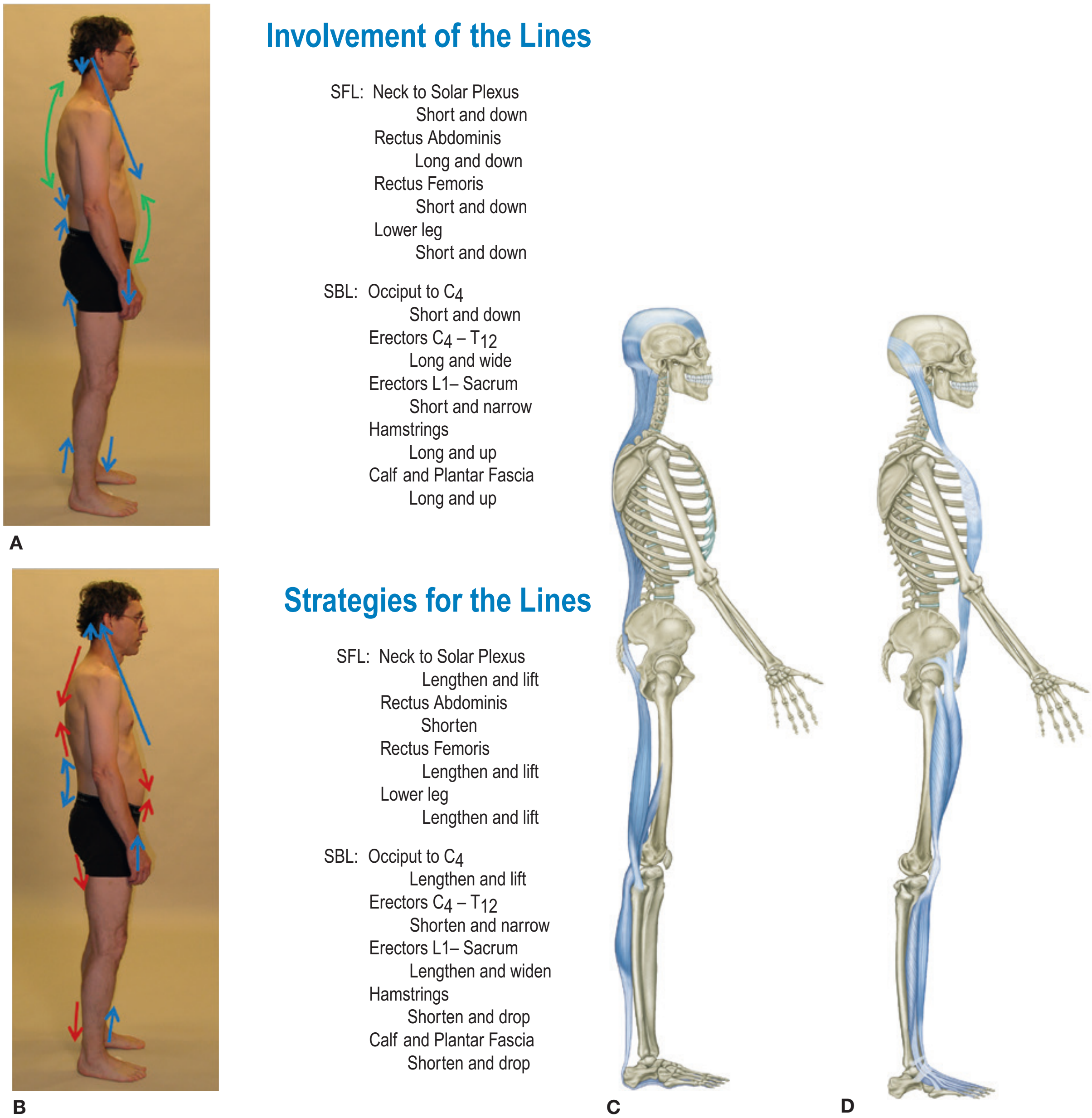


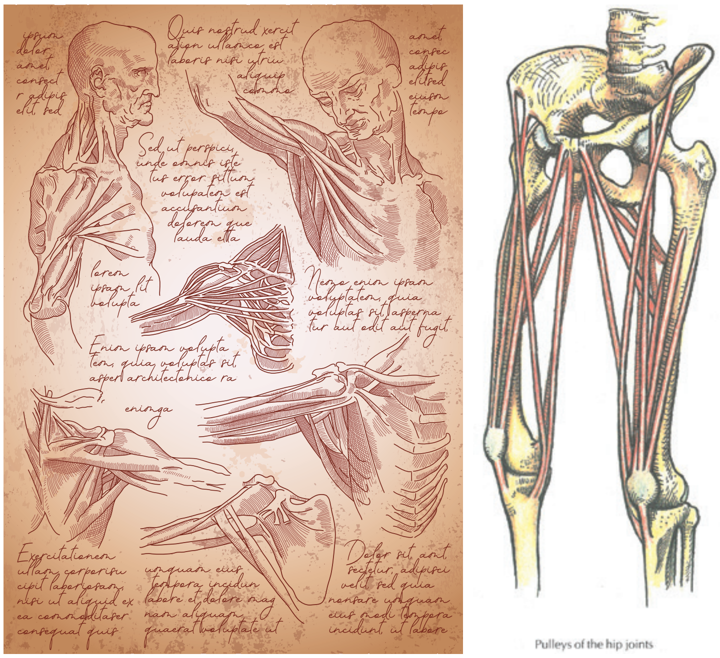
• **Fig. 1.2** An analysis of shortness or weakness within any given myofascial meridian coupled with the relationship of that meridian to the others lead to whole-body strategies for improving posture and movement function. (**A**) A side view shows us the relationship between just the Superficial Back Line (pictured in **C**) and the Superficial Front Line (**D**). In **A**, a simple chart of the directionality in the fascial planes, and areas of likely hyper- and hypotonus in sagittal plane control. (**B**) A chart of the strategy to remedy the pattern via myofascial manipulation and movement education.

