CASE REPORT

Pancoast's tumour presenting as shoulder pain in an orthopaedic clinic

Lynne Ronan, Sunil D'Souza

Department of Orthopaedics,
Royal Bolton Foundation Trust,
Bolton, UK

Correspondence to

Lynne Anne Ronan,
Lynne.Ronan@boltonft.nhs.uk

SUMMARY

A 71-year-old lady was referred by her general practitioner to an orthopaedic clinic for management of shoulder pain. The patient complained of pain in the shoulder and chest region but also described reduced sensation and power in her arm and a worsening of her respiratory symptoms. These prompted further investigation with an isotope bone scan which showed a large soft tissue mass posteriorly in the apex of the right lung with chest wall extension and destruction of adjacent ribs. A subsequent CT scan identified Pancoast's tumour. This case highlights the importance of considering non-musculoskeletal causes of shoulder region pain.

BACKGROUND

Patients with shoulder pain commonly present to general practitioner (GP) surgeries and orthopaedic departments. This case study highlights the importance of considering non-musculoskeletal conditions which cause referred shoulder pain. Often these conditions do not behave in the mechanical manner that is usually associated with orthopaedic shoulder pathology. In some instances, pain in the shoulder region can be indicative of serious underlying pathology.

CASE PRESENTATION

A 71-year-old woman was referred by her GP to an orthopaedic primary care clinic for management of 'shoulder pain'. She complained of an 8-week history of constant, severe pain in the right shoulder region. This pain also radiated beneath her scapula, into the right axilla around the right chest wall. The pain was exacerbated by walking, sitting and turning in bed. There was no arm pain or paraesthesia. The patient reported right hand symptoms of grip weakness, loss of dexterity and a feeling of her arm 'not belonging to her'. On closer questioning she also reported chest tightness beyond that which she normally associated with her history of asthma. She also reported reduced appetite and sleep disturbance. Her weight was steady. She was a long term heavy smoker. She had undergone an aortic valve replacement 5 years earlier.

On examination, this patient had a normal shoulder. Cervical and thoracic spine movements were restricted and painful. The patient was noted to be short of breath and complained of increased pain and chest tightness on deep breathing. There was no neurological deficit in the upper limbs. Pain was exacerbated by palpating the upper thoracic spinous processes and the facet/rib joints.

INVESTIGATIONS

This patient had not undergone any investigations prior to attending the orthopaedic clinic. We initially obtained an isotope bone scan to investigate further. The isotope bone scan (figure 1) showed a large soft tissue mass posteriorly in the apex of the right lung with chest wall extension and destruction of adjacent ribs. No increased uptake was identified anywhere else to suggest diffuse metastatic disease. The bone scan results suggested that the appearances were compatible with the diagnosis of a large Pancoast's tumour. This is often described as a superior sulcus tumour¹ or non-small cell lung cancer.²

Pancoast's tumours are often challenging to diagnose as they are difficult to detect on plain chest x-ray.³ Radioisotope bone scanning is used primarily to detect bone abnormalities and involves the injection of a radioactive tracer which is taken up by bone during new bone formation. This tracer emits γ -rays detected by the scanner. Areas of elevated bone metabolism show areas of increased isotope activity.⁴ In this case, Pancoast's tumour resulted in rib destruction which gave rise to an increase in osteoblastic activity in the region and resulted in a 'hot spot' of increased bone activity in this area. Had there been no bone destruction, this diagnosis might have been delayed. MRI is regarded to be the modality of choice for imaging structures of the thoracic inlet.² In this case, this was not the first investigation of choice as the patient had a history of aortic valve replacement. While most of the heart valves are safe for MRI, this investigation would have been delayed by the process of obtaining information regarding the make and model of the valve to ensure MRI compatibility.

High resolution CT scanning is commonly undertaken to further investigate areas of interest identified by other investigations.⁴ CT scanning subsequent to isotope bone scanning in this patient was used to confirm the stage of Pancoast's tumour. The CT thorax (figure 2) confirmed an apical Pancoast's tumour with radiological stage T3, N0, MO (stage 2b). Staging determines the extent of a tumour and allows rational grouping of patients with similar disease for prognostic, analytic and therapeutic purposes.⁵ 'T' indicates the size of the tumour, 'N' relates to nodal involvement and 'M' indicates the presence or absence of distal metastases. T3 tumours are neoplasms that have grown beyond the lung parenchyma.⁵

OUTCOME AND FOLLOW-UP

Treatment of Pancoast's tumour is dependent upon the staging of the tumour. This patient's case was

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Figure 1 Bone scan.

discussed at the local respiratory multi-disciplinary team meeting and a decision was taken that the tumour was inoperable and too large for radical radiotherapy. A mixture of palliative radiotherapy and chemotherapy was given. The patient died within a year of diagnosis.

