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Editorial

## Torrent-Guasp's anatomical legacy<sup>☆</sup>

Ladies and gentlemen, I should point out that Francisco Torrent-Guasp and I were close friends, so this should not be regarded as a scientific dissertation but rather the story of a long-standing friendship. I called him Paco instead of Francisco (Fig. 1).

They say 'A prophet has no honour in his own country' but honour was accruing rapidly for Torrent-Guasp, together with his widespread recognition as the instigator of our basic knowledge of the true anatomy of the myocardium. With this went his association with the apparently magical, and incompletely understood, myocardial contractility and its relationship to the circulation of the blood. Unfortunately, this developing knowledge of the heart's function was still in the process of evolution when it was tragically interrupted by Paco's death.

Whatever the inevitable ensuing arguments bring to light, there can be *absolutely no doubt* that this seminal work emanated entirely from the thoughts and pen of Francisco Torrent-Guasp, spread over 50 years of painstaking study.

My first connection with Paco was when he was living in Spain, in the region of Denia. I was a trained surgeon, and when we met was working at the National Heart and Guy's Hospital, London, and struggling to resolve the mysteries of what, at that time, was the rapid development of heart surgery. Those days, the heart was perceived to be a simple, thick muscular organ together with numerous autopsy studies and crude dissections, but with no knowledge of its living function or its basic intricate structure.

Out of the blue, about 40 years ago, I had a letter from Paco whom I had previously met only socially. He wrote to tell me that none of his associates took him seriously, nor attempted to study his meticulous dissections aimed at establishing the intricate structure of the heart muscle. His problem appealed to me, and I had him invited to Guy's Hospital, London, to give a major anatomical lecture in 1971, although I realized that, at that time, it was well beyond the comprehension of most of his audience.

From that time on, we exchanged information regularly, and I was privileged to observe him while he carefully blunt-dissected the heart. His plan, as he explained to me, was to dissect from apex to base, starting at the

apex. Finally, the whole heart was gradually dissected with his bare fingers, after heating the organ to loosen its collagen fibres.

The increasingly fascinating layers of tissue he produced revealed muscle fibres apparently disappearing into the apex of the heart and these fibres were clearly demonstrated for the first time. This point I would designate respectfully as '*Guasp's Point*' (Fig. 2). Already a 'figure-of-eight' type of muscle pattern was appearing, although at that time we had no understanding of its significance.

In 1973 he published his preliminary findings (Fig. 3). Torrent-Guasp was a prolific and descriptive writer, and particularly excellent at illustrations, which helped his otherwise technical and linguistic difficulties in making himself understood. A clear figure-of-eight type of muscle pattern emerged, beautifully and sometimes frighteningly illustrated (Fig. 4), with the fibres disappearing at the cardiac apex, and this was in direct contrast to what, at that time, was accepted dogma; namely, that the myocardial muscle fibres ran from the mitral valve ring directly to the apex.



Fig. 1. Francisco (Paco) Torrent-Guasp.

<sup>☆</sup> The following remarks were made by Donald N. Ross at Alder Hey Royal Children's Hospital in Liverpool, England, on May 28, 2005 at the Symposium on 'The New Concepts of Cardiac Anatomy and Physiology'.



Fig. 2. At the apex, the superficial epicardial fibres become sub-epicardial, around a point which defines a virtual orifice, between the ventricular cavity and the exterior—'Guasp's Point'.

The next fundamental development, as far as I was concerned and which interested me enormously, was the progressive understanding and simplification of the dissected muscle layers which appeared to revert ultimately to the original primitive embryology. This, you will recall, was originally a simple muscle tube, with blood entering one end, and being ejected from the other end, or aorta. This basic tubular muscle pattern was developed by Paco, and, I understand, can now be acquired as a commercially available plastic model, able to be repeatedly unravelled and reconstituted as our familiar heart.

