epithelioma in this situation is slow and there is less liability of grave ulceration than epithelioma in other situations. This has not been my experience entirely. They have been usually slow in progress, but the lymphatic glands were invaded in many cases that I have seen at the time they were referred. Therefore, even the axillary glands should receive treatment.

Epithelioma of the genitals is always a serious matter, although with the proper treatment in the beginning the results are often successful. Left untreated until far advanced, palliation is all that can be expected from any form of treatment.

Paget's disease or eczematous epithelioma of the nipple is classified by most dermatologists under epitheliomatosis or carcinoma of the skin. It is like superficial epithelioma, the onset is slow and the condition suggests an eczematous involvement of the areola of the nipple. The process begins with a moderate inflammation exhibited as redness and scaling involving the nipple areola. Murphy called attention very forcibly in the *Year's Progress of Medicine and Surgery*, 1915, that Paget's disease is cancer from the very first, and that even in the early cases there was a mortality of over 90 per cent. of cases even when submitted to surgical operation. I have treated cases of Paget's disease by radiation alone and have patients clinically cured for over ten years. This corresponds with the experience of many others. The treatment should consist in radiation not only applied locally, but the adjacent glands should be treated as thoroughly as it is given postoperatively for carcinoma of the breast. If these cases are treated early, when there is only the eczematous condition present, and treated thoroughly, the results are rather uniform. It is to be remembered in all cases there is no attempt at repair, and, when abandoned to its course, the ultimate result is a profound ulceration with the destructive effects most noticeable in the region of primary invasion, the entire breast becomes cancerous and invades the lymphatics. It is to be remembered that local treatment suggested for eczema has no effect on this condition.

CEREBRAL HEMORRHAGE OF THE NEWBORN.

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Since earliest times the traumatism undergone by an infant during the process of birth has been recognized and deplored. This is, of course, especially marked in long or difficult labors, and we have become only too familiar with the severe injuries which may result

from this cause. The most common of these has been naturally head injury, associated with hemorrhages which often have been considered as a cause of stillbirth or death during the first few days of life. But, although recognized as a theory, on reviewing the literature one finds very few statistics founded upon detailed autopsy reports in cases of cerebral hemorrhage of the newborn. Although a subject of vital interest and fundamental importance to the obstetrician, pediatrician and pathologist it seems to belong to none and to be neglected by all.

Little, in 1861, was the first to emphasize birth injuries, and their results in later life, as shown by the development of impaired mentality or the palsies or contractures in older childhood. But as at that time the effects of pressure on the cortex was but imperfectly understood, it was left to Sarah McNutt, in 1885, to establish the relationship between cerebral hemorrhage at birth and Little's disease of later life. This was done by autopsy reports on 10 carefully studied cases. Of these 10, 7 were vertex and 3 breech presentations, showing that prolonged pressure on the head is not always responsible for the condition. Of the 7 vertex presentations 5 showed hemorrhage over the cerebrum and 2 below the tentorium. The hemorrhage in the breech presentations was over the cerebrum in all 3.

Of the occurrence of cerebral hemorrhage as compared with other causes of death in infants only meager information is found Holt says that one-third of all deaths during or as the result of parturition are due to hemorrhage, but gives no exact numbers based on autopsy findings. Cushing found that in studying stillborn infants for another purpose, many showed cerebral hemorrhage. From the Pathological Institute of Kiel, Weyhe reported that in 959 autopsies on infants 122, or 12 per cent., showed intracranial hemorrhage. In 80 of these cases the hemorrhage was subdural, in 56 subarachnoidal, in 35 intracerebral and in 21 intraventricular. Of these 122 cases 23 showed evidence of congenital syphilis. Döhle found hemorrhages occurring in 13.7 per cent. of his series. Beneke observed in 100 autopsies on the newborn laceration of the tentorium resulting in hemorrhage in 14 cases. Osler quotes Litzmann as finding 35 cases of hemorrhage in 161 autopsies, Parrot as noticing bleeding in the subdural space 26 times in 34 autopsies of the newborn and Spencer finding in 130 postmortem examinations on stillborn infants 53 cases with hemorrhage under the pia-arachnoid. Sachs in autopsies on 78 cases of infantile hemiplegias noticed hemorrhage in 23. Couvelaire saw intracranial bleeding in 18 per cent. of autopsies on prematures born with easy and spontaneous labors. Archibald reports in 74 postmortem examinations that intermeningeal hemorrhage occurred in 32, and this hemorrhage was extensive in 19 and extradural in 5.

