

Nature, Heart, and Conscience: a Tear in Time

Naturaleza, corazón y conciencia: un desgarro en el tiempo

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ABSTRACT

The knowledge gained in recent years on heart functioning, not only through basic research but also through technology, has unraveled essential questions. A thorough analysis reveals that the answers date back some 200 years to the Industrial Revolution, when man developed mechanical knowledge analogous to aspects of cardiac function that date back to the emergence of mammals in the Triassic and were demonstrated in the last decade. In other words, human consciousness surprisingly employed the same strategy in its evolution of knowledge that biological development used to construct the heart 200 million years ago, which, obviously, was unknown to man.

Keywords: Nature - Evolution - Heart - Consciousness

RESUMEN

El conocimiento del funcionamiento del corazón que se consiguió en estos últimos años, no solo con la investigación básica sino también con la tecnología, ha desentrañado preguntas esenciales. Las respuestas provienen desde hace unos 200 años con la Revolución Industrial, cuando el hombre desarrolló conocimientos mecánicos que son análogos a aspectos de la función cardíaca que datan de la aparición de los mamíferos en el Triásico y que fueron demostrados en esta última década. Es decir que la conciencia humana empleó de manera sorprendente la misma estrategia en su evolución del conocimiento que la que utilizó el desarrollo biológico para construir el corazón hace 200 millones de años, y que obviamente, el hombre desconocía.

Palabras clave: Naturaleza - Evolución - Corazón- Conciencia

INTRODUCTION

Mammals appeared in evolution about 200 million years ago. Since the Triassic period, the heart has been structurally consolidated. Some aspects of its recently studied functional organization are striking because they were imitated by human cultural evolution after the Industrial Revolution during the 18th and 19th centuries. This analogy exists between an organ formed millions of years ago and the current intellect of humans, who had no prior knowledge of its mechanisms.

When life and social composition reached a high level of complexity, the brain of *Homo sapiens* appeared. This happened about 250 000 years ago, a

mere blink of an eye in relation to the appearance of matter, which occurred about fifteen to twenty billion years ago, while the first signs of life appeared only about 3500 million years ago. The human brain, as we know it, is the most recent of the remarkable patterns of evolution. This evolution, although staggered, left almost all of creation behind. It was woven together on a track where randomness and necessity complemented each other to continue a path of self-organization, with only the slogan that "order is change." It is currently believed that the vast majority of biological species are extinct. As for our class *Mammalia*, of the 32 orders, 14 have become extinct, leaving only 18 alive today.

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Let us not forget that the brain started out as primitive ganglia and eventually acquired a significant neocortex, a situation that *homo sapiens* has only been able to capitalize on in the last 30 000 years, while the evolution of the species dates back to about two million years.

In other words, biological evolution and human culture arrive to the same solutions, in this case mechanical ones, by different paths and without humans having any prior knowledge of them, since only recently has an understanding of cardiac function been achieved, while certain mechanisms invented by humans date back to the Industrial Revolution. We will discuss some of these findings.

Bearing

The first patent for a ball bearing was granted in 1794 to Philip Vaughan, and in 1898 Henry Timken patented the tapered roller bearing. This mechanism has different rotations between its inner and outer rings with an intermediate system, called a ball cage, which acts as an anti-friction device.

Recent technological advances have revealed that the left ventricle has different rotations in systole between the descending and ascending segments (inner

and outer muscle rings), which are reversed in the protodiastolic phase. (1-4) This rotational mechanism is a fundamental determinant in the ejection and suction of the heart (Figure 1). (5-8) In this analysis, we found a correspondence between cardiac structure-function and the bearing mechanism.

