

HISTORY OF MEDICINE

Antonio Scarpa (1752-1832) and his study on ocular cancer

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Summary

Antonio Scarpa (1752-1832) is known in the history of medicine as a distinguished anatomist and surgeon. Apart from his anatomical studies that established him and especially in clinical anatomy, he focused also his interest on ophthalmology, therefore he was considered as the “father of ophthalmology in Italy”. His study on ocular cancer is of particular interest, because he not only reviewed older ap-

proaches on this issue enriching them with his own clinical observations but his study served as a bridge connecting the previous tradition to the scientific study of ocular cancer which began at the second third of 19th century.

Key words: Antonio Scarpa, carcinoma, Fungus haematodes, ocular cancer

Introduction

Antonio Scarpa (1752-1832) (Figure 1) was an ingenious surgeon, anatomist and professor of anatomy at the Universities of Modena and Pavia [1,2]. He presented a particular interest in the anatomy and physiology of the nervous system and the sensory organs [3]. Therefore we can understand why he focused also on the anatomy and the diseases of the eye [4]. In 1801 he published his treatise on ocular diseases under the title: *Saggio di osservazioni e d'esperienze sulle principali malattie degli occhi* (Essay on the observations and experience on the principal diseases of the eyes) [5]. This study until 1816 had four editions. In 1816 he decided to enrich this study on ocular diseases, therefore in the same year he published the fifth revised and enlarged edition of this book under the new title: *Trattato delle principali malattie degli occhi* (Treatise on principal diseases of the eyes) [6]. This fifth edition had a tremendous success and not only received many editions but

was also translated in English [7], French [8] and Spanish [9], while the first edition apart from the other languages was also translated in German [10]. His study on ocular diseases since its first edition in 1801 is the first study written in Italian, therefore he was considered as the “Father of Italian ophthalmology” [11]. An extensive analysis of ocular cancer is found only in the fifth edition of his study, which has a special place in the history of ocular cancer, not only for the clinical study of these diseases but also for their surgical treatment.

Material

The second volume of Antonio Scarpa's work, *Trattato delle principali malattie degli occhi* (Figure 2), chapter no. VIII by the title, *Del Fungo haematodes, e del Carcinoma dell' occhio* (About Fungus haematodes and ocular Carcinoma) is devoted



Figure 1. Antonio Scarpa (1752-1832) (https://en.wikipedia.org/wiki/Antonio_Scarpa).

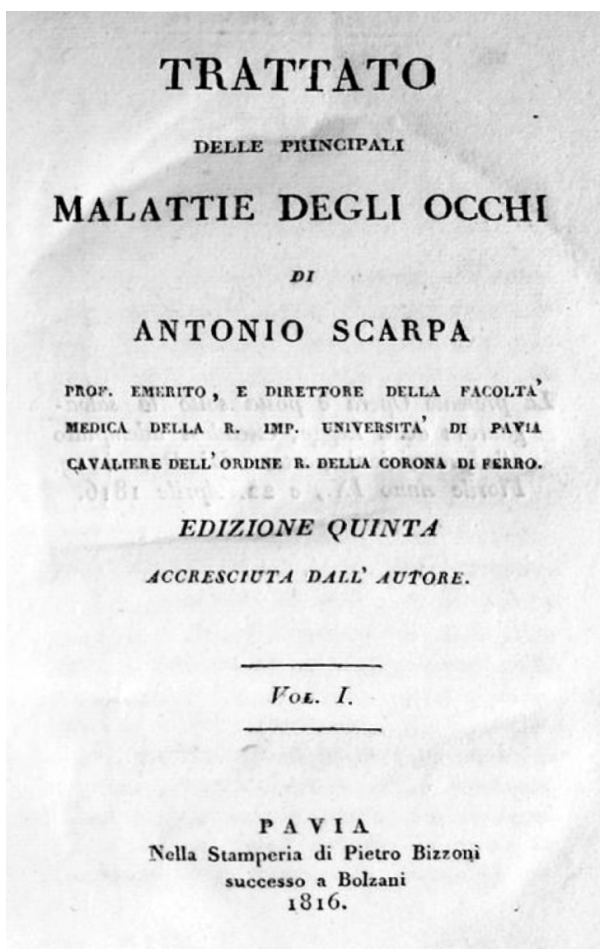


Figure 2. Trattato delle principali malattie degli occhi (Scarpa A. Trattato delle principali malattie degli occhi. I-II. Pavia, nella stamperia di Pietro Bizzoni, 1816.)

to ocular cancer. In this chapter Antonio Scarpa reviewed older publications on this topic, presented his own experience and expressed his questionings. Finally, he arrived to seven conclusions regarding the characteristics of ocular cancer and made a thorough analysis of its surgical approach [6].

