This book provides you with simple instructions on how to draw and interpret the crucial anatomy you need for your anaesthetic training.

Covers all the relevant anatomy in:

- **Head, neck and neuro** – from Circle of Willis to cervical plexus
- **Vertebral column** – from the spinal cord to the sacrum
- **Cardiac** – coronary arteries and venous drainage of the heart
- **Airway and respiratory** – from airway sensation to the diaphragm
- **Abdomen** – from the abdominal aorta to the nephron
- **Limbs** – from blood vessels in the arms to the ankle, via the femoral canal

For the majority of sections, in addition to a simple drawing and detailed explanation, there are also step-by-step illustrations to show you how to draw the anatomy yourself – taking some of the stress out of potential viva questions!
Quick Draw
ANATOMY
For Anaesthetists
Related titles from Scion

[Imagery of book covers for Equipment in Anaesthesia and Critical Care, Graphic Anaesthesia, OSCEs for the Primary FRCA, and Physics in Anaesthesia]
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I have always found anatomy a tricky subject: it was my ‘last minute’ subject when revising for exams. During final FRCA preparation, both I and Kiran Singh-Kandola realised that drawing simplified diagrams helped us to label any anatomy image shown to us, and so it might help others too.

This idea stayed an idea for a long time. I then started teaching some of the diagrams to core trainees studying for the primary FRCA. They seemed enthused to have an easy way to learn anatomy, but there seemed to be no revision books which did this.

I developed the step-by-step approach to drawing the diagrams from the way I taught people to draw them. In the last few years I have added many more drawings/diagrams, with the aim of covering most of the syllabus for anatomy.

Many of the diagrams are done in a step-by-step ‘how to draw’ method. For some topics, such as the eye and the spleen, rather than step-by-step drawing, the salient points and general anatomy needed for the exams are covered.

The main idea of the book is to make anatomy simpler for you to learn. Lots of tips are included, some about how to draw and some to help you answer some common questions. The book should aid you in all primary and final FRCA exam revision.

Joanna Oram Fox
Cardiff
November 2017
Acknowledgments

I would like to thank Kiran Singh-Kandola for being a great revision partner. From the inception of this idea, we designed simple diagrams to help us remember complicated anatomy. He was involved with the original drawings of the trigeminal nerve, cervical plexus, parts of the eye, epidural space, caudal anatomy, brachial plexus, cubital fossa, wrist, femoral canal and popliteal fossa.
About the author

Dr Joanna Oram Fox graduated in medicine from Cardiff University in 2007. She obtained certificates of clinical excellence in medicine, surgery and general practice and won the prestigious Willie Seager surgery prize.

Joanna worked four general years as a junior doctor covering medicine, surgery, obstetrics and gynaecology, paediatrics and emergency medicine. During this time she worked in Australia and developed an interest in anaesthetics.