Isolated cases confirmed at the autopsy table are quite numerous

in the recent literature, especially since Cushing's article describing operative procedure for the relief of the condition. Green describes 1 with blood over both hemispheres and at the base along the crura and pons, 1 other with clots over the right hemispheres and 2 more with bleeding over the cerebrum accompanied by hemorrhages in other organs. Eastman reports 1 case with bleeding in both ventricles. Torbert had 2 cases, both with hemorrhage over the cerebrum. Simmons saw 2 cases with the same distribution. Others are given by Cushing and Meara and Taylor.

Every pathologist familiar with autopsies on the newborn has noticed, even without massive bleeding in any organ, numerous small punctate hemorrhages occurring especially over the epicardium and the parietal pleura. Paul finds these same hemorrhages in the retinæ of the newborn during life. In 200 examinations he noted hemorrhage in the retina in 20 per cent. of children born with a normal labor, 50 per cent. of prematures and 40 per cent. of those from complicated and prolonged labors. In view of these findings the assumption is justifiable that young infants' bloodvessels are particularly delicate and susceptible to rupture from injury.

As to the etiology of these hemorrhages one finds as many theories suggested and advanced as there are authors. All agree, however, that the condition is as frequent in cases of normal or precipitate delivery as in difficult labors. It has also been shown that hemorrhage may occur even before birth. Gibb reports a child born with contractures of one arm and leg and an old blood clot above the lateral ventricle, while the mother gave a history of trauma. Osler found in an autopsy on a woman dying of typhoid in the seventh month of pregnancy a fetus containing a large hemorrhage in the brain. Seitz quotes another case in which a macerated fetus delivered spontaneously had a hematoma the size of a walnut in the brain hemisphere.

Kreyberg thinks that a long time elapsing between the birth of the head and shoulders is an etiological factor, while La Lætra states that hemorrhage frequently follows asphyxia caused by the cord being twined about the neck. Benthin suggests that it may be caused by too great pressure on the perineum. Beneke points out that during severe labor pains the pressure is often on the sides of the head, increasing its long axis, pressing the brain forcibly against the tentorium and causing tearing of its radiating fibers. He further explains that this tear may be of the anterior, posterior or middle layer, and therefore may cause bleeding over either the cerebrum or cerebellum. But Seitz, after a careful study in which he cut serial sections of the head and its contained brain, concluded that although one-half of his cases confirmed Beneke's theory the other one-half excluded tentorium injuries as a cause and pointed instead to injuries of the vessels over the brain. He therefore groups all of these cerebral hemorrhages into three divisions: (1) hemorrhage

over the cerebrum (one or both hemispheres) from injury to the longitudinal sinus or the vessels emptying into it; (2) hemorrhage under the tentorium around the cerebellum, due to injuries to the transverse sinus or tributary vessels; (3) hemorrhage into the lateral or fourth ventricles, due to the tearing of the veins of the choroid plexus. The last group is evidence against the theory of tentorium injury being the only cause of cerebral bleeding.

Abels places the causes under two groups: (1) Tearing of the vessels due to molding of the head in such cases, as contracted pelvis, forceps deliveries, etc.; (2) backing up of the blood in the sinuses and veins in asphyxia. He points out that during labor the pressure on the fetus is raised in the uterus, and especially before the membranes are ruptured, is evenly distributed, thus causing no congestion or stasis of the blood in the child's head. But when the head is born it is released from the uterine pressure still acting on the body, and the result is a marked congestion or stasis of the bloodvessels of the head. Since the skull cannot expand to any marked degree the delicate-walled veins on the surface of the brain may become extremely engorged and often rupture. The sutures permit of some expansion, and Abels thinks that this is the reason hemorrhage is rarely found in the neighborhood of the sutures.

