause is never found. Prone position for surgery is probably associated with more cases of ION but it is still not common in this position. Differential diagnosis includes cortical blindness, retinal occlusion and ophthalmic venous obstruction.

Question: 20 of 100

Time taken: 1 hrs 12 mins 49 secs

At the volar aspect of the wrist:

True / False

●	○	The median nerve is lateral to palmaris longis ✓Correct
●	○	The ulnar nerve is medial to the ulnar artery ✓Correct
●	○	The median nerve is medial to flexor carpi radialis ✓Correct
○	●	The ulnar nerve is medial to flexor carpi ulnaris ✓Correct

○	◉	The radial artery is a larger vessel than the ulnar artery ✓Correct

The usual relationship between the nerves, arteries and tendons (radial side to ulnar side) at the volar aspect of the wrist is as follows: Radial artery, flexor carpi radialis, median nerve, palmaris longis, ulnar artery, ulnar nerve and flexor carpi ulnaris. The ulnar artery is the larger vessel.

Question: 20 of 100

Amiodarone:

True / False

◉	○	May lead to difficulties driving at night. ✓Correct
○	◉	Is a Vaughan-Williams class II drug. ✓Correct
◉	○	Infrequently causes abnormal liver function tests. ✓Correct
◉	○	Causes a dry cough. ✓Correct
◉	○	Commonly causes central nervous system toxicity. ✓Correct

Amiodarone is a Vaughan-Williams class III antiarrythmic agent most commonly used in the treatment and prophylaxis of tachydysrthymias. Although a widely used drug, it has a number of unpleasant and potentially fatal side effects, which are frequently asked in examinations. Pulmonary involvement is the toxic effect responsible for most deaths associated with amiodarone therapy, and generally correlates closely with duration of therapy rather than plasma levels. There are several different types of pulmonary toxicity; Chronic interstitial pneumonitis is most common. Other manifestations include organizing pneumonia, acute respiratory distress syndrome, and a solitary pulmonary mass. A nonproductive cough and dyspnea are present in 50-75% of affected individuals at presentation. Pleuritic pain, weight loss, fever (33-50% of cases), and general malaise can also occur. The physical examination often reveals bilateral inspiratory crackles. Corneal microdeposits occur in most patients receiving long term amiodarone therapy. Although they do not reduce visual acuity, ocular symptoms do occur include halo vision (colored rings around lights), particularly at night, photophobia, and blurred vision. Many patients will complain of troublesome “halos” around bright street lights. A transient rise in serum aminotransferase concentrations occurs in approximately 25 % (range 15-50%) of patients soon after starting amiodarone. The patients are usually asymptomatic, but the drug should be discontinued if levels increase more than a two-fold. Fortunately a symptomatic hepatitis occurs in less than 3% of patients but potential complications include cirrhosis and hepatic failure. As a result, it is recommended that liver function tests be monitored at baseline and every six months. Neurological toxicity may take many forms including tremor, ataxia, peripheral neuropathy with paresthesias, and sleep disturbances. These effects, which have been described in up to 30% of patients, appear to be dose-related, being more common during initial loading or in patients requiring higher doses.

Question: 33 of 100

Time taken: 2 hrs 9 mins 35 secs

Regarding opioid receptors:

True / False

○	◉	They are intracellular structures ✓Correct

○	◉	They contain between 3500 and 4000 amino acids ✓Correct
○	◉	In the spinal cord, kappa receptors are predominantly localised in lamina IX ✓Correct
◉	○	Binding with an opioid agonist increases potassium conductance ✓Correct
○	◉	Binding with an opioid antagonist inhibits voltage sensitive calcium channels ✓Correct

