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Differential diagnosis of shoulder pathology

hen I teach the shoulder joint masterclass at my clinic within the University of Oxford, it is to students from all the corners of the earth, a fact that makes me feel truly honored. Nevertheless, when, during the course of the class, I discuss differential diagnosis of shoulder pain and upper limb pain, I have often found it disappointing how little knowledge many physical therapists have regarding other bodily structures and vital organs (viscera or viscus) that can be the underlying causative factor for the patient's presenting symptoms (or at least contribute to it). Medically trained personnel, whose initial training is generally longer, may have greater knowledge but hopefully this chapter will be of interest to all readers and serve as a reminder of the specific pathologies that can cause shoulder or upper limb pain. It is very important that pain from a musculoskeletal origin can be differentiated from a visceral pathology because they can easily mimic each other in terms of how they present, as we will read shortly.

An article I wrote many years ago discussed five individual patients that presented to my clinic with shoulder pain. What was of particular interest was that they all had something in common. Each was asked to place their arm by their side and to perform a movement of shoulder abduction as far as they could comfortably reach and to try to raise their arm over their head to the normal range of motion (typically classified as 180 degrees).

All were aware that something was 'not quite right' during the movement: three of them had actual pain on motion during abduction of their arm. The first patient was a 75-year-old male who had fallen off a ladder onto his right

shoulder and when he presented to the clinic he was not able to even initiate abduction actively, even though I could take his arm to 180 degrees passively without any pain. The second patient was a 34-year-old female painter and decorator and she presented with pain only between 60 and 110 degrees of abduction (after a weekend of painting ceilings) - this is typically called a painful arc. The third patient was a 24-year-old rugby player. He had sustained an injury to the top of his shoulder when he was tackled in a game and he had pain towards the end of the range of motion for abduction. The fourth patient was a 55-year-old female. She had started to notice her shoulder was getting stiffer since doing a fitness class 6 weeks ago and now had limited movement of the shoulder joint and could not even lift the arm to 60 degrees without feeling restriction and subsequent pain. The fifth person was a 45-year-old male. He did not have the ability to abduct his shoulder past 20 degrees (but could initiate) and this had happened after doing some push-ups in the morning when he woke up. The patient could lift his arm to 20 degrees but could go no further without some pain and weakness and it appeared that the deltoid muscle was not working. At the time I considered this was due to a potential muscle weakness of some sort or possibly caused by a neurological problem.

My personal belief about treatment of the shoulder complex tends to chime with a methodology that was taught to me many years ago, when I was student of manual therapy. It is known as the K.I.S.S. principle (Keep it simple stupid!), or the *keep it simple* principle. I always say to my therapy students that if a patient presents with what they believe to be an 'actual shoulder' or upper limb problem and they are having an issue in terms of pain or restriction during abduction or even flexion of their shoulder to 180 degrees, it is probably a localized shoulder complex issue or pathology that would need addressing through hands-on physical therapy, whether that is considered to be the right or wrong approach. This approach currently seems to work well for me with my own patients and athletes.

Regarding the five case studies above (see also figure 5.1), the first patient had what I believed to be a full thickness tear (rupture) of the supraspinatus, the second an impingement syndrome of the subacromial bursa and/ or a supraspinatus tendonopathy. The third patient, who presented with pain at the end range for abduction, sustained an acromioclavicular joint (AC joint) sprain, the fourth I diagnosed with a chronic frozen shoulder (adhesive capsulitis) and the last I considered to have an axillary nerve palsy due to the inability to activate the deltoid muscle during abduction (axillary nerve, which originates from the cervical nerve root level of C5 and specifically innervates the deltoid and teres minor muscles).



Figure 5.1: Abduction of 0–180 degrees and the five specific conditions

Regarding the last case study, many therapists with a good knowledge base might say it could be a C5 nerve root problem that is potentially causing the weakness with shoulder abduction, and that is perfectly correct because the person had weakness abducting their arm. However, the C5 myotome also innervates the motion of elbow flexion and in this case the patient tested strong for contraction of the biceps muscle. Also, there was no weakness to other C5 innervated muscles like the supraspinatus or infraspinatus. In this case, therefore, it cannot be a C5 nerve root issue.