assessing movement.[4–7] If you kick a ball, about the most interesting way you can analyze the result is in terms of the mechanical laws of force and motion. The coefficients of inertia, gravity, and friction are sufficient to determine its reaction to your kick and the ball's final resting place. But if you should be so cruel as to kick a large dog, such a mechanical analysis of vectors and resultant forces may not prove as salient as the reaction of the dog as a whole. Analyzing individual muscles biomechanically likewise yields an incomplete picture of human movement experience (Fig. 1.6).

In the early 20th century, physics by means of Einstein and Bohr moved into a relativistic universe, a language of relationship rather than linear cause and effect, which Jung in turn applied to psychology, and many others applied to diverse areas. However, it took that entire century for this point of view to spread out and reach physical medicine. This book is one modest step in this direction – general systems thinking applied to postural and movement analysis (Fig. 1.7).

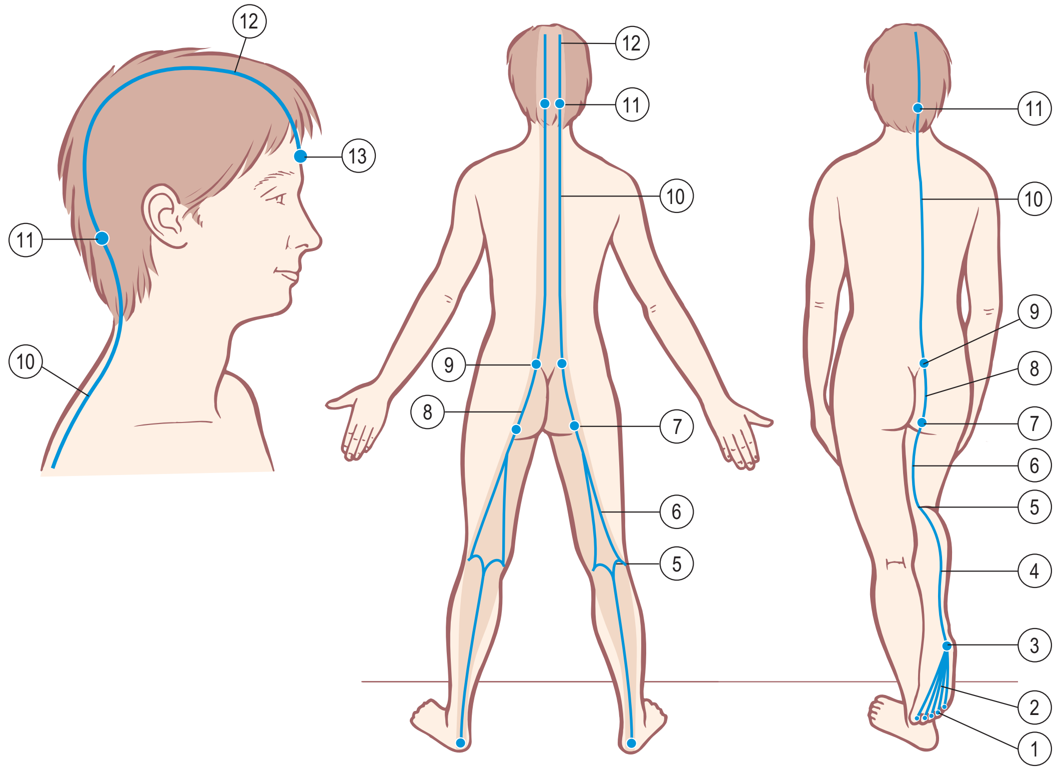
It is not very useful merely to say 'everything is connected to everything else', and leave it at that. Even though

• **Fig. 1.3** Using the kind of strategies charted in Fig. 1.2, it is possible to effect significant changes in posture (and function, but a book limits us to photos). This recent student in our training classes shows significant changes in alignment. (www.anatomytrains.com – video ref: BodyReading, 101; see also Ch. 11.) (Photo courtesy of the author.)



