Acupuncture gone awry: a case report of a patient who required surgical removal of two single-use filament needles following acupuncture treatment

Drew D. Snyder

Youngstown State University, Youngstown, OH, USA

ABSTRACT

Background: Acupuncture and dry needling are increasingly popular treatment modalities used to treat pain around the world. This case report documents the clinical history of a patient who presented to an outpatient physical therapy clinic following surgical removal of two single-use filament needles that fractured in the patient's neck during acupuncture treatment.

Case Description: The purpose of this case report was to highlight a rare adverse event following acupuncture treatment. The patient received the acupuncture treatment from a practitioner licensed in acupuncture, while on an international business trip. Following the acupuncture treatment, the practitioner realized that a needle had fractured and remained in the patient's neck. After failing to retrieve the needle, the patient was sent for imaging. Radiograph revealed that the patient had two needle fragments located in his cervical tissue. After determining that the needles did not pose an immediate threat, the patient boarded a flight home to the United States. Following his flight, the patient presented to an American hospital where it was discovered that the needle fragments had migrated during the flight, with one needle now located 2 mm from the patient's vertebral artery. Surgical intervention was required to retrieve the needles, resulting in the patient needing physical therapy to increase cervical range of motion and mediate pain relief.

Outcomes: The patient suffered a setback in his treatment of chronic neck pain that resulted in decreased cervical range of motion and increased pain.

Discussion: Clinicians utilizing single-use filiform needles in their practice, whether for acupuncture or dry needling, should be aware of the potential for this type of adverse event. Further, to minimize the risk of similar adverse events occurring in the future, clinicians should make sure that they are using high quality needles and make a habit of counting in and counting out the needles that they use to verify that all needles are accounted for.

KEYWORDS

Acupuncture; dry needling; filiform needles; adverse events; acupuncturist; physical therapy; chronic neck pain; complications

Background

Western medical acupuncture is an adaptation of Chinese acupuncture. Acupuncture involves the insertion of fine needles into the body, which act to stimulate the nervous system, primarily to treat musculoskeletal pain, such as myofascial trigger point pain [1]. Acupuncture is growing in popularity in the United States, rising to the third most frequently used alternative medical therapy for low back pain [2]. The last National Health Interview Survey (2012) revealed that almost three and a half million American adults received acupuncture therapy within the previous 12 months, representing over a 60% increase from just ten years earlier [3].

Acupuncture is a treatment modality that has existed for over 2000 years, with the first documented evidence of a description of acupuncture being found in 'The Yellow Emperor's Classic of Internal Medicine,' dating to 100 BCE [4]. Over the past 2000 years, not only has the underlying philosophy of acupuncture changed [1], but so too have the instruments used in

the practice. Originally, acupuncture needles were manufactured for reuse. However, following an outbreak of hepatitis B in the United Kingdom in 1977, single-use disposable filiform needles were brought to market to mitigate this risk [5].

The safety of acupuncture has been widely reported in the literature [6–8]. However, as with all forms of treatment, there are inherent risks to acupuncture. The most commonly reported adverse events (AE) related to acupuncture include localized pain, slight bleeding, and hematoma [7]. However, more serious AE have been reported, with one study finding that acupuncture resulted in 0.5 serious AE per 10,000 treatments [6]. Examples of serious AE resulting from acupuncture include cardiac tamponade [9], bladder stones [10], neurologic changes [11], subarachnoid hemorrhage [12], and death [7]. Additionally, some individuals have required surgical intervention to mitigate the effects of the AE from acupuncture [7].

While physical therapists do not perform acupuncture, they do use dry needling in their practice [13]. Like acupuncture, the practice of dry needling has

grown rapidly in popularity around the world to treat pain [14]. Dry needling involves the insertion of needles into tender points in the body, often at myofascial trigger points [14]. While there is debate in the literature regarding the differences between dry needling and acupuncture, both practices utilize single-use disposable filiform needles [15]. Therefore, AE resulting from the use of single-use disposable filiform needles should be of interest both to acupuncturists and health-care professionals practicing dry needling.

In addition to the AE listed above as a result of acupuncture, previous case studies have documented AE where either acupuncture needles or single-use disposable filiform needles have been found in patients' bodies, including in the abdomen [16], superciliary arch [17], left ventricle [18], right ventricle [9], lung [19], duodenum [20], bladder [10], ureter [21], lumbar spinal canal [22], the L5 nerve root [23], upper cervical spinal nerve root [12], medulla oblongata [24], median nerve [25], and throat [26]. This case study describes another such AE suffered by a patient presenting to a physical therapy clinic after having two fragments of single-use disposable filiform needles surgically removed from his neck, with one of the fragmented needles having migrated over three centimeters from its original location to within two millimeters of the patient's vertebral artery following his international airplane flight.