DISCUSSION

Shoulder region pain, though a common orthopaedic presentation, rarely causes the clinician to become suspicious of an apical lung tumour. However, a number of features of this

Figure 2 CT scan.

patient's history and diagnosis gave rise to suspicion of a condition which was non-musculoskeletal in origin. This patient did not complain of a mechanical pain pattern. Pain was reported on activities that are not normally considered troublesome in musculoskeletal shoulder pain such as resting and walking. In addition to a normal shoulder examination, this patient also described symptoms of constant severe pain, sleep disturbance, arm weakness, chest tightness and reduced appetite. It therefore became important to consider patterns of shoulder pain which might be manifestations of non-musculoskeletal conditions such as gynaecological, rheumatological, gastrointestinal (GI), cardio-respiratory and neurological disease.⁶

There was little in this patient's history to suggest a gynaecological or rheumatological component to her problems. Although gynaecological conditions such as ruptured ectopic pregnancy with abdominal haemorrhage can result in shoulder pain, this should only be considered as a differential diagnosis in women of child bearing age.⁶ Rheumatological conditions such as rheumatoid arthritis, psoriatic arthritis, ankylosing spondylitis and polymyalgia rheumatica commonly underlie shoulder pain. Rheumatological pain, in common with this patient's presentation, is non-mechanical because of its inflammatory nature. However, unlike this patient, the shoulder will rarely be affected in isolation.⁶ For example, joint problems in rheumatoid arthritis usually occur in a symmetrical pattern with at least three areas of the body being affected and is accompanied by persistent morning stiffness.⁷

GI conditions affecting the gallbladder, liver and peritoneal regions are other common examples of non-musculoskeletal

causes of shoulder pain.⁶ The shoulder is innervated by spinal nerves C3–C5, which also innervate the diaphragm. Therefore, organs in close proximity to the diaphragm which have become infected, inflamed or obstructed can cause irritation to the diaphragm and result in ipsilateral shoulder pain.⁸ For example, in liver cancer and abscess, irritation is relayed via the phrenic twigs of the liver to the diaphragm and may continue up to the trunk of the phrenic nerve, to the brachial and cervical plexus resulting in pain in the right shoulder.^{6–8} Bilateral shoulder pain can occur where the irritation crosses the midline of the diaphragm, such as pathology of the body of the pancreas, whereas inflammation of the tail of the pancreas might cause left shoulder pain.⁸ Gallbladder disease might also give rise to intercostal and interscapular pain owing to sympathetic fibres from the biliary system connecting through the coeliac and splanchnic plexuses to the hepatic fibres in the region of the dorsal spine.⁸

Although this patient reported pain in the right shoulder region with radiation beneath the scapula and around the chest wall, she did not report GI symptoms such as abdominal distension, abdominal pain, dysphagia, dyspepsia, nausea, vomiting, haematemesis or altered bowel habit.⁹ There was no report of eating, belching and taking antacids having an effect on her pain.⁸ Also, she did not specifically report a problem with supine lying, which can often be aggravating in GI conditions owing to the shift of abdominal contents towards the diaphragm.⁸

This patient reported chest tightness, pain around the chest wall, had a history of aortic valve replacement and was a heavy long-term smoker. On examination, she was short of breath and complained of pain on deep breathing. Such symptoms might cause the clinician to consider cardiorespiratory causes of shoulder pain which include myocardial ischaemia, pericarditis and pulmonary embolism.⁶ Cardiac pain is referred via the cardiac plexus to the sympathetic chain and onto the dorsal roots and ganglia of spinal nerves T1–T4. Pain is perceived by the central nervous system as pain in T1–T4 dermatomes,⁶ which correlates with this patient's area of chest pain. She did not report pain which is often associated with cardiac ischaemia and results in pain in the left arm, hand, jaw and central chest region. Her pain was exacerbated by walking; an activity which increases cardiorespiratory load, indicating that there was some involvement of the cardiorespiratory system. As the pain was exacerbated by, 'turning in bed' rather than recumbency, which increases venous return from the lower extremities,⁸ this might suggest that the problem was more respiratory in nature rather than cardiac. In this case, there was no report of severe respiratory symptoms such as cough and haemoptysis which might have alerted the clinician to the possibility of lung pathology.⁹ However, such symptoms are known to be uncommon until the late stages of Pancoast's tumour.¹⁰ Her history of asthma may have resulted in misattribution of her respiratory symptoms and a failure to report them at an earlier stage.