Opioid receptors are members of the large family of seven transmembrane domain receptors (rather than just intracellular), coupled to pertussis toxin-sensitive G proteins. Four types have been characterised and cloned and designated delta (DOR), mu (MOR), kappa (KOR) and orphan receptor-like 1 (ORL-1). They each contain between 372 – 400 amino acids and have different molecular weights. Binding of opioid agonists to the receptors causes: inhibition of adenyl cyclase (reducing cAMP levels); an increase in potassium conductance (the G-protein-activated inwardly rectifying conductance or GIRK); inhibition of voltage sensitive calcium channels; and a decrease in transmitter release (excitatory and /or inhibitory). Protein kinase C is also activated. Opioid receptors are located in plasma membranes of neuronal and non-neuronal cells located at pre, post and extra-synaptic sites. In the CNS they are differentially distributed in the brain and spinal cord. The expression of kappa receptors (KOR) in the spinal cord is high in laminae I and II, and moderate throughout laminae III – VIII and X. Delta receptors (DOR) are predominantly in lamina IX (not Kappa) with lesser densities throughout laminae III and VIII. Mu receptors (MOR) are predominantly localised in laminae I and II with moderate expression throughout laminae III – VIII and X.

Question: 46 of 100

Time taken: 2 hrs 23 mins 57 secs

Which of the following statements regarding stages of anaesthesia, as described by Guedel, is true:

True / False

○	◉	Unpremedicated patients were required to breath diethyl ether in oxygen ✓Correct
○	◉	Stage 2 is also known as the analgesia stage ✓Correct
○	◉	Laryngeal reflexes are depressed in stage 3 plane II ✓Correct
○	◉	Carinal reflexes are depressed in stage 3 plane III ✓Correct
◉	○	The pupils are dilated in stage 2 and stage 4 ✓Correct

In 1937 Guedel gave the classical description of the stages of anaesthesia, in unpremedicated patients breathing diethyl ether in air (not oxygen). There are four stages and stage 3 is further subdivided into four planes.

- Stage 1 (analgesia) ends with unconsciousness and the loss of the eyelash reflex.
- In Stage 2 (excitement) the pupils are dilated; the breathing is irregular with breath holding or coughing; and the stage ends with the loss of the eyelid reflex and with the onset of automatic breathing.
- Stage 3 (surgical anaesthesia) has 4 planes:
  Plane I: normal pupils with increased lacrimation and centrally placed eyes;
  Plane II: regular deep breathing, with loss of the corneal reflex, larger pupils and increased

lacrimation;

Plane III: shallow breathing with depressed laryngeal reflexes (not plane II) and lacrimation;

Plane IV: the carinal reflexes are depressed (not plane III) leading to diaphragmatic paralysis.

- In Stage 4 (overdose) the pupils are dilated and the patient is apnoeic.

  Therefore, the pupils are dilated in both stages 2 and 4.

Question: 47 of 100

Time taken: 2 hrs 29 mins 30 secs

Which of the following statements regarding the ABO and Rhesus systems is true:

True / False

○	●	Blood group A antigens have a D-galactose attached to the H substance ✓Correct
●	○	Rhesus antibodies rarely occur naturally ✓Correct
○	●	The commonest Rhesus genotype is CDe/CDe ✓Correct
○	●	Anti-d is responsible for haemolytic disease of the newborn ✓Correct
○	●	The plasma of a patient with blood group AB contains both anti-A and anti-B antibodies ✓Correct

The Rhesus system is coded by allelic genes at three closely linked loci. In Caucasians the commonest Rhesus genotype is CDe/cde and is found in approximately 32% of people (CDe/CDe is found in 17% of patients). Rhesus antibodies are rarely naturally occurring and are usually the result of previous blood transfusion or pregnancy. Anti-D is responsible for most of the clinical problems associated with this system. Anti-C, anti-c, anti-E and anti-e are occasionally seen and can all cause transfusion reactions and the haemolytic disease of the newborn. Anti-d does not exist.

In the ABO system, the structure of the three antigens differs due to the addition of the following carbohydrate groups to the L-fucose of the H substance: Blood group A antigens have an N-acetyl galactosamine; blood group B antigens have a D-galactose; and blood group O antigens are unaltered. Naturally occurring antibodies are found in the plasma of patients whose erythrocytes lack the corresponding antigens. Therefore, blood group O contains both anti-A and anti-B antibodies; blood group A contains anti-B antibodies; blood group B contains anti-A antibodies; and blood group AB contains no antibodies.

