RESEARCH ARTICLE

Discrete Pathophysiology is Uncommon in Patients with Nonspecific Arm Pain

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Abstract

Background: Nonspecific symptoms are common in all areas of medicine. Patients and caregivers can be frustrated when an illness cannot be reduced to a discrete pathophysiological process that corresponds with the symptoms. We therefore asked the following questions: 1) Which demographic factors and psychological comorbidities are associated with change from an initial diagnosis of nonspecific arm pain to eventual identification of discrete pathophysiology that corresponds with symptoms? 2) What is the percentage of patients eventually diagnosed with discrete pathophysiology, what are those pathologies, and do they account for the symptoms?

Methods: We evaluated 634 patients with an isolated diagnosis of nonspecific upper extremity pain to see if discrete pathophysiology was diagnosed on subsequent visits to the same hand surgeon, a different hand surgeon, or any physician within our health system for the same pain.

Results: There were too few patients with discrete pathophysiology at follow-up to address the primary study question. Definite discrete pathophysiology that corresponded with the symptoms was identified in subsequent evaluations by the index surgeon in one patient (0.16% of all patients) and cured with surgery (nodular fasciitis). Subsequent doctors identified possible discrete pathophysiology in one patient and speculative pathophysiology in four patients and the index surgeon identified possible discrete pathophysiology in four patients, but the five discrete diagnoses accounted for only a fraction of the symptoms.

Conclusion: Nonspecific diagnoses are not harmful. Prospective randomized research is merited to determine if nonspecific, descriptive diagnoses are better for patients than specific diagnoses that imply pathophysiology in the absence of discrete verifiable pathophysiology.

Keywords: Arm, Discrete, Nonspecific, Pain, Pathophysiology

Introduction

Over half the symptoms brought to the attention of a primary care doctor have no identifiable pathophysiology and nonspecific symptoms correlate with psychosocial distress (1-3). Nonspecific symptoms are particularly common in the upper extremity (4-9). A study from the United Kingdom showed that 36% of men and women report upper extremity pain in any given week and only 45% are associated with discrete pathophysiology (10). A Dutch study found that approximately three consultations per week (in an average practice with 2500 registered persons) relate to a new or recurrent symptom in the neck or upper extremity (4).

Patients are frustrated by nonspecific diagnoses. It seems that patients and medical professionals place most of their hope in the biomedical model of illness where all illnesses can be reduced to a discrete pathophysiological process that corresponds with symptoms and has an effective medical or surgical treatment (e.g. penicillin for Strep throat)(11). Given the prevalence of nonspecific arm pain and the risks associated with both diagnostic and therapeutic interventions as well as with debatable diagnoses, perhaps the concept of nonspecific arm pain ought to be as natural as other common nonspecific pains, some of which have words in the English language that predate modern medicine: e.g. headache, stomachache,

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and backache (5, 12-14).

Surgeons that use nonspecific diagnoses place themselves at risk of patient dissatisfaction and accusations that a diagnosis was missed. The aim of this study was to assess the prevalence of discrete pathophysiology amongst patients initially diagnosed with nonspecific arm pain and assess which factors were associated with change of this diagnosis. Our primary null hypothesis was that there are no demographic factors and psychological comorbidities associated with change of diagnosis from nonspecific arm pain to discrete pathophysiology after seeing the index hand surgeon. Our secondary study question addressed the percentage of patients initially diagnosed with nonspecific arm pain in whom discrete pathophysiology is eventually identified and what those pathologies were.

Table 1. Demographics

	n = 634
	Mean (±SD)[a]
Age in years	39 (13)
	n (%)
Sex	
Women	374 (59)
Men	260 (41)
Race	
White	479 (76)
Hispanic or Latino	62 (9.8)
Black or African American	36 (5.7)
Asian	27 (4.3)
American Indian or Alaskan Native	1 (0.16)
Other or unknown	29 (4.6)
Side	
Right	333 (53)
Left	185 (29)
Both	116 (18)
Location	
Wrist	253 (40)
Arm	104 (16)
Finger	84 (13)
Hand	74 (12)
Multiple	64 (10)
Elbow	29 (4.6)
Forearm	26 (4.1)
Onset	
<1 month	78 (12)
1-3 months	99 (16)
3-6 months	66 (10)
6-12 months	55 (8.7)
>1 year	241 (38)
Unknown	95 (15)

[a]SD = Standard Deviation.

