Section 1 General guidance

Chapter 1

Introduction and general preparation

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Introduction

We can almost hear you sigh and exclaim, 'Not another chapter on general FRCS (Tr & Orth) exam guidance!' There are so many 'candidate's exam experiences' out there for everybody to read and digest. What new spin can they add to the same old story?

It is still necessary to include this chapter, as it neatly sets the scene for the exam. Perhaps more importantly, the exam focus regularly changes and you definitely want to keep ahead with the latest developments.

Finally, the nature of the book means that it is necessary to consider how the paediatric section of the exam fits together within the wider FRCS (Tr & Orth) exam.

A lot of this general advice can be found elsewhere, as we alluded to, in the various candidate accounts floating round the internet. The problem is that most of these 'candidate experiences' are in a very similar vein and after reading the first two or three very little extra new material is then uncovered. While the general exam guidance advice in the general and viva-focused *Postgraduate Orthopaedics* books contains few surprises, both books cover the material to a greater depth and sophistication than elsewhere. Candidates may want to search out the relevant book chapters for this information.

This general FRCS (Tr & Orth) exam guidance material can become a little dull and recurring to most candidates. Therefore, we have tried to avoid any unnecessary repetition of material, concentrating on the important details vital for exam success.

The aims of the exam are to see if you have enough knowledge to practice safely as a day-one orthopaedic consultant in a District General Hospital. The exam is not set out to test you in microscopic detail about trivial irrelevancies. The exam is not even designed to test for subspecialty interest.

The first day you are on call as a consultant, your registrar may phone you up about a child with a painful hip in casualty. A child with knock knees may have been wrongly referred to your adult knee clinic. Your trauma practice may cover children and you may worry about risks of growth arrest with particular fracture patterns.

The history of the FRCS (Tr & Orth) exam

In the late 1970s, the old-style FRCS had long ceased to mark the end of training and had become your entry into higher surgical training. The only exam in Britain devoted exclusively to orthopaedics was the MChOrth from the University of Liverpool. To take this exam, you generally had to work in or around the Mersey Deanery.

The situation was clearly unsatisfactory and, under the guidance of the Royal College of Surgeons in Edinburgh, a Specialty Fellowship exam in orthopaedics was introduced in 1979. This exam was optional but soon became established as a benchmark of completion of training and a quality assurance measure. It was an entirely clinical exam with a viva voce format. The standard was high and the pass mark variable. It was not an easy exam to pass but it became accepted that recognition of the standard of higher surgical training by assessment in the form of an exam was essential in orthopaedics. This is, in fact, applicable to all surgical specialties, not just orthopaedics.

In time, the exam was accepted by all four Royal Colleges, and in 1990 a new intercollegiate exam was introduced. This originally took place twice a year in each of the colleges in turn. This exam was also initially voluntary but in 1991 it became a requirement for accreditation, together with the satisfactory completion of training in an approved programme that had been inspected and approved by the Specialist Advisory Committee.

For many years, it was difficult to get hold of any valuable exam guidance. The exam appeared to be surrounded in secrecy. Despite a curriculum and syllabus, many candidates entered the exam not really knowing what to expect. The usual line was that if you had undertaken good clinical work, read the appropriate literature and had a sound grasp of the basic sciences you would be OK and would be expected to pass.

It was also difficult to get useful information and tips from previous candidates, such as the expected standard or the questions likely to be asked. Another fact – now easily forgotten – was that the internet was in its infancy and there simply wasn't the candidate support network that there is today.

Postgraduate Paediatric Orthopaedics, ed. Sattar Alshryda, Stan Jones and Paul A. Banaszkiewicz. Published by Cambridge University Press.

In time, the pass rate began to fall and candidates hoping to avoid failure wanted to be better informed about what to expect.

There weren't a large number of courses available to guide a candidate on the expected standard. Some courses set the level far too high. The idea was that you were panicked into hitting the books, as you perceived that your knowledge wasn't up to the required standard. This was fine if you had a year to go before the exam and you could plan a more intensive schedule of revision but not so good if your exam was in 3 weeks' time.