I used to be a vehicle electrician when I was in the military and I consider the axillary nerve to be similar to a sidelight or indicator on your car: if the bulb has blown or the wire has been cut (open circuit) then the light will cease to function. For the axillary nerve, if the little wire (nerve) that supplies the deltoid and teres minor has been damaged, this can subsequently cause the nerve to switch off (the muscle now becomes inhibited and/or the light bulb goes off or dims). As a result the muscles in question will test weak and will start to atrophy (waste) very quickly. However, everything else in the body (or car) will work as normal, and initially you might not notice a problem. It will not be long, though, before you are aware of the underlying issue.

So the next time someone walks into your clinic with shoulder pain, if you bear in mind what I have said regarding the motion of abduction, I am sure it will help you come to a diagnosis or an hypothesis of localized pathology or not.

To recap, if a patient is standing and is asked to abduct their arm to 180 degrees and the person is aware of something during this motion (e.g., pain, restriction, weakness) then there is a good likelihood that this patient has some dysfunction present that requires further investigation. However, if the patient in question is able to fully abduct as well as to flex their shoulder to 180 degrees, without mentioning anything, and the movement is fluid and pain free, then one needs to consider the following: does this patient actually have an underlying pathology with the shoulder complex? Remember what was discussed earlier concerning the scapulohumeral rhythm and the structures involved to allow this motion to happen? Simply lifting the arm above the head requires the precise interaction of the GH, ST, AC and SC joints, as well as the integration of all of the soft tissues and nerve innervations.

There are a multitude of reasons why patients or athletes present with shoulder pain and below I would like to discuss some of those conditions.

CASE STUDY

A lady in her mid 40s presented to the clinic, with pain generally located to the top of her right shoulder and upper trapezius muscle. This has been present for many months with no obvious cause. During the day the lady was not aware of her pain, but at night, while she was sleeping, the right shoulder was noticeably worse to the point she would wake up, take some medication and eventually fall back to sleep. The lady also mentioned something was not quite right with her middle to lower thoracic spine but she said her shoulder pain was the priority. On examination, I asked the lady to abduct her shoulder as far as she felt comfortable, and to my surprise she could easily reach a full range of motion to 180 degrees. It was the same when she was asked to flex the shoulder and also managed to reach the full 180 degrees of motion with no issues. Because the lady could abduct and flex the shoulder to full range, I considered that there could not be any underlying musculoskeletal issue present directly related with the region of shoulder complex.

This next sentence or two might sound a bit strange as I asked the patient the following: 'When you go to the toilet for a number two (defecation), have you noticed that your stool has a tendency to float on the surface, rather than sinking to the bottom of the bowl?' Unsurprisingly, the lady looked a little startled but responded by saying 'funny you should ask that question but yes, my stool does seem to float when I go to the toilet.'

Before I continue with the case study, ask yourself why I asked this particular question - what do you think was going through my thought processes? Before I actually answer this question, I want to mention something that was taught to me when I was studying osteopathy. One particular lecture that I found of great interest and remembered was on 'differential diagnosis of musculoskeletal pain in physical therapy.' The tutor had talked about a female patient that presented to him with right-sided shoulder pain who surprisingly had full range of motion (ROM) without any pain in all the tested movements. The tutor proceeded to discuss something known as the four 'F's - female, fair, fat and forty. You can probably guess that it relates to an overweight lady with fair coloring who is in early middle age. The patient in the case study certainly fitted this picture. Basically, the tutor had said if a patient comes to your clinic with rightsided shoulder pain and fits the criteria of the four Fs then one needs to consider that the gall bladder might be the underlying causative factor for their presenting symptoms of pain located to the right shoulder. Common pathologies that occur with the gall bladder are inflammation of the gall bladder (cholecystitis) and gallstones (cholelithiasis).

I am hoping at this point that I have whet your appetite enough for you to want to gain more underpinning knowledge of the subject matter and hopefully you are now trying to work out in your head the following: so how does the organ of the gall bladder cause rightsided shoulder pain? As far as I understand it there are two possible processes at work: one process is related to embryology and it is considered that when you are a foetus growing in your mothers womb, the gall bladder initially originates from the area near to the right shoulder and as you develop, the gall bladder naturally descends to its resting position underneath the lower rib cage located on the right side of the body. This means that if you have an inflamed gall bladder, or even gallstones, in some way the gall bladder remembers its original position from when it was forming inside of you as a foetus and subsequently pain is now present in the right shoulder.

