Lumbar Compression Fracture Caused by Cardioversion

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Conflict of interest: None declared

Patient: Male, 46-year-old
Final Diagnosis: Lumbar compression fracture
Symptoms: Low back pain
Medication: —
Clinical Procedure: Cardioversion
Specialty: Family Medicine

Objective: Diagnostic/therapeutic accidents

Background: Cardioversion is a safe, commonly used procedure throughout the world. It is performed over 30,000 times per year in the United States, specifically for atrial fibrillation. Procedural risks from cardioversion include clot dislodgement, sedation effects, site pain, burns, hypotension, dysrhythmias, or heart failure. Generally, back pain is considered to be simple muscle soreness, and cardioversion consents therefore do not include discussion of back injuries.

Case Report: A 46-year-old man with no prior back pain or injury history underwent a planned synchronized cardioversion for atrial fibrillation. He immediately reported new back pain following the procedure. No unusual event such as a fall occurred near the time of the procedure, but upon evaluation, he was found to have a new lumbar compression fracture that caused incapacitating pain for more than 6 weeks.

Conclusions: Cardioversion has been found to be a safe, effective treatment for atrial fibrillation. Adverse effects are generally minor, and the frequency of adverse effects appear to be low overall. The case reported here represents a rare, but possibly underreported adverse effect, namely, lumbar compression fracture due to cardioversion. Patients should be counseled on the possibility of back injury, even compression fracture, as a result of cardioversion. It would also be prudent to broaden the differential diagnosis possibilities should a patient complain of back pain after cardioversion.

MeSH Keywords: Electric Countershock • Fractures, Compression • Intraoperative Complications

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Background

Approximately 30,000 cardioversion procedures are performed annually in the United States for atrial fibrillation alone [1]. Cardioversion is generally safe, and it is well indicated for several cardiac conditions. Procedural risks from cardioversion include clot dislodgement, sedation effects, site pain, burns, hypotension, dysrythmias, or heart failure. Typically, a transesophageal echocardiogram is done prior to the procedure to ensure that no clots are present within the heart. Postprocedural back pain is often considered to be simple muscle soreness. Therefore, cardioversion consents do not include a discussion of potential back injuries. This case highlights a possible major adverse effect that should be considered in the differential diagnosis of pain that occurs after cardioversion.

Case Report

A 46-year-old man with frequent atrial fibrillation symptoms that were refractory to medical management underwent synchronized cardioversion. He presented with palpitations and a heart rate in the range of 120 to 130 beats per minute. His vital signs were otherwise normal. His weight was weighed 137 kg, his height was 1.9 m, and his body mass index was 38.9 kg/m². Laboratory test results on the morning of the procedure revealed normal values for calcium, magnesium, creatinine, hematocrit, troponin, and international normalized ratio. Following an unremarkable transesophageal echocardiogram, he was cardioverted with pads placed on the anterior chest and midback to a normal sinus rhythm with 1 shock at 200 J. The procedure and recovery were uneventful, but immediately upon coming out of procedural sedation, he reported new severe low back pain. The procedure had not been complicated by any mishap, fall, or traumatic injury.

The patient’s past medical history included atrial fibrillation and nephrolithiasis. He had no history of back pain, and his electronic medical record did not show any medical encounters for back issues in the previous 12 years. His only surgery was cholecystectomy. The medication list included diltiazem 240 mg (extended release) daily and apixaban 5 mg twice a day. He used smokeless tobacco (one-quarter tin daily), and his alcohol use was normal based on his AUDIT-C score.

Differential diagnoses included lumbar back strain, myofascial pain, preexisting condition, herniated disc, pathological fracture, and injury-related lumbar fracture.

The initial assessment suggested probable back spasms while the patient was recovering from sedation, and he was treated with acetaminophen, transdermal lidocaine, and cyclobenzaprine. He later tried diclofenac gel and injectable ketorolac without any relief. Auricular acupuncture and cupping provided relief so that he could stand and walk relatively pain free. Diazepam helped slightly for sleeping, but his sleep was poor due to pain associated with any sitting or lying position.