The situation began to change around the turn of the millennium. A number of candidates began writing down their own experiences as a revision tool for the next wave of candidates sitting the exam. A small select number of candidates in larger training programmes began to form study groups. These study groups acquired and circulated these candidate accounts among themselves to help with exam preparation. The deal was that once you had passed you wrote your own account for those candidates coming after you to use with their own preparation. In time, these candidate's experience reports began to circulate more freely in a wider domain, such that most candidates, with a bit of detective work, were able to get hold of them.

Today there are numerous websites containing significant numbers of candidates' exam experiences. These include the British Orthopaedic Trainees Association, various regional training programme sites and, lastly, individual accounts from successful candidates. The major problem with many candidate experiences is that they deal with specific viva or clinical questions in a rather superficial way, mainly with bullet point headings. Also, we have yet to see an unsuccessful candidate's experience posted on the internet. Candidates generally learn more from what went wrong than if only successful accounts are presented.

The standard of FRCS (Tr & Orth) exam courses has, by and large, significantly improved and, in general, candidates are much more informed and have a better idea of what types of question tend to get asked regularly. So one of the most major changes with the FRCS (Tr & Orth) exam in the last 10 years is that the mystery surrounding it has evaporated away.

The old-style viva with a variable number of questions is definitely a thing of the past. The viva is now standardized for candidates, with similar questions being asked for each topic covered. This leads to a much fairer exam, with much less potential for any discrimination.

Exam format

The current FRCS (Tr & Orth) exam encompasses two sections: Part I is a written exam and Part II the clinical and oral exam. For further information, and to make sure that your information is up to date, we suggest that you carefully review the Intercollegiate Speciality Board website (http://www.jcie.org.uk).

Part I

This section consists of two separate papers; essentially, a multiple-choice question (MCQ) paper and an extended matching question (EMQ) paper. Part I was generally regarded as the easier section of exam to pass but since 2013 the pass mark has been raised by the Examination Board. This is to make sure that candidates entering Part II are more likely to pass. A number of candidates may be OK learning for an MCQ/EMI paper but be a long way off the standard for a clinical and viva exam.

The statistical analysis of a paper that was contained in the MCQ paper is likely to be scrapped by mid-2014.

Part II

Clinical cases

This section comprises clinical cases and structured oral interviews. The clinical component is divided into three short cases each for the upper and lower limbs, each of 5 minutes duration (30 minutes in total) and two intermediate cases of 15 minutes duration (which may be upper limb, lower limb or spine) The examiners are fairly strict with time allowance in the intermediate cases, with 5 minutes for history, 5 minutes for clinical examination and 5 minutes at the end for discussion.

Orals

The oral component is divided into four 30-minute viva sections:

- Basic science,
- Trauma, including spine,
- Adult elective orthopaedics including spine,
- Paediatric orthopaedics and hand surgery, including shoulder and elbow.

Paediatric section

The paediatric oral or viva section is combined with the hands and upper-limb section. The examiners now have to introduce themselves to the candidate and remind the candidate which oral he or she is about to be examined on, to allow the candidate time to settle. Feedback is given where appropriate, such as, 'OK, let's move on; we have covered this area, let's go on.' Examiners are encouraged to avoid such remarks as, 'Excellent, well done, that's great, fantastic.'

Props, such as radiographs, pictures, charts, are usually used to lead into a question.

Three paediatric topics are discussed: these usually cover a trauma-type question, one big (A-list) topic and a less-obvious clinical topic.

Hammering on when a candidate could not answer a question used to be a common candidate complaint but examiners are now actively dissuaded from this practice.

All candidates are treated in exactly the same manner and marks are based on performance only. Examiners are instructed to allow for candidates' nervousness and are told

not to respond to inappropriate behaviour by a candidate. Inappropriate behaviour would include rudeness or sarcastic remarks to the examiners, impoliteness and bad mannered or derogatory comments about facilities or organization issues.

A significant change is that viva questions are now more clinically orientated and relevant to the types of situation that may present to a consultant orthopaedic surgeon in clinical practice. For this reason, potential exam questions are now significantly more scrutinized than previously before being approved by the exam committee for inclusion in the exam.

When to sit the exam

It is generally accepted that you will need about one full year of preparation before you will feel confident to sit the exam.

In theory, it should be relatively easy for you to decide if you have enough experience and have prepared in sufficient detail to sit the exam. In practice, a multitude of competing issues usually complicate this decision.

