

CASE REPORT**It's Not About The Biceps**

Job N. Doornberg, MD, PhD; Jetske Viveen, MD; David Ring, MD, PhD; Annechien Beumer, MD, PhD;
Denise Eygendaal, MD, PhD; Bertram The, MD, PhD

Research performed at Amphia Hospital, Breda, The Netherlands

Received: 04 April 2018

Accepted: 16 May 2018

Abstract

In the biomedical paradigm all symptoms and limitations are ascribed to discrete pathophysiology. However, a biopsychosocial health model that accounts for the important influence of mind-set and circumstances on illness may be preferable in the vast majority of cases. Some of the shortcomings of the biomedical model include an overreliance on tests and treatments. One major issue of the biomedical model is the raging epidemic of opioid misuse and opioid related overdose deaths as previously reported in North America.

Emblematic of these issues is a 56-year-old male that had surgery for a rupture of the distal biceps in our clinic with psychosocial aspects of the illness that were underappreciated by the care team and had disastrous opioidcentric attempts at pain control leading to threats to hospital staff, and finally resulting in forcible removal by hospital security from the ward and national police from the hospital. One might argue that there is no higher priority than rejecting the biomedical model, understanding illness in its full complexity, and learning from the world's mistakes so that we don't repeat them.

Level of evidence: V

Keywords: Elective surgical procedures, Misuse, Opioid, Postoperative pain, Upper extremity

Introduction

Surgery on the distal biceps tendon is discretionary and preference sensitive (1). Patients with acute rupture or pain from tendinopathy need to balance the risks, discomforts, and inconveniences of surgery with the potential gains: 30% greater supination strength after repair of an acute rupture; the untested potential for more rapid relief of pain with surgery for tendinopathy (2-5).

In elective surgery, it may be postulated that patients that request surgery for musculoskeletal symptoms may be less adaptive and resilient than those that do not. The weight of evidence suggests that patients that request surgery have greater symptoms and limitations, and therefore likely greater stress and distress, and less effective coping strategies (6, 7). Surgeons and their patients however tend to think very biomedically and mechanistically: "fix the pathology and the machine will

be restored to good working order and the symptoms will abate" or "more symptoms should be treated with more medication and more surgery". But humans are complex, and this approach doesn't always work out. Consider the "failed back" syndrome for instance, where technically sound and biomechanically and biologically successful surgery does not avoid severe symptoms and disability. Even more important, consider the epidemic of opioid misuse and overdose deaths that can be traced to over prescription of opioids in the United States and Canada—a distressing example of the shortcomings of the biomedical paradigm and the value of the biopsychosocial paradigm of health (8, 9). Praise health care workers if they act on the magnitude of the problem that society is confronted with, and shame on The Netherlands and the rest of the world if they don't take note of these mistakes and do all they can to avert

Corresponding Author: Jetske Viveen, Department of Orthopaedic Surgery, Amphia Hospital, Breda, The Netherlands
Email: jetskeviveen@gmail.com



THE ONLINE VERSION OF THIS ARTICLE
ABJS.MUMS.AC.IR

them (10-13).

In this paper we consider a difficult and demoralizing patient interaction where the care team made several errors including: 1) incomplete psychosocial history; 2) misconceptions about distal biceps pathophysiology based on current confusing and inaccurate terminology; 3) failure to diagnose and treat stress, distress, and ineffective coping strategies; 4) overtreatment of the pathophysiology in this inadequately screened patient; 5) disregard of biomedical reasons to avoid discretionary, preference sensitive surgery; 6) inappropriate delegation of a difficult patient to junior surgeons; 7) incomplete or ineffective communication strategies; 8) misuse of opioids; and 9) a care team with six different independent prescribers of opioids. There is much to learn from our experience, perhaps most importantly that surgeons should be familiar with the biopsychosocial paradigm of health and that the opioid-centric pain management strategies that led to such trouble in North America should be strictly avoided in the rest of the world (9).