His first concern, on which he founded his analysis, was to distinguish cancer presented in children from those presented in adults. In addition, he divided the cancerous changes in two main categories, the one in which the cancerous substance was hard and the other one which was soft. He also distinguished the ocular cancer developed on the anterior part of the eyeball from the other on the posterior one. Furthermore, he accepted the theory of the time that each type of ocular cancer was provoked by a fungal infection.

He formed the idea that a fungal infection provoked ulcers from which a malignant tumor was developed. The malignant tumor, when developed in any anatomical structure of the anterior part of the eyeball, was hard in the majority of the cases and presented mainly in adults. This type of cancer was considered as schirrus cancer having the name *Carcinoma*. On the other hand, the ocular cancer presenting mainly in children developed in the posterior part of the eyeball and was soft, but lethal. He underlined that in children with this disease a yellowish or greenish substance traversed by the blood vessels originating from the central artery of the retina and gradually increasing in size devastated the ocular fundus [6].

Scarpa accepted the idea of the majority of the surgeons of his time, that this soft type of ocular cancer which then was named Fungus haematodes, was also provoked by an unspecified fungus.

Scarpa studied 24 patients with Fungus haematodes of which 20 were children under 12 years and 6 patients with ocular carcinoma of which 2 were 14 and 17 years while the others were aged from 36 to 50 years. In addition, he reviewed the bibliography from the time of Wilhelm Fabricius von Hilden (1560-1634) until his days. He reached to seven conclusions:

1. He distinguished Fungus haematodes from carcinoma, that is cancerous tumor affecting the external structures the organ, assuming that the first type of cancer may be a variation of the second or not.
2. He believed that Fungus haematodes affected the internal anatomical structure of the eye in children under 12 years more often than adults.
3. Enucleation of eyeball to treat Fungus haematodes, although applicable from the first detection of the disease, namely the appearance of

yellow spots on the fundus, was considered pointless and probably led the patient to die faster.

4. According to Scarpa, the fungus which caused ocular carcinoma (cancer in the anterior part of the eyeball), makes its appearance firstly at the conjunctiva and the anterior part of the eyeball.
5. Scarpa had the idea that the external fungous excrescence, while it is soft to the touch, flexible and flabby, although accompanied by symptoms similar to cancer (swelling, redness, pain, fever, cachexia) it is or is still not malignant until to become rigid, hard, leathery, dirty and generally schirrous.
6. He believed also that the external cancer of the eye that is tough throughout its surface on palpation and its surface carries dirty ulcers, while cancer is extended across the eyeball, optic nerve, surrounding others anatomical structures such as the orbit and lymph nodes behind the angle of the jaw, as well as those of the neck, is incurable.
7. He pointed also that a partial or a total extirpation of the eyeball, could cure the patient if the operation is performed before the external fungous excrescence present the schirrous, verrucous, and carcinomatous hardness [6].

Apart from the clinical examination of ocular cancer, Antonio Scarpa focused also on its surgical treatment making observations concerning the surgical anatomy and the surgical maneuvers in the extirpation (partial or total) of the eyeball which was then considered the only efficacious treatment for ocular cancer.

First of all, he expressed his own opinion on the issue that had arisen at the time, of trepanation of the skull in the surgical treatment of ocular cancer, in order to treat retrobulbar expansion. Scarpa emphasized that the outcome of the patient with this disease was not dependent on the removal of a part of a cranium bone, but on the type of ocular cancer or its progress. He believed that Fungus haematodes was considered incurable and ocular carcinoma's patients went to the physicians in an advanced stage, when cancer had spread, so according to him any surgery in these conditions and the drilling of the skull was in reality futile [6].