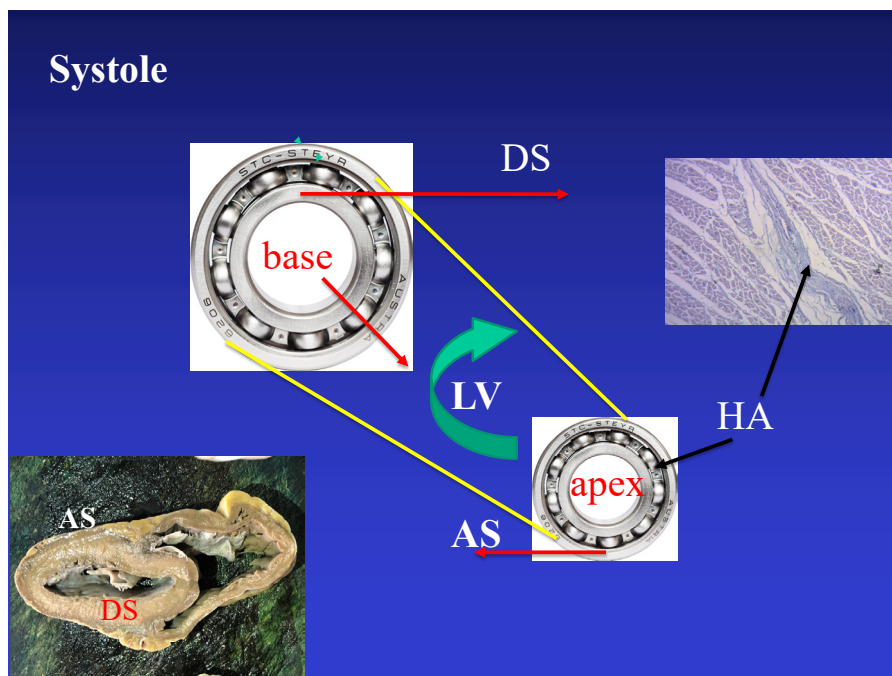
The existence of torsion (basal and apical rotations in opposite directions) is expressed in echocardiography as a rotational gradient with a positive value that is the sum of the basal and apical rotation angles. In our experience, in normal subjects it is around $19 \pm 9^\circ$, with the rotation of the tip always predominating. (9)

Anti-friction mechanism

The bearing function has an anti-friction mechanism between its rings (ball bearing), which allows it to roll without generating energy loss.

In the heart, the sliding between the internal and external segments of the myocardium takes opposite directions in its movements during the systolic and suction phases of the heart, generating friction. From a physical point of view, friction between the segments also implies an opposition to movement. As expressed by Newton's first law, friction limits the temporal con-

Fig. 1. The movement of the base and apex of the heart can be seen, similar to the rolling of a ball bearing. The red arrows indicate the direction taken by the descending and ascending segments of the heart during systole. During suction (protodiastolic phase), they are reversed. It can also be seen that both between the outer and inner rings of the bearing and in the concentric cardiac muscle segments (descending and ascending segments) there is an anti-friction mechanism, called ball bearing in a bearing, and hyaluronic acid in the heart. The inset shows a human heart with the aforementioned segments.



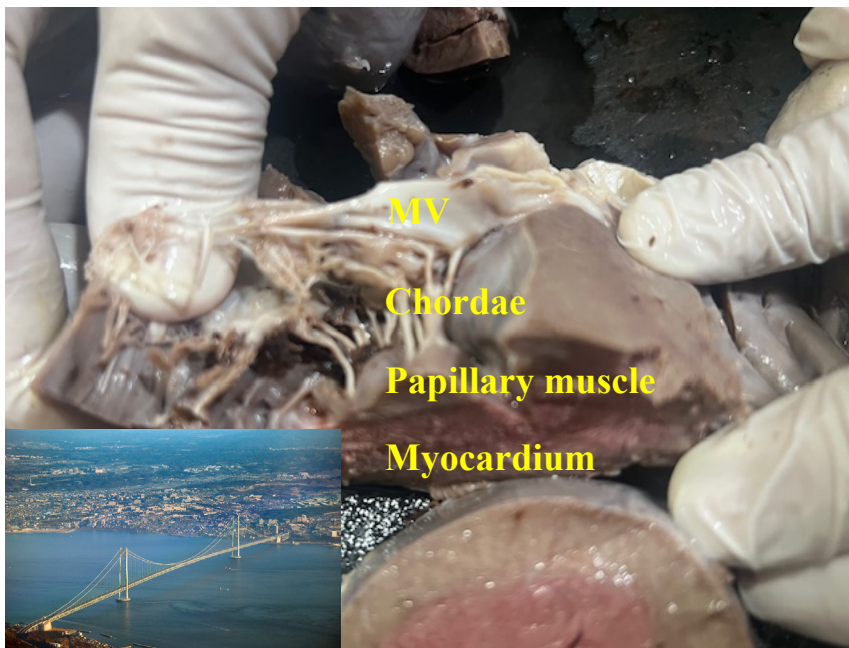
HA: hyaluronic acid; AS: ascending segment; DS: descending segment. LV: left ventricle.

tinuity of movement (Figure 1).

