

19th Century Ideas on the Transpulmonary Passage of Cancer Cells from the Orbit to the Liver

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Abstract

Although research on transpulmonary passage of cancer cells is being dated to 1952, when animal experimentation was published, it is hypothesized that affirmative clinicopathologic literature goes back to the 19th century.

Keywords: Melanotic cancer; Choroid membrane; Pigmented cells; Transpulmonary

Introduction

Curiosity was shown by our medical forbears in the field of spread of eye melanoma to the liver. Thus, consider that, by 1855, when he presented a case of "Melanotic cancer in various organs," Sanderson [1] lamented that "The orbits were inadvertently not examined." Likewise, by 1898, Calvert and Pigg [2] reported a case of melanoma involving numerous organs but had to admit that the excised right eye "was not examined microscopically." Similarly, when White [3] reported a case and cited others, he stressed that "Probably all these three cases were primary, but they would be much more complete if it could be definitely stated in all of them that the orbit was examined and that the body was carefully searched for moles. There is no mention of any such examination in either Frerichs' or Block's, neither did Wickham Legg examine the orbit."

Orbit search was not only reported upon but also theorized upon by Moore [4] as follows:

The second example, illustrating the relation of descent between a primary new growth and secondary new growths is afforded by a man aged forty-seven, who was first under my care as an out-patient, and afterwards in St. Bartholomew's Hospital, to which he was admitted on Aug 25th, 1888. He died on Sept 22nd in the same year. Three years and five months before his admission his right eye had been removed by operation for a new growth in it, which proved on examination to be a melanotic sarcoma, growing from the choroid membrane, and containing dark pigmented connective-tissue cells of the kind normally abundant in the capillary part of the membrane. In August, 1888, when I saw him first, he had a greatly enlarged liver. The socket of his right eye was empty and showed no sign of disease. His left eye was natural. After death the enlargement of his liver was proved to be due to its infiltration by numerous masses of new growth mainly consisting of dark pigmented connective-tissue cells, precisely resembling those of the capillary part of the choroid membrane, and wholly unlike any normal cellular structure of the liver. Some of the abdominal lymphatics and the kidneys contained similar masses of pigmented sarcoma. Neither kidneys nor lymphatics normally contain any such

pigmented connective tissue. The conclusion is surely obvious that the abnormally growing but normally constructed pigmented connective-tissue cells of these masses in the liver, abdominal lymphatics, and kidneys were the descendants of the original new growth starting in the normal pigmented cells of the choroid. Their colonizing ancestors had already left the original mass in 1885. The growth in such a case is sometimes said to recur in such and such a part after an operation for its removal, but the phrase is incorrect. It neither does nor recur. It began in the choroid, and thence started pigmented cells, which were already on their way to other regions when the original growth was extirpated in the eye. It was truly extirpated, for no morbid change except atrophy of the root of the right optic nerve was discoverable in the head. If I may again borrow an illustration from history, I would compare the melanotic growth in the liver – surviving and flourishing long after the destruction of the original seat of its cells in the choroid – to the Parsi community of Bombay, which preserves in a colony the race and beliefs of a Persian empire destroyed centuries ago by the Mussulman armies.

Armies of cancer cells were on the march so to say! Actually, they had a choice of routes. In the eye-liver route exemplified by Moore [5], a right eye melanoma was removed 3 years before admission. Then the liver became so enormously enlarged that "nowhere can any trace of liver-tissue be discerned," although "There was no new growth within the chest."

Chest uninvolvement by the cancer cells is important especially when it occurs without obviously being stopped in the lungs. This phenomenon intrigued Cruveilhier according to Budd [6]. It was explained thus: "The cancer-cells had to pass through the lungs, before they could arrive at the liver." Then, the reasoning continued as follows: "The circumstance may be accounted for from the variable size of cancer-cells, which are in some cases so small, as to pass readily through the lungs; in others, not."

Not to be forgotten is the report of Rolleston [7], physician to St. George's Hospital, London. In his clinical lecture, entitled "Secondary melanotic sarcoma of the liver," he mentioned the removal of the right eye for melanoma on 13th February, 1897. Next, on admission on 5th January, 1899, it was added that abdominal girth was soon such that "its dimensions while under observation" surprisingly extended. As the lungs themselves were free from growths, he concluded that "It is

remarkable that the cells of melanotic sarcoma being, as they usually are, larger than the cells of the other sarcomata which are stopped by the lungs manage to pass through the pulmonary capillaries and to infect the liver."

Discussion

Liver being at the end of the journey of orbital melanoma has so far been exemplified as a phenomenon known by the end of the 19th century. Therefore, I would hypothesize, as I did elsewhere in terms of other organs [8] that it is inadequate to regard the 1952 animal experiment of Zeidman and Buss as a "first" [9]. Actually, as has been exemplified above, the concept was being considered during the 19th century.

Conclusion

It is usual to conclude, as was done in a standard monograph [10], that it was animal experimentation that led to the acceptance of the theory that cancer cell transportation occurs through the pulmonary vessels. In point of fact, this idea was not only mooted in the 1850s but also maintained in the 1890s. Accordingly, this is one area in which a false first has been prevailing strongly in the literature. This is erroneous strictly speaking. In this context, I would hypothesize that these data are a contribution not only to ophthalmology and pulmonology but also to hepatology. Accordingly, long before 1952, the medical masters appreciated the important phenomenon of cancer cells being actually able to achieve transpulmonary passage. Thus, as Kronice concluded [11], "To understand any phenomenon it is useful to know its antecedents."

Naturally, the question arises that "the existence of paravertebral venous pexus might be the channel for orbit melanoma cancer cell to spread to the liver, by which the lung is bypassed." However, I thrashed this out in a critical review of Batson's 1940 work back in 1977 [12]. Indeed, as I concluded then as follows:

A new era dawned in 1940 when Batson published the theory that the vertebral venous system plays an important role in cancer carriage. He emphasized that this route comes into play with any natural movement such as coughing. Now, cough is a prominent feature of lung cancer. Therefore, this tumor is optimally positioned for utilizing

the vertebral venous route of spread. However, when three major distribution patterns of lung cancer are examined critically, expectations from Batson's theory are not confirmed. If this paradox is recognized and explained, the prospects for solving the mysteries of human cancer metastasis will probably improve.

Indeed, the current paper is geared towards eliminating the curious cobwebs in the realm of cancer carriage. It was on this account that my recent series are tilted towards the target therapy of cancer from 2013 [13] to 2016 [14].

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