Question: 48 of 100

Time taken: 2 hrs 30 mins 15 secs

Which of the following criteria are included in the Goldman Cardiac Risk Index (CRI)?

True / False

○	●	Age greater than 65 years ✓Correct
●	○	Aortic stenosis ✓Correct

◉	○	A third heart sound ✓Correct
◉	○	Jugular venous distension ✓Correct
○	◉	More than 10 premature ventricular contractions (PVC) per minute ✓Correct

In 1977 Goldman et al studied patients undergoing non-cardiac surgery and identified nine risk factors, each of which were then allocated a number of points (Goldman Cardiac Risk Index or CRI).

By adding up the total number of points patients were placed in one of four classes. The higher the total score the greater the class, and class III and VI represent a high risk cohort.

The most significant risk factors were:

- A myocardial infarction within the previous six months and
- A third heart sound or gallop rhythm.

Other criteria include:

- Age more than70 years
- Aortic stenosis
- Jugular venous distension
- A rhythm other than sinus, or
- More than five premature ventricular contractions per minute.

The Detsky modification was subsequently introduced, which recognised that major vascular surgery has a higher morbidity and mortality compared with non-vascular surgery.

Question: 49 of 100

Time taken: 2 hrs 32 mins 41 secs

The following statements concern tracheostomy tubes:

True / False

○	◉	the tip of the tube has a left-facing bevel ✓Correct
○	◉	they have a standard 8.5mm connector at the proximal end ✓Correct
○	◉	fenestrated tubes have a window cut into the lesser curvature ✓Correct
○	◉	silver tubes are non-irritant and bacteriostatic ✓Correct
○	◉	metal tubes are cuffed and have a removable inner tube ✓Correct

Tracheostomy tubes are curved and are designed to be inserted through a stoma cut into the second to fourth tracheal rings. They are supplied with an introducer for insertion and have wings attached to the proximal tube allowing it to be secured with a cotton tie. A standard 15mm (diameter) connector is located at the proximal end of the tube (not 8.5mm). The tip of the tubes are usually cut square rather than bevelled, which is to reduce the risk of obstruction against the tracheal wall.

Fenestrated tracheostomy tubes have a window cut into the greater curvature (not lesser curvature) which channels air towards the vocal cords allowing the patient to speak. Deflating the cuff on the tube reduces airway resistance and improves weaning.

Metal tracheostomy tubes are used when long term intubation is necessary and they are made of non-irritant silver which is bactericidal (not bacteriostatic). Metal tubes are uncuffed (not cuffed) and have an inner tube that can be removed allowing regular cleaning.

Question: 50 of 100

Time taken: 2 hrs 34 mins 20 secs

The following statements concern the sensory innervation of the nasal passage:

True / False		
○	◉	anteriorly the walls and floor of the nasal passage are supplied by the sphenopalatine nerves ✓Correct
○	◉	posteriorly the floor of the nose is supplied by the superior dental nerves ✓Correct
◉	○	the infraorbital branch of the maxillary nerve supplies the vestibule ✓Correct
○	◉	the ethmoidal branch of the nasociliary nerve supplies the posterior walls of the nasal passage ✓Correct
○	◉	the nasopharynx is innervated by the sphenopalatine ganglion via the great palatine nerve ✓Correct

The walls of the anterior nasal passage are supplied by the anterior ethmoidal branch of the nasociliary nerve, and the floor is innervated by the superior dental nerve (not the sphenopalatine nerves).

The walls and floor of the posterior nasal passage are innervated by the long and short sphenopalatine nerves and the great palatine nerve (not the superior dental nerves and the nasociliary nerve).

The vestibule is innervated by small braches of the infraorbital branch of the maxillary nerve.

The nasopharynx is innervated by the sensory braches of the trigeminal nerve (not the great palatine nerve).

