favorable, and there are now no alarming circumstances, I do not feel that we can give a favorable prognosis, for although wounds in the anterior and upper portion of the hemispheres are least dangerous, yet the risk of continued cerebral symptoms, epilepsy, abscess of the brain, and death from acute cerebral disease are great. A case somewhat similar to mine happened some years ago in Vineland, N. J., which created quite a sensation at the time. The patient apparently recovered, but eventually died suddenly with cerebral symptoms, and after death a large abscess, with the ball in the centre, was found in the brain.¹ Concerning gun-shot wounds of the cranium where penetration has taken place and the ball has remained within, a recent writer² has said, "The foreign body never becomes a harmless tenant, its presence always furnishes a potential source of mischief, and recovery can only be held to take place in a limited sense, for notwithstanding the absence of symptoms speedy dissolution may ensue with little or no warning."

In some cases of apparent recovery where foreign bodies have remained in the brain the patient did well till cerebral excitement was experienced. In several cases spoken of in Holmes, "Five died suddenly after excessive drinking, one by the excitement produced by playing cards, and one on account of a slight injury received upon the head."

In the second surgical volume of the Medical and Surgical History of the War of the Rebellion, there are found reports of one hundred and eighty-six cases of balls penetrating the cranial cavity, of which number one hundred and one were fatal. In eighty-five cases of removal of the foreign body there were forty-three recoveries. In one hundred and one cases in which the foreign body was not removed fifty-nine were fatal.

The same authority under the head of Balls Lodged within the Cranium gives nineteen cases in detail, the analysis of which shows that they were nearly all more or less troubled in after life, or rather, as long as they were kept under observation, which was in all the cases at least ten years. Of the nineteen cases, two were subject to epilepsy, four affected with marked vertigo, four with other cerebral symptoms, in one no report covering the subsequent history is given, one was paralyzed, one had continuous pain in the head, in one the wound had not healed, and concerning four there were no bad symptoms recorded.

In another series of four hundred and eighty-six recorded cases of penetrating gun-shot wounds of the skull four hundred and two died, sixty-five were discharged from service, and nineteen were returned to duty.

The weapon which was used in this case was the oft-mentioned "toy pistol," of the "Magic" pattern, and is only intended for blank cartridges to be used simply for explosion, but in this case it was loaded with a shell carrying a number twenty-two conical projectile. The distance between the boys at the time of firing was twenty-one feet.

— Nearly one twelfth of the Esquimaux inhabitants of the Labrador coast have been carried off by an epidemic which appears to be a malignant type of measles.

¹ Gross.

² Holmes' System of Surgery; Am. Ed.

A CASE OF CRIMINAL ABORTION RESULTING IN DEATH FROM AIR-EMBOLISM.

REPORTED BY W. W. GANNETT, M. D.

ALTHOUGH death from criminal abortion is by no means uncommon, ample opportunity being afforded the medical jurist for observation of the pathological processes by which death is brought about, yet it must be conceded as rare for the fatal result to be produced by the entrance of air into the circulation through opened uterine sinuses.

The rarity of cases of air-embolism from a pathological point of view, together with their greater rarity from a medico-legal stand-point, coupled also with the fact that the medical examiner was enabled indirectly to bring about the conviction of an abortionist, lends interest to the case given below, both to the pathologist and medical jurist.

It has long been known as a fact in surgery that wounding of veins in the region of the neck was an extremely dangerous accident, from the liability of air being sucked in by the action of respiration and its accumulation in the heart; death usually ensuing instantaneously. More recently it was discovered that pregnant, parturient, and puerperal women were liable to a similar catastrophe, the factors requisite to produce such a result being open uterine sinuses in communication with air. Position of the woman was also considered of importance, the knee-elbow being the most favorable to the entrance of air into the uterus, from the negative pressure produced by the weight of the abdominal viscera acting in the opposite direction to that either in the dorsal or erect positions. Again, cases of death from air-embolism have been observed to follow intra-uterine injections in the puerperal condition, air gaining entrance into the uterus with the injecting fluid, either through carelessness of the operator or defect in the instrument used.

