

Cardioversion à la carte – your choice of the unconventional

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'In the middle of difficulty lies opportunity.'

Albert Einstein

Cardioversion involves the use of mechanical, pharmacological or electrical methods to convert cardiac arrhythmias into normal sinus rhythm. It is employed both on an elective and emergency basis, where well established guidelines and protocols dictate its use [1].

There are cases, however, which fall outside the guidelines and necessitate out-of-the-box thinking. In this issue of the Journal, Avidan et al. [2] describe such a case, where a rectal thermometer was found to inadvertently cardiovert a 54-year-old patient with stable atrioventricular nodal re-entrant tachycardia (AVNRT). Their unconventional and accidental method proved reproducible in the same patient, especially helpful since conventional approaches were contraindicated. Despite the peculiarity of this approach, the authors explored the mechanism and concluded that this was due to the stimulation of parasympathetic nerve fibres in the rectum, physiologically explaining its non-random and reproducible nature.

The authors should be congratulated for bringing this... unique case to the medical literature, which in turn inspired a comprehensive review of existing research. Certainly, when it comes to unconventional cardioversion techniques, the authors are not alone! Often, these cases (examples given in table 1) are identified due to pure coincidence, but where would medicine be without coincidences?

Rather similar to Avidan et al., Ruan CH reported cardioversion from Atrial Fibrillation (AF) to Sinus Rhythm (SR) in a 29-year-old following digital rectal examination and the patient remained asymptomatic after a 3-month follow up [3].

Yan et al. describe a case of an 84-year-old patient with AF, where a hyperkalaemia of 8.1 mmol/l temporarily reverted him to sinus rhythm, before returning to AF a few days later once his potassium normalized [4]. Regrettably, the absence of anticoagulation during his transition from AF to SR, coupled with the

possibility of numerous paroxysmal episodes, led to the development of arterial thromboembolism in the lower limb.

Mechanical mechanisms have been described by Perruchoud [5] and Ehtisham [6]. In the former, a collision between a patient's hospital bed and doorframe on the way to an elective cardioversion for AF, facilitated the intended procedure without any shocks required. Unfortunately, a cost-effectiveness analysis had not been undertaken! And despite the hospital pressures across the world, we would not feel comfortable recommending a 'trial of colliding with the wall' before offering definite treatment! In the latter, a cardiac monitor in the back of an ambulance was monitoring a patient with stable ventricular tachycardia, and the patient cardioverted into SR after going over a speed bump at 5mph. An unusual case indeed, and only if the monitor fell on the patient's chest leading to cardioversion could that have made it *more* unusual! Are there mechanisms for these? Yes, both these cases hypothesized that kinetic energy from collisions, delivering the equivalent energy of a pre-cordial thump, led to successful cardioversion.

Furthermore, McGavin et al. reported in 2006 a patient with AF refusing direct current cardioversion on the grounds of not wanting sedation [7]. While engaging in a do-it-yourself project at home, the patient inadvertently met a mains cable while holding a drill, resulting in an electric shock of 240 joules. He was promptly cardioverted to SR, in which he remained, when followed up ten weeks later.

Perhaps the crown of unusual cardioversion (Fig. 1) belongs to a Northern Irish Craigavon farmer reported by Knight et al. [8]. The farmer in the 1980s invented his own escalating protocol of methods to treat his Supraventricular Tachycardia. For many years, he would cardiovert by jumping off a barrel and thumping his feet hard on the ground. If this failed, he would then climb using a ladder to a higher level and then jump again... and if this failed, he would fire a 12-bore shotgun to cardiovert. As years progressed and these methods were less successful, he realized that jumping in a really cold-water bath would also cardiovert him. But this farmer would not stop at anything to cardiovert.

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Table 1. Examples of unusual mechanisms cardioversion, sorted by year reported

Year	Rhythm	Mechanism of cardioversion	Ref
2023	AVNRT	Rectal thermometer (mechanical)	[2]
2018	Atrial Fibrillation	Severe hyperkalaemia (metabolic/pharmacological)	[4]
2010	Atrial Fibrillation	Digital Rectal Examination	[3]
2008	Atrial Fibrillation	Hospital bed hitting doorframe (mechanical)	[5]
2006	Ventricular tachycardia	Going over speed bump in ambulance (mechanical)	[6]
2006	Atrial fibrillation	Drilling into mains electric cable while doing DIY (electrical)	[7]
1988	Permanent junctional reciprocating tachycardia (PJRT)	Jumping off a height/cold water immersion/shotgun recoil/electrical cattle fence (mechanical and electrical)	[8]



Figure 1. Cardioversion a la carte. Country Cure-All. With a shotgun's kick, an ice bath's embrace, a fence's bite, and a barrel's grace— a farmer's heart finds its steady pace. Image created using OpenAI DALL-E3.

If none of the methods described here worked, he would then escalate to the... 6V electric cattle fence, which he grasped wearing hob-nailed boots. Unusual as these methods were, they worked, for a bit at least...

Our exploration of some unconventional cases of cardioversion illustrates that despite their freak-event nature, their mechanisms can be explained through our existing knowledge of physiology. While attempting to replicate the techniques may not be

advisable, Avidan et al. have highlighted a unique case where an odd observation may lead to a safe and reproducible treatment. As Isaac Asimov, the American writer and biochemistry professor, putatively noted, the most exciting phrase to hear in science is not “Eureka!”, but “that’s funny!”. Avidan et al.’s case underlines why it should be incumbent on us all as clinicians and scientists to keep a curious eye for the unusual, peculiar and odd in the patients we see.

CONFLICT OF INTEREST STATEMENT

No conflicts of interest.

REFERENCES

1. Brugada J, Katritsis DG, Arbelo E, Arribas F, Bax JJ, Blomström-Lundqvist C. et al. 2019 ESC guidelines for the management of patients with supraventricular tachycardia The Task Force for the management of patients with supraventricular tachycardia of the European Society of Cardiology (ESC): developed in collaboration with the Association for European Paediatric and Congenital Cardiology (AEPC). *Eur Heart J* 2020;**41**:655–720.
2. The Alternative Vagal Maneuver. Converting atrioventricular nodal re-entrant tachycardia by a rectal thermometer. *Oxf Med Case Reports* in press.
3. Ruan C-H. Instantly converting atrial fibrillation into sinus rhythm by a digital rectal exam on a 29-year-old male. *Clin Med Insights Case Rep* 2010;**3**:51–4.
4. Yan L, Jiang T, Yang X, Xu M. Spontaneous conversion of atrial fibrillation caused by severe hyperkalemia. *Medicine (Baltimore)* 2018;**97**:e0442.
5. Perruchoud C. Low-cost cardioversion. *Br J Anaesth* 2008;**101**:883.
6. Ehtisham J, Lim PB, Rajendrum R. A case of “sleeping PC” cardioversion. *Heart* 2006;**92**:460.
7. McGavin C, Davies J, Beer J. Do-it-yourself cardioversion. *BMJ* 2006;**332**:50.
8. McKnight JA, Balnave K, O’Keefe DB. Do it yourself cardioversion. *BMJ* 1988;**297**:1641.