The second process, which I am more inclined to believe, is the proximity of a nerve called the phrenic nerve and its relationship to the gall bladder. The phrenic nerve innervates the central component of the respiratory muscle of the diaphragm (it is a musculotendinous structure and not a viscus). This nerve originates from C3, C4 and C5 and there is a simple mnemonic that states C3, 4, 5 keep the diaphragm alive. This relates to spinal cord trauma, in that if you damage the spinal cord below the level of C5 then you should be able to breathe for yourself unassisted; however, if you damage the spinal cord above this level then you might need to have artificial respiration. However, the peripheral part of the diaphragm is innervated by the lower six intercostal nerves and subsequently, does not refer pain to the shoulder complex.

Let us now look at the scenario of an inflamed gall bladder. Because of its close proximity to the diaphragm and the phrenic nerve (figure 5.2a) there is a stimulus that excites the neurological system and subsequently a signal is relayed back to the origins of the nerve that is located to the area of the cervical spine from levels C3-5. If you look at a map of the neurological dermatomes, you will notice that C3-5 actually covers the area of the upper limb and in particular, the area of the shoulder region (figure 5.2b). Pain that is referred from the diaphragm is typically felt near the superior angle of the scapula, along the suprascapular fossa and even along the upper trapezius muscle, and it can be exacerbated when the patient coughs, sneezes, or deep breathes. What I am saying is this: if you have a pathological issue with your gall bladder then the chances of having right shoulder pain is increased because the pain signals are transmitted back to the cervical spine and the sensory input is then transported to the peripheral nerve and subsequent dermatomes.



Figure 5.2a & b: a. Gall bladder and its relationship to the phrenic nerve b. The dermatomes of the upper limb

One could look at this as a referred pattern of pain. Let me give you an example: someone is having a myocardial infarction (heart attack). The person will naturally feel intense pain in the area of the central chest; however, most patients describe feeling other areas of pain or sensations and these can be felt in the mid thoracic spine. left arm and hand, and even towards the left side of face and jaw. What I want to do now is give an analogy for this process. Imagine you are travelling to London by train on a Monday morning at rush hour, arriving at, say, Paddington station. Hundreds of people will get off the train at the same time. The conductor directs them through the normal gates (relate this to chest pain). Nevertheless, because so many people are getting off the train, a queue forms and now the conductor diverts some people to alternative gates (left side of face and jaw), and if they also become busy, to another gate, which might be a few extra minutes walk away (arm and hand). I hope that this analogy makes some sense to you. To put it simply, if the gall bladder is inflamed then this organ can refer to the right shoulder via the phrenic nerve as well as to the area of the mid-lower thoracic spine. This is due to the sympathetic nerve celiac ganglia innervation of the gall bladder and because of the proximity of the gall bladder to the abdomen the patient could perceive pain to the right lower costal margin, which is located to the upper right quadrant of the abdomen.

Conclusion

Regarding the lady from the above case study, I mentioned to her that I thought it was the gall bladder that was responsible for her pain to her right shoulder as well as discomfort in the mid-lower thoracic spine. I discussed with her the function of the gall bladder in terms of breaking down fatty foods, etc., that and if this organ does not function correctly then the stool has a tendency to float. I also discussed through anatomical books and diagrams how the gall bladder caused pain to her right shoulder via the phrenic nerve. There is also a small area under the lower right costal margin (rib) that when palpated (especially with the patient breathing in), may cause a rebound tenderness (figure 5.3). This is known as Murphy's sign and is a positive finding for an inflamed gall bladder, especially if the same procedure is performed on the left side of the abdomen with no perceived pain from the patient.

I wrote a letter to my patient's GP, explaining my findings and she had a meeting with a gastrointestinal consultant who confirmed it was pathology with the gall bladder and removed it a few weeks later. The patient in question had a follow-up appointment a few weeks after the surgery and I was pleased to see that her shoulder and thoracic pain had disappeared.