The history of the case to be at present considered is as follows: An unmarried mulatto woman, twenty-one years old, whose health, previous to January, 1881, had been good, consulted in that month an irregular practitioner living in Boston for some indefinite symptoms, among which backache was prominent. This doctor examined her, said she had prolapse and retroflexion of the womb, and gave her medicine. A few months later she again saw him, this time on account of suppression of the menses; for this he gave her some drug. At a visit in June he suspected, from the continued absence of menstruation, that she might be pregnant; finding on examination that this was the case he charged her with it, and, on her confessing the whole affair, advised her to take legal measures to recover from the father. Four months later, on the 26th October, she went with a sister to this doctor's office by appointment, the object being, as stated by the girl to her sister, that as she was in trouble she was going to have something done, and that Dr. T. was going to do it. Immediately on their arrival the girl went into a small room with the doctor, the sister remaining in the office. After being in this room about fifteen minutes, during which he was two or three times interrupted by callers at the outside door, this doctor suddenly rushed out of the small room, saying that the girl had fainted, and asking the sister to come in. He worked over her a few minutes, sent for a physician, who arrived shortly after, but she was already dead.

Medical Examiner Draper was summoned, and on his

reaching the house Dr. T. stated to him that he supposed the case to be one of heart disease; that he had made no examination whatever; that he was simply sitting beside the patient on the bed, when she suddenly threw up her arms, uttered a moan, and fell backwards in a convulsion, from which all efforts to resuscitate her were of no avail. It may be here stated that the girl's drawers, which had been previously removed, were replaced by Dr. T. after her death. On the following day an autopsy was made by Dr. Draper, his report of which is as follows:—

External examination. The body was that of a well-nourished, apparently healthy, colored woman. Rigidity of limbs was well marked. There were patches of livid discoloration in the posterior parts of the body, on the sides of the neck and chest, and in the loins. There was no odor or other sign of decomposition.

Upon the posterior or lower parts of the external genitals and upon the buttocks were stains of blood.

Red stains, resembling blood stains in their appearance, were found upon the underclothing removed from the body at the time of the autopsy.

Internal examination: When the primary incision was made from the neck along the front of the body to the genitals, bubbles of air were observed to issue from the blood-vessels in the parts over the breast bone. The right side of the heart was fully inflated with air; and when a small puncture was made in this distended side of the heart air escaped, at first in a free jet, then in the form of bloody bubbles, and the walls of the heart collapsed. The left side of the heart was firmly contracted and empty. The structure of the organ was entirely healthy. The superficial veins of the heart were seen to contain air as well as blood. The blood in all parts of the body was thin and of a dark color; there were no clots.

Both lungs contained an excess of blood. In other respects they showed no change from a healthy condition.

The spleen was normal in size, color, and consistency.

The kidneys were engorged with blood, and were larger than natural, but their structure presented no indication of disease.

The liver was healthy. Bubbles escaped from the mouths of the vessels when the organ was cut.

The stomach was of natural appearance. It contained between half a pint and a pint of partially digested food taken (by estimate) within three hours before death.

The intestines were healthy. The veins leading from them were seen to contain air as well as blood.

The brain and its membranes presented nothing remarkable except the presence of air in the vessels.

The lower region of the abdomen was occupied by the enlarged womb and its contents. The highest point of the womb was about two inches above the navel. Its color was natural throughout its anterior portions, but the posterior and lateral regions were reddened. The various sinuses in the walls of the organ were fully inflated with air, and stood out from the surface as tortuous elevations distributed in all directions. The left lateral region of the cavity of the womb was felt to contain air outside the sac holding the child. The enlarged vein on the left side of the organ contained air, with blood.

The womb, lower intestine, bladder, and vagina were removed together from the body, and upon dissection the following appearances were disclosed:—

The vagina was five inches long. Its lining membrane was white, thickened, and rough. Its calibre was very little, if any, in excess of that of the vagina of an unimpregnated woman. There was a little staining of a reddish thin fluid along the posterior wall.

At the anterior part of the external opening of the vagina there was a bruise-discoloration half an inch long and one eighth of an inch wide at its widest, the ends of the bruise being more deeply discolored than the middle part.

The womb was ten and a half inches in length and eight inches wide (outside measurement). The entrance to its cavity was opened to an unusual degree, admitting the thumb easily. The margin of this opening showed the effects of recent irritation by some foreign body. Just within the entrance, the membrane lining the cervical canal was reddened; and at the upper part of this canal on its posterior surface was a reddened area three eighths of an inch long and one quarter of an inch wide.

The cavity of the womb contained a child enveloped in its membranous sac and surrounded by its natural fluid. This child was a female, of light color, and well developed; it measured fourteen inches in length and weighed two pounds; its hair and nails were well grown; there was no bony centre in the lower end of the thigh bone.