If you are a trainee, you will have been sitting the UK In-Training exam for the last 3 or 4 years and should know your annual scores. Many training programmes also have yearly 'mock' clinical and viva exams and will not let you sit the real exam unless you have achieved a good enough pass in these mock tests.

In the past you may have had a charitable training programme director who was willing to take a chance with you but this is now less likely, as it may have a direct bearing on the number of trainees allocated to a region.

Study groups

A key factor for your success will be the formation of a study group that meets regularly, discusses various topics and arranges practice viva sessions. There are a number of factors that will contribute to a study group's success and also some aspects that you should avoid. Essentially, the group should comprise three to five candidates, who all need to get on well with each other and should not be too far apart from each other in terms of knowledge. If there are significant rivalries and petty jealousies within the group, with people trying to score points off each other, the group is not going to work out. Be careful of candidates who think that they are too good for the group; they are likely to let you down near the end and do their own thing.

Also, be careful with the candidates who are unlikely to pass first time round and who are just too far behind with their studies to contribute significantly to group discussions. Give these candidates the benefit of the doubt, as surprises do happen, but be concerned if you draw repeated blanks with large gaps in core knowledge. Politely sideline such candidates if the extra input is significantly affecting the group's performance. In general, don't include candidates who are a few months or perhaps a year off sitting the exam. They are unlikely to have sufficient motivation and drive at this stage in their revision.

Last-minute preparation

In the last 2 to 3 weeks leading up to the exam try not to panic and attempt to go over all your revision again. This will not work and will just lead to you getting even more stressed and irrational. Use this time for quick focused revision.

Attending a last-minute revision course as a sort of dry run a couple of weeks before the real exam is becoming more popular these days. This only really works if you are not too far away from the required standard and the dry run is used to iron out, fine tune and rehearse your performance. Hoping to get lucky with a sort of quick revision before the real exam but with significant knowledge gaps is unlikely to be successful.

Exam tactics

Dress sensibly: no loud ties, short shirts or Vivienne Westwood high heels. Don't stink of stale cigarettes, as this is very off-putting for most people. A bit of cologne is OK, but unless you have a body odour problem, be careful not to use too much, as this may also be off-putting to examiners.

If you are one of a small number of candidates who are significantly affected with exam stress it may be reasonable to get some professional help. The scenario during the exam would be extreme nervousness, wet armpits and sweat pouring off your face. This situation is very uncomfortable and will affect your performance. A beta-blocker will probably have no significant physiological affect but psychologically may help to calm you down and improve your overall exam performance. We would suggest speaking to your GP for advice.

Book a hotel fairly near the exam venue, preferably within walking distance, although this may not always be possible.

Allow plenty of time to arrive promptly at the exam hall. We know the arguments of turning up too early and getting freaked out by other candidates talking too much and winding you up. This is irritating but a fair amount less stressful than leaving your arrival to the last minute and risking that you get caught up in traffic and turn up late.

Keep your distance

A piece of advice that we keep repeating is to get away from other exam candidates as quickly as possible after completing the various exam sections. It is extremely questionable whether anything useful can be gained by hanging around to chat to other candidates after completing the clinical or vivas.

At best, this will unnerve you and can make you feel uncomfortable; at worst, it will put you off for the remaining parts of the exam. Even worse, you may end up in a bar afterward, drinking too much alcohol in drowning the sorrows of a perceived poor performance and ruin any chances of that last-minute brush up of key topics you had planned for later that evening.

Stay focused during the exam period; don't let your guard down, don't relax and don't be fooled into a false sense of security.

At the same time, and in equal measure, don't get paranoid, edgy, nervy and uptight, as this is just as counterproductive. You need to come across as relaxed, professional, someone who is in control and who can be relied on. This mindset is much easier to achieve if you stay clear of other candidates. Perhaps the only exception should be the other candidates in your study group; you could chat to them for a few minutes after each exam section.

Recommended reading

Which orthopaedic paediatric books to use for preparation for the paediatric section of the FRCS (Tr & Orth) exam is very much a matter of personal preference and choice. However some books are more suited and better to use than others.

Staheli's *Practice of Pediatric Orthopaedics* [1]

The illustrations are first class and the book has excellent recommendations and reviews. It is easy to read and fairly comprehensive.