Figure 5.3: Palpation for rebound tenderness of gall bladder pathology – Murphy's sign

This type of condition is what is described as a *visceral-somatic* dysfunction because the organ (viscera) is the underlying causative factor for pain to present itself to the somatic/soma region (body), in this case pain the right shoulder.

Regarding pathology of the gall bladder, patients can also present with upper right abdominal pain, as well as nausea and vomiting, after eating fatty meals. They might also present with jaundice, low-grade fever and weight loss, especially if there is a cancer present.

Liver

The liver (hepatic) can suffer pathologies such as cirrhosis, tumors, and hepatitis. This organ has an association with the gall bladder and common bile duct (biliary) and these organs commonly present with musculoskeletal presentations to the area of the right shoulder, right upper trapezius (due to the liver's contact with the central portion of the diaphragm), thoracic spine, and interscapular regions of the upper body, as well as pain in the right upper quadrant of the abdomen (figure 5.4). The liver is the most common site for secondary cancer metastasis (especially in men older than 50 years of age) as

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a result of other primary cancer sites such as the stomach, lung, and pancreas, as well as breast cancers in women.



Figure 5.4: *Pain sites from the liver, gall bladder and common bile duct*

The sympathetic nerve fibers from the hepatic and biliary systems are connected through the splanchnic and celiac plexuses and have their origins from the thoracic spine, potentially giving interscapular pain and possibly intercostal pain. The splanchnic nerves synapse with the phrenic nerve, hence producing pain to the area of the right shoulder.

From a physical therapy perspective, the practitioner might be the first person who initially sees this patient, who presents with what they think is a simple musculoskeletal problem. It is of paramount importance that a detailed case history is taken, making close observations of the patient's physical appearance and well-being and looking for any obvious skin changes. The physical therapist will need to diversify and ask appropriate non-musculoskeletal questions that relate to the urinary and gastrointestinal systems. For example, one of the functions of the liver or biliary system is to convert bile from bilirubin, which gives the stool its natural brown color. If, due to some pathology, these systems lose the ability to excrete bilirubin, then the color of the urine can change and it becomes dark, almost like the color of coke or tea. This also has the effect of changing the stool from its normal brown appearance to a light color.

Spleen

CASE STUDY

I was reading a case study of a young male who was playing rugby one Sunday afternoon when he was tackled and hit the ground hard, landing on the left side of his body and feeling pretty winded. The physiotherapist gave him some assistance and said it would be best if he came off the pitch because they felt he needed to rest. After the game the player complained of left shoulder pain and the therapist said he might have damaged his rotator cuff and gave him some strengthening exercises. After a restful night the player woke up in the morning with severe pain to his left shoulder but still managed to go to work. While he was sitting at his desk he collapsed and was rushed to the emergency department, where a diagnosis of a ruptured spleen was made.

Think back to the proximity of the phrenic nerve to the aforementioned organs, as explained earlier; in this particular case the spleen is located on the left side of the body, at a similar level to the gall bladder and liver on the right side. A damaged or ruptured spleen can also refer pain but this time to the left shoulder (figure 5.5) rather than the right, as in the earlier case study: however, the C3–5 dermatomes are still involved because of the



Figure 5.5: Pain referred from the spleen



Figure 5.6: Kehr's sign and the relationship to the spleen

relationship to the phrenic nerve with the subsequent referral pattern to the region of the left shoulder. There are many problems that present to therapists, especially in a sporting context. It is very easy to come to a diagnosis of a rotator cuff tear when a player complains of shoulder pain. However, if the physiotherapist had assessed the player fully, then they would have probably seen a full range of motion into abduction and flexion of the shoulder complex, without any pain, and that in itself should have been a red flag for a medical referral. The history in this case would be beneficial and might have suggested a medical referral, because the patient had history of trauma with sudden onset of symptoms, especially with left shoulder pain. There is a sign called Kehr's sign and that is pain that typically presents itself to the tip of the shoulder. The most common cause of this pain in the left shoulder is a ruptured spleen (figure 5.6).