Cushing adopts the same classification as Abels and says that rupture may be possible in marked asphyxia, just as it may be possible in later life in a paroxysm of whooping-cough or a convulsion. He also notes the frequency of rupture of the veins at the point of entrance into the longitudinal sinus and points out that in infants there are no adhesions between the dura and cerebral hemispheres, thus leaving these veins unprotected and in a position to be easily displaced or torn by the overriding of the parietal bones during the molding of the head.

Seitz made an effort to find the etiology of cerebral hemorrhage in the newborn by making a careful analysis of the 13 cases which came under his observation. Of these infants he found 5 to be below and 8 above average weight, suggesting oversize as a possible etiological factor. Of the 13 mothers 7 were primipara, and of these 4 were over thirty years of age; 6 were multipara, and of these 4 had borne many children. One-fourth of the mothers had a contracted pelvis, but in none was it marked. Of the 13 deliveries forceps were used 10 times, leaving only 3 spontaneous births; 11 of the 13 babies were born asphyxiated, 5 to a mild degree and 6 to a marked degree. However, of the 3 unaided deliveries 2 breathed spontaneously, all 3 mothers were multipara, none had narrow pelves, none had lues, the births were all rapid and the cervices all quickly and completely dilated. In view of these facts the explanation of the occurrence of the hemorrhages becomes exceedingly difficult or obscure. But all three babies were large, so Seitz reaches the con-

clusion that although dilatation appeared complete it was not sufficient for children so large, and in the rapid delivery the head was too quickly molded and injury to the veins was the result.

All authors agree on the predominance of bleeding over the cerebrum, usually limited to one side. It is also frequently pointed out that the child may appear normal for the first few days and then develop cerebral symptoms. Kundrat thinks that many of these infants recover from hemorrhage resulting from birth trauma without developing any symptoms, for in autopsies on children several weeks old he has found old pigment in the meninges and other signs of old extravasated blood. Meara and Taylor warn against "jackknifing" as a means of artificial respiration, on the ground that it increases the distention of the cerebral vessels already engorged by the asphyxia. This assumption is given greater weight by the occasional discovery of subdural and extradural hemorrhage in the spinal column following such manipulations. But to Green belongs the credit of first suggesting hemorrhagic disease of the newborn as a cause of cerebral hemorrhage.

In the pediatrics service at the University Hospital during the last three years 36 routine autopsies have been performed on stillborn babies or those dying early in infancy. In this series 18, or 50 per cent., showed definite hemorrhages in the dura, over the brain or in the ventricles. Of the 18, 10 occurred in females and 8 in males. If one takes Seitz's figure of 3200 grams as the average weight of a full-term child, of our 18 cases 11 were of average weight or below and only 7 above. Of the 18 mothers 11 were primiparæ of these 11 only 1 was over thirty years, 1 was twenty-nine and the remaining 9 were twenty-four or under. Of the 7 multiparæ 2 were second labors, 1 was third, 1 was fourth, 1 was fifth, 1 was eighth and 1 was ninth. Forceps were used but once, and then in the case of delivering a mother, critically ill with pneumonia, of a six months' fetus. In only 2 cases was the labor very long, and in both of these cases twins were born, in each instance the first one remaining normal while the second showed cerebral hemorrhage. Of the 18 babies only 2 were born dead and 4 exhibited signs of asphyxiation, while the remaining 12 breathed spontaneously, thus excluding mechanical asphyxia as a major factor in this condition. Only 2 infants appeared normal at and following birth, the others showing respiratory symptoms from the very first.