Question: 51 of 100

Time taken: 2 hrs 35 mins 48 secs

In acute exacerbations of chronic obstructive pulmonary disease (COPD):

True / False		
○	◉	Spirometry is a good guide to the severity of the attack ✓Correct
○	◉	All patients should receive ipratropium in addition to a beta agonist ✓Correct
○	◉	Aminophylline should be administered at an early stage if there is no clinical improvement ✓Correct
○	◉	Physiotherapy is a useful adjunctive treatment ✓Correct
○	◉	When the patient appears exhausted, tracheal intubation and ventilation is the treatment of choice ✓Correct

Although there is a correlation between peak expiratory flow rate (PEFR) and the forced expiratory volume in one second (FEV_1), spirometry in acute exacerbations of chronic obstructive pulmonary disease (COPD) is neither useful in predicting the severity of the attack, nor in guiding the subsequent management of the patient.

Ipratropium bromide may act synergistically with short acting beta agonists such as salbutamol, and may produce early improvements in arterial oxygenation and the FEV_1, and reduce the length of stay in hospital. It is well tolerated and is associated with only mild side effects. However the Cochrane collaboration found no evidence of a beneficial additive effect, and recent evidence suggests that it is most useful when the first bronchodilator has been administered at its maximum dose.

Aminophylline has demonstrated only marginal benefits in acute exacerbations of COPD, and due to its high toxicity it is recommended that Aminophylline be avoided.

Mucus clearance strategies such as the administration of mucolytic drugs, and chest physiotherapy have not been demonstrated to improve ventilatory function (FEV_1 or forced vital capacity) in COPD patients.

In situations where exhaustion is apparent tracheal intubation and ventilation may be necessary however, non invasive ventilation may be a superior option.

Question: 54 of 100

Time taken: 2 hrs 39 mins 52 secs

Damping:

True / False

○	◉	The degree of damping is described by the damping quotient (D ✓Correct
○	◉	D is equal to zero when there is no overshoot of the trace ✓Correct
○	◉	D is greater than one when an overshoot is followed by many oscillations ✓Correct
○	◉	The degree of damping is independent on the properties of the liquid in the system ✓Correct
○	◉	Critical damping is 0.6 – 0.7 of optimal damping ✓Correct

Damping is the progressive reduction in amplitude of oscillations in a resonant system, which is caused by dissipation of the stored energy. The degree of damping is described by D which is the damping factor (not damping quotient). If a sudden change is imposed on a system the value of D changes, and reflects the subsequent response of the trace:

- D = 1 in critical damping, where no overshoot of the trace occurs (not D = 0);
- D is < 1 when a marked overshoot is followed by many oscillations (not D is > 1);
- D is > 1 if an excessively delayed response occurs.

Optimal damping produces the fastest response without excessive oscillations, and is 0.6 – 0.7 of critical damping (not 0.6 – 0.7 of optimal damping). The degree of damping depends on the properties of the liquid in the system and the dimensions of the cannula and connecting tubing.

Question: 55 of 100

Time taken: 2 hrs 41 mins 56 secs

Measurement of the cardiac output by thermodilution:

True / False

○	◉	10ml of cold fluid is injected through the distal port of the pulmonary artery catheter ✓Correct

○	◉	a thermistor is located at the tip of the pulmonary artery catheter ✓Correct
○	◉	a secondary drop in temperature may be seen ✓Correct
◉	○	cardiac output should be measured during the end-expiratory pause ✓Correct
○	◉	a curve of the temperature increase against time is displayed ✓Correct

Cardiac output is commonly measured on the ITU using the thermodilution technique, which is easily performed and allows repeated estimations to be performed. 5 – 10 ml of cold dextrose or saline is injected through the proximal port (not distal) of the pulmonary artery catheter (PAC). The fluid should be injected during the end-expiratory pause. The drop in temperature is measured by a thermistor located proximal to the balloon and is about 4cm from the tip of the PAC. Thus a curve is produced showing the temperature drop (not increase) against time. A secondary peak is seen when using the dye dilution techniques, but a secondary drop in temperature is not seen with the thermodilution method. The estimate of cardiac output is affected by the phase of respiration and it should be measured during the end-expiratory pause.