When Antonio Scarpa dealt with the partial or total extirpation of the eye, he advised that the surgeon should pay attention to the anatomical structures and should do everything possible so that the patient experience less pain and should complete the operation as quickly as possible. He believed that a surgical treatment could have an effect if done in an early stage and only to treat carcinoma.

Discussion

The 18th century is a significant point in the history of ophthalmology, because it was then that the greatest revisions of ancient doctrines in ophthalmology preserved until 17th century occurred [12]. Regarding ocular cancer, the concept of the excess black bile which produces hard (schirrus) tumors in any part of the eyeball and eyelids that may or may not have ulcers, while their treatment is very difficult, was born in ancient Greek medicine [13]. This concept of ocular cancer survived over 1500 years. The Renaissance was an epoch when all the doctrines of ancient Greek medicine were put in question [14]. Nevertheless, the thorough microscopic examination of the tissues considered as cancerous which was necessary in the study of this disease, was achieved only in 19th century and the modern concept of cancer was established by the work of Rudolf Ludwig Carl Virchow (1821-1902) who expressed the idea that every cell produces another cell (*Omnis cellula e cellula*) and cancer cells are those with irregular mitosis [15]. In the 18th century the idea of the excess production of black bile as a cause of ocular cancer was gradually abandoned, even if the symptomatology (schirrus tumor, ulcers) was preserved in clinical practice. Among the greatest ophthalmologists of this century who dealt with ocular cancer only Antoine Maître - Jan (1650-1725) was fun of the ancient doctrines [16]. The others, such as Charles St. Yves (1667-1733) [17], Jean François Gleize (1763-1811) [18], Pierre Guérin (1740-1827) [19], Antoine Louis (1723-1792) [19] and Guillaume Pellier de Quenqsy (1750-1835) [20] were not interested in searching the cause of ocular cancer but they did not repeat ancient doctrines in their works.

They focused on the clinical description of this disease and its surgical treatment. Jean François Gleize adopted Charles St. Yves' ideas on ocular cancer and in his treatise *Nouvelles observations pratiques sur les maladies de l'oeil et leur traitement* (New practical observations about ocular diseases and their treatment) advised the reader to go to Charles St. Yves' treatise to be informed about ocular cancer [18]. Charles St. Yves in his treatise, *Nouveau traité des maladies des yeux, les remèdes qui y conviennent, et les opérations de chirurgie que leurs guérisons exigent* (A new treatise on eye diseases, the remedies that suit it, and the operations of surgery which their cures require) noticed that cancer can be grown in every ocular tunic, pointing that exophthalmos is a common symptom. Although he did not give further details about ocular cancer except of the fever, pain and death of the major-

ity of the patients, he focused his study mainly on eyelid cancer. He distinguished five types of eyelid cancer according to the anatomical structure they appeared. The first type was the one appearing in the upper eyelid, the second in the medial canthus, the third the one which could arise by a varicose vein in the eyelids, the fourth in lacrimonasal apparatus expanding in the nearby tissues and the fifth that developed after a blow to the orbit [17]. Guillaume Pellier de Quenqsy tried also to summarize the types of ocular cancer. In his treatise, *Précis ou cours d'opérations sur la chirurgie des yeux* (Precision or course of operations on eye surgery) he distinguished three types of ocular cancer. The first one was the cancer concerning only a part of the eyeball, the second the one concerning the total of the eyeball and the third the one which could expand outside the bulb to the eyelids [20].

In the above descriptions it is obvious the inability of the physicians of the time to understand the pathological anatomy of the disease, therefore they focused on its topographical anatomy. Scarpa also did not avoid this difficulty, but he offered a new division of the types of ocular cancer, which was based not only on the anatomical structures where malignant ocular tumors could arise but also on their clinical characteristics and the supposed etiological factor of them, combining the knowledge of the past with the new of his time. Therefore, he recognized Fungus haematodes as the soft ocular cancer developing in the posterior ocular tunics, which appeared mainly in children and carcinoma as the hard ocular cancer developed in the anterior ocular tunics which appeared mainly in adults.

In order to understand how he formed these ideas about ocular cancer we should have in mind the new evidence of his times regarding ocular cancer and how these were combined with the earlier ones by the physician.