Case presentation

A 56-year-old disabled male labourer presented with arm pain. The pain began a month prior, after lifting a heavy box. We did not realize at this point that he was disabled since two years due to post-nephrectomy pain (renal cell cancer, seven years prior) and a suicide attempt upon re-admission for pain syndrome in a neighbouring hospital (one year prior), unrelated to his arm pain. The records indicate that the patient reported “a pop” around his elbow with a subsequent haematoma in his forearm at the time the arm symptoms began. The haematoma was not present upon presentation at our outpatient clinic. He suffered from coronary artery disease with myocardial infarctions eight and nine years prior to presentation treated with endovascular stents and life-long anticoagulant drugs (clopidogrel)—a strong reason to avoid discretionary surgery. The referral letter of his general practitioner noted his diagnosis of major depression, but the antidepressants and the morphine he had been taking were not listed.

The exam was documented as full range of motion, pain in full pronation, and pain on resisted supination, as well as pain on palpation over the distal biceps. The distal biceps could easily be hooked and the neurovascular exam was normal. The provisional diagnosis was distal biceps tear or tendinopathy. Magnetic resonance imaging (MRI) was ordered. The radiologist noted signal changes in the distal biceps described as a “partial tear”. There were also signal changes in the brachialis and common extensor tendons [Figure 1a-e].

Although his symptoms improved while waiting for the MRI, the patient insisted that something needed to be done. He used extreme words such as “unbearable” and displayed non-verbal signs of pain (14). He was convinced that surgery was the only hope for a useful arm. The senior surgeon explained that surgery was discretionary, but may speed recovery, which reinforced the patient’s determination for surgery. An informed consent was signed.

The patient had the option of having surgery with the

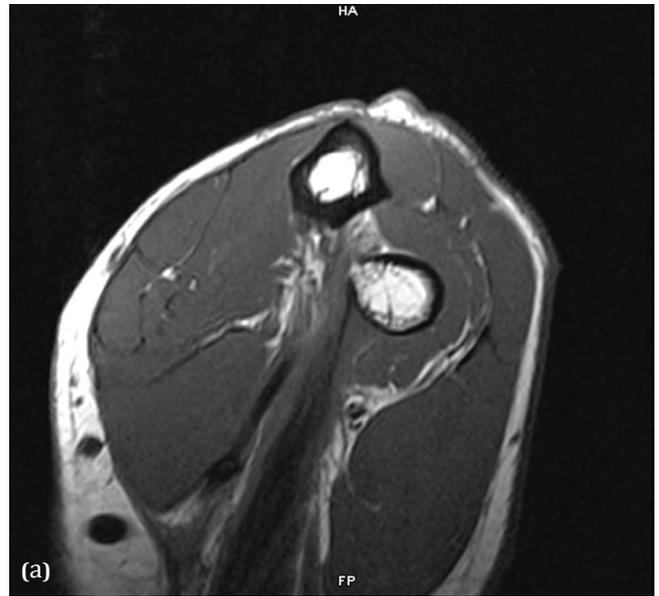


Figure 1a. Flexed Abducted Supinated View MRI T1.

senior surgeon in several months or having surgery within a month with a surgeon-in-training. He opted for the latter. Surgery was performed two months after the pain began. Through a single anterior incision, the distal biceps tendon was confirmed to have tendinopathy. It was detached and reattached to the biceps tuberosity. The elbow was splinted in 90 degrees of flexion and neutral forearm rotation. A neurovascular exam performed in the recovery unit was documented as normal.

Post-op in the hospital his pain was treated with paracetamol 1000 mg four times a day, diclofenac 50 mg three times daily, and tramadol 50 mg three times a day according to hospital protocol. He complained of more pain than expected and was evaluated by a member of the surgical team in the evening after the surgery. On examination there was some numbness in the distribution of the superficial radial nerve distal to the radial styloid. There were no signs of compartment syndrome and post-op radiographs were unremarkable. The tramadol was increased to 50 mg six times daily. In addition, the patient requested and was provided 10 mg intramuscular injections of piritramide (a synthetic opioid used in Europe). Nevertheless, he described the pain as “unbearable”.

As no abnormalities were found, he was discharged with prescriptions for paracetamol, diclofenac, and tramadol, and the day after surgery he was scheduled to return to the office in two weeks. On postoperative day three the patient called our office requesting stronger pain medication. During this phone consult, there was again no suspicion of compartment syndrome or infection. An attempt was made to reassure the patient that pain was part of normal recovery without honouring his request for stronger pain medications. On day five he called again and was asked to come in for physical examination. He



Figure 1b. Flexed Abducted Supinated View MRI T2.