Joseph's *Paediatric Orthopaedics* [2]

This book is a tad disappointing as it promises a lot but doesn't quite deliver the goods. This is not to say that it isn't a good book; it is just that the contents don't quite match up to the hype.

The book is targeted at higher surgical trainees and younger consultants. It is written by paediatric orthopaedic surgeons from four different continents. However, although this gives the book a truly international flavour, in the highly focused world of FRCS (Tr & Orth) exams, this is probably a drawback.

The book discusses in depth the treatment options for particular paediatric conditions, hopefully allowing trainee orthopaedic surgeons to speak confidently about the approach to individual patients during their specialty exams.

Pediatric Orthopaedic Secrets, 3rd edition [3]

We are not great fans of the *Secrets* series. Some of the material does not particularly match the FRCS (Tr & Orth) syllabus and the format is only loosely applicable to the exam. That said, we have come across a number of candidates who swear by the *Secrets* series. We advise that you borrow one from the library before buying. It has good reviews.

Oxford Textbook of Trauma and Orthopaedics, 2nd edition [4]

This is more of a reference book with a fairly detailed paediatric section. Reducing the three-volume first edition into a single volume in the second edition was a masterstroke and makes the book much easier to read.

Miller's *Review of Orthopaedics* [5]

This has a reasonably good paediatric section. As the text is list led, the section is probably best suited for revision for Part I of the FRCS (Tr & Orth) exam.

AAOS Comprehensive Orthopaedic Review [6]

This book is similar in style to Miller but more comprehensive. It has excellent reviews and is recommended for FRCS (Orth) exam preparation. The biggest drawback is the price.

References

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Section 1 General guidance

Chapter 2

History and examination of the paediatric patient

Stan Jones and Sattar Alshryda

History and examination

The assessment of a child presenting with a musculoskeletal complaint requires a thorough history and full clinical examination and should be carried out in a child-friendly environment. If this is done properly, a diagnosis can be made in the majority of cases.

The initial contact with the child and family involves introducing oneself to all the family members, including the child. This should be carried out in a professional yet friendly manner. The cultural background of the family should be considered and it is important to conform to gender order for introductions.

The next stage of the assessment should aim to allay the anxiety or fear of the child. This can be done in a variety of ways and depends on the age of the child. In a younger child an introduction to toys may be all that is required, while in the older child this may involve talking about friends, sports, school or a piece of clothing.

History

Presenting complaint

Common complaints include deformity, gait abnormalities, altered function and pain.

The duration of symptoms, mode of onset, history of any injury, frequency and timing of symptoms, aggravating or relieving factors, any functional impairment, previous investigations or treatment received should be noted. An older child should be involved in the discussion about presenting complaints.

It is also important to consider the presenting complaints in relation to the age of the child, e.g. Perthes disease has to be considered a differential in a young child (4 to 8 years of age) with a history of hip and knee pain, while in an adolescent with similar complaints one has to think of slipped upper femoral epiphysis (SUFE).

Deformities

In-toeing, out-toeing, bow legs, knock knees and flat feet are common reasons for attendance at the paediatric orthopaedic clinic. In the majority of patients, the deformities are normal variants and require no treatment other than parental reassurance. A history of progressive deformity or deformities that are asymmetrical or unilateral requires further assessment, to exclude a pathological cause.

Birth history and developmental milestones

A history of bleeding during pregnancy, maternal diabetes and reduced fetal movements during late pregnancy can be associated with abnormalities at birth. Breech presentation, premature birth and jaundice at birth are also significant factors to be enquired about.

Enquire about developmental milestones, e.g. when the child first sat and walked. In one-third of late walkers, the cause is pathological, e.g. cerebral palsy [1] (Table 2.1).

Family history

It is useful to enquire whether other members of the family have similar problems. A number of orthopaedic clinical conditions run in families, e.g. pes cavus. Details of past illnesses and hospitalizations complete the history.

Examination

The examination of a child commences as soon as the child and the family enter the consulting room. The child must continue to be observed while taking the history, as valuable clues can be gained.

The child should be undressed appropriately but with its cooperation and must be kept warm at all times. The modesty of the older child should always be respected, e.g. by providing a gown.

The infant can be examined on a parent's lap.

Examination involves:

- Screening and general assessment,
- Specific thorough musculoskeletal examination undertaken with the presenting complaint in mind.