Lung carcinoma (Pancoast tumor)

A US radiologist called Henry Pancoast described a type of lung cancer that is called a *Pancoast tumor* and is defined primarily by its location at the extreme apex (very top) of the right *or* left lung (figure 5.7). The reason I am writing about lung carcinoma and the shoulder is because of the relationship to the lower roots of the brachical plexus and subclavian artery. When the tumor is progressing it can affect the nerves and blood vessels and potentially mimic a thoracic outlet syndrome (TOS). Thus the patient can present with pain to the areas of the shoulder, axilla, scapula, arm, and hand as well as atrophy/ weakness of the hand and arm muscles. Because of the location of these tumors within the apex, they are less likely to cause typical symptoms seen with general lung cancer, such as shortness of breath, persistent cough, and coughing up blood.



Figure 5.7: Pancoast tumor

Typically, later stages of a Pancoast tumor cause a *Horner's* syndrome, due to compression of the sympathetic ganglion (figure 5.8). The symptoms in severe cases include the following: drooping of the eyelid (ptosis), constriction of the pupil (miosis), and lack of sweating to one side of the face (anhidrosis).



Figure 5.8: Horner's syndrome

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Other symptoms of a Pancoast tumor are unexplained weight loss, loss of appetite, fatigue, sleep disturbance, chest tightness, and arm or hand weakness.

CASE STUDY

A 68-year-old woman was referred by her local doctor to a physiotherapy clinic for treatment of chronic shoulder pain. The patient had a 12-week ongoing history of constant, severe pain in the right shoulder. This pain also radiated beneath her scapula, into the right axilla (armpit) and around the right side of the chest wall. She mentioned an awareness of shortness of breath and complained of increased pain and chest tightness, especially on deep breathing.

The pain was exacerbated by walking a short distance, sitting, and even turning over in bed. On further questioning she also reported reduced appetite as well as sleep disturbance due to the discomfort and that she was a long-term heavy smoker.

On examination, this patient had a 'normal' shoulder in terms of range of motion but there were some cervical and thoracic spine movements that were restricted and painful; this was considered to be caused by agerelated degenerative changes. There was no arm pain or paresthesia; however, the patient mentioned her right hand had symptoms of grip weakness, loss of dexterity (probably because of the compression from the tumor to the lower brachial plexus of C8/T1 – ulnar nerve) and a feeling of her arm 'not belonging to her.' On neurological testing there was no deficit in reflex testing nor was there any obvious weakness of the muscles for the corresponding myotomes for C5/6/7 within the upper limbs.

The patient had private health insurance and requested an MRI scan rather than a standard X-ray as soon as possible because she was naturally worried about her symptoms. The medical diagnosis was that of a large Pancoast tumor. Unfortunately, because of the size of the tumor it was considered inoperable so palliative care was given before the lady passed away a few months later. The patient did not present with Horner's syndrome in this instance because the tumor had not progressed far enough to compress the paravertebral sympathetic nerves.

Stomach and duodenal

Both the stomach and small intestine (duodenum) can be a source of pain to the right shoulder and in particular to the superior angle of scapula as well as to the area of the suprascapular region and the upper trapezius muscle. It is commonly considered that *Helicobacter pylori* (*H. pylori*) infection is the main cause of the majority of abdominal conditions that are specifically related to gastric or duodenal ulcers. Approximately 10% of ulcers are caused through chronic use of nonsteroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen, naproxen and aspirin, which are often taken long term for arthritic types of medical conditions.

The physical therapist has to be continually aware of other presenting signs and symptoms because pain located to the midline of the epigastrium or upper abdomen as well as pain to the right shoulder could possibly be referred from the gall bladder and liver as well as from the stomach or small intestine. One has to be intuitive through correct questioning during the initial history taking, because there are almost certainly other signs and symptoms present that are associated with the above organs. For example, does the pain change during specific times, such as when eating meals? Have you noticed the stool is particularly dark (this darkness within the stool is called a melena, and can relate to a bleed that is located within the upper section of the alimentary canal, stomach or small intestine)?