In this regard, in all the hearts investigated, we found hyaluronic acid in the cleavage planes between the myocardial bundles. Our recent research has clari-

fied this aspect of myocardial lubrication, which counteracts surface friction by exerting an anti-friction mechanism. Hyaluronic acid, with its lubricating capacity, facilitates sliding between the bundles. (10)

Fig. 2. Both in the anatomical heart and in the photo of a suspension bridge, we can see the analogy between the solutions found by biological evolution (nature) and human intellectual consciousness, without prior knowledge in the latter of the cardiac arrangement, which has only been understood in recent years.



MV: mitral valve

Fig. 3. Attachment of the tendinous cords of the mitral valve after the valve has been replaced.

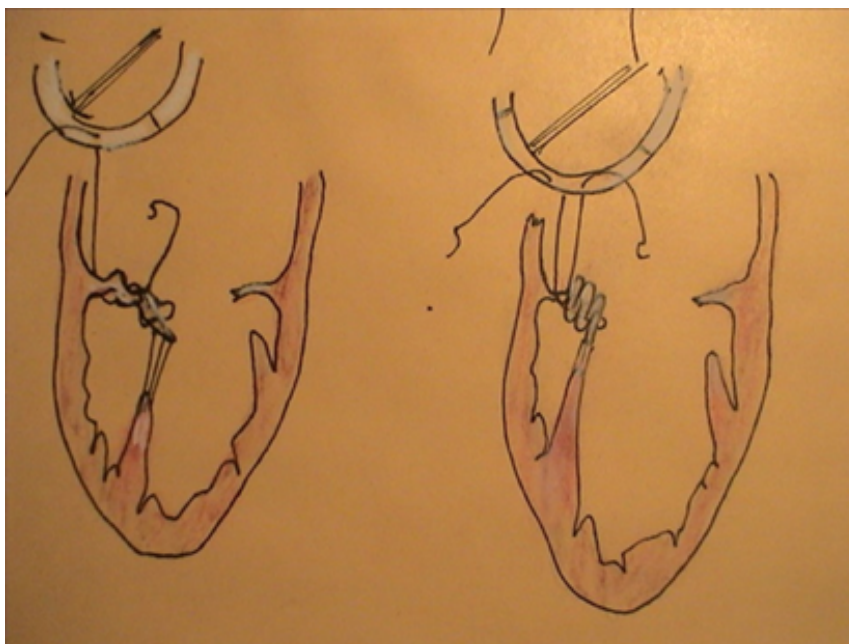
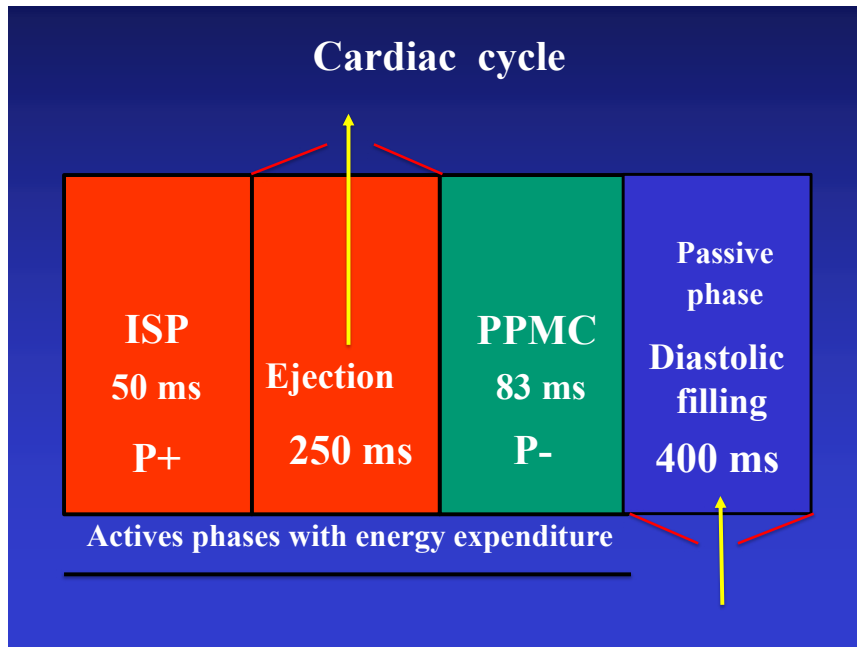


Fig. 4. Ejection and suction phases of the left ventricle



ISP: isovolumetric systolic phase; PPMC: protodiastolic phase of myocardial contraction; P+: positive pressure; P-: negative pressure.