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Table 2.1 Normal developmental milestones

Age	Motor skills	Social skills
3 months	Lifts head up when prone	Smiles when spoken to
6 months	Sits with support, head steady when sitting	Laughs and smiles spontaneously
9 months	Sits without support	Waves 'bye-bye', vocalizes 'ma-ma' or 'da-da'
1 year	Walks with one hand support	Starts cooperating with dressing
2 years	Runs forward	Uses three-word sentences, matches colours
3 years	Jumps in place	Dresses self, puts own shoes on
5 years	Hops	Names four colours, counts ten objects correctly
6 years	Skips	Does small buttons on shirt, ties bows on shoes

Screening examination

1. Inspection of the child's face may reveal:
   - Dysmorphic features suggestive of a syndrome or skeletal dysplasia,
   - Blue eyes – a parent with blue eyes may clinch a diagnosis of osteogenesis imperfecta,
   - Mongoloid features (flat face with upward and slanted palpebral fissures or epicanthic folds, high-arched palate), in keeping with Down's syndrome,
   - Large tongue, suggestive of Beckwith–Wiedemann syndrome (Figure 2.1).
2. The height of the child should be noted, as well as the heights of the parents.
3. Asymmetry in body proportions, e.g. disproportion between the truncal height and limb lengths, may suggest a skeletal dysplasia.
4. Evidence of generalized ligamentous laxity (the Beighton score, Table 2.2). Excessive generalized joint laxity is associated with such conditions as Ehlers–Danlos syndrome and Marfan syndrome.

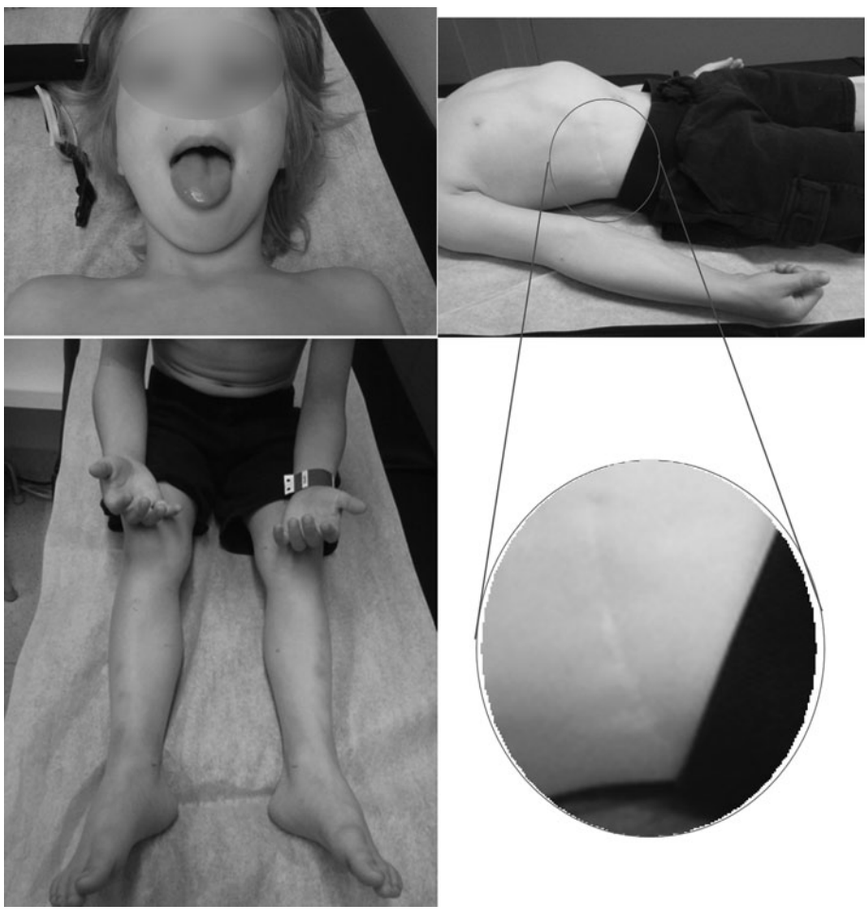

Figure 2.1 Beckwith–Wiedemann syndrome. There is a hemihypertrophy of the right side of the body including the tongue. There is a right loin scar from a previous nephrectomy.