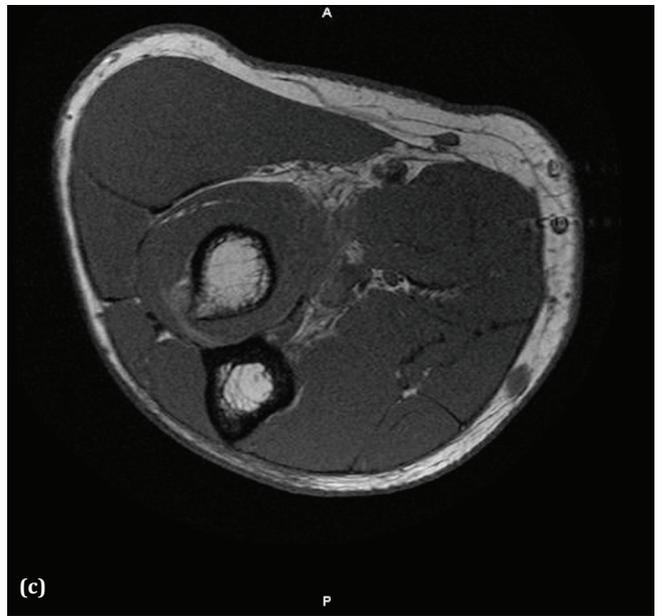


Figure 1c. Coronal View MRI T1.



Figure 1d. Sagittal View MRI T1.

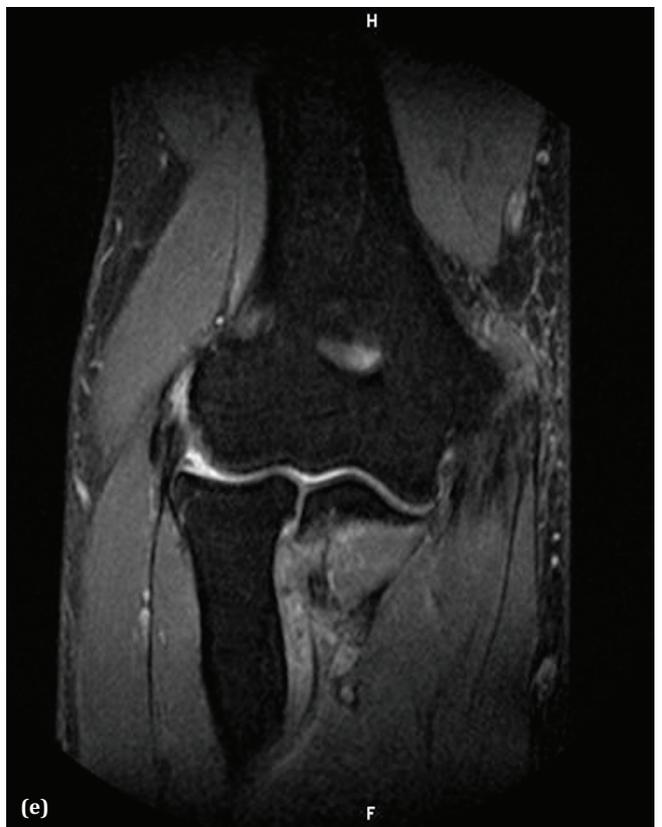


Figure 1e. Water-fat MRI.

was restless, had disproportionate pain, and reported persistent decreased sensibility in the dermatome of the superficial radial nerve. There were no signs of infection or compartment syndrome. Suspected traction neuropraxia of the superficial radial nerve was diagnosed and he was prescribed gabapentin 600 mg once a day.

Twelve days after surgery, the patient returned to the office with similar symptoms. He used the word "excruciating" to describe his symptoms. An explanation of the neuropraxia and expected pain of surgery did not reassure him. The patient kept repeating that he was in pain, that something was wrong, and that something needed to be done. He and his wife felt that they were not being taken seriously and complained how difficult it was to get into the office. In an attempt to satisfy them the gabapentin 600 mg was discontinued and pregabalin 75 mg twice a day was prescribed.

