A Practice Changer for Cardioversion in Obesity

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An emergency physician we know recently had a challenge. A very big challenge. Under the care of Akhila Pamula, MD, was a large man—6'5" and 500 pounds—who presented with palpitations. And diaphoresis. And a heart rate higher than 200 bpm, which surely contributed to him feeling a bit winded.

Dr. Pamula was not quite sure of the rhythm, but knew it was fast and labile with runs of what could be ventricular tachycardia. She knew that this gentleman needed emergent cardioversion and that sedation would be a significant risk. She also knew that cardioversion can be difficult in obese patients, with historical failure rates of 10 percent and higher. (*Europace*. 2018. doi: 10.1093/europace/euy285; *Europace.* 2012;14[5]:666; *Heart* 2008;94[7]:884.)

The Evidence

What is the best approach to electrical cardioversion of atrial dysrhythmias in the obese patient? This is a growing and evolving area in the literature. Ramirez, et al., reported tremendous success across all body habitus of a four-step approach to cardioversion for atrial fibrillation (AF). (*Europace.* 2018. doi: 10.1093/europace/euy285.) Step 1: 200 J biphasic shock delivered using anteroposterior self-adhesive electrodes; step 2: 200 J shock with anterolateral configuration while applying pressure over the electrodes with disconnected standard handheld paddles; step 3: 360 J biphasic shock delivered using the same technique as in step 2; step 4, wild type: at the treating physician's discretion.

This protocol—the Ottawa AF cardioversion protocol, or OAFCP—was associated with a 99 percent (386/389) cardioversion rate, which was sustained in 91.4 percent and remained significantly improved compared with prior practice even when adjusted for confounding factors such as body mass index (BMI) and transthoracic impedance. Of note, a stunning 50 percent of their enrolled patients met the criteria for obesity with a mean BMI of 31.1 (+/- 7.5). The OAFCP protocol would seem to be a reasonable choice for morbidly obese cardioversion, but what about evidence specifically tailored to this demographic? You are in luck!

Voskoboinik, et al., compared shock success in obese patients (BMI ≥30) with persistent AF randomized to receive transthoracic synchronized biphasic direct-current cardioversion by handheld paddles or by adhesive patches. (*J Cardiovasc Electrophysiol.* 2019;30[2]:155; http://bit.ly/2Ty50AB.) The superiority of paddles over patches after the initial shock of 100 J, then 200 J if needed, was remarkable—90 percent (56/62) v. 68 percent (43/63), respectively. The authors drew a sensible conclusion: "Routine use of adhesive patches at 200 J is inadequate in obesity."

The Ottawa AF cardioversion protocol was associated with a 99 percent cardioversion rate

Interestingly, the success in this study was unaffected by electrode location and vector (anteroapical v. anteroposterior), which contradicts other studies. This investigation included a substudy of manual pressure augmentation (MPA), where they found MPA to be 80 percent effective in 20 patients who had failed to respond to 200 J with patches and paddles. The MPA technique seems simple enough—apply manual force to the adhesive patches with gloved hands for cardioversion during end-exhalation. Furthermore, it was safe and caused no injury to the physician. The trial did not directly compare initial augmented patch use with initial paddle use, but one could reasonably argue that physicians who lack handheld paddles should start with patches and MPA at 200 J. This, however, awaits formal evaluation.

The Verdict

Back to Dr. Pamula's diaphoretic and tachycardic challenge. Given the uncertainty of the rhythm, she gave 12 mg adenosine, which briefly slowed his heart rate and demonstrated atrial tachycardia—P waves, some with different morphologies. Before long, his heart rate ramped back up, and he became more diaphoretic and, though his blood pressure was stable, it seemed unlikely that it would hold.

Sedation seemed risky, given his size and difficult airway assessment. After a brief shared decision-making discussion, the patient opted for cardioversion with light midazolam and a variation of manual pressure augmentation. Using 15 pounds of Zimmer sand bag weights rather than manual pressure to augment 200 J, Dr. Pamula brought the patient around to normal sinus rhythm with one quick shock. He was then loaded with amiodarone and sent off to the telemetry ward.

Immediate application of this clinical anecdote and recent evidence to practice is straightforward: With increasing BMI, anticipate increasing resistance to electrical cardioversion. Start with maximal biphasic joules and pressure augmentation to the adhesive pads, be it with paddles or gloved hands. One could consider weights as Dr. Pamula did, but be aware that this alternative technique has not been well studied and one may need upward of 80 newtons (20 pounds) to achieve an 80 percent reduction in transthoracic impedance. (*Pacing Clin Electrophysiol.* 2016;39[10]:1141; http://bit.ly/2TAUjgH.)

It is worth knowing if your ED has paddle electrodes available. Unfortunately, the increasing use of adhesive patches has led to a reduction of accessory paddle purchases. The results of this trial, however, attest to the importance of retaining access to paddles for use in obese patients and those with other dysrhythmias refractory to patch electrodes. If the dysrhythmia proves refractory, consider adjusting the electrode placement and pretreatment with an antidysrhythmic medication before repeating direct-current countershock.

Intravenous ibutilide, for example, lowers the energy requirements for transthoracic cardioversion, assuming there are no contraindications. (*CJHP.* 2006; 59[4]:201; http://bit.ly/2TBkdRz.) Pretreatment ibutilide is a Class I recommendation with the support of level B evidence in the 2014 Guideline for the Management of Patients with Atrial Fibrillation by the American Heart Association, the American College of Cardiology, and Heart Rhythm Society. (*J Am Coll Cardiol.* 2014;64[21]:e1; http://bit.ly/2TwyCya.) **EMN**


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