

Observations on hydrocephalus chronicus / by Alexander Monroe, jun.

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To Mr Liston
with the authors
best Compts

OBSERVATIONS

ON

HYDROCEPHALUS CHRONICUS.

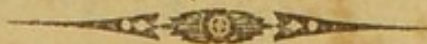
BY

ALEXANDER MONRO, JUN.

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EDINBURGH:

PRINTED BY A. NEILL AND COMPANY.

1803.

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THE PROGRESS OF THE CHRONIC

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ADVERTISEMENT.

The following Observations on Hydrocephalus Chronicus, with the Cases, were originally published as an Appendix to Mr PATERSON'S Inaugural Dissertation on Hydrocephalus Phreticus or Acutus.

ST ANDREW'S SQUARE, }
August 24. 1803. }

ADVERTISEMENT

The following Observations on Hydrocephalus
in Children, with the Cases, were originally
published as an Appendix to Mr. Pearson's
Treatise on Hydrocephalus, &c.
1784.

By Thomas A. Green,
August 4. 1803.

GENERAL OBSERVATIONS

ON

HYDROCEPHALUS CHRONICUS.

THIS disease is much less prevalent than hydrocephalus phreniticus or acutus, and generally attacks infants before, at, or soon after birth.

On account of its duration, it has been named Chronicus, in contradistinction to the hydrocephalus acutus, as some children have laboured under it for two, four, six, nay even for nine or more years*.

The

* "In nundinis quondam publicè se spectandum exhibebat homo, qui primo vitæ tempore hydrocephalo laboraverat, et languidam quidem vitam duxerat, sed tamen trigesimum annum superaverat: immanis erat capitis moles, dum reliquum corpus decennis pueri magnitudinem non superabat; sensus aderant quidem,

The effusion of a watery fluid into the ventricles of the brain, does not, during early infancy, prove so immediately fatal as at a later period of life when the sutures have closed, because the pieces of the skull, being united by membranes only, recede from each other, while the water is accumulating within the head ; hence the bad effects of pressure suddenly made upon the brain, or of long-continued pressure, are eluded.



Of the Causes which are said to give rise to Hydrocephalus.

MANY of these have been enumerated by Mr PATERSON. I shall therefore remark only, that

dem, hebetè tamen erat ingenio, nec multùm se movere poterat ; imò ingens capitis pondus impedièbat, quo minùs erecto situ diu sedere posset, nisi retro appositis pulvinaribus sustineretur." VAN SWIETEN, *Comment.* § 1217.

that it is sometimes difficult to determine whether the disease began while the child was *in utero*, or whether it was the effect of violence done to the child's head during delivery.

The mother of the child twenty-two months old, had a very difficult labour, which may have been the consequence of the preternatural size, which her child's head had acquired *in utero*, and the following circumstances concur in rendering such an opinion probable.

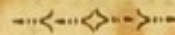
1st, As at birth there was no mark of violence about the head, which was of an unusual size.

2d, As the mother is well formed, and as all her other labours were easy.

But in the other cases, the heads of the children were pressed into an oblong shape, and were, immediately after birth, observed to be much swelled and discoloured. May not therefore the unusual size of the child's head have been in the former instance the cause of
the.

the difficult labour? and may not hydrocephalus in the latter instances be the consequence of the pressure which the children's heads had suffered during delivery?

Upon the whole, I should rather suppose that in most cases the disease existed before the birth of the child, and that the tedious or difficult labour was to be imputed to the preternatural size of the head.



Of the Changes as to Size and Shape which the Head undergoes during the different stages of Hydrocephalus Chronicus.

IN consequence of this disease, the head soon acquires a preternatural size and form.

There is more difference as to the particular shape which the heads of different individuals assume, than in their size, which depends upon various causes.

Besides

HYDROCEPHALUS CHRONICUS. 9

Besides the effects of diseases, and the differences in the form of the heads of the inhabitants of different countries, there also are other causes which contribute to bring about a change in the shape of the head.

1st, There is a form of head which is peculiar to members of the same family ; and it may not be improper to add, in illustration of this principle, that the foreheads of the sisters and brother of that child, whose forehead had become remarkably prominent, in consequence of hydrocephalus, were also more prominent than usual.