Table 2.2 The Beighton score

Criteria	Note
Little finger dorsiflexion	1 if >90°, 2 if bilateral
Thumb to forearm (wrist flexion)	1 if thumb tips touch the forearm skin, 2 if bilateral
Elbow extension	1 if hyperextension >10°, 2 if bilateral
Knee extension	1 if hyperextension >10°, 2 if bilateral
Trunk flexion with knees full extended	1 if palms can rest flat on the floor

The Beighton score is a nine-point score: the higher the score, the greater the laxity. The threshold for joint laxity in a young adult ranges from 4 to 6.

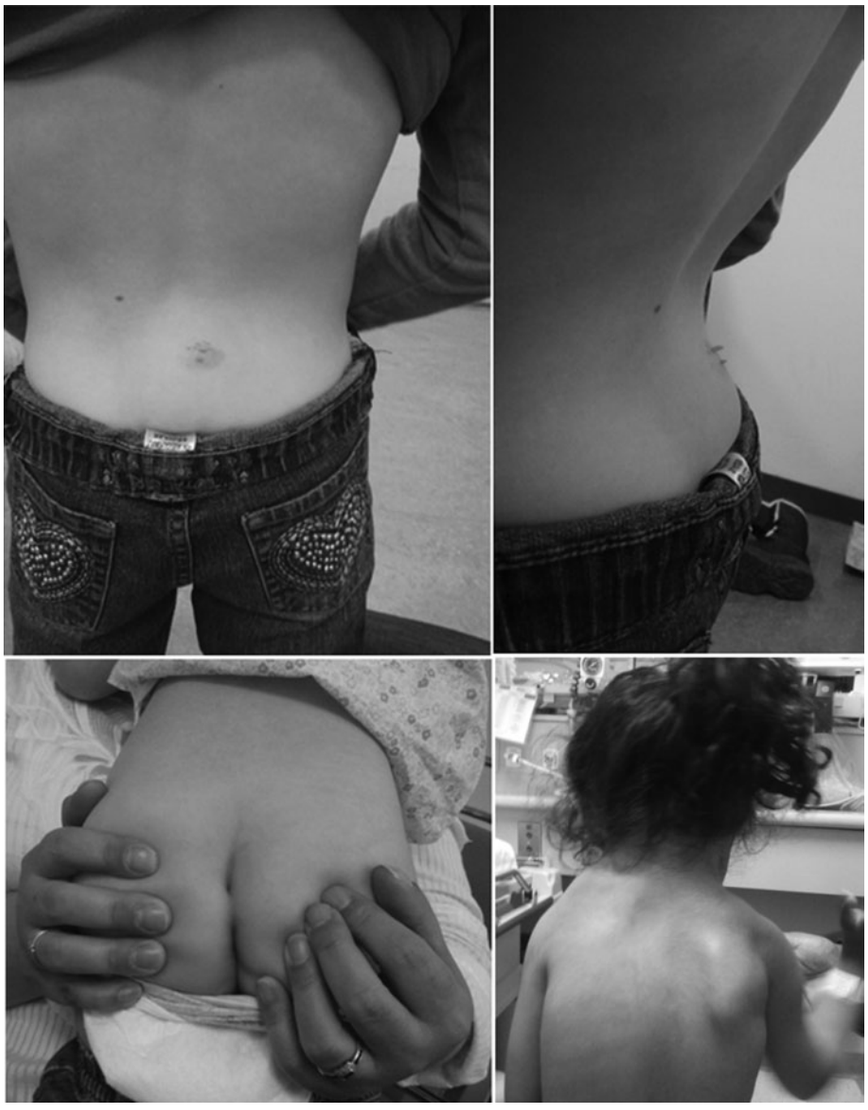

Figure 2.2 Useful signs on general inspection of the back. Top pictures: Skin tag and fatty swelling in a patient with lipomeningocele (see also Figure 10.8, which shows the feet of the same patient). Bottom left: Sacral dimple in an infant with developmental dysplasia of the hip. Bottom right: A patient with Klippel–Trénaunay–Weber syndrome and Sprengel's shoulder, which is associated with several orthopaedic abnormalities.