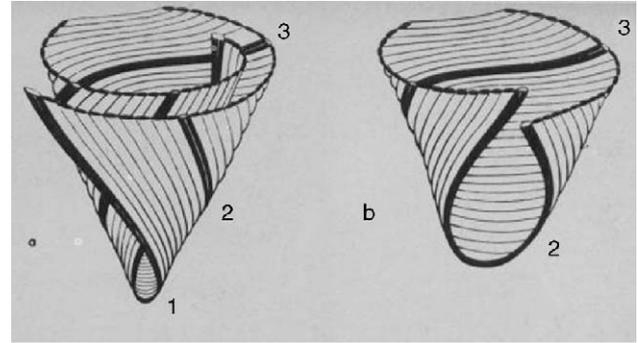
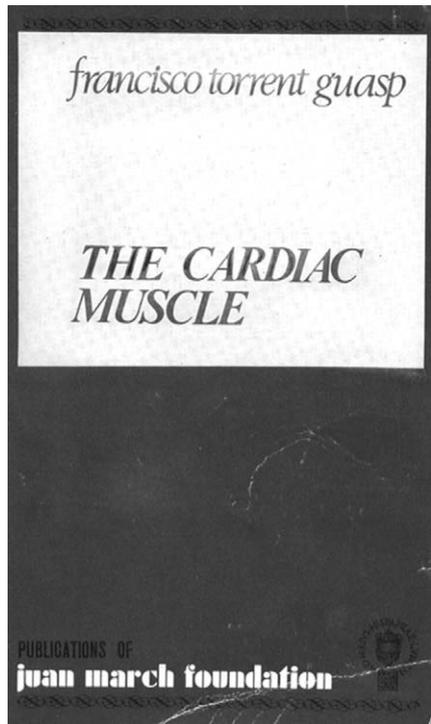


Fig. 4. Drawing of leaf-like overlap of muscle bands by Torrent-Guasp.

To return to our original meeting in London, where Paco had shown me that his original dissections opened up like the pages of a book (Fig. 5), he then moved on to dissect the base of the heart in similar fashion, and ultimately connect the basal fibres with those of the apex (Fig. 6). The situation became steadily more intriguing. His dissections of the muscle fibres, again, as with all his work, avoided sharp knife dissection or cutting across the natural myocardial fibres. Looking at his many beautiful and hand-produced dissections and rope models has really been a revelation to us all. Under Paco's direction, we were kept in line and properly disciplined to remain anatomically correct, rather than revert to our old-fashioned and entrenched, but comfortably familiar vague cardiological concepts.

Slowly and reluctantly, conventional cardiology has tried to keep up with these anatomical revelations. Paco, meanwhile, turned his thoughts to not only the structural details but also to the increasingly intriguing action of the heart. This represented, from most points of view, a still unsolved



To DONALD ROSS  
 With my best wishes  
 and thanks to you  
 PACO  
 20-1-73

Fig. 3. Personal note from 'Paco' Torrent-Guasp to Donald Ross.

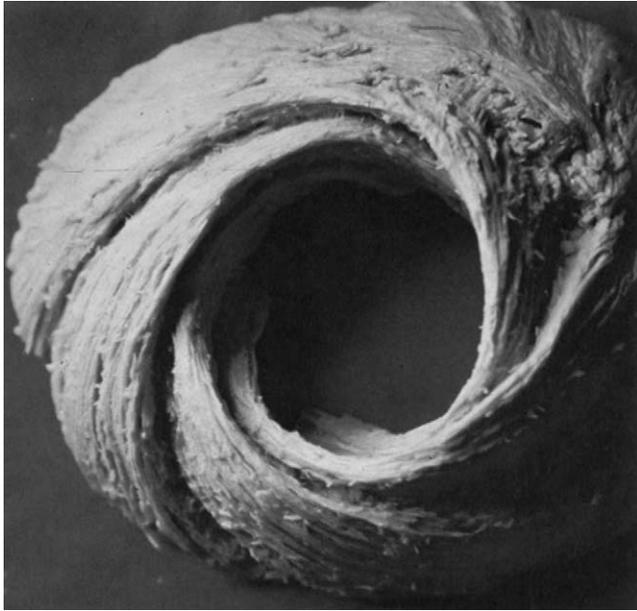


Fig. 5. 'Figure-of-eight' type of muscle pattern becoming apparent.