A B

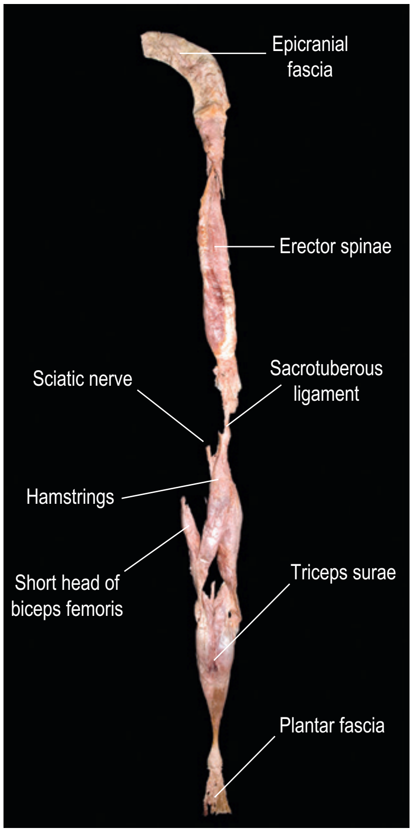
• **Fig. 1.4** (**A**) Leonardo da Vinci, drawing without the pervasive prejudice of the mechanistic muscle–bone viewpoint, drew some remarkably ‘Anatomy Train’-like figures in his anatomical notebooks. (**B**) A few modern anatomists, like the delightful John Hull Grundy, have also applied systems thinking to musculoskeletal anatomy. (A, Leonardo da Vinci/Shutterstock. B, Reproduced with kind permission from Grundy 1982.)



• **Fig. 3.2** Superficial Back Line tracks and stations. The shaded area shows where it affects and is affected by the more superficial fasciae (dermis, adipose, and the deeper fascia profundis). (Video 6.15)

TABLE 3.1 Superficial Back Line: Myofascial 'Tracks' and Bony 'Stations' (Fig. 3.2)

Bony Stations		Myofascial Tracks
Frontal bone, supraorbital ridge	13	
	12	Galea aponeurotica/epicranial fascia
Occipital ridge	11	
	10	Sacrolumbar fascia/erector spinae
Sacrum	9	
	8	Sacrotuberous ligament
Ischial tuberosity	7	
	6	Hamstrings
Condyles of femur	5	
	4	Gastrocnemius/Achilles tendon
Calcaneus	3	
	2	Plantar fascia and short toe flexors
Plantar surface of toe phalanges	1	



• **Fig. 3.3** The Superficial Back Line dissected away from the body and laid out as a whole. The different sections are labeled, but the dissection indicates the limitation of thinking solely in anatomical 'parts' in favor of seeing these meridians as functional 'wholes'.

• **Fig. 3.4** The same specimen laid out on a classroom skeleton to show how the whole is arrayed. The cadaver was a good deal taller than the skeleton. (Video 4.3)

and corrected along with addressing bilateral patterns of restriction in this line.

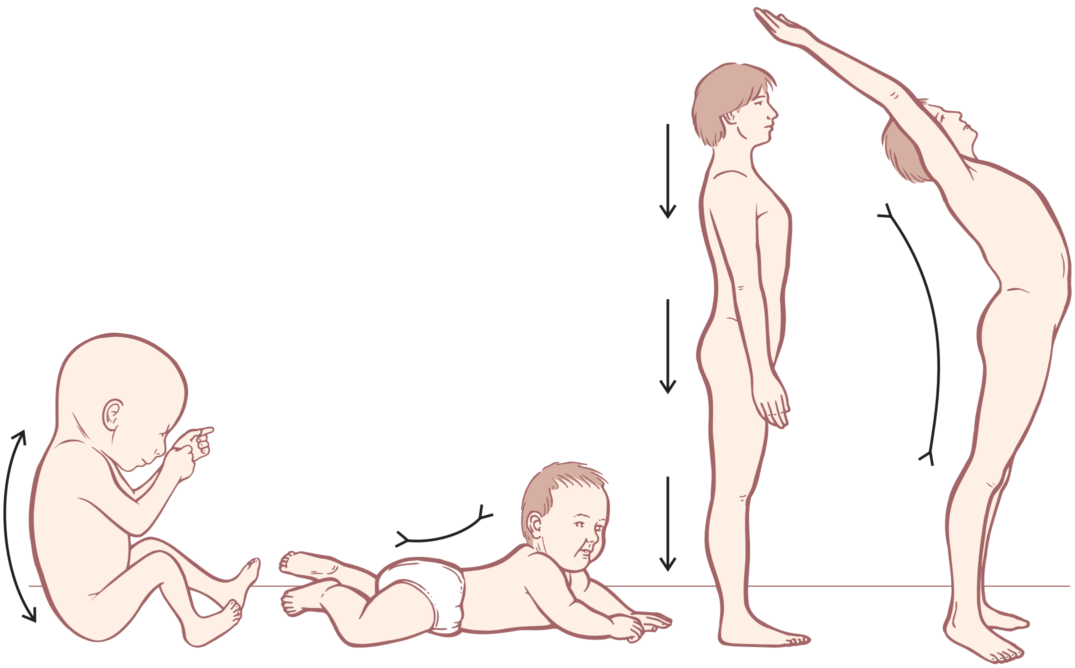
Common postural compensation patterns associated with the SBL include: ankle dorsiflexion limitation, knee hyperextension, hamstring shortness (often as a substitution for inadequate deep lateral rotators), anterior pelvic shift, sacral nutation, lordosis, extensor widening in thoracic flexion, suboccipital limitation leading to upper cervical hyperextension, anterior shift or rotation of the occiput on the atlas, and eye–spine movement (oculo-motor reflex) disconnection.