Question: 56 of 100

Time taken: 2 hrs 44 mins 4 secs

The following affect the value of MAC (minimal alveolar concentration):

True / False

○	◉	gender ✓Correct
○	◉	mild hypercapnia ✓Correct
◉	○	hypoxaemia ✓Correct
○	◉	acidaemia ✓Correct
○	◉	alkalaemia ✓Correct

The minimal alveolar concentration (MAC) of an inhalational anaesthetic agent is unaffected by the following: gender, acidaemia, alkalaemia, body weight, serum potassium variations and the duration of the anaesthetic.

MAC is increased in: infants/children; hyperthermia; hypermetabolic states and sympathetic increase and chronic alcoholism. MAC is reduced in: hypothermia; hypoxaemia; old age; the presence of other depressant drugs, e.g. opioids; and when the central nervous system has low levels of catecholamines, e.g. alpha methyl dopa.

Carbon Dioxide (levels > 120 mmHg) has been used an anaesthetic - Hickman, which by an additive effect can be considered as decreasing MAC. On the other hand a markedly elevated CO_2 (and even severe acidaemia) can stimulate the sympathetic system / release catecholamines and result in MAC increasing. The issue is which is the dominant effect. Thus the subject of MAC and CO_2 is confusing and in an MCQ it may be wise to leave the stem unanswered.

Question: 57 of 100

Intrapulmonary shunt (Qs/Qt) in a pregnant, normotensive woman in the lateral position at term is approximately:

○	3%
○	5%
○	10%
◉	15% ←This is the correct answer
○	20%

Hankins et al measured Qs/Qt in a group of pregnant volunteers at term. They found that directly measured Qs/Qt averaged 15.3% in the left lateral, 15.2% in the right lateral, 13.9% in the supine, 12.8% in the knee-chest, 13.8% in the sitting, and 13.0% in the standing position. This represented a marked increase in venous admixture in comparison with the non-pregnant state.

Question: 58 of 100

Which of the following structures accompany the median nerve in the carpal tunnel?

○	Flexor carpi ulnaris.
◉	Flexor digitorum profundis. ←This is the correct answer
○	The ulnar artery.
○	All of the above.
○	None of the above

The carpal tunnel is an osseofibrous tunnel formed by the flexor retinaculum in the wrist. The median nerve and tendons of the long flexor muscles of the digits pass through it.

Question: 59 of 100

In a neonate, the spinal cord terminates at the lower border of:

○	T12.
○	L1.
○	L2.
◉	L3. ✓Correct
○	L4.

In early foetal life, the spinal cord is as long as the vertebral canal. During development, however, increase in the length of the cord does not keep pace with the growth of the vertebrae. At birth the tip of the spinal cord has risen from the level of the second coccygeal vertebra to the lower border of the third lumbar vertebra.

Question: 60 of 100

A 65-year-old lady with a history of recurrent DVT. She has been weaned off her warfarin and started on intravenous heparin prior to cardiac bypass for ischaemic heart disease. She seems to require very high doses of heparin to achieve adequate anticoagulation especially during surgery.

Which of the following conditions would explain her thrombophilia and her heparin resistance?

○	Activated Protein C resistance
◉	Antithrombin III deficiency ←This is the correct answer
○	Lupus anticoagulant
○	Protein C deficiency
○	Protein S deficiency

"Cardiac surgery produces a unique activation of coagulation due to the presence of the cardiopulmonary bypass (CPB) circuit. Whilst not yet fully elucidated, the mechanisms of activation of coagulation during CPB may involve activation of fX by the tissue factor-mediated pathway within the pericardial cavity, in addition to direct generation of fXa on the surface of monocytes by Cathepsin G, a substance released from activated monocytes. The inhibition of fXa in these situations involves the AT-dependent mechanism of action of heparin.

Question: 61 of 100

The depth of the subarachnoid space in the thoracic region is:

○	1 mm.
◉	3 mm. ←This is the correct answer
○	5 mm.
○	9 mm.
○	12 mm.