Sixteen days after surgery the patient returned to the outpatient office again still agitated. He described himself as depressed. He started crying in our office and mentioned that every treatment he had ever undergone in his life went wrong. He felt angry and sad and he felt that doctors never took him seriously. He insisted on admission to the hospital until his pain was under control and such was done. Pregabalin was increased to 150 mg twice a day.

The next day the tramadol was replaced by Oxynorm 5 mg 4x/day and Oxycontin 10 mg 2x/day and nortriptyline 25 mg once a day was added by the anaesthesiology pain consultants. This is notable as it would be unusual to see this level of opioid used in The Netherlands until recently (11, 12). Only in 2012, the Dutch Anaesthesiology Association (Nederlandse Vereniging voor Anaesthesiologie - NVvA) revised their 'postoperative pain treatment' practice guideline that dated from 2003 to include oxycodone as an option, although tramadol was still preferred (12). The 2012 'postoperative pain treatment' protocol was approved by the Dutch Orthopaedic Association (Nederlandse Orthopaedische Vereniging - NOV) and the Dutch General Surgery Association (Nederlandse Vereniging voor Heelkunde - NVvH). One wonders whether or not the North American mistakes with opioids (10, 13, 15, 16) were taken into account when revising this protocol.

As one might begin to expect, the opioids did not relieve his pain. In fact, his pain intensity increased (16, 17). The patient came to the nursing station every six hours for his oxycodone. His Oxynorm was raised to six times a day 5 mg and Oxycontin to 10 mg 3x/day on day 18 and he started to come to the nurses' station every 4 hours. In spite of clear evidence that opioids were not effective in relieving his pain, the dosage was increased to a remarkable Oxynorm 10 mg 6x/day, Oxycontin 10 mg 3x/day and combined with benzodiazapines (temazepam 20 mg at night, and lorazepam 1 mg)—something that is strongly discouraged based on a high risk of overdose death (15)—on day 19.

In desperation, unsettled by the disproportionate symptoms and via stress contagion from the patient, we ordered additional tests including radiographs, ultrasound, and electrodiagnostic testing. No new

diagnoses were made. The superficial radial neuropathy was confirmed.

The patient became more and more agitated, increasingly pestered the nurses, and ultimately threatened to kill himself on the 25th day after surgery if his pain could not be resolved. It took this extreme gesture for us to ask for help with the psychosocial aspects of his illness: Psychiatry was consulted.

The psychiatrist diagnosed him with a personality disorder without underlying psychiatric illness. The prior suicide attempt two years earlier was revealed. The psychiatrist did not find an indication for admission to a closed ward as indicated two years prior and scheduled an outpatient follow-up. A discharge was planned.

However, on day 27, hospital security had to remove our patient from the Orthopaedic Surgery Department after attempted physical abuse of nurses, Orthopaedic residents and staff. Upon psychiatric reevaluation, there was again no indication for admission to the closed psychiatric ward according to the psychiatrist. Later that day, police officers had to forcibly remove the patient from the hospital campus when he attempted to abuse staff in the Emergency Department on his way out.

Discussion

In general, orthopaedic surgeons are trained in the biomedical paradigm. Surgeons learn to restore anatomy—to "fix the machine". A surgeons' focus is most commonly on the technical aspects of care. For instance, a surgeon's efforts regarding biceps pathology are generally oriented towards strong fixation of the tendon to the bone while avoiding iatrogenic nerve injury (3-5). When patients present with ruptures or fractures, few surgeons tend to address the psychosocial aspects of the illness according to a biopsychosocial health model. As this patient's course emphasizes, orthopaedic surgeons can benefit from placing equal emphasis on non-technical skills such as recognizing and accounting for the psychosocial aspects of illness; effective communication strategies and opportunities for empathy; appropriateness and shared decision-making; curious and critical reevaluation of current concepts; expecting to err and championing systems that can catch error before it causes harm; caution with medications that are prone to misuse and are deadly (10). In this patient's care there were many reasons to avoid discretionary surgery; there were missed cues (or "red flags") that the biceps was not the priority in treatment; there was excessively biomedical thinking, some of which reinforced stress and maladaptive coping strategies; there were several missed empathic opportunities; and there was an over-reliance on and misuse of opioid medications.