2d, The uniform and equal growth of every part of the bones of the brain-case may be stunted, or its shape distorted by posture.

Cases I. and III. afford striking examples of the operation of posture and pressure in modifying the form of the head. In the former instance, from the boy sleeping most frequently on his back, the back-part of the head on which he rests has become flat : and as, in the latter case, the child was suckled

at one breast only, the pressure of the mother's arm prevented the one side from bulging out as much as the other.

Anatomists differ very widely in their opinions with regard to the cause of the form of the head ; *viz.* Whether does the brain serve as a mould upon which the skull is formed ; or does the skull serve to limit the growth of the brain, so as to model it to a particular shape ?

The former of these opinions, which has the support of many facts, is now most generally adopted, and the sequel of this paper will shew, that what takes place in hydrocephalus chronicus adds an additional fact in support of it.

It seems probable, that in cases of hydrocephalus chronicus, there is not the usual balance betwixt the actions of the arterial and absorbent systems. The arteries of the brain do not secrete the usual quantity of medullary matter, while the absorbent vessels, in consequence of the distention and pressure, act

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act much more powerfully than usual, and remove a considerable portion of the brain.

The morbid appearances discovered upon dissection, have shewn, that in many instances, almost the whole substance of the brain has been removed. Its cavities have been so distended, that the brain itself seemed only a thin lining to the dura mater.

In such a morbid state, the water contained within the ventricles will push the brain outwards, and will separate the pieces of the brain-case to a greater or less distance, in proportion as the water is effused into the enlarged ventricles in a greater or less quantity.

In order to describe the changes which the head undergoes in its size and form during the successive stages of hydrocephalus chronicus, it seemed necessary to premise the preceding observations.

By keeping these in view, and by marking the progress of ossification, and also the mode of attachment of the different bones of the skull, the phenomena that present themselves
appear

appear to me to admit of a satisfactory explanation.

The form of the skull of the foetus is very different from that of the adult : in the former, it projects remarkably at the original centres of ossification of its component pieces, and hence the upper part of the skull of the foetus is not of so round a figure as that of the adult.

In the adult, those prominences which are very apparent in the foetus disappear, owing to the gradual growth and alteration of the shape of the brain, which serves as a mould on which the skull is formed.

But as, in consequence of hydrocephalus, the growth of the brain is checked, or in some measure suspended, the brain does not acquire its usual form ; and as the brain is pushed outwards from the accumulation of water within it, the pieces of the brain-case, though they increase in size, retain the form they had when the child was born ; and the ossific spiculæ, instead of describing portions
of

of spheres, as they do at a later period of life, describe only straight lines from their centres of ossification.

Hence the head of a child labouring under hydrocephalus chronicus, notwithstanding its increased bulk, preserves for some time the form it had at birth.

Some of the prominences in the head are more apparent than others: those on the forehead are evident even to the most superficial observer: the others also may be detected by a careful examination.

These prominences, in cases of hydrocephalus, correspond in situation, as in the fœtus, with the original centres of ossification of the different pieces of the brain-case.

The os frontis in the fœtus is composed of two pieces. Two projecting parts are seen in the foreheads of all children labouring under hydrocephalus chronicus. There is a well-marked projection on each side of the head corresponding with the centres of ossification of the parietal bones.

There

There is only one projection in the upper and middle part of the os occipitis, which corresponds in situation with the largest piece of the os occipitis of the fœtus.

It also frequently happens, that there is a marked inequality as to the size of the projections on opposite sides of the head, which gives the head a distorted appearance; and in some instances, such an inequality in the growth of the head takes place at the back-part of the head; in others, in the forehead.

In Case III. that part of the head which is opposite to the centre of ossification of the right parietal bone, is more prominent than the same part of the skull on the left side; but the skull on the right side, underneath the prominent portion, is almost flat; whereas the corresponding portion on the left side bulges out, and forms a semicircular line downwards towards the neck.

In Case II. one side of the os frontis was much more prominent than the other to such a degree, that if the profiles of both sides

sides of the head had been taken, no one could have conceived them to have represented different views of the same head: the one would have been thought to be the profile of a child whose head was a little larger than usual; whereas the other bears all the characters of the head of a child labouring under hydrocephalus chronicus.

