

FROM THE “SMALL DOLL” UNTIL “PROSTITUTE’S PUPIL” THROUGH ARGYLL ROBERTSON: THE ARGYLL ROBERTSON’S SIGN, ONE HUNDRED FIFTY YEARS FROM HIS FINDINGS (1869)

DA “PEQUENA BONECA” ATÉ “PUPILA DA PROSTITUTA” ATRAVÉS DE ARGYLL ROBERTSON: O SINAL DE ARGYLL ROBERTSON, CENTO E CINQUENTA ANOS DE SEUS ACHADOS (1869)

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ABSTRACT

A tiny structure, the pupil, attracts too much attention, since the antiquity. The pupil as part of the “window of/to the soul”, the eyes, it can demonstrate a clinical disorder sign, or simply a psychological expression. In this paper, it is studied the situation in which the pupillary reflex to light is compromised, but the accommodation reflex is preserved, what is named after Argyll Robertson, the first Scottish ophthalmologist, who besides described the signal (1869), he also tried to defined its clinical significance. Afterwards, it was clearly demonstrated its relationship with tertiary neurosyphilis.

Key words: Pupil, reflex, miosis, Argyll Robertson, autonomous nerve system, neurology, ophthalmology

RESUMO

Uma estrutura minúscula, a pupila, atrai muita atenção, desde a antiguidade. A pupila como parte da “janela da alma”, os olhos, poderia demonstrar um sinal de desordem clínica, ou, simplesmente, uma expressão psicológica. Neste trabalho, estuda-se a situação em que o reflexo pupilar à luz é comprometido, mas o reflexo de acomodação é preservado, o que leva o nome de Argyll Robertson, o primeiro oftalmologista escocês que além de descrever o sinal (1869), também tentou definiu seu significado clínico. Posteriormente, foi claramente demonstrada sua relação com a neurosífilis terciária.

Palavras-chave: Pupila, reflexo, Argyll Robertson, sistema nervoso autônomo, neurologia, oftalmologia

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INTRODUCTION

The pupil presents several important characteristics, its name already foreshadows this, since the term originated from Latin pupilla, originally “little girl-doll,” diminutive of pupa «girl; doll», named because the tiny image one sees of oneself reflected in the eye of another⁷.

Besides, pupil is not inert, since it constricts or dilates in accordance with physiological response to stimulus: its circular muscle constricts controlled by the parasympathetic nervous system, and its smooth cells of the radial muscle dilates (mydriasis) controlled by the sympathetic nervous system.

The normal pupil responses can have a variety of causes, and these reactions become an area of increasing interest, as it have been demonstrated that pupils respond to more than changes in light, they also betray mental and emotional commotion⁴. This is linked to the popular wise proverb that the “eyes are the window of/to the soul”.

A particular abnormal aspect of this special structure, the pupil, was worked by a representative of the Edinburgh School of Medicine, Douglas Moray Cooper Lamb Argyll Robertson (figure 1). He described (1869) symptoms of tertiary syphilis of the nervous system about pupils that consist of absence of the light response and brisk accommodation reaction^{2,3}. Now, it is known as Argyll Robertson's pupils, and also as reflex iridoplegia, and informally and politically incorrect, as “Prostitute's Pupil.”, as it is related to syphilis¹¹.

ARGYLL ROBERTSON'S LIFE AND CAREER

Argyll Robertson's father was a general surgeon, with a special interest in the surgery of the eye. During the 1850s, the invention of the ophthalmoscope by Hermann Ludwig Ferdinand von Helmholtz, in 1851, and the new operations such as iridectomy introduced by von Graefe, in 1856, ensured that ophthalmology developed into a specialty of its own right¹². Argyll Robertson graduated from St. Andrews in 1857, and later he studied under von Arlt, in Prague, and then, in Berlin under the leading ophthalmologist Albrecht von Graefe^{3,8,12}. Von Graefe, at the time, was at the height of his reputation and made up Argyll Robertson's mind to devote himself to the practice of ophthalmology. This was done, and Argyll Robertson became the first surgeon in Scotland to practice entirely in the field of ophthalmology^{6,2}.

Argyll Robertson, in 1883, began teaching ophthalmology at the University of Edinburgh, remaining in

this office until 1897, when he retired from active hospital service.