Case description

This case involves a 52-year-old male who was previously receiving ongoing physical therapy treatment as part of a multi-disciplinary approach to chronic neck pain and decreased cervical neck range of motion. In August of 2016, the patient returned to an outpatient orthopedic physical therapy clinic four days following surgery to remove two equal length fragments of two different single-use disposable filiform acupuncture needles from his neck. Following the surgery, the patient was found to have significantly decreased cervical range of motion and increased reports of pain compared to the period immediately preceding the surgery to remove the acupuncture needles. The patient consented to continued treatment at the physical therapy clinic, and shortly thereafter, agreed to have this case report published to document this unique AE resulting from his acupuncture treatment.

In August of 2016, the patient received two acupuncture treatments while on an international business trip from a practitioner licensed to provide acupuncture. The patient had been receiving acupuncture treatments for 'many years' prior to the incident as a treatment for his chronic neck pain. The patient reported that he had received

acupuncture treatments from the same practitioner prior to the incident and had experienced 'good success' from the treatments. During a treatment session in early August, the acupuncturist used an approach in which multiple needles were inserted into the patient's neck with the goal of stimulating pain relief. During the treatment, one of the acupuncture needles fractured in the patient's neck in the right paraspinal region, near the C1-C2 junction. The acupuncturist immediately attempted to retrieve the needle with a pair of tweezers, but his attempt failed as the needle was too deep to retrieve.

Following the failed retrieval attempt, the acupuncturist immediately sent the patient to the hospital to have a radiograph performed. Upon viewing the radiograph, it was discovered that there were two needles that had fractured in the patient's neck. The known needle was discovered near the C1-C2 junction (Needle 1), while a previously unknown second needle was discovered abutting the left facet of the C6-C7 segment (Needle 2). During a later physical therapy session, the patient reported that he believed that the second needle had fractured during a treatment that he had received four days prior to Needle 1 fracturing. Per patient report, he experienced an unfamiliar pain following the initial acupuncture treatment near the location where Needle 2 appeared on radiograph. The images revealed that neither of the needles posed an immediate threat to the patient, at which time he was discharged for his flight home to the United States, where he would have the needles removed.

The patient boarded his flight less than three hours following his acupuncture treatment and trip to the hospital for x-rays. The patient reported that when he boarded the plane that there was a palpable lump in his neck at the site of Needle 1. However, less than two hours into the flight, the palpable lump had disappeared. After returning to the US, he went to a hospital where radiographs, a fluoroscope, sonogram, and MRI studies were performed. Following these imaging studies, it was revealed that Needle 1 had migrated three centimeters from its original insertion site and settled two millimeters from the patient's right vertebral artery. Needle 2 was found vertically oriented abutting the left C6-C7 facet.

The needles were surgically removed one week after returning to the US. The surgery required the patient to undergo general endotracheal anesthesia. Needle 1 was removed following dissection into the superficial region of the patient's neck. Needle 2, however, had settled much deeper in the patient's neck, requiring the surgeons to dissect bluntly into both the superficial and deep cervical fascial layers. The surgeons were able to locate Needle 2 where it

abutted the C6-C7 facet and remove it. Upon comparison of the needles, the surgeon report states that both needles were found to be of equal lengths. The surgeons reported no apparent intraoperative complications, and the patient was subsequently released from the hospital with an order for physical therapy to restore general cervical ROM. (All information about the surgical procedure was obtained through a surgical report provided to the physical therapist by the patient.)

Outcomes

The patient was seen in the clinic two days per week, and physical therapy interventions included scar tissue mobilization, passive accessory joint mobilizations, and muscle-energy techniques for increased ROM. Additionally, the patient completed a home exercise program that included swimming and gym exercises completed three to four days per week. After 14 weeks of physical therapy, goniometric measurements recording the patient's cervical ROM in right (75.0° degrees) and left (68.0°) rotation, right (55.0°) and left (55.0°) lateral flexion, cervical flexion (45.0°) and cervical extension (50.0°) had returned to the ranges documented prior to the patient's surgical procedure to have the needle fragments removed due to the acupuncture AE. Unfortunately, goniometric measurements from the initial session following the surgical procedure in August of 2016 were not available. The patient continued to receive treatment following the attainment of the above measurements as part of continued care to help control the chronic neck pain and decreased ROM that preceded the AE discussed in this case report.

Discussion

Upon researching this case, it was discovered that this was not the first case in which a patient had a needle fragment discovered in their body following acupuncture treatment [7,9–12,16–27]. In the United States, acupuncture needles (single-use disposable filiform needles) are regulated by the Federal Department of Agriculture as a 'medical device,' requiring only that the needles must be biocompatible and sterile [28]. Globally, the International Organization of Standardization (the ISO), a worldwide federation of national standards bodies, provides an international standard for single use filiform needles that describe guidelines and evaluation methods for the intensity and sharpness of needle tips, as well as qualitative and quantitative evaluation methods used to determine the puncture performance of the needle tip. Additionally, the ISO publishes standards for material requirements, packaging, and labeling.