Such is the state of the head in the first stage of hydrocephalus chronicus; perhaps it may not be improper to add, that in some cases of hydrocephalus chronicus, some parts of the head are below the level of the others, which is probably owing to the ossification not being completed at those places.

But during the progress of the disease, the head exhibits many striking varieties as to its form and size. It does not preserve its natural form. It acquires an unusual breadth, especially at those parts which correspond with the centres of ossification of the parietal bones, and also in the forehead.

The effusion of a watery liquor into the cavities of the brain, which takes place to a
greater

greater or less degree in different instances, produces these effects*.

The former change is owing to the separation of the parietal bones ; the latter is the consequence of the separation of the upper part of the pieces composing the os frontis : (for the lower parts of the pieces of that bone, on account of their connections with other bones which are ossified at an early period of life, cannot recede from each other to any distance) ; and hence the face, instead of being nearly oviform, somewhat resembles a
triangle

* The undulation of a fluid within the head, may be distinctly perceived at the sutures, if the watery liquor has been effused between the membranes of the brain ; nay, even where it is effused within the ventricles, especially if the quantity of it be large ; as in such cases, in consequence of the pressure by distention, a great part of the brain is absorbed, and a communication is formed betwixt the water which is effused between the membranes, and that within the ventricles of the brain.

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triangle in shape, of which the brow makes the basis, and the chin the apex.

As the disease advances, the forehead becomes unusually prominent, to such a degree, as often to prevent the unfortunate sufferer from seeing objects above the eyes.

Owing to the water contained within the head raising upwards the bregma, and membrane betwixt the parietal bones, the form of the head is still farther changed; its upper part becomes somewhat of a conical figure.

The next change as to the shape of the head which may be remarked, and which generally occurs only when the disease has been of two or three years standing, is the bulging out of the bones at the sides of the prominences, which is the consequence of a very large collection of water within the head.

The bones bulge out at the sides of the original centres of ossification of the pieces of the skull, which form the most resisting points; and hence, in this stage of the dis-

ease, the prominences in the skull corresponding with the original centres of ossification of the pieces of the brain-case, are less apparent than in the head of a child who has laboured under hydrocephalus for a few months only.

But it may not be improper to add, that these changes in the form of the head take place much more rapidly in some than in other cases.

This disease at its commencement, and also for some time thereafter, is proper only to the bones of the brain-case; but in process of time, the bones of the face partake of the disease, are enlarged, become distorted, especially those of the orbits*: and the distance between the outer ridges of the orbits becomes much greater; in Case III. it was greater by $1\frac{3}{4}$ inches than in most men of twenty years of age.

Of

* Vid. Annexed engraving.

Of the Progress of Ossification in the Sutures.

SHOULD the unfortunate patient linger for some years under hydrocephalus, nature endeavours to give protection to the brain, by completing the ossification of the skull; the progress of which, and all the symptoms which it gives rise to, I shall endeavour to describe.

This process, probably from the diseased state of the vessels, takes place imperfectly and unequally; so that instead of the whole void being filled up by bony matter, only a few pieces of bone, of unequal sizes and irregular figures, are formed for many months in some of the sutures, and in others for years, as in Case I.

This gives rise to the sensation which the mother of the boy of nine years of age, so feelingly

feelingly expressed : she said, her son's head, about eighteen months ago, seemed to her as if it had been broken in several places ; but now the whole is consolidated : for the detached pieces of bone in the membranes uniting the pieces of the brain-case, have, in the progress of ossification, adhered firmly to these bones.

The ossification takes place at different times in the different sutures.

The membrane uniting the pieces of the os frontis, is generally ossified when the child is between its twelfth and twentieth month.

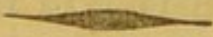
The membrane betwixt the os occipitis and parietal bones, is not ossified until a much later period of life ; and the sagittal and coronal sutures were not ossified in the boy of nine years of age.

The head acquires its unusual bulk, in part from the greater size of the pieces of the brain-case, and in part also from the ossification of the membranes which united the different pieces of it.