CASE STUDY

A man in his mid twenties came to my clinic presenting with pain to his mid to lower thoracic spine and also mentioned an awareness of something that was not quite right in his right shoulder but he couldn't say quite what exactly. These symptoms had been present for many months and did not seem to be going away. When I assessed the patient and focused initially on the area of the thoracic spine, I found that he had particular spinal restrictions and tenderness to the area of T4-9. I also noticed that the skin overlying that area of the spine had trophic changes (dry, scaly, pimply skin) and would become hyperemic (reddening of the skin) quite quickly on light palpation. The muscles overlying the thoracic spine felt very firm to the touch and I considered them to be hypertonic (increased state of contraction). During the medical screening, I asked him about particular things that would exacerbate his symptoms and he replied by smiling and saying 'beer and curries' seemed to make his symptoms feel worse. I asked him how often he ate these and he said he had a few beers every evening and frequently enjoyed a spicy curry. I told this gentleman to see his general practitioner, because I felt an ulcer was responsible for his presenting symptoms (figure 5.9). I also mentioned that physical therapy in this instance would probably not be of any value. The patient telephoned me a few weeks later and confirmed my diagnosis of an ulcer, the cause of being *H. pylori* infection. He is now on medication for the infection and I am pleased to say that he has also reduced his regular intake of alcohol and curries. I am hoping that in time he makes a full recovery.



Figure 5.9: Stomach ulcer

Regarding the trophic changes to his thoracic spine, this was related to the sympathetic nerves from the stomach and small intestine being overstimulated, a condition called sympathetictonia (increased tone of the sympathetic nervous system); this condition alters the tone of the overlying muscles, as well as affecting the function of the sebaceous glands and hair follicles. In my medical notes, I remember writing down that he presented with a visceral-somatic (viscera (organ) responsible for causing pain to the soma (body)) dysfunction and the underlying cause was more than likely to be a peptic ulcer.

CASE STUDY

I had the privilege of knowing my very good friend Mark (renamed here to hide his true identity) for over ten years. Mark was a physical therapist who lived in Wales. When he approached his sixties he decided to do an online test for colon cancer, and unfortunately, the test was positive for carcinoma. Over the next few months he had the majority of his colon removed, with continual treatments of chemotherapy and radiotherapy. I saw Mark a year or so after his diagnosis and he was a changed man. He must have lost over 4 stone (25 kg) in weight. The months passed and everything seemed to be going well. However, when Mark attended a course with me in Oxford in the November, he mentioned a swelling above his left clavicle (supraclavicular fossa) and complained of left shoulder discomfort. The GP had put him on medication and he could not venture into the sunlight because of the prescribed medication: the doctors had found something within his left lung, but didn't actually say what they found and further tests were needed.

I thought to myself that this would probably be the last time I would see my good friend and not surprisingly this became a reality: in late December he passed away. The diagnosis was stomach carcinoma and this was probably related to the initial primary colon cancer that caused secondary cancers that had metastasized to his stomach and lung. The left swelling that was present within the left supraclavicular fossa was probably due to metastasizing enlargements of the lymph nodes from the stomach cancer. It is a known fact that the left supraclavicular fossa can be one of the first signs of stomach cancer and malignancies of the stomach can actually be asymptomatic, and reach an advanced stage before giving any symptoms. This particular left-sided lymph node related to the above is called Virchow's node (named in 1848 after the German pathologist Rudolf Virchow) and has the scary alternative name of the 'devils' lymph node, for obvious reasons.

The thoracic duct (left side) in relation to the lymphatic system is like a reservoir (unlike the right side) and it is responsible for draining the lymphatic fluid for the majority of the body before it enters subclavian veins of the venous system. If there are metastases present then the thoracic duct can be blocked and this blockage causes a regurgitation of the lymphatic fluid into the surrounding lymph nodes (Virchow) (figure 5.10).



Figure 5.10: Virchow's lymph nodes

Pancreas

Generally speaking, the pancreas, especially in the case of carcinoma rather than pancreatitis (inflammation)), can be nonspecific and rather vague in terms of the presenting signs and symptoms. It has been clinically proven that lower back pain may be the only symptom that the patients present with. I can guarantee that if a patient walks into the clinic and presents with lower back pain the majority of physical therapists and medical practitioners will *not* suspect pancreatic carcinoma and will consider other musculoskeletal causes of back pain. However, some of the following signs and symptoms might also be present; if so, that should arouse suspicion:

- upper abdominal pain (epigastric) that radiates to the back
- unexplained weight loss and loss of appetite
- light colored stools
- dark urine
- constipation
- nausea and vomiting
- lower back pain
- left shoulder pain
- jaundice.