In the cervical and thoracic regions of the spinal cord. the subarachnoid space is annular and has a depth of only 3 mm between the arachnoid mater and the pia mater which is adherent to the spinal cord. The spinal cord terminates at the lower border of L1 (or upper border of L2 in some texts). At this point, the subarachnoid space becomes circular and has a diameter of approximately 15 mm

Question: 62 of 100

In adults, the angle at which the right main bronchus leaves the carina is:

○	15 degrees.
○	20 degrees.
○	25 degrees. ←This is the correct answer
○	30 degrees.
○	35 degrees

In adults, the angle between the left and right main bronchi and the midline are 45 and 25 degrees respectively. In infants, these are 47 and 30 degrees.

Question: 63of 100

A 42-year-old male farmer has been spraying his crop with insecticide and presents with dyspnoea, lacrimation, salivation and eye pain. He is given high flow oxygen and intravenous access is obtained. On examination he has miosis, is bradycardic and has marked bronchorrhoea and bronchospasm.

Which of the following should immediately be given?

○	Intramuscular adrenaline
◉	Intravenous atropine ✓Correct
○	Intravenous pyridostigmine
○	Nebulised salbutamol
○	Tropicamide ophthalmic drops

This patient has features of organophosphate poisoning, which include: Diarrhoea, Urination, Miosis, Bronchorrhoea, Bronchoconstriction, Bradycardia, Emesis, Lacrimation, and Salivation. Treatment requires organ support, intensive care and the early administration of antidotes (atropine and pralidoxime). Diazepam may be required for seizure prophylaxis. 0.5% tropicamide ophthalmic drops will relieve the eye pain and miosis.

Question: 64 of 100

A 66-year-old hypertensive female who presents with copious vomiting due to small bowel obstruction is listed for an emergency laparotomy. She has a recently diagnosed hiatus hernia and a strong family history of suxamethonium apnoea. Her past anaesthetic history includes an open cholecystectomy that was performed ten years previously without complication.

Which is the most appropriate anaesthetic technique for this patient?

○	A combined spinal-epidural
○	A modified rapid sequence technique using vecuronium
◉	A rapid sequence induction using low dose suxamethonium←This is the correct answer
○	An awake fibreoptic intubation
○	An inhalational induction in the left lateral position should be performed

A thorough bedside assessment of the airway is necessary before giving any muscle relaxant. Suxamethonium as part of a rapid sequence induction is not contraindicated in this patient, despite her strong family history of suxamethonium apnoea. It is unlikely that suxamethonium was used for her cholecystectomy, which predates the hiatus hernia. A small dose of suxamethonium may be given to facilitate intubation, but further doses of relaxant should be delayed until muscular recovery is apparent. The provision for postoperative ventilation and sedation should be available. Using a non-depolarising relaxant as part of a modified rapid sequence technique is acceptable, but rocuronium is preferable to vecuronium. An awake fibreoptic intubation could cause aspiration of intestinal contents as the local anaesthesia would compromise her ability to protect her own airway. A gas induction in the left lateral position is of historical importance but is rarely used today.

Question: 65of 100

The most common early sign of amniotic fluid embolism (AFE) following a normal vaginal delivery is:

○	Skin rash
○	Hypertension.
○	Fitting
○	Abnormal bleeding.
◉	Cyanosis✓Correct

The overall incidence of amniotic fluid embolus ranges from 1 in 8,000 to 1 in 80, 000 pregnancies, with a maternal mortality of up to 86%.

Cyanosis and respiratory distress are the commonest early presenting signs of AFE. These are shortly followed by cardiovascular collapse +/- coma. In addition, prodromal chills, sweating, coughing, hyperreflexia, and convulsions occasionally occur.

Question: 66 of 100

A 34-year-old female is anaesthetised for a parathyroidectomy. She has been induced with propofol and alfentanil and tracheal intubation has been facilitated using rocuronium. The tracheal tube is connected to a coaxial Mapleson D system and ventilation is provided by a Penlon Nuffield 200. Her body weight is 65 kg. Which of the following is the fresh gas flow required to achieve normocapnia?

◉	4.5 L / min ← This is the correct answer
○	6.5 L / min
○	9.5 L / min
○	50 ml / kg / min
○	3550 ml / min

For controlled ventilation using a Bain or coaxial Mapleson D system, a fresh gas flow of 70 ml / kg / min will maintain normocapnia (65 x 70 = 4.5 L / min) and a flow of 100 ml / kg / min will cause moderate hypocapnia.