He continued to have severe pain regardless of position. Due to the ongoing, poorly relieved symptoms, an X-ray was obtained and showed an L1 vertebral anterior wedge compression fracture with 30% compression. No bony tumor was seen. On X-ray, the bones appeared normal, and owing to the patient’s history, sex, and body habitus, osteoporosis did not appear to be a factor. Lumbar magnetic resonance imaging confirmed the L1 compression fracture with 50% anterior to mid-vertebral body loss of height, marrow edema in the upper 50% of L1, endplate edema, and L4–L5 mild disc bulge with mild left foraminal stenosis (Figure 1). No osteoporotic change, pathologic lesion, or posterior compromise was noted. Testing for testosterone, 25-hydroxy vitamin D, thyroid functions, hemoglobin A₁c, and glucose repeat yielded normal results.

The patient needed diazepam or hydrocodone and acetaminophen in order to get any sleep for over 6 weeks after the procedure. Even after 6 weeks, he was unable to sleep well or to tolerate any pressure against the L1 vertebra due to pain. Furthermore, he had progressive L1–L2 bilateral sensory neuropathy that worsened over time and spread to his thighs and testicles. As a consequence, he was referred to neurosurgery and treated with gabapentin. The severe pain started to subside after 7 weeks.

Figure 1. Magnetic resonance imaging scan illustrating the patient’s lumbar compression fracture.
Conclusions

Cardioversion is commonly performed for atrial fibrillation to reduce the risk of stroke and is successful in 67% to 91% of cases [2], with variability related to the amount of energy delivered and duration of symptoms. The risks commonly associated with cardioversion include clot dislodgement potentially resulting in a stroke; sedation adverse effects, such as aspiration or respiratory depression; shock site pain; burns; transient hypotension; other dysrhythmias; heart failure or injury; or skin damage. A recent assessment of the safety of cardioversion for acute atrial fibrillation indicated that among 419 cases, iatrogenic hyponatremia occurred in 1 case, but there were no reports of strokes, major bleeding, serious dysrhythmias, or peripheral thromboembolism [3]. The study noted 9 first- or second-degree burns, which were attributed to a batch of faulty pads. Typical risk factors for vertebral compression fractures are osteoporosis, estrogen deficiency, falls, trauma, low body mass index, tobacco use, frailty, impaired eyesight and impaired physical activity increasing fall risk, malignancy, calcium deficiency, and vitamin D deficiency [4]. Tonic-clonic seizures have also been known to cause lumbar compression fractures. The patient in the current report had none of these risk factors other than light tobacco use.

Lumbar compression fractures are most commonly caused by osteoporosis or trauma, such as from falls or accidents. The only 2 cases of vertebral fractures from electrical energy found on a PubMed literature search were a 1987 case in Italy due to a direct current defibrillation for ventricular fibrillation [5] and a 1983 case in Brazil, which had no available English abstract [6]. One other case found via an online search was from 1968; it involved 21 shocks, most at maximal energy settings [7]. The first shock in that case was for a slow idioventricular rhythm, and the last 20 were for ventricular fibrillation. Of the 2 reviewable cases in the literature, both involved treatments for ventricular fibrillation and stronger defibrillation energies.

Cardioversion for atrial fibrillation is overall a safe, effective procedure. The case presented here is unique in that a rare complication of cardioversion occurred with the delivery of much lower electrical energy than in prior reported cases. It is possible that this adverse effect of cardioversion occurs periodically, but it is not reported. Counseling patients on this possible, rare adverse effect would be prudent, especially in patients at higher risk, such as those with low bone density. Vertebral compression fracture should be included in the differential diagnoses for severe back pain after cardioversion procedures.

Statement

The views expressed in this article do not represent the views of the United States Air Force or the Department of Defense.

Conflicts of interest

None.

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