The patient reported right hand symptoms of grip weakness, loss of dexterity and a feeling of her arm 'not belonging to her'. Such symptoms suggest neurological involvement. There are many examples of neurological causes of shoulder pain. These are normally associated with shoulder weakness resulting from pathology of the peripheral or central nervous system. C5/C6 cervical radiculopathy causes shoulder pain which may be accompanied by additional clinical signs of paraesthesia/anaesthesia in the C5/C6 distribution, reduction or loss of biceps reflex and weakness of shoulder abduction and elbow flexion.¹¹ In this case the reported weakness was distal, and neurological examination was intact, suggesting the absence of a C5/C6 lesion. Peripheral nerve injury might also underlie shoulder

pain. For example, suprascapular nerve compression or injury may present as a pain at the top of the shoulder from the clavicle to the spine of the scapula with weakness and atrophy of supraspinatus and infraspinatus^{6–11} but again, this was not consistent with the clinical presentation.

The symptoms of thoracic outlet syndrome or acute brachial plexus neuropathy are more consistent with this patient's presentation. These conditions present as a deep, toothache pain in the neck and shoulder region, often with radiation of pain into the ulnar distribution of the arm with additional vascular changes in the upper limb in thoracic outlet syndrome.^{11–12} Typically, Pancoast's tumour does not produce symptoms while it is confined to the pulmonary parenchyma.⁸ This gives rise to an explanation as to why the tumour was extensive with symptoms being of relatively short duration. As the tumour extends to the surrounding structures it frequently involves the C8 and T1 nerves within the brachial plexus. This correlates with this patient's complaint of hand weakness and loss of dexterity. However, the tumour had not progressed sufficiently to produce Horner's syndrome which can occur owing to extension of the tumour into the paravertebral sympathetic nerves. Horner's syndrome consists of enophthalmos (backward displacement of the eye), ptosis (drooping eyelid), miosis (pupil constriction) and ipsilateral impaired sweating of the face.^{8–9}

Despite the absence of Horner's syndrome, many of this patient's pain symptoms were consistent with typical presentation of Pancoast's tumour. The most common initial symptom associated with Pancoast's tumour is sharp posterior shoulder pain produced by invasion of the brachial plexus and/or parietal pleura, fascia, first and second ribs or vertebral bodies.⁸ There may also be pain in the axilla or subscapular area on the affected side, pain radiating to the head or neck, across the chest and/or down the medial aspect of the arm into the ulnar nerve distribution.⁸

This patient was referred by her GP to an orthopaedic clinic for management of shoulder pain. When her shoulder symptoms were considered in the context of other symptoms, it became apparent that this might not be an orthopaedic problem. In particular with this patient, the pain was non-mechanical in nature and present in a region atypical of normal shoulder pathology as it extended into the axilla, beneath the scapula and around the chest wall. She presented with symptoms suggestive of cardiorespiratory and neurological pathology and had a history of heavy smoking. In addition, she complained of constitutional symptoms such as appetite loss and sleep disturbance which are known to be suggestive of serious underlying pathology.¹³ The diagnosis of Pancoast's tumour is extremely challenging and it is unclear whether an earlier diagnosis in this patient would have significantly improved this patient's outcome. However, a higher index of suspicion of apical lung tumours might be recommended in heavy smokers with pain in the shoulder region accompanying cardiorespiratory and neurological symptoms.

Learning points

- ▶ Common problems such as pain in the shoulder region may be indicative of serious underlying pathology.
- ▶ Symptoms such as constant severe pain, loss of sleep, history of smoking and reduced function should raise the index of suspicion for serious underlying pathology.
- ▶ Care should be taken to avoid misattributing new symptoms to a previously diagnosed problem.

Competing interests None.

Patient consent Obtained.

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