Letters to the Editor

Ventricular mural architecture

Arquitectura de la pared ventricular

To the Editor,

We read with interest the article submitted to the journal by Omar Yassef Antúnez Montes OY.[1] As we read his account, we were reminded of the aphorism of H.L. Mencken, who commented that "there is always a well-known solution to every human problem–neat, plausible, and wrong."[2] In this regard, we were also reminded of the statement of the British mathematician, W.K. Clifford, in his essay on the "Ethics of Belief". This has become known as Clifford's principle, and states "it is wrong always, everywhere, and for anyone to believe anything on insufficient evidence".[3]

It is certainly the case that Antúnez Montes has failed to produce sufficient evidence to substantiate his belief that, by following pre-existing anatomical boundaries, the ventricular cone can be unwrapped in the fashion initially suggested by Torrent-Guasp.[4] His review, furthermore, is a masterpiece of selected citation. Had Antúnez Montes studied the literature carefully, he would have found that Lower[5] showed, as long ago as 1669, how it was possible to unwrap the ventricular cone in the form of a solitary band. The entity produced by Lower, however, started and ended with the atrioventricular, rather than the ventriculoarterial junctions. The overall findings substantiate the viewpoint expressed by Lev and Simkins,[6] namely, that the ventricular walls can be unwrapped at the whim of the prosector. Thus, we do not doubt that it is possible to unwrap the cone in the fashion of Torrent-Guasp, as now confirmed by Antúnez Montes.[1] The question that should be asked, however, is not whether it is possible to produce the artefact, but rather whether the dissection is conducted by following pre-existing anatomical boundaries. Evidence exists from multiple sources, reflecting both histological and clinical investigations, to show that the ventricular myocardial walls are formed on the basis of a 3-dimensional mesh. They lack any boundaries that might permit uniform dissection of the helical band. As had been emphasised by Pettigrew in the nineteenth century,[7] cardiomyocytes, unlike skeletal myocytes, lack origins and insertions other than their attachments to each other.

The fact that the cardiomyocytes within the ventricular walls form helical endocardial and epicardial arrays was established long ago by Streeter. He conducted a series of seminal histological studies, which culminated in a chapter published in the textbook of the American Society of Physiology.[8] Within its pages, Streeter referred to his collaborations with Torrent-Guasp, illustrating it with several dissections made by the latter. Based on these dissections, along with his histological studies, Streeter concluded that "the heart wall was shown to be a 3-dimensional continuum made up essentially of the 1-dimensional rod element, the cardiac muscle cell". [8] All of our own studies, including an investigation in which we reassessed the findings of the echocardiographic study of Hayabuchi et al.[9] cited by Antúnez Montes, are in keeping with the conclusion reached by Streeter.[8]

Thus, those reading the account of Antúnez Montes[1] should be aware that, whilst it is possible to unwrap the ventricular cone as he has demonstrated, the dissection is not achieved by following pre-existing anatomical "planes of cleavage". It is only possible to produce the artefact by destroying the ubiquitous transmural chains of cardiomyocytes, which are an integral component of the 3-dimensional myocardial mesh.[10]

Damián Sánchez-Quintana,[a,*] Peter Agger,[b] and Robert H. Anderson[c]

[a]*Departamento de Anatomía Humana y Biología Celular, Facultad de Medicina, Universidad de Extremadura, Badajoz, Spain*
[b]*Comparative Medicine Laboratory, Department of Clinical Medicine, Aarhus University, Aarhus, Denmark*
[c]*Institute of Genetic Medicine, Newcastle University, Newcastle-upon-Tyne, United Kingdom*

[*] Corresponding author:
E-mail address: damians@unex.es (D. Sánchez-Quintana).

Available online 28 October 2019

REFERENCES

1. Antúnez Montes OY. Anatomical Correlation of the Helical Structure of the Ventricular Myocardium Through Echocardiography. *Rev Esp Cardiol.* 2020;73:153–160.
2. Mencken HL. *Prejudices: Second Series, Chapter 4: The Divine Afflatus, Start*. Borzoi: New York; 1920:155.
3. Clifford WK. *The ethics of belief*. In: Madigan T, ed. *The ethics of belief and other essays*.. Amherst, MA: Prometheus; 1877:70–96.
4. Torrent-Guasp F. *Anatomía funcional del corazón: la actividad ventricular diastólica y sistólica*. Madrid: Paz Montalvo; 1957.
5. Lower R. Tractatus de Corde.In: *Early science in Oxford*. London: United Kingdom; 1669.
6. Lev M, Simkins CS. Architecture of the human ventricular myocardium; technic for study using a modification of the Mall-Maccallum method. *Lab Invest.* 1956;5:396–409.
7. Pettigrew JB. The Croonian lecture: On the arrangement of the muscular fibres of the ventricular portion of the heart of the mammal. *Proc Royal Soc Lond.* 1860;10:433–440.
8. Streeter DD. Gross morphology and fiber geometry of the heart.In: *Handbookof Physiology, Section 2: The Cardiovascular System*. Bethesda, Maryland: American Physiological Society; 1979:61–112.
9. Hayabuchi Y, Sakata M, Kagami S. Assessment of the helical ventricular myocardial band using standard echocardiography. *Echocardiography.* 2015;32:310–318.
10. Agger P, Stephenson RS, Dobrzynski H, et al. Insights from echocardiography, magnetic resonance imaging, and microcomputed tomography relative to the mid-myocardial left ventricular echogenic zone. *Echocardiography.* 2016;33:1546–1556.

https://doi.org/10.1016/j.rec.2019.06.013
1885-5857/

SEE RELATED CONTENT:
https://doi.org/10.1016/j.rec.2019.08.008
https://doi.org/10.1016/j.rec.2018.10.016