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# THE HYALOID CANAL AND ITS RELATION TO CYCLITIC EXUDATION [1]

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IN fœtal life the hyaloid canal and artery play an important part in the nutrition and development of the eyeball. The artery makes its appearance at a very early stage in the development of the mammalian eye, and is, comparatively speaking, of considerable size owing to its extensive and important distribution. It is the continuation of the central artery of the retina, which in adult life occupies the axial area of the distal portion of the optic nerve, and passes forwards to near the posterior pole of the lens, where it divides into numerous small branches, forming a vascular network—membrana capsularis—enveloping the entire lens. The anterior portion of this vascular network, which corresponds to the pupillary area—membrana pupillaris—is supplemented by arterial branches from the vessels of the anterior surface of the iris.

The central and hyaloid arteries gain access to the interior of the optic nerve and eyeball respectively through the so-called choroidal fissure, situated along the ventral surface of the optic vesicle. This fissure is a continuation backwards of the distal or lenticular invagination of the primary optic vesicle, and is prolonged into the optic pedicle for a short distance, thus converting the originally tubular pedicle into a more or less solid structure grooved longitudinally along its ventral surface. Into this groove the central artery of the retina is prolonged forward till it reaches the interior of the secondary optic vesicle, where it gives off the retinal arteries, which we see with the ophthalmoscope. The continuation of the artery from the point where the retinal arteries are given off to the posterior pole of the lens is called the *hyaloid or central artery of the vitreous.* The groove along the ventral surface of the optic pedicle and the choroidal fissure eventually become obliterated, the former by its margins growing round the central artery of the retina, and the latter by simple approximation and coalescence of its margins.

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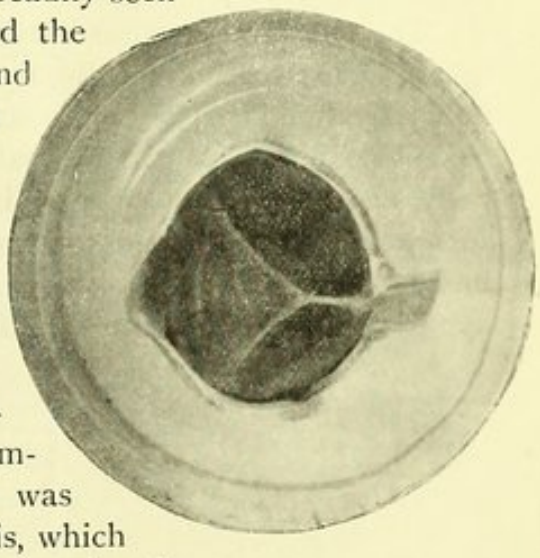
In mammals before the closing of the choroidal cleft, mesoblastic tissue passes into the interior of the secondary optic vesicle. This mesoblastic tissue, together with a small quantity of mesoblast that has been carried in with the lens, forms the future vitreous. At first it surrounds the hyaloid artery, forming a canal or perivascular sheath, *the hyaloid canal.* The contents of the canal disappear before birth, but the canal itself remains patent throughout adult life as a slightly compressed tubular channel one or two mm. in diameter, beginning behind in a slight conical enlargement at the optic disc—area Martegiani, and passing forwards somewhat eccentrically through the substance of the vitreous to the posterior pole of the lens, where it ends in a similar conical enlargement called the post-lenticular space. This space communicates with the patellary fossa in which the lens lies, and this again with the posterior and anterior aqueous chambers through the zonular spaces. Michel has injected the hyaloid canal with a coloured fluid by injections into the anterior chamber, and Schwalbe has even succeeded in passing the coloured fluid along the optic nerve into the intervaginal space, so that the hyaloid canal may be regarded as a lymph space communicating between the aqueous chambers in front and the intervaginal space behind. It is moreover one of the chief posterior lymph channels of the eye, with its outlet in the lymphatic spaces of the optic nerve.