From Toes to Heel

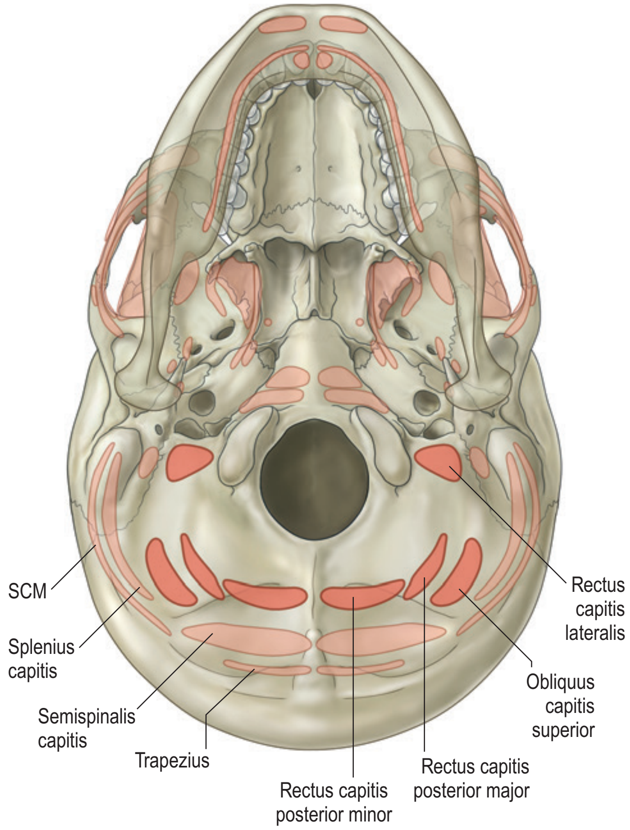
Our originating 'station' on this long line of myofascia is the underside of the distal phalanges of the toes. The first 'track' runs along the under surface of the foot. It includes the plantar fascia and the tendons and muscles of the short toe flexors originating in the foot.

These five bands blend into one aponeurosis that runs into the front of the heel bone (the antero-inferior aspect of the calcaneus). The plantar fascia picks up an additional and important 6th strand from the 5th metatarsal base, the lateral band, which blends into the SBL on the outside edge of the heel bone (Figs. 3.6 and 3.7).

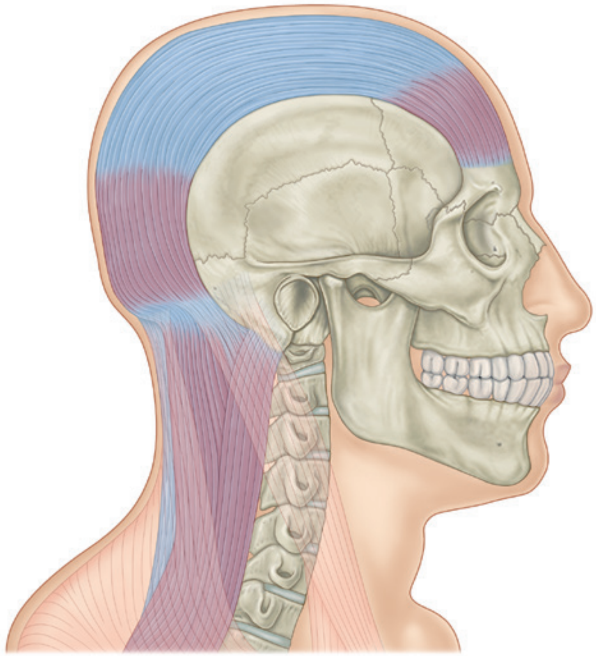
These fasciae, and their associated muscles that pull across the bottom of the foot, form an adjustable 'bow-string' to the longitudinal foot arches. This bowstring helps to approximate the two ends, thus maintaining the heel and the 1st and 5th metatarsal heads in a proper relationship (Fig. 3.8). The plantar aponeurosis constitutes only one of



• **Fig. 3.5** In development, the SBL shortens to move us from a fetal curve of primary flexion toward the counterbalancing curves of upright posture. Further shortening of the muscles of the SBL produces hyperextension.



• **Fig. 3.28** A view looking up at the skull from below. The three middle fingers of each hand usually correspond 'handily' to the origins of the three suboccipital muscles at the deepest level of the upper spine.



• **Fig. 3.29** From the erector fascia the SBL travels over the top of the skull on the galea aponeurotica, or scalp fascia, to attach firmly onto the frontal brow ridge.

of their head toward you and flattening the neck against the table). While these two patterns often accompany each other in determined head forward posture, they also occur separately, so that this distinction becomes useful.