She commenced anaesthetic training in 2011 and is due to finish in August 2018. Joanna has been involved in copious amounts of teaching; she has organized an OSCE course since 2012 which includes some anatomy teaching. This has helped her develop her interest in simplifying difficult subjects for other trainees. *Quick Draw Anatomy for Anaesthetists* was developed with this in mind, as a learning aid for anaesthetists in training.
# Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Definition</th>
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<tbody>
<tr>
<td>AFOI</td>
<td>awake fibreoptic intubation</td>
</tr>
<tr>
<td>ASIS</td>
<td>anterior superior iliac spine</td>
</tr>
<tr>
<td>CD</td>
<td>collecting duct</td>
</tr>
<tr>
<td>CF</td>
<td>cubital fossa</td>
</tr>
<tr>
<td>CN</td>
<td>cranial nerve</td>
</tr>
<tr>
<td>DCT</td>
<td>distal convoluted tubule</td>
</tr>
<tr>
<td>EJV</td>
<td>external jugular vein</td>
</tr>
<tr>
<td>FCR</td>
<td>flexor carpi radialis</td>
</tr>
<tr>
<td>FCU</td>
<td>flexor carpi ulnaris</td>
</tr>
<tr>
<td>FO</td>
<td>foramen ovale</td>
</tr>
<tr>
<td>FR</td>
<td>foramen rotundum</td>
</tr>
<tr>
<td>FRCA</td>
<td>Fellow of the Royal College of Anaesthetists</td>
</tr>
<tr>
<td>GFR</td>
<td>glomerular filtration rate</td>
</tr>
<tr>
<td>IJV</td>
<td>internal jugular vein</td>
</tr>
<tr>
<td>IMA</td>
<td>inferior mesenteric artery</td>
</tr>
<tr>
<td>IOP</td>
<td>intraocular pressure</td>
</tr>
<tr>
<td>IVC</td>
<td>inferior vena cava</td>
</tr>
<tr>
<td>LAD</td>
<td>left anterior descending</td>
</tr>
<tr>
<td>LMS</td>
<td>left main stem</td>
</tr>
<tr>
<td>MN</td>
<td>median nerve</td>
</tr>
<tr>
<td>PCT</td>
<td>proximal convoluted tubule</td>
</tr>
<tr>
<td>PL</td>
<td>palmaris longus</td>
</tr>
<tr>
<td>RA</td>
<td>radial artery</td>
</tr>
<tr>
<td>RBC</td>
<td>red blood cell</td>
</tr>
<tr>
<td>RMS</td>
<td>right main stem</td>
</tr>
<tr>
<td>SCM</td>
<td>sternocleidomastoid muscle</td>
</tr>
<tr>
<td>SLN</td>
<td>superior laryngeal nerve</td>
</tr>
<tr>
<td>SM</td>
<td>somatic motor</td>
</tr>
<tr>
<td>SMA</td>
<td>superior mesenteric artery</td>
</tr>
<tr>
<td>SOF</td>
<td>superior orbital fissure</td>
</tr>
<tr>
<td>SPG</td>
<td>sphenopalatine ganglion</td>
</tr>
<tr>
<td>SS</td>
<td>somatic sensory</td>
</tr>
<tr>
<td>SVC</td>
<td>superior vena cava</td>
</tr>
<tr>
<td>UA</td>
<td>ulnar artery</td>
</tr>
<tr>
<td>UN</td>
<td>ulnar nerve</td>
</tr>
<tr>
<td>VS</td>
<td>visceral sensory</td>
</tr>
</tbody>
</table>
How to use the book

For the anatomical sections that have step-by-step drawings, the idea is to learn how to draw each diagram quickly and efficiently.

At each stage the diagram follows conventional labelling:

- Green for nerves
- Blue for veins
- Red for arteries
- Black for structures

For subsequent steps the colours are shown as tints to allow you to easily see the new lines drawn in the next step.

Once you can draw diagrams without thinking (e.g. using the shape memos like ‘diamond’ for the popliteal fossa), then you should learn to label them.

Finally, you should learn to explain what you are drawing. For example, the brachial plexus can be drawn in less than 15 seconds. Then you explain it whilst drawing, which should take around a minute. This will give an excellent impression in viva or OSCE examinations.

Happy drawing!
6.1 Blood vessels in the arms

**ARTERIES**

- The arteries can be seen as one line from the armpit that forms a loop from the cubital fossa (CF) to the hand.
- The subclavian artery becomes the axillary artery which becomes the brachial artery.
- This then divides in the CF to the radial artery (laterally) and the ulnar artery (medially).
- They join in 2 loops in the hand, the deep palmar arch and the superficial palmar arch.

**VEINS**

- The veins start as a shorter line, the subclavian vein, that divides into the cephalic vein (laterally) and the basilic vein (medially).
- These loop from the upper arm down to the hand where it also forms 2 loops, the deep palmar arch and superficial palmar arch.
- The median cubital vein joins the basilic and cephalic veins.
- The median cubital vein drains into the basilic vein.
6.2 Brachial plexus

How to draw

STEP 1
- Draw 3 lines horizontally.
- The middle line should be approximately 2/3 the length of the outside lines.

STEP 2
- Add in the landmarks: the clavicle and 1st rib. These should be perpendicular lines at approximately 2/3 and 1/3 along the middle line.
**STEP 3**

- Add the roots and label: C5, C6, C7, C8 and T1.
- Add in the long thoracic nerve; this usually comes off near the roots of C5, C6 and C7.
- Label the upper, middle and lower trunks.

**STEP 4**

- Draw in the divisions – these normally occur between the clavicle and first rib. Each trunk has an anterior and posterior division.
- Draw them in by drawing an arrowhead from the outer two lines to meet in the posterior cord and then cross the top half of the arrow.
- The posterior (P) division of each trunk joins to form the posterior cord.
- The anterior (A) divisions of the upper and middle trunk join to form the lateral cord and the anterior division of the lower trunk forms the medial cord.

**STEP 5**

- Draw a second arrowhead joining the lateral and medial cord. These form the median nerve.