Materials and Methods

This retrospective study was approved by our Institutional Review Board. The setting was the practice of one hand surgeon that prefers to use nonspecific diagnoses when discrete pathophysiology is not evident based on interview and examination. Such patients are classified using the International Classification of Diseases, 9th revision (ICD-9) codes as 729.5 (pain in limb), 719.44 (pain in joint, hand), 719.43 (pain in joint, forearm). Using billing records, we identified 1508 consecutive patients that received one of these ICD-9 codes between July 2001 and July 2013. Inclusion criteria were age 18 years or greater and no additional specific upper extremity pathophysiology. Eight hundred sixty patients were excluded because they had discrete pathophysiology in addition to nonspecific arm pain and another 14 were excluded for age under 18, leaving 634 patients for analysis.

We extracted the following information from medical records: sex, age at initial visit, race, side, location (arm, elbow, forearm, wrist, hand, or finger), onset, previous visits to a physician for the same pain, prior diagnostic procedures (MRI, EMG, ultrasound), prior invasive procedures (injection, surgery), and prior diagnoses. We then looked for subsequent visits to the same hand surgeon, a different hand surgeon, or any physician

Table 2. Prior healthcare visits

	n = 634
	n (%)
Has seen a doctor before for this condition	258 (41)
Prior diagnostic procedures	
Magnetic Resonance Imaging (MRI)	57 (9.0)
Electromyography (EMG)	32 (5.1)
MRI + EMG	11 (1.7)
Ultrasound	2 (0.32)
None	532 (84)
Prior invasive procedures	
Operation	55 (8.7)
Injection	44 (6.9)
Operation + Injection	10 (1.6)
None	525 (83)
Prior diagnosis	
Single diagnosis	91 (14)
Multiple diagnoses	17 (2.7)
None	526 (83)

within our health system for the same pain.

There were 260 (41%) men and 374 (59%) women with an average age of 39 years (range 18 to 83 years). Pain was present in one arm in 518 patients (82%) and both arms in 116 patients (18%). The most common site for nonspecific pain was the wrist [Table 1].

Among the 258 patients (41%) who had previously seen a hand surgeon, 102 (40%) had a diagnostic test other than radiographs, and 109 (42%) had an invasive therapeutic procedure (injection or surgery) [Table 2]. One hundred eight patients (42%) received a diagnosis from the previous hand surgeon. Among these 108 patients, 91 (84%) were given a single diagnosis, and 17 (16%) were given multiple diagnoses [Table 3].

Four hundred seventy-one patients (74%) remained within our health system, with additional visits – most often with their primary care doctor – recorded in the medical record. Among these 471 patients, 287 (61%) never had another evaluation for the upper extremity pain within the care network covered by our electronic medical record and it was not mentioned in the notes of the primary care doctor or other specialists.

One hundred eighty-four of the 471 patients (39%) that had follow-up visits within our health system had another evaluation of the index upper extremity pain: 122 of the 184 (66%) returned to the same hand surgeon, 37 (20%) saw another hand surgeon, and 25 (14%) saw another type of physician.

Table 3. Diagnoses given by previous physicians

	n=108
	n (%)
Carpal tunnel syndrome (CTS)	23 (21)
Cyst/Ganglion	18 (17)
Tendonitis	17 (16)
Triangular fibrocartilage complex (TFCC) tear	16 (15)
Lateral epicondylitis	11 (10)
de Quervain	7 (6.5)
Repetitive strain injury	4 (3.7)
Trigger finger	4 (3.7)
Cubital tunnel syndrome	3 (2.8)
Ulnocarpal impaction	3 (2.8)
Scapholunate lesion	3 (2.8)
Sprain/Strain	3 (2.8)
Reflex sympathetic dystrophy	2 (1.9)
Cervical radiculopathy	1 (0.93)
Distal radius fracture	1 (0.93)
Elbow contusion	1 (0.93)
Elbow UCL insufficiency	1 (0.93)
Intersection syndrome	1 (0.93)
Myotonic dystrophy	1 (0.93)
Osteoid osteoma	1 (0.93)
Polymyalgia	1 (0.93)
Pronator syndrome	1 (0.93)
Quadrilateral space syndrome	1 (0.93)
Radial tunnel syndrome	1 (0.93)
Rheumatoid arthritis	1 (0.93)
Rotator cuff tear	1 (0.93)
TMC laxity	1 (0.93)
Ulnar styloid nonunion	1 (0.93)
Vasospasm	1 (0.93)
Wrist synovitis	1 (0.93)

Some patients were given multiple diagnoses: 13 patients were given 2 diagnoses, 3 were given 3 diagnoses, and 1 patient was given 5 diagnoses.