One very interesting point, however, is that in 8 of these infants gross hemorrhages were found in other organs besides the brain. It thus appears quite clear that in a fairly large percentage of cases showing intracranial hemorrhage such lesions are merely incidental to a general hemorrhagic diathesis, the syndrome being usually grouped under the heading, "Hemorrhagic Disease of the Newborn." Five of the 8 vomited blood before death and showed an increased coagulation-time of the blood. Of the 3 remaining cases without

clinical symptoms 1 revealed besides the hemorrhage over the brain an extravasation of blood into the right adrenal, another, massive hemorrhages in the lungs and the third hemorrhages in the pericardium and skin. These facts emphasize the value of routine estimations of the coagulation-time on the blood of newborn infants. Early recognition of decreased coagulability of the blood and prompt treatment of such cases by the injection of whole blood or serum might obviate otherwise fatal hemorrhages in the brain as well as other organs. Of the two small twins each born alive after its fellow the condition cannot be explained on the ground of overweight or of only partially dilated cervix, but one showed massive hemorrhage in the lungs as well as over the brain and the other was definitely, clinically and anatomically hemorrhagic disease.

Kundrat points out that partial atelectasis of the lungs is always associated with cerebral hemorrhage and is almost pathognomonic of it. While our necropsy findings show that the two conditions are associated, atelectasis of varying degrees was also found in infants not showing cerebral hemorrhage. Hence, as partial atelectasis may be explained by the short period of life, asphyxiation or prematurity, it may be considered as, at the most, merely a contributory and not as a primary condition.

The location of the hemorrhages of the series of cases from the University Hospital conforms well with other observations given above. In this series hemorrhage over the cerebrum and limited to one hemisphere occurred six times; over the cerebrum, cerebellum and in the dura three times; over the cerebrum, cerebellum and in the ventricle once; over the cerebrum and cerebellum three times; over the cerebellum once; in the dura alone only twice; and in the ventricles alone twice. Hemorrhage over the cerebrum either alone or with other parts of the brain is found in a total of 13 cases, or 72 per cent. In only 2 cases was softening of the brain under the hemorrhage noted, and this occurred in the oldest in the series, an infant of five days, and in a premature one month of age. In the other cases doubtless death occurred before degenerative changes could take place in the brain substance. In no case was gross hemorrhage into the brain substance found. None of these infants showed any signs of congenital syphilis, and only one mother gave a positive Wassermann reaction. Only four were born prematurely. The high percentage of hemorrhages in these cases may be partially due to the fact that very few emergency or acutely ill patients are admitted to the University Hospital, so that the list therefore includes few acute diseases of either mothers or infants and is limited to births occurring in the hospital.

When confronted by the resumé of the literature and the analysis of the cases give above, one is impressed by the comparative frequency of occurrence of cerebral hemorrhage in newborn infants and also by the number and confusion of the etiological factors

claiming attention. A classification of the various causes which have been proposed will emphasize this latter fact and also form a basis for a discussion of their relative merits. They may readily be divided into three main groups:

I. Traumatic: from molding the head, either in normal or precipitate deliveries.

1. Over the cerebrum:
   (*a*) Due to injury of the longitudinal sinus or its tributary vessels.
2. Below the tentorium:
   (*a*) Due to injury of the transverse sinus or its tributary vessels.
3. In the ventricles:
   (*a*) Due to injury of the choroid plexus.
4. In the dura.
   (*a*) Due to elongation of the head with pressure of brain against dura and tentorium.

II. Congestion or stasis with rupture of veins in protracted or complicated labor due to:

1. Malpresentations.
2. Overgrowth of child.
3. Twins.
4. Umbilical cord around neck.
5. Rigid cervices in primipara.
6. Prolongation of the interval between the birth of the head and that of the shoulders.

III. A diseased condition of the child in intra-uterine life and having no relationship to labor, such as:

1. Hemorrhagic disease of the newborn.
2. Prematurity.
3. Syphilis.
4. Congenital heart disease.
5. Other toxemias.

Considering the subject as a whole it becomes at once clear that the most frequent source of this bleeding, regardless of cause, is rupture of the superficial veins which pass over the surface of the brain into the longitudinal sinus. This may be explained by the fact that these veins are in a comparatively unprotected position, and hence more susceptible to injury from either displacement or abnormal distention. Of all vessels in the body these are the ones most exposed to the injuries and accidents of labor and birth.