A cyclitic exudation, which is always more or less plastic, passes first into the posterior aqueous chamber, being the direction of least resistance, thence into the anterior chamber, where the cells and lymph become agglutinated by coagulated fibrin into small masses of varying size. These agglutinated masses when tossed about in the aqueous whirlpool, become more or less rounded, and being, as a rule, too large to pass through the filtration area into Schlemm's canal, they remain in the anterior chamber, and not unfrequently become deposited in a pyramidal fashion on the posterior surface of the cornea at the lower portion, as one sees in so-called *keratitis punctata* or *Descemitis.* The exudation may, however, pass backwards between the lens and the patellary fossa into the post-lenticular space, especially if the posterior aqueous chamber be filled with exudation—*total posterior synechia.* Once in the post-lenticular space, the exudation enters the distal end of the patent hyaloid canal, and then readily passes along to the optic disc. In this way an exudation cast, both of the patellary fossa and hyaloid canal, may be formed.

Sooner or later contraction of the cast sets in, with the result that the part corresponding to the patellary fossa gets dragged backwards into the vitreous cavity by the contracting hyaloid portion, and assumes the appearance of a hollow cone or bell tent, adherent by its base to the ciliary body all round, the apex being directed backwards towards the optic disc. During the formation of this conical protrusion into the vitreous cavity the vitreous becomes displaced backwards and outwards, and in very severe cases, as when complicated with suppuration, the whole of the vitreous may be displaced by the exudation.

In support of this view a series of eyes mounted in glycerine jelly, showing the condition described, was exhibited. The following are brief notes of the case in which the condition was first observed. Mrs S., æt. fifty, received an injury some thirty years previously, to the left eye, causing iridodialysis of about one-third of the periphery of the iris, corresponding to the upper and outer portion. The pupil was somewhat oval in shape, and displaced downwards and inwards, *i.e.*, away from the rent in the iris. The lens and fundus, readily seen through the displaced pupil and the rent at the periphery, were found to be normal. The eye was quiet and showed no signs of recent inflammatory mischief. Vision was six-ninths, and with + 2D Sph. she could read Jaeger 1 at 12 inches. Six weeks after her first visit she returned, complaining of pain and discomfort in the injured eye. On examination it was found that she was suffering from severe iridocyclitis, which reduced the vision to little more than hand movements. The eye eventually made a good recovery, and remained well for some months, when a severe relapse occurred. On this occasion glaucoma supervened, and the eye went gradually from bad to worse. Enucleation was performed on account of the excruciating pain. The eye was preserved in formol, and mounted in glycerine jelly. While a section was being made, the lens unfortunately became displaced, so that its exact relation to the surrounding parts could not be determined. On examination, the following very interesting and unusual con-



dition was observed (*vide* photograph): From the posterior portion of the ciliary body all round, a filmy semi-transparent conical expansion was seen extending backwards into the vitreous cavity like a vertical section of a bell-tent. From the apex a narrow band about ·50 mm. in diameter extended backwards, expanding into a small cone, the base of which was firmly adherent to the optic disc. The vitreous, although somewhat fluid, was *in situ*, and there was no detachment of the retina. At first sight the condition was suggestive of a persistent hyaloid artery, but on closer inspection it was found that the band running backwards through the vitreous cavity was solid and directly continuous in front with the ciliary body. This, together with the clinical history, points to its being a cyclitic exudation, which had filled the patellary fossa, hyaloid canal, and area Martegiani.

In the other specimens shown the same appearance was observed, but in all of them the large conical expansion, corresponding to the retraction of the patellary fossa, was more dense, the cyclitis being very much more severe.

The condition is interesting as showing the patency of the hyaloid canal pathologically, instead of by injections of coloured fluids as already described. It may also explain many of the so-called cases of persistent hyaloid artery seen ophthalmoscopically. In many of these cases it is probable that the appearance seen with the ophthalmoscope is simply an exudation cast which has extended either backwards from an inflamed ciliary body-cyclitis, or forwards from an inflamed optic nerve-optic neuritis.