These

HYDROCEPHALUS CHRONICUS. 21

These membranes are of unequal breadth ; that between the two pieces of the os frontis, and that between the parietal bones being broader than the others, allows these bones to recede from each other to a considerable distance, and hence, as has been already observed, (in p. 15. and 16.), the head acquires an extraordinary breadth. From a similar cause, the os occipitis is protruded to a considerable degree ; and were it not owing to the patient generally resting on the back-part of his head, that part of the head would also become very prominent.



HAVING described the changes which take place in the size and form of the head, during the different stages of hydrocephalus chronicus, I shall conclude this paper, by adding a few remarks on the thickness of the skull, and on the changes which the other bones undergo in consequence of this disease.

On account of the great size of the head, the bones of the brain-case are generally rendered much thinner than in the healthy state ;
and

and a case is quoted by VAN SWIETEN*, in which the bones of the brain-case became nearly transparent.

In some instances, every part of the skull has not been ossified, some spots of the brain being covered by membrane instead of bone †.

When sheep are attacked by hydrocephalus, or when hydatids are lodged within their brains, the earthy part of the skull opposite to the seat of the disease is removed by absorption; that part of the skull becomes soft, feels like a piece of wetted pasteboard, and may be cut through, without turning the edge of the knife.

But

* "*Ossa tamen capitis tenuia erant adeò, ut irradiante lumine pellucerent sic, ut interiora capitis videri potuerint.*" Vid. vol. iv. pag. 122. quarto edition, published at Leyden.

† Vid. Plates of Dr BAILLIE's Morbid Anatomy, Fasc. 10.

But in some rare examples, the reverse of what has been already described takes place; for the bones of the skull, instead of becoming thinner, become thicker than common, in consequence of hydrocephalus chronicus*.

MORGAGNI † informs us, that even the other bones of the body partake of the disease, and are much altered in shape. Such a change, I believe, but rarely occurs; but I have no doubt, that in almost all cases of hydrocephalus chronicus, the bones of the skeleton are, as the soft parts, of a more slender form and thinner than usual; or that even supposing the head not to be of a larger size than usual, the rest of the body does not bear the same proportion to it as in healthy children.

* Vid. DU VERNEY Traité des Maladies des Os, tom. ii. pag. 8.

† Vid. Epist. xii.

C A S E S

O F

HYDROCEPHALUS CHRONICUS.

C A S E I.

THE patient is a boy, nine years of age.

The mother told me that she had had a very difficult and lingering labour, and that his head at birth seemed to her to be longer than usual, and the skin of it was of a bluish colour.

His head increased gradually in size until he was four months old, after which it became so rapidly larger, that (to make use of the poor woman's own phrase) one thought they could see it growing; so that, at the age of nine months, he required as large a hat as a child of five years of age.

Since that period the child's head has gradually become larger.

Of

Of its shape, and size proportioned to that of the body, the annexed engraving will convey a more distinct and impressive idea than any verbal description.

The following are the measurements of the head.

At its greatest circumference, that is, about the middle of the brow, it measures $36\frac{1}{2}$ inches.

From the root of the nose to the middle ridge of the os occipitis, or from before to behind, the head measures 25 inches.

From ear to ear, or across the head, 24 inches.

To ascertain the diameters of the head, I measured it by callipers, and found it to be from the most prominent part of the forehead, to the most prominent part of the occiput, about $11\frac{1}{2}$ inches; and from the most prominent part on one side, to the most prominent part on the other side, $10\frac{3}{4}$ inches.

On pressing the head, it was readily discovered, that the two pieces which compose the os frontis of the foetus were firmly uni-

ted by bony matter. The parietal bones were completely ossified, except at their upper and anterior parts.

There are two projections in the forehead ; there is a marked projection on each side of the head, and there is a projection in the middle of the back-part of the head, and two smaller beneath it.

The bregma was not completely ossified ; a bridge of bone could be distinctly felt in the middle of it, which was about $1\frac{1}{2}$ inch in breadth at its narrowest part, and which covered the superior longitudinal sinus ; but on each side of the bregma there was an unossified portion, about two inches square.

The mother told me, that about eighteen months ago the bregma was much larger, and also that there were other soft parts in the back-part of the head, in which soft parts (I make use of her own words) hard pieces could be perceived, which conveyed the same sensation as if the skull had been broken in several places.

Some

Some parts of the skull are below the level of the rest, and seem as if they had been depressed in consequence of external violence.