Argyll Robertson left no large number of medical publications, and according to his obituary⁶, he “preferred the tongue to the pen as a medium”⁶. In 1863, he described the clinical effects on the eye from physostigmin - The calabar beam. This is the result of Thomas Fraser talk to Argyll Robertson about calabar bean and its physostigmine (eserin) that is a potent miotic. Consequently, the ophthalmic surgeon tested it on himself, in this way he undoubtedly knew the worth of this drug mainly for glaucoma, and his papers on the calabar bean as a new ophthalmic agent were published, what made him renowned immediately¹⁰. In the same year, von Graefe utilized calabar miotic power to ease iridectomy¹². Moreover, Argyll Robertson showed the antagonistic property of the calabar bean to atropine³.

Argyll Robertson was a man of broad medical interests, always emphasizing the role of ophthalmology in a wider medical context. Besides, his professional standing Argyll Robertson seems to have impressed his contemporaries by his social appearance, sport and party talents. He was married to Carey Fraser, but they did not have children. Regarding his death, he died abroad and suddenly while visiting India, and his body was cremated at the burning ghat, on the bank of the Gondli River¹⁰.

ARGYLL ROBERTSON'S PUPIL

Under normal circumstances, light entering one pupil reply as a constriction of it, at the same side, the direct response, as well as a constriction of the pupil of the not stimulated eye, the consensual response.

The pupillary light reflex neural pathway on each side has an afferent limb, running within the optic nerve, and efferent limbs, running along the oculomotor nerve.

The afferent limb carries sensory input from the retina, through the optic nerve, until the pretectal nucleus in the midbrain, at level of superior colliculus.

The efferent limbs have important autonomic nervous system influences, but the “normal” pupillary constriction is a balance between the sympathetic and parasympathetic nervous systems.

Parasympathetic innervation leads to a pupillary constriction, and this system conducts to the light reaction, being its major center in the dorsal midbrain - at the Edinger-Westphal nucleus, near the oculomotor nerve nucleus. The preganglionic axons from the Edinger-Westphal nucleus, through the oculomotor nerve, they do a synapsis at

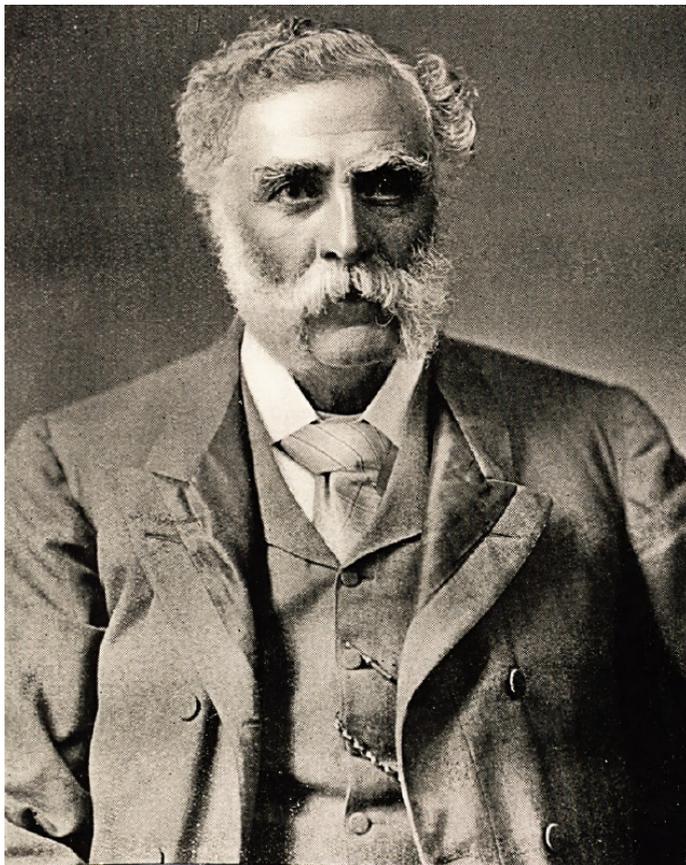


Figure 1: Douglas Moray Cooper Lamb Argyll Robertson (1837, Edinburgh - January 3, 1909, Gondy/India) 6,11.

the ciliary ganglion. After, the postganglionic axons innervate two eye muscles, the sphincter pupillae muscle of the iris to control pupil constriction, and the ciliary body (making the lens more convex, and consequently, the accommodation)⁵. The sphincter pupillae muscle receives muscarinic, cholinergic innervation from the postganglionic fibers arising from the ciliary ganglion⁵.