The first division of the above classification represents, theoretically at least, one of the most common causes of injury, *i. e.*, overriding of the parietal bones and resulting displacement and laceration of the veins. For this condition even an abnormal labor is not necessary, and it frequently is most marked in normal deliveries, especially those which are rapid or precipitate. In fact, the more

rapid the delivery the less chance do the brain and vessels have to adjust themselves to the changed relationships and the greater tendency there is to injury. This point is emphasized in the 18 cases cited above in which only 2 showed a prolonged labor. In the overriding of the parietal bones the condition is naturally the most marked on one or the other side, and as a result the hemorrhage is frequently limited to one cerebral hemisphere, as was noted in 6 cases of our series. Of less moment, perhaps, but following the same principles, the changes in the relation of the occipital bone to the parietals may account for hemorrhages over the cerebellum, and perhaps in certain cases even those originating from rupture of the choroid plexuses. The hemorrhages in the dura only may be accounted for by injury to the tentorium or dura, either by laceration of their fibers or of their capillaries in the twisting or elongation to which the head is subjected in its passage through the birth canal. The use of forceps is often advanced as an explanation of these hemorrhages, but one finds in the 18 cases analyzed above that forceps were employed but once, and then in a very easy delivery. There is little doubt that this factor has been greatly overemphasized. Their usual position in this category may be due to a confusion of the ideas of cause and effect. The harm is doubtless done in many instances not by the mechanical injury of the forceps themselves, but by congestion or asphyxiation due to the protracted or complicated labor which caused the attempt at artificial aid to delivery.

The second group includes those cases in which labor is prolonged and the resulting congestion and overdistention of the veins lead directly to hemorrhage or indirectly to rapid degeneration and subsequent rupture, just as in later life undue dilatation of a cerebral vessel may result from a paroxysm of whooping-cough or a convulsion. Narrow pelves, malpresentations or an abnormally large child are self-explanatory factors in producing mechanical obstruction to normal birth of the infant. The constriction of the neck by encircling with the umbilical cord is also a fairly common cause of asphyxiation. A long time elapsing between the birth of the head and that of the shoulders may result in a marked congestion of the cerebral veins, due to the fact that while the head is free the body is still subjected to uterine pressure and the blood is forced out of the body into the head. In the case of twins the first child may be normal while the second, even though delivered quickly, will show marked congestion because of too long delay in birth. In respect to primipara it is interesting to note that in the cases above cerebral hemorrhage occurred more frequently in young primipara mothers than in older ones. The difficulty here is doubtless due to rigidity of the cervix, with resulting slow and imperfect dilatation in the first labor, and this occurs in young as well as older women.

In the third group of cases the cause of the hemorrhage undoubtedly is in the fetus and has little or no relationship to the process of

labor itself or the conditions accompanying birth. In this division hemorrhagic disease of the newborn deserves by far the most important place because of the comparatively large number of deaths with cerebral hemorrhage showing this condition. It accounts for the death of 8 of the 36 cases in our series. One is justified in emphasizing the importance of this disease because of the fact that it has been largely disregarded in the past. Prematurity, while not an actual disease, is placed here because it represents a pathological condition of the child rather than of the mode of birth. Underdevelopment of the body as a whole naturally includes abnormally delicate bloodvessel walls and hence greater liability to rupture from any cause. Moreover, the conditions which have produced a premature birth are often those which have also brought about pathological changes in the tissues, including the bloodvessels, and this has increased the possibility of accident. It is important to note in this connection that nearly one-fourth of the autopsies in our series of cerebral hemorrhages were on premature infants.