From Occiput to Supraorbital Ridge

From the occipital ridge the SBL continues up and over the occiput as these layers blend into the galea aponeurotica, or scalp fascia, which includes the small slips of the occipitalis and frontalis muscles, all clearly oriented in the same direction as the SBL. It finally comes to rest in a strong attachment at the brow or supraorbital ridge, on the frontal bone just above the eye socket (Fig. 3.29).

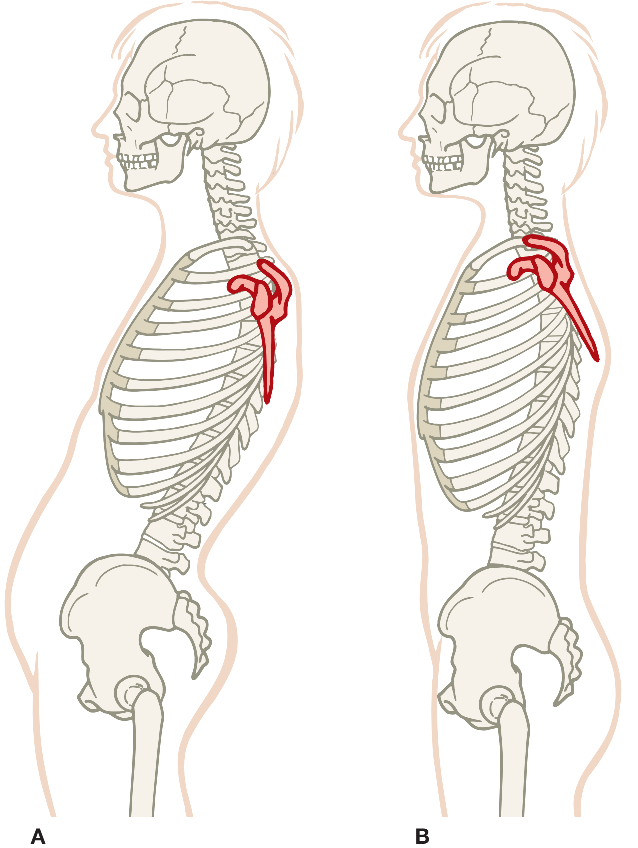
The Scalp

Though the scalp may seem plastered down to the skull and largely amuscular, it is still an active area within the SBL and other lines, where much relief can be obtained. The scalp is the terminus of several of the longitudinal lines, so tugging and releasing here can be like playing with the strings of a marionette for the skilled manual therapist. Larger areas of tension can be 'scraped' caudally with the fingertips working in extension. In those with a head forward posture, the fascial attachments of the erectors 'creep' up the back of the occiput, seeking higher leverage on the skull, just as a quadruped's erectors do – one reason your cat or dog loves to be scratched behind the ears. Part of the solution, besides easing pulls from the Superficial and Deep Front Lines and correcting faulty breathing, is to release these extra fascial attachments at the back of the scalp to allow the head to rise.

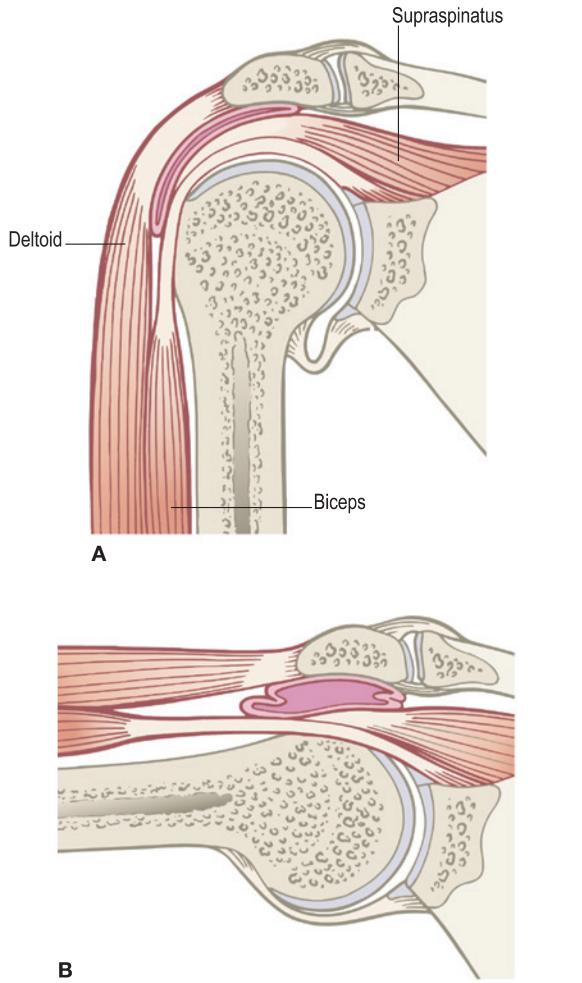
A detailed examination of the scalp from the occipital ridge to the brow ridge will also reveal little spindle-shaped fascicles that, though sometimes difficult to find because they are so small, are often extraordinarily tight and painful to the touch (Video 6.8). They can be released through steady finger (or even fingernail) pressure, applied to the very center of the knot (use client feedback to locate yourself) for around a minute or until the knot or trigger point is entirely melted. Effectively applied, this can often occasion blessed relaxation through the entire affected line.