Matching these two responses, accommodation and pupil constriction in both eyes, is supportive in detecting a lesion. It has been credited to a dorsal midbrain lesion in neurosyphilis the interference in the pupillary light reflex pathway, but this lesion would not reach the more ventral pupillary near reflex pathway¹.

In 1869, Argyll Robertson described the patient's phenomenon⁹. The pupils of the reported patients were small and did not react to light, but reacted at accommodation (figure 2) and were only incompletely dilated by atropine. He concluded that: "These four cases serve well to illustrate the connexion between certain eye-symptoms and a diseased condition of the spinal cord. In all of them there was marked contraction of the pupil, which differed from miosis due to other causes, in that the pupil was in-

sensible to light, but contracted still further during the act of accommodation for near objects, while strong solutions of atropine only induced a medium dilatation of the pupil. In three of the cases a slight degree of atrophy of the optic nerves existed, as was evinced by a shallow excavation and lighter colour of the optic disc. In one, we observed a symptom which has been noticed occasionally in spinal disease by Brown-Sequard and others?namely, a drooping of the upper lids. In none of the cases was there any appreciable colour-blindness. As regards the nature of the spinal lesion, in one case the characters of locomotor ataxy were well marked; in the other two the form of spinal affection is doubtful; while in the fourth patient, as I have already mentioned, the symptoms of spinal disease are by no means well marked."

Grzybowski and Sak³ remember that although the lack of pupillary light response in patients with spinal disease had been described before, Argyll Robertson was the first to appreciate that the pupils still responded to near stimuli. However, some dispute that Robertson's remarks on the pupil in neuro-syphilis were actually distinct years before by the French ophthalmologist Armand Trousseau².

Indeed, Argyll Robertson supposition was that the lesion causing the syndrome was located in the spinal cord and fitted the findings in the sympathetic system. He did not understand the implication that his pupillary finding was related to syphilitic spinal disease¹⁰.

Miotic, irregular pupils without reaction to light were known in singular cases of tabes dorsalis and paralysie générale since the end of the eighteenth century. However, the combination of miosis and pupils without reaction to light while the power of contraction during accommodation was retained, had never before been described. This is highly linked to neurosyphilis, but it might be seen in other disorders, such as diabetic neuropathy, Parinaud syndrome, brain injury and thiamine deficiency/Wernicke's encephalopathy^{3,8}.

The Argyll Robertson pupil soon became a "pathognomonic sign" in tabes dorsalis, dementia paralytica, and meningovascular syphilis⁸. Although, not until the opening of the XX century, syphilis was commonly accepted as the cause of the abnormal pupils, because of the discoveries by Schaudinn and Hoffmann of the treponema palladium, in 1905, and August Paul von Wassermann's serologic test, in 1906⁸.

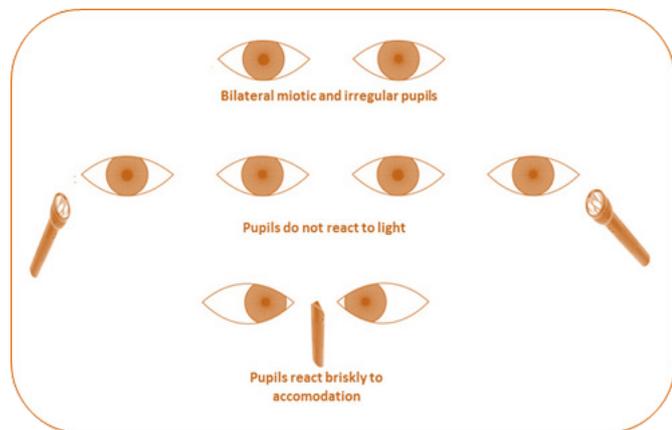


Figure 2: Argyll Robertson's pupils

CONFLICT OF INTEREST

The author declares that there is no conflict of interest.

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