On the innovative genius of Andreas Vesalius

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Chapter 11

Vesalius and the tennis racket

Chapter based on article

Anatomist Andreas Vesalius (1515–1564) and the early history of the tennis racket

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Introduction
The predecessor of the rackets used in the modern game of tennis originated around 1500 when the European nobility started using sheep-gut strung rackets to play their game of jeu de paume [1, 2]. We were surprised to come across a note on such rackets in the 1543 work of the founder of modern anatomy, Andreas Vesalius, and set out to try and explain how such an early mentioning found its way in a principally anatomical treatise [3].

Materials and Methods
The original Latin quote on the tennis racket was found in Book II - The Ligaments and Muscles of the first print of Vesalius’ opus magnum De Humani Corporis Fabrica Libri Septem (De Fabrica). For this inventory we used the digital copy of the original 1543 print of De Fabrica [3], and its English translation as provided by Richardson and Carman, in 1999 [4].

The possible links between Vesalius and the early origins of the tennis racket was assessed by use of the earliest historical references provided by Whitman [5], Gillmeister [2], and de Bondt [1]. Most of these references were digitally traced through the world wide web.

Results

Early history of the tennis racket
Jeu de paume allegedly originated in the courts of French monasteries at some moment during the high Middle Ages (1000 - 1300). As the name of the game indicates, the ball was initially played with the palm of the bare hands but, gradually, the players started using gloves (c. 1200) or thong bindings (c. 1300) [2].

At the end of the 13th century, jeu de paume started to spread outside the monasteries to become a very popular game, initially among the nobility and later among the people of Western Europe. In the Dutch and Flemish speaking regions (currently known as the Netherlands and Flanders and Brussels in Belgium), the game became known as ‘kaatsen’ [1]. The people played the game in the open, whereas courts were built in the castells of the nobility. Hence, the elite played jeu de courte paume. As of the 14th century, some players started to use a battoir to hit the ball and the form of this bat evolved from a club to the form of our current table tennis paddle [5]. As this use implied that the ball could be played over longer distances, it introduced the jeu de longue paume.
FIGURE 11.1: In Tabula VII of the twelve muscle-men included in De Fabrica “the rope from which the cadaver was suspended while being drawn has been lowered. The cadaver therefore leans slightly backward, enough to show the transverse septum [diaphragm]. [...] Δ: Transverse septum” (quotes on p. 50-1) [4].
Figure 11.2: Detail of Tabula VII in which you can see the septum depicted [...]. in the form in which it appeared to us after being cut out and stuck to the wall with its own tackiness [...]. \( \Delta, k, l, m, n \): Transverse septum, whose membranous circle is circumscribed by \( k, l, m, n \) in the septum spread out beside the body. The area which surrounds these symbols and stands outside them and has fibers running through it is the fleshy part of the septum. \( o, p \): Two ligaments or tendons of the septum [left and right crus of the lumbar part of the diaphragm], inserted into the bodies of lumbar vertebrae. \( q \): Cleft in the septum [aortic hiatus], where the septum rests upon the bodies of the vertebrae, and which transmits or makes way for the great artery and the vein with no partner; their orifices are marked \( q \) in the cadaver of the present table [...]. \( r \): Foramen for the gullet [esophageal hiatus]; the gullet is marked \( r \) also in the cadaver. \( \int \): Foramen for the trunk of the vena cava; the trunk of the vena cava is marked \( \int \) also in the cadaver’ (quotes on p. 50-1) [4].
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Some time around the year 1500 the solid wooden bat evolved to become a racket that was strung [1, 2]. The earliest mention of such a tennis racket may be traced back to the Archduke of Austria and King of Castile, Philip le Beau. A contemporary report accounts that on “the XXXI of January which was one of a Sattordaye in the yeare of our Lord 1505 and the 21 yeare of our Souveraigne Lord Kyng h. 7 [King Henry VII], his Highness receaved the kyng of Castelle at his castell of Windsore [Windsor Castle]. [...] The Sattordaye of the 7 of february [...]. both kyngs went to the tennys playe [...]. where played my Lord marques, the Lord Howard and two other knights togethere, and aftere the kyngge of Castelle had seene them play a whylle, he made partye with the Lord Marques of Dorset the kyngge Lookynge on them, but the kyng of Casteele played with the Rackete and gave the Lord Marques [an advantage of] xv. and after that he had pled his pleasure and arrayed him selfe agene it was almoste nighte, and so bothe kyngs Retorned agayne to their Lodginges” (quote on p. 434-441) [6]. Rather than in 1505, however, this episode must have taken place in early 1506 according to our Gregorian calendar because Philip and his wife Joana sought shelter in the harbor of Falmouth after struggling with adverse winds for more than a fortnight after they left the Netherlands to take possession of the Castilian throne, in the beginning of 1506. Second, Henry VII seized the crown on August 22, 1485, and the 21st year of his reign ran, therefore, from August 1505 to August 1506. Third, January 31st fell on a Saturday in 1506 and on a Friday in 1505 according to the Julian calendar that was predominant until the Gregorian reform, in 1582. However, from 1155 to 1751, the English civil year started on March 25th (the feast of the Incarnation of Jesus) and, hence, January 31st was still reckoned to 1505, in England.