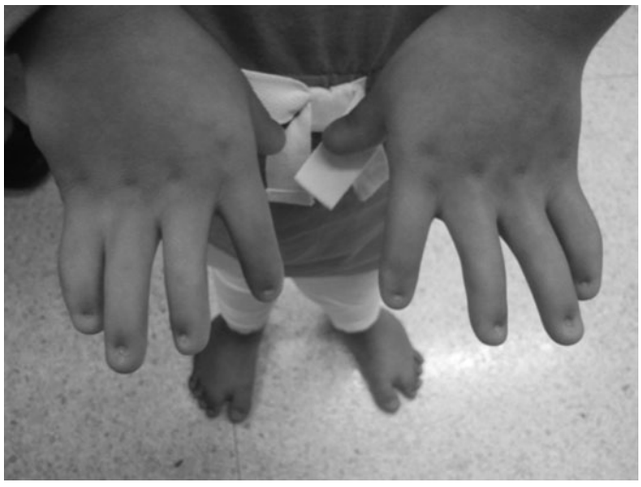

Figure 2.3 Absent nails. Nail abnormalities can be a manifestation of several orthopaedic problems, such as nail-patella syndrome and ectodermal dysplasia.

5. Café au lait spots (Figure 12.5), axillary freckling (Figure 17.8) and neurofibromas are suggestive of neurofibromatosis; vascular marking (haemangiomas) may suggest Klippel–Trénaunay–Weber syndrome; hairy patches, skin tags or sacral dimples may indicate underlying spinal pathology (Figure 2.2); nail abnormalities may indicate ectodermal dysplasia or nail-patella syndrome (Figure 2.3).

Specific examination

With the child standing, inspection is carried out from the front, sides and back, assessing:

- The standing posture and curvature of the spine,
- The level and contour of the shoulders,
- The level of the anterior superior iliac spines,
- For any evidence of genu valgum or varus (intermalleolar and intercondylar distance),
- For calf hypertrophy (myopathy) or muscular wasting,
- For surgical or other scars,
- For hindfoot alignment, valgus or varus,
- For evidence of tiptoeing, flat feet or cavus deformity.

Gowers' test is carried out if a myopathy is suspected. Gowers' sign is positive if, on rising from sitting on the floor, a child climbs his hands up his thighs for support.

Gait

The child is then asked to walk in a straight line. While doing so observe:

- For abnormal upper-limb movements, i.e. spasticity (cerebral palsy),

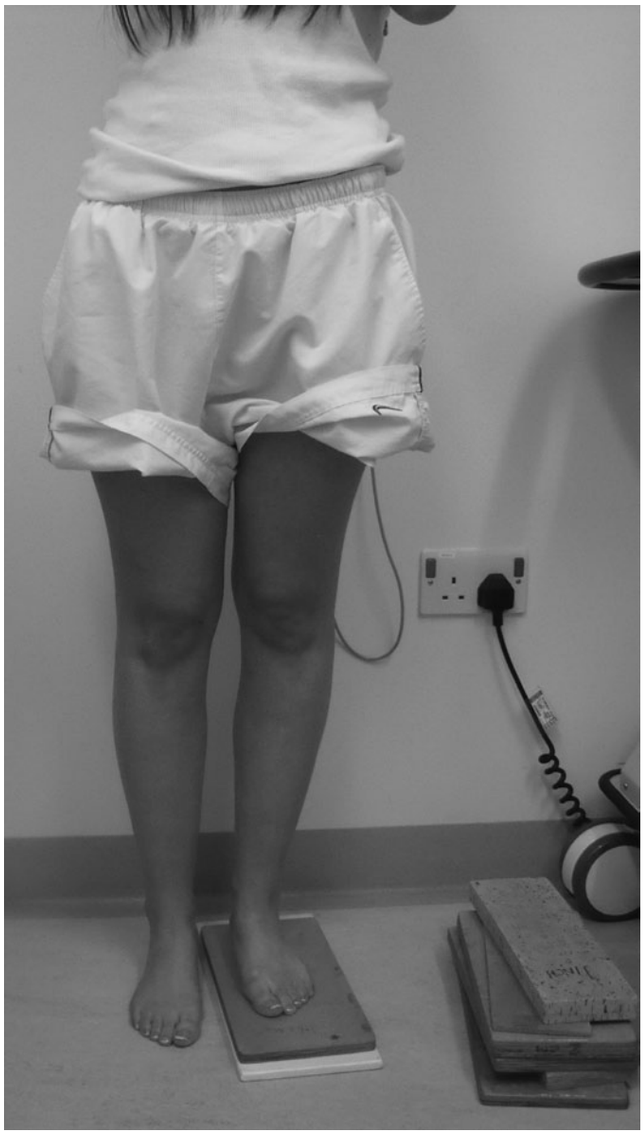

Figure 2.4 Block test. Blocks of various heights are used to equalize the legs and level the pelvis. This is a better way to estimate the height required for a shoe raise or insole.