Suspension bridge

We have found that the heart maintains its helical spatial arrangement through supports called papillary muscles strategically located at the beginning of the descending and ascending segments, the rings of the left ventricle (Figure 2). It can be assumed that they act as tensors of the left ventricular myocardium being attached by their cords to the mitral valve. They are the pillars that support the myocardium and also open and close the valve. In fact, in mitral valve replacement, removing the chordae tendineae can cause ventricular dysfunction.(11) This has led to the chordae of the papillary muscles not being sacrificed but rather tied to the prosthetic mitral annulus in order to preserve the tensors of the descending and ascending cardiac segments (Figure 3). This concept implies that the papillary muscles, with their chords and attachment to the mitral valve leaflets, not only act for valve functioning but also as a support for the myocardium, analogous to the recent construction of suspension bridges.

It is worth noting that the first important modern suspension bridge was the Menai Bridge, built in 1826. This bridge was designed by engineer Thomas Telford with a span of 125 meters, which allowed sailing ships to pass under it.

Engine

An engine is a machine that converts one type of energy into mechanical energy, usually to produce movement. This is exactly what the heart has been doing

for 200 million years. Remember that the first engines appeared in the 19th century (Figure 4). (12-14)

Comments

Is there a correlation between biological evolution and the evolution of human consciousness, in light of the emergence of thought, knowledge, and learning? It would be reasonable to think that there is no way to deny this coherence. Sociocultural evolution could not have occurred without biological evolution. (15,16)

This advance, like all transformations involving flow of matter and energy in the universe, has also followed a journey in thought, in which the reductionist, mechanistic, or atomistic model has been vigorously debated in the face of the new model of self-organization and systems. Systemic thought has currently taken hold. Massive connectivity provides information to thought, which shapes it into ideas in a self-organizing process. Analogous to the homeostasis of organisms, thought is subjected to a process of self-organization. They are feedback loops characteristic of living beings (nonlinear network).

Thought is a network. Between the universe and each consciousness there is a limitless network. There are only consciousnesses as nodes controlling networks, within networks subjected to flows of matter and energy. Organizing relationships can belong to organisms, to society, and to thought. There are interactions between the parts, which are lost when dissected (properties of the whole). Biology has this organizational character.

Erwin Schrödinger (1887-1961) ascribed to a vast and unified consciousness, interrelated with individual consciousnesses. He reflected on a unified universal consciousness. (15) It is not understood that the vision of consciousness on the internal and external world has its own specific nature. We must accept that space-time is a representation of our consciousness. However, once we have achieved this representation, it becomes assimilated into our consciousness with an absolutely objective nature. The perception that consciousness establishes of a phenomenon depends on:

- a) The prevailing ideas that occupy the intellectual space and misinterpret new ones.
- b) The ability to delve deeper than the level reached with the new vision. This was the case with the work of Erwin Schrödinger, in which the phenomena described were considered too microscopic to be observed. This vision allows for spatial ordering in its entirety.

This analogy between the mechanisms of nature's construction of the heart, which began with mammals 200 million years ago, and the mechanical knowledge that humans have acquired over the last 30 000 years remains a mystery. But what is most surprising is that knowledge of these biological cardiac mechanisms is recent, subsequent to the development of bearing, the anti-friction mechanism, the engine, and suspension bridges. In fact, the same creative resource was used by human consciousness without knowing that this procedure had already been used by nature in hearts 200 million years ago, at the beginning of mammals.

The fact that human knowledge, faced with mechanical problems that have arisen in the last two centuries, has produced results analogous to those used by the biological evolution of the heart in prehistoric times, without any knowledge of them, is surprising and raises disturbing questions: Is there a point where the mind can enter a higher order? Is there a common plan for biological evolution and human consciousness? Can human consciousness be connected to a metaphysical plan? In this analogy between physis (nature) and human consciousness, is there a coincidence that occurred 200 million years ago, or is it the consequence of an unknown connection between humans and that higher order? Or could it be that we belong to a single consciousness?

Beyond these questions and their possible answers, perhaps we should understand that this development opens the much-needed path of complementarity between reason and faith, since science is a communion of both.

The art of medicine has always considered the heart to be taboo (vis pulsiva), despite being explored in its most intimate nooks. It has even been replaced. Despite the knowledge gained, its magic is unmatched and imperishable, an alchemy of anguish and movement. In it lies the fantasy of genesis and flickering infinites.

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Conflicts of interest

None declared.

(See authors' conflict of interests forms on the web).

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