Results

There were too few patients with discrete pathophysiology at follow-up to address the primary null hypothesis.

Definite discrete pathophysiology that corresponded with the symptoms was identified in subsequent evaluations by the index surgeon in one patient (0.16% of all patients) and cured with surgery (nodular fasciitis). Discrete

Table 4. Follow-up and discrete pathophysiology

	n = 634
	Median (IQR)[a]
Follow-up in hospital system (in days)	232 (0-758)
Number of follow-up visits with hand surgeon	1 (1-2)
	n (%)
Patients with follow-up in hospital system	471 (74)
Follow-up visit for index upper extremity pain	**n = 184**
	n (%)
Patients with follow-up visits with same hand surgeon	122 (66)
Patients who went to different hand surgeon in hospital system	37 (20)
Patients who went to other healthcare provider in hospital system	25 (14)
Pathophysiology identified at follow-up	
Arm ache	174 (95.5)
Debatable pathophysiology or debatably related to the symptoms	9 (4.9)
Discrete objective pathophysiology definitely related to the symptoms	1 (0.54)

[a]IQR = Interquartile range. Underlined diagnoses were applied by same hand surgeon.

Debatable pathophysiology: Electrodiagnostically normal cubital tunnel syndrome (2), de Quervain tendinopathy (1,1), contusion of capitellum (1), myotonic dystrophy (1), ulno-carpal impaction (2), mild trigger finger (1).

Discrete pathophysiology: Nodular fasciitis (1).

pathophysiology that accounted for a small portion of the patient's symptoms was identified in subsequent evaluations by the index surgeon in four patients (2.2% of patients with a second evaluation of the arm pain by any physician within our system; 0.63% of all patients). This pathophysiology included ulnocarpal impaction in two patients and de Quervain tendinopathy and trigger finger with very slight catching with finger flexion and extension each in a single patient. Subsequent physicians made debatable unverifiable diagnoses in four patients (electrodiagnostically normal cubital tunnel syndrome in two patients and contusion of capitellum [based on nonspecific MRI signal changes] and myotonic dystrophy in one each) and one possible discrete pathophysiology of de Quervain tenosynovitis, which accounted for a fraction of the patient's symptoms [Table 4].

Discussion

The use of nonspecific diagnoses poses several risks including: 1) overlooking treatable pathology, 2) sending a message of hopelessness to a patient that feels they can only depend on their arm if it is free of symptoms and that it can only be free of symptoms if there is a discrete diagnosis and a definitive intervention, 3) bad feelings towards and bad reviews for the surgeon, and 4) subsequent surgeons implying a missed diagnosis even if that diagnosis is debatable or incidental, among other risks. On the other hand nonspecific diagnoses are 1) more accurate, are 2) a better representation of current best evidence and best care, can 3) more accurately characterize the pretest odds of finding discrete pathology (which when it is as low as it is in this setting makes even the best diagnostic tests misleading), 4) have a low risk of iatrogenic harm, and 5) encourage adaptation to the limits of modern medicine and the development of self-efficacy. These are not new issues. It's just that we have not faced up to them as well as at other anatomical sites such as backache, where these issues are better worked out. This study addresses the risk of overlooking treatable pathology when using nonspecific diagnoses. In a study that relied on electronic medical records in one care network, discrete pathology was eventually identified in about one in 100 patients initially diagnosed with nonspecific upper limb pain, usually when the patient stayed with the initial surgeon.

The limitations of this study should be kept in mind when interpreting our results. First, patients may have sought treatment outside the care network covered by the electronic medical record. Based on other studies we have done using large databases, we feel this is likely relatively uncommon as patients seem to stick with the original surgeon for the most part. For instance, in studies of the variations in care of discrete pathophysiology such as de Quervain tendinopathy and trapeziometacarpal arthrosis, the treating surgeon had a substantial influence on care and about 4% of patients sought care from another surgeon within the system (15). In the current study, among a population where 75% of patients had a primary care doctor in the system, roughly 10% of patients had a documented evaluation of the arm pain with another doctor within our system, 20% with the index surgeon, and 70% either did not have another evaluation or were evaluated outside the system. Second, as with all nonspecific diagnoses, it is possible that treatable pathology exists in many of these patients that will be more easily identified with future advances. Third, these data were reviewed by a team of researchers working with the original surgeon, which could bias the findings; however, we list every subsequent diagnosis for the reader's consideration and the probability of any substantial bias in the data seems unlikely.