- The knee and foot progression; these indicate in- or out-toeing, if present,
- Knee extension on heel strike and knee flexion in swing,
- For any evidence of a limp (asymmetrical movement of the lower limbs).

The different kinds of gait include:

1. Antalgic,
2. Trendelenburg,
3. Short limb,

Figure 2.5 Galeazzi's test. These clinical photographs show various modification of Galeazzi's test to identify the site of the LLD, i.e. whether it is in the femur or the tibia.

4. High stepping,
5. Toe walking,
6. Ataxic.

Antalgic gait

This type of gait is the result of pain in the affected limb. The stance phase of the affected limb is hurried, with a quick swing phase of the opposite limb.

Trendelenburg gait

A failure of the hip abductor mechanism produces this type of gait pattern. The hemipelvis on the affected side dips during the stance phase of gait and there is a compensatory lurch of the ipsilateral shoulder to the opposite side, e.g. developmental hip dysplasia.

Short-limb gait

As the name implies, this gait is observed in children with a longitudinal limb deficiency, e.g. fibular hemimelia. The shoulder on the side of the short lower limb dips during the stance phase.

High stepping gait

This gait pattern is usually observed in children with hereditary sensory motor neuropathy. A lack of sufficient ankle dorsiflexion during the swing phase results in increased knee flexion to facilitate clearance of the foot.

Toe walking gait

This is observed when the child's initial contact is with the forefoot and not the hindfoot.

Ataxic gait

This gait pattern is of a broad base.

Limb length discrepancy

Limb length discrepancy can be assessed using a tape measure or by the block test. The block test is the preferred method.

The child is made to stand with the short leg on blocks of varying heights until the posterior superior or anterior superior iliac spines appear level to the examiner's eye (Figure 2.4). It is important that the hips and knees are kept extended.

In a child with a fixed flexion deformity of the hip or knee or an adduction or abduction deformity of a limb, the leg length discrepancy (LLD) assessment will have to be made with the child supine and the normal limb held in a position comparable to the deformed limb. Measurements are then made with a tape measure.

It is important to note that adduction deformities of the hip produce apparent shortening, while the opposite is true for abduction deformities.

Figure 2.6 Gage test to estimate femoral anteversion. Left: Feel when the greater trochanter is most prominent and hold the leg. Right: Measure the angle between the long axis of the leg and an imaginary vertical line. Notice any rise in the ipsilateral hemipelvis on flexing the knee (Duncan–Ely test), which indicates a tight rectus femoris.

Once the LLD is established, *Galeazzi's test* is performed, to determine whether the shortening is above or below the knee (Figure 2.5).

Rotational profile

Deformities in the hip, femur, tibia or feet may lead to rotational malalignment. Hence it is important to examine all these segments when assessing the rotational profile of a lower limb.

The rotational profile assessment starts while assessing the gait, observing the foot progression angle (FPA) and the patellar progression angle (PPA). On the couch, rotational profile is best undertaken with the child lying prone (Staheli's rotational profile) [2], with the knee flexed and the examiner's palm applied to the back of the child to keep the pelvis level. The degree of internal and external rotation of the hip joint is noted (the normal range of external rotation is 45°–70°, and of internal rotation is 10°–45°). The presence of excessive internal rotation and limited external rotation would imply excessive femoral neck anteversion.

The Gage test (also known as Craig's test or Ryder's method) is then conducted, to confirm the degree of femoral anteversion (FAV). This is noted by measuring the angle between the long axis of the leg and an imaginary vertical line when the greater trochanter is most prominent (Figure 2.6). At birth, the femoral anteversion is about 40° and by age 16, it is approximately 16°. Figure 2.7 shows the relationship between the FPA and the FAV.

Tibial torsion is assessed by measuring the thigh–foot angle and the transmalleolar thigh angle (TMA). The thigh–foot