From the late 17th century until the early 20th century it was a common perception that cancer, despite its type or the organ where it appeared, was provoked by an infection [21]. This idea was adopted by Antonio Scarpa for the two types of ocular cancer he recognized, Fungus haematodes and Carcinoma, even if he could not identify the cause of the supposed infection [6]. This idea was also supported by the fact that all cancer patients, despite the type of ocular cancer, suffered from high fever, pain and cachexia, symptoms which were also common in infections.

Fungus haematodes was the name of retinoblastoma at Scarpa's times. Its first description was made by Petrus Pawius (ca. 1564-1617) in

1597 on a 3-year-old boy who died due to a huge tumor in his left eye [22]. The second description was made in 1767 by William Hunter (1718-1783), but now on a 3-year-old girl with bilateral ocular tumor [23]. William Hey (1736-1819) in 1805 proposed the name Fungus haematodes for all forms of soft type cancer regardless the organ where they could appear, on the basis that a Fungus was the real cause of this disease, although unspecified, which also provoked soft tumors with neovascularizations [24] and in 1809 James Wardrop (1782-1869) made the first complete study on Fungus haematodes in which the ocular manifestation was indicated as a special disease for the first time [25].

For modern medicine, Fungus haematodes is retinoblastoma, comparing the clinical characteristics of this disease described then with the modern concept of the disease [24].

On the other hand, Carcinoma was the standard type and term for ocular cancer since antiquity. In this type of cancer the tumors were schirrus (hard) in substance and mainly were developed from the anterior anatomical structures of the eyeball presenting mainly in adults [13].

Although Scarpa pointed that Fungus haematodes affected mainly children, he also accepted the idea that this type of cancer could affect also adults but more rarely. This misconception about retinoblastoma, as we identify today Fungus haematodes, is likely due to the fact that in that time the pathological anatomy of the disease was unknown, therefore cases of cancer with the characteristics of soft tissue in adults could easily misinterpreted as Fungus haematodes (retinoblastoma).

Regarding carcinoma, Scarpa believed that this disease concerned mainly adults, although young adolescents could also be affected. He underlined the crucial role of inflammation in the eye in the development of carcinoma. Ophthalmia was considered by the physician as a predisposing factor. He also pointed that other benign conditions of the eye, such as staphyloma and pterygium, could provoke carcinoma under the influence of inflammation. Scarpa believed that carcinoma could not be lethal as Fungus haematodes if the patient asked for help at the early disease stages and underwent a total or partial extirpation [6].

Scarpa's ideas on ocular cancer did not influence only Giovanni Barrata who repeated his doctrines and emphasized also the role of inflammation in the appearance of ocular carcinoma [26], but also William Mackenzie who, except of schirrous cancer and Fungus haematodes, he introduced a new type of ocular cancer, this of melanoma [27]. Today Scarpa's conceptions on ocular cancer have

been overpassed owing to the progress of modern medicine. Nevertheless, Scarpa's methodology on the approach of this disease recalls a modern epidemiological study, although in an early form.

Conclusion

Antonio Scarpa's study of ocular cancer was of significant value, because it had the role of the bridge which connected earlier ideas on this topic with the newer which appeared during late 18th and early 19th century. Antonio Scarpa abandoned the ancient doctrines about ocular cancer and accepted the infectious theory of cancer which was very popular at his time. Although his supervisor in his doctoral thesis was Giovanni Battista Morgagni, the so-called 'father of pathology' [28], he did not examine in detail the cancer tissues and did not write specific details about its microscopic characteristics. But we should have in mind that

the first atlas of ocular pathology where was barely mentioned ocular cancer, was published only in 1808 by James Wardrop (*Essay on the morbid anatomy of the human eye*) [29], therefore we can infer that it was early even for Antonio Scarpa such a study. On the other hand, he focused a lot on the clinical part of ocular cancer, therefore his seven conclusions had the role of a compass in order to facilitate physician's daily work. In addition, his conclusions summarized earlier studies enriched by his own observations, pointed the direction where future studies on the subject should follow. His observations in clinical examination and surgical treatment of ocular cancer [30] were the base where the new ideas developed during the following 19th century, because his ophthalmological treatise received great acceptance, being translated in many languages showing that it was a reference book for ocular diseases and consequently for ocular cancer.

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