The skin of the head has a shining appearance, from its distention ; and from the same cause, the eye-brows are drawn upwards about an inch beyond the upper ridges of the orbits.

Notwithstanding the duration and severity of this disease, his faculties are not much impaired.

He readily answers all questions put to him, joins in conversation, seems much amused by company, and expressed much anxiety for the return of his father, who had gone out a fishing. His memory is good ; he recollects the voices of those he has not heard speak for many months, and he amuses himself by making fishing-nets.

The only symptoms denoting an affection of the brain are, extreme irritability ; his starting from the slightest noise ; and his sleeping but very little.

His

His senses of hearing, smelling and tasting are very acute. He suddenly lost his sight last year.

Mr Stewart, while drawing his portrait, remarked that the figure of his orbits were much altered. They appeared unusually broad. The distance between the outer edges of the orbits was equal to $4\frac{1}{4}$ inches; and the eye-balls seemed to be forced out from the orbits.

His mother told me, that in the earlier part of his life, he seemed to suffer great pain in his head: he was observed to put his hands to his head very frequently, and to clasp them upon it; but he said he did not suffer much now, except from the great weight of his head.

He is subject to occasional febrile attacks, during which his pulse rises to 120 in a minute; he feels very uneasy, and his eyes are inflamed.

He eats generally very little, but with a good appetite; has had measles and whooping-cough, but not small-pox, though he slept in the room with his brothers when they had that complaint.

C A S E

CASE II.

THE patient is a girl, twenty-seven months old, and has had hydrocephalus since her birth.

The head is much enlarged, but of a very different shape from that of the preceding patient, being much rounder, and the forehead flatter; but one side of it is more prominent than the other.

The greatest circumference of the head is 24 inches. Across the head from ear to ear it measures $14\frac{2}{10}$ inches. By callipers, the head was found to measure, from the brow to the most prominent part of the back of the head, $7\frac{2}{10}$ inches, and $6\frac{2}{10}$ inches from side to side.

The posterior fontanelle is larger than in Case III., but the anterior is of a much smaller size.

This

This child's eyes are not affected; pupils are of a natural size, and contract readily on exposure to light. This child is also very irritable, and had convulsive fits for half a year.

C A S E III.

THE patient is a girl, twenty-two months old, and of a scrofulous family.

The mother informed me, that her other labours had been very easy; but that when she bore this child, she had a difficult and lingering labour.

The father remarked, that immediately after birth, his child's head was larger than usual, and also that the parietal bones were separated from each other to the distance of a finger's breadth; but the skin of the head was not discoloured in the slightest degree.

On measuring the greatest circumference of the head, it was found to be 1 foot $9\frac{6}{10}$ inches,
which

HYDROCEPHALUS CHRONICUS. 31

which is very nearly the same as her sister's head, who is a girl of ten years of age.

Across the head, viz. from ear to ear, it was $13\frac{3}{4}$ inches. From the root of the nose to the most projecting part of the occiput, it measured $13\frac{3}{4}$ inches.

I measured the diameters by means of calipers, and found that the head measured, from the brow to the back part of the head, $7\frac{1}{4}$ inches, and across $5\frac{9}{10}$ inches.

The bregma in breadth measures $4\frac{1}{10}$ inches. The posterior fontanelle is of a small size. When the child was about three months old, she had three convulsive fits; is still in a very irritable state; and is very easily alarmed by the slightest noises.

She sleeps but little.

Notwithstanding the duration and severity of the disease, her faculties are more perfect than might be expected. She distinguishes one person from another, and laughs when spoken to by her father.

She

She hears, smells and tastes as perfectly as other children, and sees tolerably well, although her eyes are inflamed, her pupils dilated, and she squints.

The mother believed that her child never had suffered very acute pain in her head; she never was observed to put her hands up to her head, nor to clasp them upon it.

The skin at the back-part of the head is ulcerated, from her lying on it. The lymphatic glands at the upper and back part of the neck were swollen, before the skin of the head was ulcerated.

Her appetite is voracious, but the growth of her body has been very slow, and she is much emaciated.

Has had measles and hooping-cough.

She has never attempted to utter an articulate sound.

F I N I S.



Drawn & engraved by J. Howard Edlin