Syphilis is perhaps given undue importance as an etiological factor. In none of the 18 cases of our series was there any evidence of this disease. Weyhe claims a place for it, and the importance of syphilitic degeneration of the vessel walls cannot be denied as a possible cause of early rupture. As a rule, however, the disease itself usually accounts for the death of the child and cerebral hemorrhages do not appear to be a common complication. The influence of congenital heart disease, particularly those forms which interfere with the development of a normal extra-uterine circulation and the resulting abnormal congestion thus produced, is a self-evident cause of the occasional appearance of complicating and intracranial hemorrhage. This point is well illustrated in one of our series in which the heart presented an absence of the interventricular septum, and from this common ventricle only one arterial trunk carried away the blood destined for both pulmonary and systemic circulation, the mixture of which must unavoidably lead to profound asphyxiation.

Lastly under this heading must be placed certain cases in which the exact cause of the hemorrhage is by no means clear but in which a diverse group of intoxications occurring in the mother may reasonably be assumed as having an important relation to antenatal degeneration and weakening of the vessel walls. An example of this was, in our series, the small six months' fetus, quickly delivered from a mother dying of lobar pneumonia, which showed marked cerebral hemorrhage.

In conclusion, a general consideration of cerebral hemorrhage in newborn infants emphasizes two very important facts: (1) that the condition is often a complex disease syndrome giving rise to diverse clinical symptoms, modes of death and pathological findings, and (2) that it is not brought about by any single cause but by an inter-

relation and interaction of a varying number of causes which may be found in the circumstances governing labor in the condition of the mother or of the child. Several causes may often be present, any one of which in itself might have been the responsible factor.

SUMMARY. 1. Cerebral hemorrhage of the newborn is frequently found, occurring in 50 per cent. of 36 deaths of young infants at the University Hospital.

2. The condition is brought about by trauma in normal or rapid deliveries, by congestion or asphyxiation in slow deliveries or by disease of the child itself.

3. The so-called "hemorrhagic disease of the newborn" is a much neglected but very important cause of cerebral hemorrhage in infants, occurring in 44 per cent. of the deaths of our series.

4. Forceps deliveries, advanced age of the primipara mother and syphilis probably do not play as important a role in the etiology of this condition as was formerly supposed.

5. More careful and complete routine autopsies on newborn infants as well as more accurate observations on the conditions of the mothers and circumstances of the birth are needed as a foundation for further studies.

I am indebted to the department of pediatries for obtaining permission for these autopsies and to the department of obstetries for their careful records on their parturition charts.

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PNEUMOHYDROTHORAX.[1]

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The teaching clinician of two decades ago found in pneumohydrothorax an opportunity for one of his finest demonstrations of pulmonary physical signs. Da Costa and Musser, without thoracic roentgen-ray aid, presented the striking signs of this condition with great exactness; but we, their pupils, seem to have either forgotten this result of pathological destruction to the lungs, or else pneumohydrothorax is not so common as formerly. This latter view one cannot but feel is possibly true, and for two reasons: (1) due to the elaborated work on tuberculosis, early infections are recognized, patients are brought to a state of cure and saved in great numbers from the late stages of pulmonary destruction; (2) those cases that do go on to advanced pulmonary disease receive better care in the cavity stage. It is generally accepted that 90 per cent. of all cases of pneumohydrothorax are due to advanced pulmonary tuberculosis. One cannot but pause here to emphasize again what most progressive internists still stand for, namely, that physical signs are of the first importance and their interpretation of the utmost value, even with our plates, fluoroscope and laboratory studies, desirable as they are and useful as adjuncts. Pneumohydrothorax is a conspicuous example of this.

Hoover called the attention of the Interurban Clinical Society some years ago to a sign in thoracic diseases which impressed us very much and which, like him, we continue to teach our students. This sign, simple in itself and easy of application, shows well the movement of the diaphragm, and is far superior to and easier of demonstration than either the so-called Litten's diaphragm phenomenon or possibly the fluoroscope. We have never seen this sign explained in print, but if not recorded it well deserves to be so placed. The diagnostician

[1] Read before the Allegheny County Medical Society, April 16, 1919.