The topic of referred pain is both fascinating and at times perplexing. Orbach and Heisiger (2001) illustrate this point in a case study where a patient with a 6 month history of moderately severe shoulder pain was suddenly pain free following dental root canal surgery. Based on my experience of talking to both students and therapists, it appears that there is a general awareness of pain referral patterns from a few commonly taught body structures. This typically includes neural structures in the spine, and occasionally knowledge of referral patterns from other somatic spinal structures. In addition referral patterns associated with trigger points and internal organs are often mentioned. Knowledge of pain referral patterns from extremity joints and soft tissue structures appears to be limited in the physical therapy community. This essay aims to present the evidence basis for pain referral patterns in the shoulder and hip, with particular reference to the question of whether or not these structures can refer pain proximally towards the spine and distally past the knee and elbow.

Pain referral maps are commonly formulated by either injecting joints with a noxious substance and noting where in the body pain is reported or by noting the pain pattern reported by symptomatic subjects, grouped by diagnosis. In the shoulder girdle, injection studies using hypertonic saline have been completed in healthy subjects for the acromioclavicular joint, the sternoclavicular joint and the subacromial space. Hassett and Barnsley (2001) found that injections into the sternoclavicular joint commonly produced pain over the joint, clavicle, anterior shoulder, upper trapezius, neck and jaw. In one subject pain was reported in the arm radiating down as far as elbow. One subject also reported chest wall pain. Gerber et al (1998) reported that acromioclavicular joint injections commonly produced pain around the shoulder, spreading into the trapezius and anterolateral neck. In this study, injections into the subacromial space occasionally produced forearm and finger pain in addition to pain around the shoulder.

Evidence supporting the capacity of the shoulder complex to refer pain into distal regions of the upper extremity can also be found in a prospective study by Bayam et al (2011). In this study pain maps were recorded for 94 shoulder pain patients, who were subsequently placed into diagnostic groups based on imaging and clinical test findings. Subjects with suspected neck involvement, multiple shoulder problems or upper extremity neuropathic symptoms were excluded from this study. The results demonstrate that a significant number of subjects diagnosed with impingement, rotator cuff tears and glenohumeral joint arthritis reported pain below the elbow (impingement 46.4%, cuff tears 54.5%, glenohumeral arthritis 83.3%). Two subjects diagnosed with acromioclavicular pathology also reported pain below the elbow.

In the lower extremity 3 studies exist in which pain locations have been mapped in subjects with hip pathology. Hsieh et al’s (2012) prospective study produced pain maps for 113 patients with end stage hip disease, who subsequently underwent a total hip arthroplasty (THA). Out of the 113 subjects, 110 reported complete relief of their symptoms within 3 months of the surgery. Before the surgery the most common areas of pain included the groin, anterior thigh, buttock and greater trochanter. It is also worth noting from this study that 21% of the patients had low back pain (LBP), 7.1% had shin pain and 2.7% had calf pain. Nakamura et al’s (2012) study followed a similar research methodology producing pain maps for 369 patients who underwent a THA and reported significant symptom relief following. The results support the finding of the Hsieh et al (2012) with 17% reporting LBP, 29% reporting pain down to the knee and 8% reporting pain in the lower leg. In a smaller study by Lesher et al (2008), pain maps were recorded for a group of
51 patients with hip pain, who subsequently underwent intra-articular hip injections. In this patient population 22% had pain distal to the knee and 6% reported foot pain. In contrast to the 2 previous studies none of the subjects from this study reported LBP.

Outside of the shoulder and hip there appears to be a paucity of research investigating pain referral patterns from other extremity joints or soft tissue structures. While a few studies have produced pain maps for subjects with knee osteoarthritis, this research is limited by the use of body diagrams which only extended from the mid thigh to the mid shin region (Thompson et al 2009). Due to this shortcoming, such studies are unable to provide further insight into the capacity of the knee joint to refer pain beyond these points.

While the evidence underpinning pain referral patterns for the shoulder and hip may be limited to a handful of articles, it can be contended that there is enough to suggest that clinicians should be cognizant of the potential for both structures to refer pain both proximally and distally. The characteristics of referred pain, outlined in the shoulder and hip research, is in keeping with other studies investigating spinal somatic structures (facet joints, discs, spinal ligaments/muscles and the sacroiliac joint). Typically for all of these structures the most common referral pattern, and the region with the highest pain intensity rating, tends to be found in areas of close proximity to the pain generator. Individual variability is often noted, and the location of the extremity pain does not to follow a specific dermatomal pattern. Like the shoulder and hip, most of these spinal somatic structures also have the potential to refer pain distally into the extremities as far as the foot and hand (Feinstein et al 1954, Mooney & Robertson 1976, O’Neill et al 2002, Slipman et al 2005, van der Wurff 2006). It is also pertinent to consider that the research into the shoulder and hip demonstrated that both structures can refer pain proximally, up as high as the neck and low back respectively. Taken as a whole this research has clinical implications by suggesting that it is good practice to consider a wide pool of hypothesis when contemplating potential pain generators, particularly in presentations in which both spinal and extremity symptoms are reported. It also suggests that the use of screening questions and clinical screening tests, aimed at implicating or ruling out different body regions, should be encouraged.

References