**STEP 6**

- Draw a ‘snake’s tongue’; this is the posterior cord dividing to form the axillary nerve (upper) and the radial nerve (lower).
- Label the musculocutaneous (M/C) nerve and the ulnar nerve.
STEP 7

- Add in one branch from the lateral cord – this is the lateral pectoral nerve.
- Add in three branches from the medial cord – these are the medial cutaneous nerve of the forearm (CNFA), the medial cutaneous nerve of the arm (CNA) and the medial pectoral nerve.

STEP 8

- Add in one branch from the posterior cord – this is the thoracodorsal nerve (dorsal and posterior both mean behind/back).
- Add in one branch from the upper trunk – this is the suprascapular nerve (this can be missed in a supraclavicular block; it normally supplies the lateral skin of the shoulder and so can lead to pain in shoulder surgery if missed).
There are few good simplistic versions of the axilla. I found it difficult to represent the anatomy exactly. This diagram should help you label any diagram of the axilla the examiner may show you, but it is not an exact anatomical replica.

**How to draw**

**STEP 1**
- Draw a large circle to represent the cross-section of the axilla with a small circle in the middle just lateral to the centre – this represents the humerus.

**STEP 2**
- Draw a semicircular shape, split into 3, below the humerus. This represents the triceps muscle.
- There are 3 heads: the lateral head (left), the medial head (middle) and the long head (right).
STEP 3

Draw 3 shapes as shown above the humerus:
- the brachialis muscle (left)
- the biceps brachii muscle (top)
- the coracobrachialis muscle (right).

STEP 4

- Draw a red circle medial to the humerus – this represents the axillary artery.

STEP 5

- Draw a blue shape lateral to the axillary artery – this represents the axillary vein.

STEP 6

- Draw 4 green dots, 3 encircling the axillary artery at approximately 12 o'clock (median nerve), 5 o'clock (ulnar nerve) and 8 o'clock (radial nerve), and 1 between the biceps brachii and coracobrachialis muscles; the musculocutaneous nerve. It can be missed in an axillary block due to the fact it is often located here.
I remember this image by the shape – ‘the triangle’. Using different shapes for different areas helps to differentiate them in your mind.

**How to draw**

**STEP 1**

- Draw an equilateral triangle pointing downwards. Label the borders: biceps brachii muscle above, the pronator teres medially and the brachioradialis laterally.
- Draw a smaller triangle just lateral to the centre to represent the biceps tendon.
**STEP 2**

- Draw the brachial plexus as a straight line down just medial to the bicep tendon.
- This divides into the ulnar artery medially and the radial artery laterally. The ulnar artery passes under the pronator teres where it joins the ulnar nerve.

**STEP 3**

- Add in the ulnar nerve part way down by the dotted ulnar artery.
- Add in the median nerve medial to the brachial artery.
- Add in the radial nerve lateral to the bicep tendon; draw in the posterior interosseous branch. This is important because a radial nerve block that is too low can miss this branch and hence the patient can experience wrist pain during surgery.

**STEP 4**

- Add in the veins. Draw an H shape with a diagonal crossbar from lower to higher, lateral to medial.
- Label these: cephalic, basilic and median cubital veins of the forearm.

**TIP!**

Put your arm out with your thumb pointing upwards. The basilic vein is on the 'base' of the arm and the cephalic vein is nearer the head.
The wrist is often overlooked for revision of anatomy. However, we commonly put in arterial lines and sometimes perform nerve blocks on the arm and so it is vital we know what lies where. To help remember it, think about the ‘7 lines’ of the wrist.

**How to draw**

**STEP 1**
- Draw a hand shape.
STEP 2

- Draw 7 lines in the following order: red, black, green, black, red, green and black. The lines represent the tendons (black), nerves (green) and arteries (red).
- From lateral to medial these are: the radial artery, flexor carpi radialis (FCR), the median nerve, palmaris longus, ulnar artery, ulnar nerve and flexor carpi ulnaris (FCU).
- Nerves are often ‘protected’ by tendons and so you can see that the median nerve lies between and below 2 tendons and the ulnar nerve lies just below FCU.
- The radial artery can be easily found by feeling for FCR and palpating just laterally.

How to draw the cross-section

STEP 1

- Draw an oval shape with 2 squares in it to represent the radius and ulna.

STEP 2

- Draw 7 coloured dots/circles that correspond to the picture above. Note that nerves are deep compared to the tendons.