Care must be taken to notice the orientation of the spindles, since several lines melt into the scalp fascia, and the spindle will line up like a compass needle along the direction of pull. Pulls from any of the cardinal lines – Front, Back, or Lateral – plus the Spiral Line, Deep Front Line, or the Superficial Back Arm Line, can all show up here.

A generally over-tight scalp can be released more gently by applying the fingerpads slowly in a circular motion, moving the skin on the bone until you feel the scalp melt itself free from the skull beneath. This method can be particularly effective if you stay with the pads, not the fingertips, and stay with melting, not forcing (www.anatomytrains.com – video ref: Superficial Back Line, 57:05–59:59).



• **Fig. 7.35** The relative tilt of the scapula is better measured against the rib cage than the line of gravity. If the rib cage is posteriorly tilted (a common postural pattern in the modern world), the scapula may appear vertical to the floor but in fact be anteriorly tilted relative to the rib cage, involving a short pectoralis minor. Both (**A**) and (**B**) show an anteriorly tilted scapula relative to the rib cage; both need length in the pectoralis minor.



• **Fig. 7.36** There is a mechanical link between the supraspinatus and the long head of the biceps when the arm is abducted. This forges a crossover from the DBAL and the DFAL.

same, and lengthening work on the pectoralis minor is indicated for both Fig. 7.35A and B.

DISCUSSION 7.2

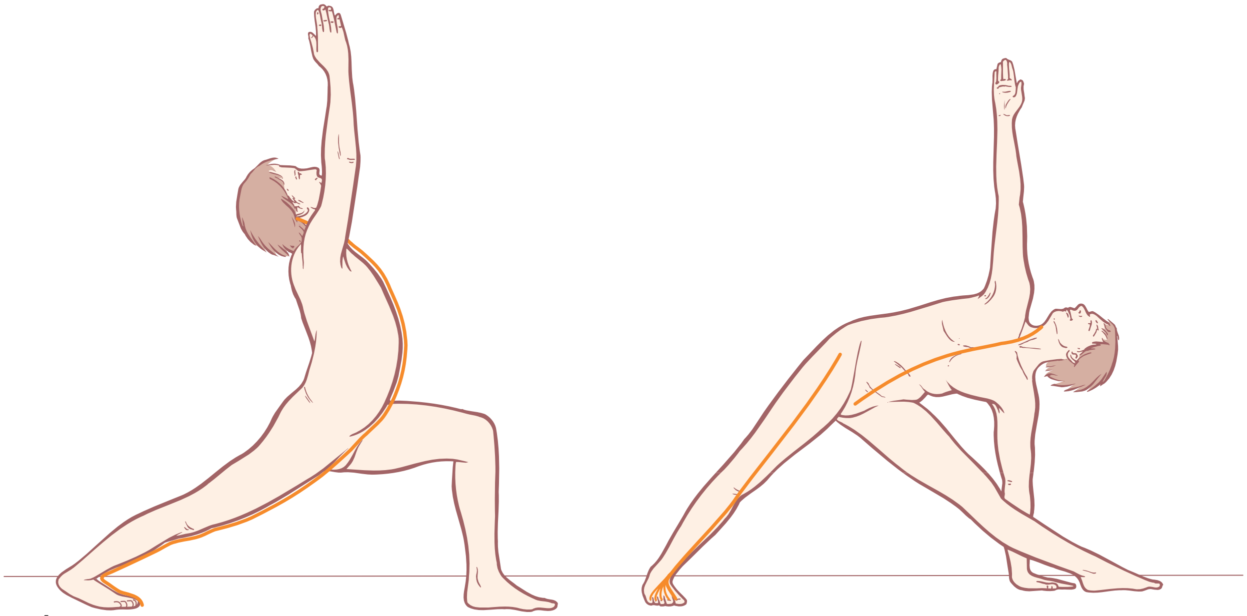
Crossovers

Though the lines we have described here are very logical, and certainly work usefully in practice, the extra rotational ability in the shoulder, lower arm, and hand requires a number of crossover 'switches' that muddle the neat precision of the Arm Lines, but provide additional possibilities for mobility and stability in movement (www.anatomytrains.com – video ref: Shoulders and Arm Lines, 15:18–15:38).

The two heads of the biceps brachii give us an instance of a crossover link between lines. So far, we have enunciated only the connection of the short head from the coracoid process to the radial tendon, which suited our purposes for the DFAL. The long head, however, passes through the intertubercular groove and onto the top of the glenum of the scapula, thus joining mechanically with the supraspinatus of the rotator cuff and on into the levator scapulae – or, in our language, connecting the DFAL to the DBAL (Fig. 7.36).