However, any local rules or regulations take precedence over conflicting ISO standards [29]. With single-use disposable filiform needles serving as such a common treatment modality for both acupuncture and dry needling [15], it is important to consider the quality of the needles and investigate the conditions that are most likely to result in needles fracturing to assure that these types of events do not occur in the future.

While serious AE from acupuncture and dry needling are rare [6–8,30], the rapidly increasing use of both acupuncture and dry-needling increase the potential of similar AE occurring in the future. Recently, researchers have begun to investigate the quality of single-use disposable filiform needles [5,31–33] to identify potential causes of needles fracturing. Two of these studies used electron microscopy and found that imperfections such as bent needle tips and foreign loose metallic bodies on the needle tips could potentially account for the milder AE such as bleeding, hematoma, and skin irritation [5,31]. Another study investigated the relationship between buckling of single-use filament needles and handle type, revealing that a plastic handled needle had an almost 50% greater average buckling force than needles with a copper coil handle [32]. The final study investigated static compression forces applied to a filiform acupuncture needle and found that the needles did not break with a compression rate of 10mm/min but were permanently bent [33]. While this final study concluded that needle fractures were unlikely to happen, numerous case studies prove these fractures are possible. The World Health Organization notes that breaks in acupuncture needles may arise from poor quality manufacture, erosion between the shaft and the handle, strong muscle spasm, sudden movement of the patient, incorrect withdrawal of a stuck or bent needle, or the prolonged use of galvanic current [34]. Further studies into the quality of these can help inform new standards for single-use filiform needles to prevent similar cases in the future.

Conclusion

While acupuncture and dry needling present a very low risk of serious AE [6–8,30], there are risks involved. To prevent similar AE to this case in the future, we recommend investigating the quality of the needles to assure that there are no visible defects in the needle (such as a bent tip) before inserting the needle into the patient's body. When inserting the needles, clinicians may consider leaving more than just the needle handle exposed above the skin, so that if the needle breaks where the needle and shaft come together, part of the needle will remain exposed for retrieval. Clinicians

should also 'count in' and 'count out' the needles used during an acupuncture or dry needling session to assure that all needles are accounted for and that no needles unknowingly remain in the patient's body. Finally, clinicians should be aware of the manufacturing process of the needles that they use in clinical practice to assure that they are selecting the highest quality needles for the dry needling or acupuncture treatments.

Acupuncture and dry needling using single-use disposable filiform needles are very safe treatment options with relatively few serious AE documented. However, these treatments are not without any risk. The recommendations made above can help to further reduce the risk of similar serious AE in the future.

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Data Availability

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Notes on contributor

Drew D. Snyder is a licensed physical therapist working as a PRN physical therapist at UH Avon Rehab Hospital in Avon, Ohio while pursuing a law degree from Case Western Reserve University in Cleveland, Ohio. Drew received his Doctorate in Physical Therapy from Youngstown State University in 2017. Currently, he serves as the Chair of the Ohio Physical Therapy Association's Early Professional Special Interest Group.