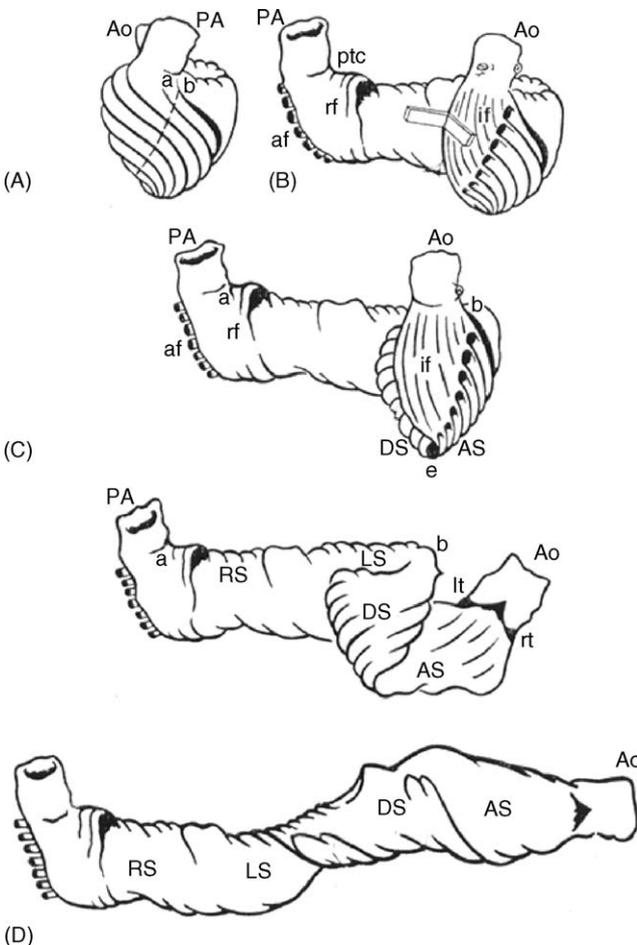


Fig. 6. Steps in unravelling of the heart into a single tube.

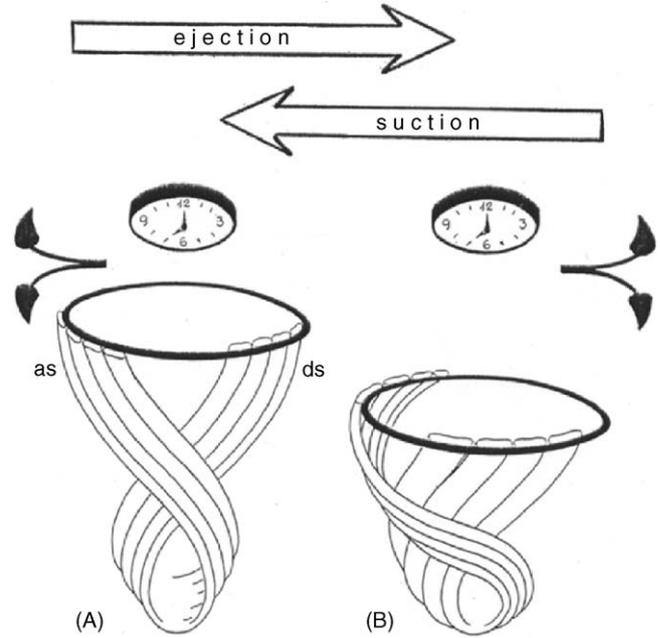


Fig. 7. Actions of overlying descending and ascending segments during ejection and suction.

enigma, slowly coming to our attention. He taught us to take into account not only systole and ejection but also equally important, the diastolic or suction phase of the cardiac cycle, which of course has again been a revelation (Fig. 7), together with the apparent immobility of the cardiac apex during the cardiac cycle.

I remain intrigued and regret that Paco is no longer here to guide us at this critical stage, but his colleague, Mladen Kocica from Belgrade, has been personally and warmly recommended to me by Paco because of his depth of understanding of Paco's concepts, some of which had originally eluded me because of linguistic difficulties. From my point of view, Torrent-Guasp's legacy is a valuable open door to the heart, its anatomy and function, and it is clearly an asset which we will always treasure.

Finally, with regard to the suggested eponym 'The Torrent-Guasp Heart', incorporating both form and function: I regard this title as wholly appropriate, and probably more suitable than the more cumbersome and perhaps ill-understood 'Helical Ventricular Myocardial Band'. Unless there is a more appropriate suggestion to clarify Paco's legacy, I propose we should accept this term 'The Torrent-Guasp Heart' to establish and perpetuate his unique contributions. Although he was apparently a solitary man academically, I was pleased to receive an optimistic email from him a few days before he died, indicating quite clearly that he was tranquil and at peace with the world.

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