The ancient Syrian physician Archigenes and his contributions to neurology and neuroanatomy

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Introduction

Archigenes practiced during the era of the Emperor Trajan (bust pictured here) during the time of the building of the Colosseum, where early Roman medicine was practiced. Archigenes provided us with an early understanding of the decussation of pyramids.

The Museum and Library at Alexandria was founded between 323 and 246 BCE as a scholarly institution providing over 700,000 texts and an adjacent medical school in order to attract the finest Hellenic scholars [1]. It was considered successful until the Roman conquest of Egypt, the burning of the

library circa 47 BCE and lack of any subsequent attempts at repair [2]. While in operation, however, this academic environment produced several different schools of thought. The Hippocratic theory of medicine became dominant in the third century BCE and was premised on linking pathology to dyscrasia of the four humors: blood, phlegm, black bile, and yellow bile. On the other hand, pneumatists posited that matter is held together by a refined airy element called pneuma, which in turn is influenced by hot, cold, wet, and dry elements [3]. While this doctrine of pneumatism originated with Hippocrates, it did not become cohesive until a school was founded in the first century CE by Athenaeus of Attalia in Pamphylia, who was a student of the Stoic philosophers [4]. This synthesis of multiple practices and ideas into a single system was called eclecticism and was founded by Agathinus of Sparta. This method would be used by other medical writers such as Soranus, Rufus, and Archigenes [5].

Archigenes and medicine

The physician Archigenes (Αρχιγένης) lived in the first or second century CE and was born in Apamea, Syria but practiced in Rome. He was a student of Agathinus and it is thought that he lived in Rome during the time of Emperor Trajan (CE 98–117) [6]. Among other things, he was known for operating on breast and uterine cancer and utilizing ligatures for limb amputations. Archigenes widened the conditions under which limb amputation would be a safe and successful procedure through new techniques such as first bandaging the limb to expel the blood before a tourniquet was applied above the line of severance. After these changes, the procedure's use was expanded to include ulcers and deformities. Apart from his medical practice, Archigenes also managed to write several significant expositions on a variety of topics such as types of

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pulses, palpitations, types of fevers and the anatomy of the kidneys, testicles, breasts, and hepatic circulation. He provided advice on medicines derived from herbs such as white hellebore and diagnostic reasoning to differentiate illness based on the kind of pain experienced by the patient. Archigenes also used opium to treat the symptoms of dysentery and described abscesses of the liver and the associated symptoms.

Unfortunately, all of the writings from the pneumatist school were lost except for those of Aretaeus [3]. However, the majority of his work in the second century was compiled from the writings of Archigenes and these treatises were rediscovered in the sixteenth century. Therefore, one can look to the works of Aretaeus as an important source of our understanding of pneumatist teachings such as those of Archigenes [3, 4].

Neuroanatomy and neurology

According to Aretaeus, Archigenes demonstrated considerable anatomic knowledge of the nervous system. For instance, Archigenes is thought to be the first to show the relationship between contralateral hemiplegia from head lesions and ipsilateral paralysis from spinal cord lesions, which he correctly attributed to the decussation of pyramids [5]. Archigenes and other pneumatists transferred the “psychic pneuma” from the brain to the heart and arteries, the function of which was to mix innate heated pneuma with cooler pneuma drawn into the lungs from the outside [3, 5]. Although these latter attributions have since been shown to be incorrect, other observations of Archigenes, such as mania seen in the post-ictal state and melancholy as a precursor to mania, may be reconcilable with modern medical evidence depending on the reader’s interpretation of the pneumatist nosology [7].

Moreover, Archigenes and other pneumatists made distinctions between acute and chronic headaches with associated syncope and scotoma [8]. These practitioners also wrote on tonic-clonic seizures and preceding auras, phthisis or miosis, platycoria or mydriasis, spasmodic laughing and crying, and phrenitis, i.e., delirium secondary to infection [9]. Furthermore, Aretaeus reported on mental illness through maladies such as hysterical suffocation, i.e., panic attacks, reported on distinctions between melancholies, i.e., depression, as a medical illness distinct from situational depressed mood and also distinguished between organic and mental illness by separating melancholy and mania from other diagnoses such as dementia and toxic encephalopathy [7, 10].

It is thought that pneumatists, Hippocratic practitioners, and other medical sects competed with one another for patients [3]. This likely explains the arguments that arose between members of different schools, and even the exclusion by Galen of mentioning Aretaeus despite having identical

descriptions and treatments for maladies, such as hysterical suffocation and epilepsy [5, 11]. This broad diffusion of ideas is further shown by Galen, who wrote volumes of commentary and criticism on Archigenes’ work, but who also quoted so extensively from Archigenes that some scholars believe Galen’s own theory on the pulse was derived from Archigenes’ work [5]. Some have also questioned if many of the teachings of Aretaeus were actually derived from those of Archigenes [12].

Conclusions

Archigenes was considered one of the “Fathers of Medicine” due to his vivid and detailed descriptions of many diseases such as pneumonia, pleurisy, empyema, diabetes, elephantis, diphtheria, leprosy, and even possibly cerebrospinal meningitis [5, 10]. Our early understanding of the brain and spinal cord is based on the contributions of pioneering physicians such as Archigenes.

Compliance with ethical standards

Conflict of interest The authors have no conflicts of interest.

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