There were several reasons to avoid surgery. When surgery is discretionary and preference sensitive, major medical issues can tip the scales in favour of nonoperative treatment. This patient had coronary artery disease and was on anticoagulant medication that could not be discontinued for surgery. He was at sufficient risk both medically and surgically that one might argue that discretionary surgery should not be considered.

Among the missed cues that the biceps was not the

priority in treatment present in the patient's record were: 1) disabled at 56 years of age; 2) a persistent/chronic pain condition (post-nephrectomy pain); and 3) diagnosed clinical depression. These were overlooked or minimized by the care team. Had we inquired further, we would have identified that he had a prior suicide attempt after hospital admission for unexplained post-nephrectomy pain. This more complete view of the person would have helped take a broader view of his illness and it would have made sense of the disproportionate pain and limitations.

During care, there were missed cues that the biceps pathology was not the priority for this man's health, and missed empathic opportunities and openings where the psychosocial aspects of the illness might have been addressed or at least discussed: 1) the patient 'insisting' that something needed to be done (even as the symptoms improved); 2) the patient using extreme words such as "unbearable" and "excruciating"—words that belie maladaptive coping strategies; 3) the patient's manipulative behaviour—steering treatment towards surgery; 4) the patient's impatience for surgery opting for surgery with a surgeon-in-training because he felt that this discretionary surgery had to be done as soon as possible; 6) the patient's knowledge of and specific request for opioid medication; and 7) immunity to reassurance (inflexible thinking; negative affectivity). The care team felt bullied and pressured but did not speak up or ask for help (14).

There was one major missed opportunity: when the patient opened up and cried with us. He spoke about his anger and sadness, and he shared his feeling that every treatment he had ever undergone in his life went wrong. The feeling that doctors never took him seriously. He was ready to talk about stress and distress. He was asking for help. But the focus remained biomedical: medications, admission to the hospital, and eventually opioids.

There was excessive biomedical thinking. Instead of reading the cues and taking advantage of the opportunities to address stress and distress and develop more effective coping strategies we: 1) ordered magnetic resonance imaging (MRI) in spite of a negative hook test in this particular patient; 2) accepted and used confusing and inaccurate terminology (i.e. signal changes in the distal biceps described as a "partial tear") which reinforced a focus on surgery; 3) offered discretionary surgery as a way to "speed recovery", inadvertently reinforcing maladaptive coping strategies such as catastrophic thinking; 4) treated disproportionate pain (a sign of stress, distress, and less effective coping) with medicine; and 5) replaced the gabapentin with pregabalin rather than addressing psychosocial issues.

Finally, and arguably most importantly, there was an overreliance on opioid medication. This is relatively new in The Netherlands and it is a concerning development that merits careful reconsideration (12). The opioid-centric model of pain management had disastrous consequences in The United States and Canada (10). European caregivers should learn from their mistakes, and cannot repeat them. Opioids are dangerous, prone to misuse, and—at least beyond a certain point—they are

not effective pain relievers. Our patient is emblematic of the problem: opioids are often used to treat psychological and sociological aspects of illness—a situation where they can only make things worse. This would also be in favour of the on-going argument of a National Centralized Electronical Medical Record (EMR) in the Netherlands that facilitates monitoring opioid (mis)use, and in this particular patient may have prevented errors associated with the incomplete psychosocial history.

It's easy for orthopaedic surgeons to overlook the psychosocial aspects of illness. It's not our main focus in training. We are trained to recognize pathophysiology and treat it. In this case MRI-proved tendinopathy of the distal biceps tendon, describe as a partial "tear". We allow the word "tear" and the tradition of offering surgery to unsatisfied patients to seduce us into doing something unwise for the patient. When there are signs of trouble after surgery, our intuitive response is to look for technical (often iatrogenic) and patho-anatomical causes for disproportionate pain and limitations. It is high priority to rule out compartment syndrome and severe infection, and it's also important to rule out technical problems (dislocation, loss of fixation, etc.), but otherwise we have plenty of breathing room while we try to help a patient get comfortable. We placed too much focus on the radial sensory neuroapraxia—a known adverse event associated with distal biceps tendon surgery that is usually transient and either goes unnoticed or is a slight bother.