King Philip I, thus, was an early adaptor to the use of rackets in the jeu de paume and when he died shortly after, on September 25, 1506, his legacy included three rackets [1]. Because of their costs, use of such rackets was initially reserved to the elite. One would not expect an anatomist as Andreas Vesalius, to mention a tennis racket in one of his works less than 40 years after.

Vesalius’ mentioning of a tennis racket

In a paragraph on the transverse septum [diaphragm] in chapter XXXV of Book II of De Fabrica, Vesalius explained that “the septum as a whole is almost exactly circular. It is positioned obliquely, for it stretches from the breast bone through the ends of the false ribs to the region of the lumbar vertebrae just described, and therefore occupies a position that slopes down from the front to the back. Furthermore, it has two circles, one membranous (which is regarded as its head) and a fleshy one surrounding this; and just as the latter becomes ever fleshier the closer it gets to the ribs, so the former is more membranous the closer it comes to the center of the septum. Neither is an exact circle, but each is, as you might say, broadened out and ends at one point in an acute angle. The membranous one extends its acute angle upward and forward, the fleshy one downward and backward, very like the racquets that we use in the game with the small ball, particularly if the handle of the racquet were undone and left slightly open, and the wooden part made shorter and broader by being crushed hard against
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FIGURE 11.3: Emblem 5 in Le Théâtre des bons Engins by Guillaumes de la Perrière, published in 1539 [10]. Along with Emblem 41, it is accepted as the earliest known illustrations of netted tennis rackets.

FIGURE 11.4: Emblem 41 in Le Théâtre des bons Engins by Guillaumes de la Perrière, published in 1539 [10]. Along with Emblem 5, it is accepted as the earliest known illustrations of netted tennis rackets.
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In this quote, Vesalius inserted the superscript ‘a’ referring to a note in the margin of the text, in which he noted: “In Table VII one is between k,l,m,n, the other outside”. This Tabula VII is the seventh of the fourteen famous muscle-men that Vesalius included in De Fabrica (Figures 11.1 and 11.2) [4]. Vesalius used the words “illis reticulis quam simillimus, quibus in parue pilae ludo utimur et praecipue si eius reticuli capulus dissolutus” in his 1543 Latin original of this quote (on p. 291) [3], thus referring to tennis rackets as reticula. The same use of the Latin word reticulum may also be found in the Colloquies of his contemporary Desiderius Erasmus (1466 - 1536) from Rotterdam, in which Hieronymus and Nicolaus discuss the use of a racket, in 1522 [7].

Discussion

Vesalius’ knowledge of tennis and tennis rackets

Vesalius was the second-born in the fifth generation of a family serving the Habsburg and Burgundy royal houses as physicians (first three generations) or apothecary (Vesalius’ father; the fourth generation). Vesalius’ father served both the sister, and the son of Philip le Beau, while his grandfather had served Philip himself (see Figure 1.3) [8]. Hence, Vesalius may have been familiar with the tennis racket at an early age.

The idea of a wooden racket netted with sheep gut strings probably had its origin in the Dutch or Flemish speaking region (that included Brussels, the home town of Vesalius) and [2], as mentioned above, Erasmus already made note of the use of such strung rackets in his Colloquies in 1522 [7]. Proof exists that, by 1525, the Dutch duke Karel van Gelre ordered his rackets in the Brabant region in Flanders or the Netherlands [1, 9]. Hence, Vesalius very much lived in the very center of early use of the racket.

When Vesalius did his studies in Paris from 1533 until 1536, moreover, the students of the University of Paris already played their jeu de paume using rackets [1]. By the time Vesalius wrote De Fabrica, from 1538 to 1543, the use of rackets had spread over Europe [10, 11]. Consequently, Vesalius had many opportunities to be well informed on the details of the tennis rackets of his era.

The tennis rackets of Vesalius’ era

Two emblems in Guillaumes de la Perrière’s Le Théatre des bons Engins published in 1539 are accepted as the earliest illustrations of strung tennis rackets (Figures 11.3 and 11.4) [10]. Both woodcuts show that these early rackets had hardly any length of stem. The handle turns directly to the blade of the racket. The same applies for the second-oldest known illustration of a diagonally strung racket that is illustrated on page 164 of Scaino’s Trattato del giuoco della palla di Messer (Figure 11.5) [11]. Viewing
these figures from Vesalius’ era, the comparison he made between these and the diaphragm as illustrated in his De Fabrica (Figure 11.2) may be well understood. One can even imagine what these early rackets will look like “if the handle of the racquet were undone and left slightly open” (quote on p. 291-292) [4].

Conclusion
We conclude that Vesalius had many opportunities to be well informed on the details of the tennis rackets of his era. He may well have used the comparison knowing that it would appeal to his students, all of whom were likely to be familiar with the meanwhile very popular game of tennis.

Figure 11.5: La rachetta depicted on the ‘pianta del giuoco dell' Louvre de Pariggi’ [11]. Note that this racket was diagonally strung.
References