In addition to the two heads that give it its name, the biceps is also a biped with two 'feet', and this other foot provides another crossover. Aside from the radial tendon, the distal end of the biceps sports the odd bicipital aponeurosis weaving itself into the flexor group, thus linking the DFAL with the SFAL (Fig. 7.37). This structure, along with the oblique cord between the ulna and the radius, allows us to carry weight in the arms almost entirely through myofascial connection between the scapula and the fingers, without putting undue strain on the delicate elbow and radio-ulnar joints.

To expand this weight-carrying function, as it is yet another example of a crossover, when we carry an object like a suitcase by our sides, the weight is primarily carried by the fingers curled and held by the flexors of the SFAL (reinforced by the thumb gripped with the DFAL). This tensile weight is not carried to the medial epicondyle and on up the rest of the SFAL; however, it is intercepted by the



A B

• **Fig. 4.17** (**A**) Purely sagittal (flexion–extension) movements will engage the SFL as a whole. (**B**) Rotational movements through the hips or trunk disengage the upper portion of the SFL from the lower.

is important to understand that the SFL involves at least three layers at this level: the fascial aponeurosis that runs in front of the rectus, the muscle itself, and the fascial sheet that runs behind it (see Fig. 4.18). These aponeuroses are shared with the other abdominal muscles, and will come up for consideration with other lines (see Chs 5, 6, 8, and 9). For now, we will concern ourselves with the span of the rectus itself between the pubis and the costal margin of the rib cage.

As we view the rectus, then, we must assess three separate parts: the tonus of the muscle itself, and the tonus of the two enveloping sheaths, in front and behind the muscle. If the rectus is flat – a set of 'six-pack' abs – then we can suspect high tonus in the superficial sheet and in the muscle itself. If the rectus bulges out, we must assess the tonus of the muscle, but we can be fairly sure that the deeper sheet behind the muscle, the transversalis fascia, is shortened (www.anatomytrains.com – video ref: Superficial Front Line, 33:15–35:05).

To free the front sheet and the muscle, have your client lie supine with his knees up, feet on the table. Facing cephalad, hook the tips of flexed fingers into the lower part of the muscle and move tissue upward, toward the ribs, taking a new purchase each time you reach one of the tendinous inscriptions in the rectus. You can repeat this move as necessary to continue the process of freeing the superficial aspect of the rectus up to the 5th rib.

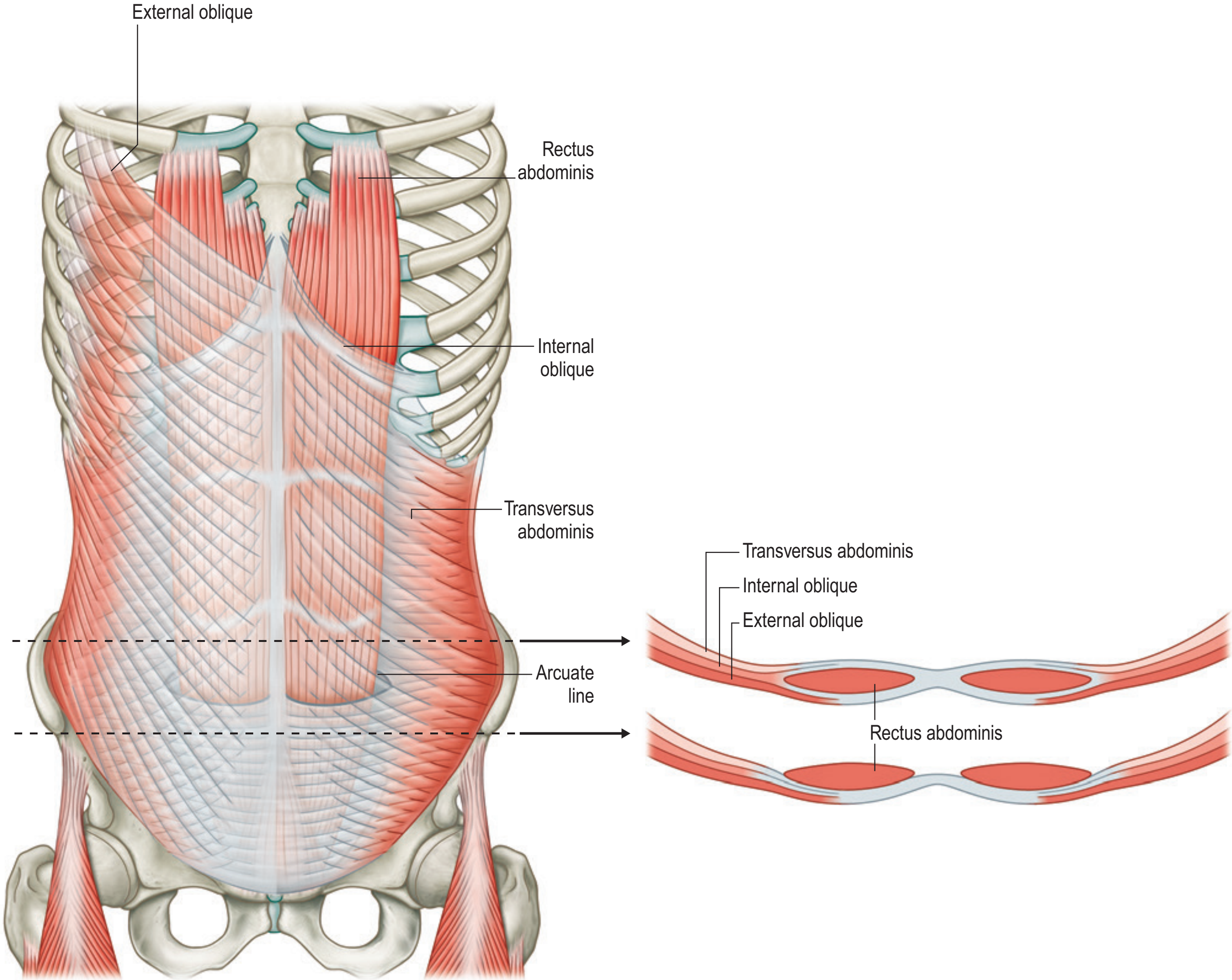
To reach the posterior lamina of the rectus requires a more invasive but very effective technique. First, we must assess the nature of the shortness. If the lumbars are hyperextended into a lordosis, or the pelvis is held into an anterior tilt, the lumbars may simply be pushing the abdominal contents forward into the restraining rectus. In that case, it is necessary to free the SBL in the lumbars to give the abdomen more room to drop back (see Ch. 3).