References

- [1] Adrian W. Western medical acupuncture: a definition. *Acupuncture Med.* 2009;27(1):33–35.
- [2] Cherkin DC, Sherman KJ, Deyo RA, et al. A review of the evidence for the effectiveness, safety, and cost of acupuncture, massage therapy, and spinal manipulation for back pain. *Ann Intern Med.* 2003;138(11):898–906.
- [3] Clarke TC, Nahin RL, Barnes PM, et al. Use of complementary health approaches for musculoskeletal pain disorders among adults: United States, 2012. *Natl Health Stat Report.* 2016; CDC's National Health Statistics Report number 98:1–12.
- [4] White A, Ernst E. A brief history of acupuncture. *Rheumatology.* 2004;43(5):662–663.
- [5] Hayhoe S, McCrossan M, Smith A, et al. Single-use acupuncture needles: scanning electron-microscopy of needle-tips. *Acupuncture Med.* 2002;20(1):11–18.
- [6] White A. A cumulative review of the range and incidence of significant adverse events associated with acupuncture. *Acupuncture Med.* 2004;22(3):122–133.
- [7] Zhang J, Shang H, Gao X, et al. Acupuncture-related adverse events: a systematic review of the Chinese literature. *Bull World Health Organ.* 2010;88:915–921.
- [8] Lao L, Hamilton GR, Fu J, et al. Is acupuncture safe? A systematic review of case reports. *Altern Ther Health Med.* 2003;9(1):72–127.
- [9] Park JH, Shin HJ, Choo SJ, et al. Successful removal of migrated acupuncture needles in a patient with cardiac tamponade by means of intraoperative transesophageal echocardiographic assistance. *J Thorac Cardiovasc Surg.* 2005;130(1):210–212.
- [10] Izumi K, Takizawa A, Udagawa K, et al. Bladder stone secondary to migration of an acupuncture needle. *Hinyokika Kiyo.* 2008;54(5):365–367.
- [11] Hasegawa O, Shibuya K, Suzuki Y, et al. Acupuncture needles, straying in the central nervous system and presenting neurological signs and symptoms. *Clin Neurol.* 1990;30(10):1109–1113.
- [12] Murata K, Nishio A, Nisikawa M, et al. Subarachnoid hemorrhage and spinal root injury caused by acupuncture needle. *Neurol Med Chir (Tokyo).* 1990;30(12):956–959.
- [13] Ries E. Dry needling: getting to the point. [cited 2019 Jan 5]. Available from: <http://www.apta.org/ptinmotion/2015/5/dryneedling/>
- [14] Legge D. A history of dry needling. *J Musculoskelet Pain.* 2014;22(3):301–307.
- [15] Zhou K, Ma Y, Brogan MS. Dry needling versus acupuncture: the ongoing debate. *Acupuncture Med.* 2015;33(6):485–490.
- [16] He AQ, Li KY, Liu G. A rare cause of abdominal pain. *Gastroenterology.* 2017;152(8):1841–1842.
- [17] Jin YL, Jiang X. Foreign bodies of external nose and forehead: a case report. *J Clin Otorhinolaryngology Head Neck Surg.* 2016;30(24):1973.
- [18] Wigger O, Stortecky S, Most H, et al. Cardiac perforation as a rare complication of acupuncture. *Eur Heart J.* 2015;37(17):1383.
- [19] Scharf ML, Kommuri A. Delayed recognition of an uncommon cause of iatrogenic pneumothorax. *J Bronchology Interv Pulmonol.* 2015;22(2):162–164.
- [20] Yun JM, Moon W, Roh JH. Endoscopic removal of an impacted acupuncture needle in the duodenum. *Endoscopy.* 2012;44(S 02):E106–E107.
- [21] Yuzawa M, Hara Y, Kobayashi Y, et al. Foreign body stone of the ureter as a complication of acupuncture: report of a case. *Hinyokika Kiyo.* 1991;37(10):1323–1327.
- [22] Ulloth JE, Haines SJ. Acupuncture needles causing lumbar cerebrospinal fluid fistula: case report. *J Neurosurg.* 2007;6(6):567–569.
- [23] Patrick BS. Acupuncture complication – a case report. *J Mississippi State Med Assoc.* 2005;46(7):195–197.
- [24] Hama Y, Kaji T. A migrated acupuncture needle in the medulla oblongata. *Arch Neurol.* 2004;61(10):1608.
- [25] Southworth SR, Hartwig RH. Foreign body in the median nerve: a complication of acupuncture. *J Hand Surg.* 1990;15(1):111–112.
- [26] Chaput JM, Foster T. Pain in the neck-the enigmatic presentation of an embedded acupuncture needle. *West J Emergency Med.* 2010;11(2):144–145.
- [27] Lewek P, Lewek J, Kardas P. An acupuncture needle remaining in a lung for 17 years: case study and review. *Acupuncture Med.* 2012;30(3):229–232.

- [28] 21 C.F.R. § 880.5580.
- [29] ISO 17218:2014(en) sterile acupuncture needles for single use [Internet]. International Organization for Standardization; [cited 2019 Jan 5]. Available from: <https://www.iso.org/obp/ui/#iso:std:iso:17218:ed-1:v1:en>
- [30] Brady S, McEvoy J, Dommerholt J, et al. Adverse events following trigger point dry needling: a prospective survey of chartered physiotherapists. *J Man Manip Ther.* 2014;22(3):134–140.
- [31] Xie YM, Xu S, Zhang CS, et al. Examination of surface conditions and other physical properties of commonly used stainless steel acupuncture needles. *Acupuncture Med.* 2014;32:146–154. acupmed-2013.
- [32] Zhang CS, Pannirselvan M, Xue CC, et al. Relationship between buckling of acupuncture needles and the handle type. *Acupuncture Med.* 2014;32:400–405. acupmed-2014.
- [33] Leow MQH, Cao T, Wong YR, et al. Needle breakage in acupuncture: a biomechanical study. *Acupuncture Med.* 2017;35(1):78–79.
- [34] World Health Organization. Guidelines on basic training and safety in acupuncture (No. WHO/EDM/TRM/99.1). Geneva: World Health Organization; 1999.