In the absence of compartment syndrome or necrotizing fasciitis, etc., disproportionate pain and limitations reflect stress, distress, or less effective coping strategies. Pain is the cognitive, emotional, and behavioural response to nociception. The patient had undertreated depression, ineffective coping strategies, and a personality disorder. All of this take priority over treatment of the nociception from the distal biceps no matter the etiology. The biceps could be hooked, so surgery was an option at any time no matter the precise pathophysiology. There was no time pressure. The care did not adhere to Osler's adage that the person that has the disease is more important than the disease the person has. We underappreciated and did not take adequate interest in the patient's disability, depression, persistent pain, ineffective coping strategies, and prior exuberant and irrational behaviour that had the disease. We also missed verbal and nonverbal cues of stress, distress, and ineffective coping strategies.

Until recently The Netherlands (and most of the world) used little or no opioids in the treatment of pain from injury or surgery (11-13). In 2010, most hospitals had post-op pain protocols that included paracetamol, diclofenac, and tramadol. Studies have shown that Dutch patients have similar or superior pain relief compared to Americans taking oxycodone (11). Unfortunately, strong opioids are increasingly used in The Netherlands in spite of this data. In 2016, most Orthopaedic surgeons and anaesthesiologists prescribe paracetamol, diclofenac and oxycodone (immediate and sustained release) (12). The rationale for this may be an increasing number of one-day or (very) short-stay surgery protocols. It is our impression that there is little knowledge of the US and

Canadian epidemic of opioid misuse and opioid overdose deaths among orthopaedic surgeons in the Netherlands and Europe (10). The symposium at the 2015 Orthopaedic Trauma Association on opioid misuse struck most Dutch Surgeons as well as many of the international participants as a surprise. Tracing back the driving forces behind the opioid pain protocol in the Netherlands is difficult, however it seems that Tramadol has—for some reason—developed a reputation for nausea and inadequate pain relief according to anecdotes of both nursing staff and anaesthesiologists although the contrary is supported by evidence (12, 16, 17). This probably represents misinterpretation of and overreaction to decreasing adaptation and resilience in a small percentage of the Dutch population, in addition to more demanding patients. In the United States, these unsatisfied patients contributed to the opioid epidemic by inducing surgeons to provide excessive opioid medication to the average patient, most of which went unused and was diverted and misused (8, 9).

There are better strategies for optimal pain relief. First, each Department or Practice should have a pain relief strategy or policy. This depersonalizes any discussion about medications prone to misuse and makes it much easier to limit their use. Second, pain relief should be discussed prior to scheduling discretionary surgery. It's important that people understand that you care about their comfort. This is an opportunity to remind them that surgery hurts and to help prepare them for an optimal post-operative mind-set ("this hurts, but it's temporary and I'll be fine"). Third, a preoperative screen for symptoms of depression, low pain self-efficacy (high catastrophic thinking), and risk for opioid misuse may identify opportunities for treatment that merit postponement of discretionary surgery. Fourth, the care team's support for a person with post-operative pain can be scripted for optimal empathy and the most effective communication strategies. These are difficult discussions that do not come naturally. The entire care team will benefit from on going training and practice—this should be a major focus and key priority. Finally, when opportunities are identified, the care team needs to provide optimal empathy and support and needs options for help from psychology and psychiatry collaborators.

This is very difficult when patients lack insight. They are liable to be very offended. This is a critical conversation that must be planned and practiced. The conversation is easier prior to surgery than it is after. Don't ignore any warning signs prior to discretionary surgery.

Orthopaedic surgeon training should emphasize the psychosocial aspects of illness. Nontechnical skills should receive as much emphasis as technical skills. Discretionary surgery should be considered sacred—the utmost trust between a person seeking care and the one who wants to provide care. Discretionary surgery should ideally be delayed until other opportunities for good health are identified and treatment initiated. Tests and treatments have substantial capacity for harm. Opioids in particular are addictive and deadly. Opioids should be used in the lowest dose possible, for the shortest time, mostly for sleep, and all extra pills should be discarded in safe manner that limits the potential for diversion or misuse.

Disclosure: The authors report no conflict of interest concerning the materials or methods used in this study or the findings specified in this paper.