The low rate of repeat evaluations and discrete pathophysiology suggests that - as with low back pain - a substantial percentage of these pains resolve over time without a specific diagnosis or treatment. Most of the patients remained in our health system where all diagnoses and medical encounters are tracked and attention to these symptoms would have been noted.

We were unable to answer our primary study question because discrete pathology was uncommon among patients initially diagnosed with nonspecific upper extremity pain. Substantial research has established that psychological factors such as psychological distress (anxiety and depression), cognitive and behavioral coping strategies, and family and work environment and other sources of stress are the factors most strongly associated with pain intensity and magnitude of disability (16-22). These factors also correlate with increased somatic symptoms (23-27). Conversely, patients with high levels of self-efficacy (effective coping strategies) experience less pain and disability (23, 24, 28, 29). Nonspecific upper limb pains are associated with higher levels of catastrophic thinking and show a tendency for increased somatic complaints (25). Indeed, the work of Barsky and others has identified nonspecific illnesses (what he terms "functional somatic syndromes") at most anatomical areas, and has established that a substantial percentage of these are essentially a type of somatoform disorder (30, 31).

Some suggest that the prevalence of psychiatric illness among patients with nonspecific arm pain is underappreciated and undertreated (27). Psychological factors attribute to the onset of somatic symptoms and perseverance of symptoms are associated with limited recovery (32, 33).

Patients see hand surgeons because they want to be able to depend on their upper extremities. The sense that they cannot rely on their limbs as desired arises from a combination of pathophysiology and the cognitive, behavioral, and emotional response to that pathophysiology. Treatments such as cognitive behavioral therapy (CBT) that lower psychological distress and improve coping strategies can be very effective and helpful, particularly in patients with discrete but untreatable pathophysiology and patients with no identifiable pathophysiology, but also in patients with discrete treatable pathology (5, 31, 34-38).

Alternatives to the use of nonspecific diagnoses include; 1) the use of vague, non-discrete terminology often emphasizing speculative cause (e.g. repetitive strain injury), 2) discrete unverifiable diagnoses

(e.g. electrodiagnostically normal peripheral nerve compression), or 3) discrete pathophysiology applied to a nonspecific problem without verification (e.g. "tendinitis")(5, 12, 13, 19, 22, 39-43). While these approaches might be more welcome and acceptable to patients, they risk iatrogenic harm by; 1) reinforcing maladaptive coping strategies (e.g. the concept of "overuse" exacerbates catastrophic thinking and kinesiophobia), 2) leading potentially unhelpful surgery, injection, or medication that only offer risks and side effects, 3) medicalization of symptoms that might be best currently considered an expected part of human existence, and 4) missed opportunities to grow self-efficacy with ultimate decrease overall health and well-being.

The indiscriminate use of diagnostic tests in the setting of nonspecific arm pain is unlikely to reveal useful information and may lead to inaccurate diagnoses and unnecessary treatments with possible harm (13, 42, 44). They may also increase sick leave and health care costs (17, 32, 39).

Prospective randomized research comparing the use of nonspecific diagnoses with more specific diagnoses will be difficult because it will require surgeons that feel discrete diagnoses should only be used for verifiable pathology to apply diagnoses based on faith, and it will require surgeons that feel it is better to try to be specific to withhold diagnoses that they feel are helpful. A better approach may be to randomize patients with upper extremity pain and no measurable pathophysiology (or measurable pathophysiology where the relationship to symptoms can be debated) to receive standard treatment with or without supplemental cognitive behavioral therapy and track the influence of specific vs. nonspecific diagnosis and specific treating surgeons on symptoms and disability.

Nonspecific upper extremity pains are common. It is uncommon to identify discrete pathology among patients that initially receive a nonspecific diagnosis. The one diagnosis where surgery was the only treatment that would relieve the pain (the nodular fasciitis) among 634 patients that received nonspecific diagnoses (0.16%) was identified four years after the diagnosis of nonspecific pain when the nodule became palpable and visible on MRI (initially it was invisible on an MRI taken 2 years after the initial diagnosis). In other words, the nonspecific became discrete. This indicates that one should remain vigilant while operating under the assumption that most people with nonspecific pain feel better over time and important pathophysiology will rarely be diagnosed later, and when it is it will be discrete and verifiable. At a minimum, these data make the case that nonspecific diagnoses are not harmful and compel us to do the research to determine if nonspecific diagnoses are better for patients than specific diagnoses in the absence of discrete verifiable pathophysiology.

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