Question: 67of 100

A fit and healthy 38-year-old male is having a vasectomy under general anaesthesia. Anaesthesia was induced with propofol and fentanyl and a size 5 laryngeal mask airway was inserted. Anaesthesia is maintained using 3% sevoflurane, oxygen and air, providing an inspired oxygen concentration of 38%. Ten minutes into the procedure, he is breathing spontaneously at a rate of 18 breaths/min through a circle system with a functioning carbon dioxide absorber with tidal volumes of 350 ml. The end tidal carbon dioxide has increased from 5 kPa to 7 kPa, the heart rate has increased from 60 to 120 / min and the saturation has decreased to 94%. Which of the following should be immediately performed?

○	Additional analgesia should be given
○	Sodium dantrolene should be given intravenously
◉	The core temperature should be monitored ← This is the correct answer
○	The inspired sevoflurane should be reduced to 2%
○	The patient should be paralysed and the minute ventilation increased

Malignant hyperpyrexia (MH) is characterised by increased temperature and muscle rigidity during anaesthesia, which results from abnormal skeletal muscle contraction and increased metabolism. Early warning signs of MH are an increased end tidal carbon dioxide, desaturation and cardiovascular instability. Known triggering agents include the volatile anaesthetic agents and suxamethonium, but susceptible patients show different sensitivity to the triggering agents and the reaction can be delayed by several hours. Intravenous sodium dantrolene (up to 10 mg / Kg) is the only available specific treatment, but takes time to reconstitute into an injectible solution.

Question: 68 of 100

What is the number of bronchopulmonary segments in the right lung?

○	7
○	8
○	9
◉	10 ← This is the correct answer

○	11

There are 10 bronchopulmonary segments in each lung. However, in the the left lung, the medial basal (or cardiac) segmental bronchus and segment may be absent or very small. Thus, for the left lung, both 9 and 10 would be correct answers. There is so much variation in anatomy that the 'right' answer is the one that is the most frequent finding.

There are 10 bronchopulmonary segments in the right lung.

These are:

Upper lobe:

- Apical
- Posterior
- Anterior

Middle Lobe:

- Medial
- Lateral

Lower Lobe:

- Superior ('Apical')
- Anterior basal
- Posterior basal
- Medial basal
- Lateral basal

Question: 69 of 100

Which of the following stimulate the generation of cyclic AMP as the second messenger?

(Please select 1 option)

○	Nitric Oxide
○	Pioglitazone
○	Tissue Necrosis Factor (TNF) alpha
◉	Cholera toxin←This is the correct answer
○	Growth hormone

Nitric oxide generates cGMP as the second message and pioglitazone acts through agonism of PPAR gamma. Calcitonin Cholera toxin binds to the Ganglioside receptors and causes excessive production of cAMP which leads to the activation of luminal sodium pumps and the secretory diarrhoea.. GH like TNF alpha acts on the GH/cytokine superfamily of receptor which function via the JAK-STAT pathway.

Question: 70 of 100

Which of the following are true of a cervical rib?

(Please select 1 option)

○	It occurs commonly
○	It is apparent on palpation in the supraclavicular region.
◉	It originates from the 7th cervical vertebra. ✓Correct
○	It commonly causes compression of the subclavian artery and brachial plexus.
○	All of the above.

In 0.5-1% of individuals, the costal elements of the 7th cervical vertebra form projections called cervical ribs. Commonly they have a head, neck, and tubercle, with varying amounts of body. They extend into the posterior triangle of the neck where they may be free anteriorly, or be attached to the first rib and/or sternum. Usually these ribs cause no symptoms, and are diagnosed after incidental finding on CXR. In some cases, the subclavian artery and the lower trunk of the brachial plexus are kinked where they pass over the cervical rib. Compression of these structures between this extra rib and the anterior scalene muscle may produce symptoms of nerve and arterial compression, producing the "neurovascular compression syndrome". Often the tingling, numbness, and impaired circulation to the upper limb do not appear until the age of puberty when the neck elongates and the shoulders tend to droop slightly.