Patients with pathology of their pancreas tend to find relief by bending forward and bringing their knees to their chest and the symptoms are sometimes exacerbated by drinking alcohol, eating food and even walking or lying flat (supine) with legs straight.

CASE STUDY

Recently, one of the therapists whom I had had the privilege of teaching emailed me to say that she had a patient who presented with left shoulder pain as well as abdominal pains and increased weight loss over a short period of time. The GP said it was indigestion and sent her home; however, my therapist was concerned it was more than just indigestion and sent her back the next day. After further investigations, the patient was diagnosed with pancreatic cancer and unfortunately passed away quite soon after she was given the full diagnosis. The therapist in question messaged me the following week and said she had another patient. He was a male in his fifties who played badminton four times a week and cycled a lot and he came to her clinic with presenting symptoms mainly to his left groin that were relieved by *curling* up. He also mentioned left shoulder and some abdominal symptoms. He too was referred to the GP and unfortunately was also

diagnosed with pancreatic cancer and passed away a few weeks later.

Over the last few years I have lectured to many thousands of therapists from all corners of the earth. In these courses I have rarely talked about the pancreas causing shoulder and groin pain. This is mainly because I have so much information to cover in one day that it is difficult to include every single thing that therapists might see in their practice - the course would end up taking five days rather than one. However, from now on, I can guarantee that when teaching my shoulder and hip joint master class I will always talk about the pancreas, and I am truly pleased to look back at the email I received from my previous student and to see that she remembered my mentioning the shoulder pain/cancer link during the workshop she had taken (figure 5.11). I am very pleased to say that at least some of the knowledge I pass on can be of value, so thank you Kathryn Kemp for being on top of your game.



Figure 5.11: *Typical areas of pain associated with the pancreas*

Kidney

I have personally seen thousands of patients and I do not think I can recall any one of these having shoulder pain that was directly related to pathology of a kidney. Then again, maybe in my earlier years of training I might have missed this underlying causative factor of symptoms to the shoulder. The kidney will potentially only cause ipsilateral (same side) shoulder pain if it contacts and causes increased pressure to the diaphragm and we know the relationship to the phrenic nerve (already discussed previously). It is not in the scope of this text to go through all the specific medical conditions that relate to the renal and urologic system; however, some of the signs and symptoms might be of concern to the physical therapist. Renal pain is commonly felt in the posterior subcostal and costovertebral region (figure 5.12). The pain can also be felt around the flank into the lower abdominal quadrant and even radiating into the testicular/genitalia area. As you can see from figure 5.12, lower back and possible ipsilateral shoulder pain might also be present.

Hopefully, after reading about the above specific medical conditions, my overall goal would be to make you more aware of some of the pathologies that can give rise to patients with so-called musculoskeletal presentations and in particular, pain that presents itself to the region of the shoulder complex. The underlying pathologies that I have discussed might be classified as *red flag conditions* and will require further investigation. Remember that many patients will come and see the physical therapist first with any painful symptoms rather than their primary care physician. We have a duty of care to the overall well-being of all of the patients that walk through our clinic door and we need to know *when to treat* and more importantly, *when not to treat and to refer to the medical profession*. That statement of when to refer has to be of the utmost priority because it can simply be a life or death situation, I hope you remember that when the time comes!

There are many other pathologies that I have not mentioned that can refer pain to the shoulder. However, my focus here is to try and make you aware of how the viscera actually refer pain to other structures within the musculoskeletal framework and especially to the region of the shoulder complex. With the correct questioning during the initial consultation and the appropriate orthopedic testing protocols, we can hopefully eliminate the musculoskeletal tissues as a source of a patient's presenting symptoms, especially if the practitioner cannot reproduce their symptoms during the physical therapy examination. It is time then to consider that the symptoms the patients are presenting with might actually be referred from pathology of the viscera rather than being musculoskeletal in origin.



Figure 5.12: Typical areas associated with renal and urologic pain

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