Job N. Doornberg MD PhD
Denise Eygendaal MD PhD
Department of Orthopaedic Surgery, Amphia Hospital,
Breda, The Netherlands
Department of Orthopaedic Surgery, Academic Medical
Center Amsterdam, The Netherlands

Jetske Viveen MD
Annechien Beumer MD PhD
Bertram The MD PhD
Department of Orthopaedic Surgery, Amphia Hospital,
Breda, The Netherlands

David Ring MD PhD
Comprehensive Care Dell Medical School University of
Texas, Austin, TX, USA

References

1. Ring D, Lubahn JD, Beredjiklian P. Clinical faceoff: distal biceps rupture: operative versus nonoperative treatment. *Clin Orthop Relat Res.* 2017; 475(2):324-7.
2. Beks RB, Claessen FM, Oh LS, Ring D, Chen NC. Factors associated with adverse events after distal biceps tendon repair or reconstruction. *J Shoulder Elbow Surg.* 2016; 25(8):1229-34.
3. Kodde IF, Baerveldt RC, Mulder PG, Eygendaal D, van den Bekerom MP. Refixation techniques and approaches for distal biceps tendon ruptures: a systematic review of clinical studies. *J Shoulder Elbow Surg.* 2016; 25(2):e29-37.
4. Watson JN, Moretti VM, Schwindel L, Hutchinson MR. Repair techniques for acute distal biceps tendon ruptures: a systematic review. *J Bone Joint Surg Am.* 2014; 96(24):2086-90.

5. Kokkalis ZT, Ballas EG, Mavrogenis AF, Soucacos PN. Distal biceps and triceps ruptures. *Injury*. 2013; 44(3):318-22.
6. Kortlever JT, Janssen SJ, van Berckel MM, Ring D, Vranceanu AM. What is the most useful questionnaire for measurement of coping strategies in response to nociception? *Clin Orthop Relat Res*. 2015; 473(11):3511-8.
7. Vranceanu AM, Hageman M, Strooker J, ter Meulen D, Vrahas M, Ring D. A preliminary RCT of a mind body skills based intervention addressing mood and coping strategies in patients with acute orthopaedic trauma. *Injury*. 2015; 46(4):552-7.
8. Dowell D, Haegerich TM, Chou R. CDC Guideline for prescribing opioids for chronic pain--United States, 2016. *JAMA*. 2016; 315(15):1624-45.
9. Olsen Y. The CDC guideline on opioid prescribing: rising to the challenge. *JAMA*. 2016; 315(15):1577-9.
10. Morris BJ, Mir HR. The opioid epidemic: impact on orthopaedic surgery. *J Am Acad Orthop Surg*. 2015; 23(5):267-71.
11. Lindenhovius AL, Helmerhorst GT, Schnellen AC, Vrahas M, Ring D, Kloen P. Differences in prescription of narcotic pain medication after operative treatment of hip and ankle fractures in the United States and The Netherlands. *J Trauma*. 2009; 67(1):160-4.
12. Houweling PL, Molag ML, van Boekel RL, Verbrugge SJ, van Haelst IM, Hollmann MW. 'Postoperative pain treatment' practice guideline revised. *Ned Tijdschr Geneeskd*. 2013; 157(49):A7005.
13. Helmerhorst GT, Vranceanu AM, Vrahas M, Smith M, Ring D. Risk factors for continued opioid use one to two months after surgery for musculoskeletal trauma. *J Bone Joint Surg Am*. 2014; 96(6):495-9.
14. van Dijk PA, Bot AG, Neuhaus V, Mudgal CS, Ring D. The correlation of phrases and feelings with disability. *Hand (N Y)*. 2014; 9(1):67-74.
15. Menendez ME, Ring D, Bateman BT. Preoperative opioid misuse is associated with increased morbidity and mortality after elective orthopaedic surgery. *Clin Orthop Relat Res*. 2015; 473(7):2402-12.
16. Bot AG, Bekkers S, Arnstein PM, Smith RM, Ring D. Opioid use after fracture surgery correlates with pain intensity and satisfaction with pain relief. *Clin Orthop Relat Res*. 2014; 472(8):2542-9.
17. Nota SP, Spit SA, Voskuyl T, Bot AG, Hageman MG, Ring D. Opioid use, satisfaction, and pain intensity after orthopedic surgery. *Psychosomatics*. 2015; 56(5):479-85.