If this is not the case, the bulging abdomen can also be due to enlargement of the abdominal contents caused by overeating or bloating, which must be solved by dietary means. Or, of course, there can be excess fat, either subcutaneously or, especially in men, in the visceral omental adipose layer underlying the peritoneum.

In any case, even if the belly sticks out and the muscle tonus seems low, it is possible that the tonus of the wall behind the rectus is quite high, tight, and responsible for restricting breathing or pulling on the back. With no bones near to work against, how can we isolate the sheath that runs behind the rectus but in front of the peritoneum? Since the back of the rectus sheath is part of the Deep Front Line, see Chapter 9 for the answer (or www.anatomytrains.com – video ref: Deep Front Line, Part 2).

The various tracks which crisscross the abdomen will be discussed in Chapters 6 and 8 (Video 6.9); for the moment we are moving due north on the rectus and its accompanying fascia. Of course, these abdominal lines all interact, but the SFL runs on a straight (though widening) track up to its next station at the 5th rib. The rectus must reach as high as the 'true' 5th rib to achieve sufficient stability for all the strong actions it must perform. The lower 'abdominal' ribs, with their long cartilaginous attachments to the sternum, would be too mobile to provide a stable attachment for the SFL, especially considering their large excursion during breathing, and the strong forces generated by the rectus abdominis in a tennis smash.

Mobilization and freeing extra adhesions where the rectus abdominis attaches and the abdominal fascia blends into the pectoral fascia is frequently rewarded with expanded



• **Fig. 4.18** The rectus abdominis is the most superficial muscle of the abdomen all the way from the chest to the pubic bone. In terms of fascial layering, however, the rectus begins as superficial at the 5th rib, but shortly dives under the external oblique fascia within a few inches. Two inches (5 cm) lower than that, the internal oblique fascia splits to surround the rectus. Below the navel at the arcuate line pocket, the rectus passes through the transversalis fascia behind the transversus abdominis to become, at the pubic bone, the deepest muscle of the abdomen. Such an understanding of fascial, as opposed to simply muscular, anatomy leads to different strategies for 'Spatial Medicine'.

breathing movement (www.anatomytrains.com – video ref: Superficial Front Line, 40:38–45:26).

The Chest

From the 5th rib we can continue in the same direction via the sternalis muscle (if present) or its associated fascia (which almost always is), including the sternal fascia passing up the surface of the sternum, along with the fascia underlying pectoralis major out as wide as the sternochondral joints at the lateral edge of the sternum (Fig. 4.19). (The rectus attachment at the 5th rib will make another appearance when we consider, in Chapter 7, the anterior Arm Lines, which both start from the 5th rib attachment of the pectoralis minor and major. The rectus fascia thus shows a 'switch' here, a choice point, where strain or tension could follow either line, depending on the circumstances of movement, posture, and the necessities of physics.)

The sternalis, however, is an anomalous, capricious and surface muscle, though it is often expressed fascially even when it is not expressed muscularly. Whether or not the sternalis muscle or fascia can be detected, the SFL continues up from the rectus by means of fascial layers, which are readily palpable, over the sternum, the sternochondral joints, and the costal cartilages, up to the origin of the sternocleidomastoid. We suspect that stronger forces are transmitted mechanically through the sternum, as well as fascially via these layers and the pectoral fasciae as well.

It is interesting to note that Vesalius shows the rectus fascia proceeding under the pectoralis major almost all the way to the clavicle (Fig. 4.20). Modern anatomists think he may have been making a deliberate reference to canine