The membranes enveloping the child had been forcibly separated before death from the left lateral region of the inner surface of the womb, so that fully one half of that surface was denuded and between it and the membranes there was air and a small quantity of liquid blood. This denuded area was reddened in all directions and was in marked contrast with the paler surface left by the separation of the remainder of the membranous adhesions at the time of the autopsy. Along the posterior portion of the inner surface of the womb, in the middle line of that region, the discoloration was much deeper, presenting an area of bruised and roughened uterine tissue five inches long and in width from half an inch (at its lower extremity) to one inch and a half (at its upper end). A less defined but distinct region of bruised and reddened uterine tissue was found a little to the right of that described and extending upward, like that, from the upper end of the cervical canal.

In various parts of that region of the womb which had been denuded of the membranes before death, the open mouths of many of the venous sinuses in the walls of the organ were seen and were further demonstrated with the blow-pipe; air could freely enter these openings and thence pass into the general circulation.

The bladder was empty and healthy.

The ovaries were well-developed. The right ovary contained a corpus luteum.

In conclusion Dr. Draper states as his opinion, that the said individual came to her death by the admission of air into her blood-vessels and heart through ruptured venous sinuses in the walls of her impregnated womb, in consequence of the introduction of a blunt instrument into the cavity of the womb.

An inquest was held later, and Dr. T. was indicted on the charge of attempting to procure a criminal abortion. In default of twenty thousand dollars bail he was remitted to jail to await trial.

At this trial, which occurred in December, the facts above stated were brought out. The remainder of the

testimony was that of the medical experts, and it not only constitutes the part of most interest to physicians, but it was of most importance in the case from a legal stand-point.

Medical Examiner Draper testified to what has already been mentioned in connection with the view and the autopsy, and gave also in his direct examination a very clear account of what is known of air embolism in general, and its special application in this case. His testimony may be summarized as follows:—

Admission of air into veins is a very serious accident. The effect of air so admitted varies according to the amount; if large, and its introduction rapid, death immediately follows; if small, or the introduction be slow, only a temporary circulatory disturbance, as shown by the fainting and distress, may result. The amount of air and its manner of introduction can be determined by a post-mortem examination, provided such examination be made soon after death, before decomposition has developed gases. If death follows rapidly after the introduction of air, the right side of the heart would be fully inflated with air, with comparatively few bloody bubbles; if the fatal result were slower the right cavities would still be expanded, but the contents might consist almost wholly of bloody bubbles, from the churning action of the heart. Instant death has resulted from entrance of air through the uterine sinuses in delivery at term and in instrumentally induced abortion. The anatomical structure of the uterus is such that under favoring circumstances air can enter rapidly and in large quantities into the uterine sinuses, and so make its way to the heart. Such favoring circumstances are: an open cervical canal; a separation of the foetal membranes, exposing orifices of uterine sinuses; unusually large sinuses; imperfect plugging of sinuses by clots; the structure of the canals themselves, being intimately adherent to the wall of the uterus so that they remain open when divided.

Dr. Draper then explained the way in which death is brought about in such cases. When the external air has free entrance to the cavity of the uterus, either through a tube like a catheter, or by being forced with a syringe, or by admission through the natural passages, and when the orifices of the uterine sinuses are open, then the uterus, alternately contracting and expanding under any stimulus (a foreign body like the air itself), will act like a rubber bulb to suck into its cavity and into its sinuses this external air, while the heart and lungs meanwhile act also as a suction force to draw air through the veins leading from the uterus to the heart; its rapid accumulation in the right side of the heart distends these cavities instantly, so that the heart's muscle becomes paralyzed and unable to contract. Whatever blood mingled with air the heart can propel goes to the lungs, and from the bubbles of air lodging in the capillaries the pulmonary circulation is seriously interfered with. A convulsion with this form of death is the rule. Death may result instantly, where the amount of air is large, by paralysis of the heart and asphyxia, or it may result from the consecutive effects of the air, as a pneumonia; this in cases where only a smaller quantity enters the circulation.

In regard to the case at issue Dr. Draper further testified that the autopsy showed all the anatomical conditions to be favorable to the *rapid* entrance of a *large* amount of air by way of the uterine veins to the heart; that the passages to the uterus were open, the foetal membranes had been separated from the inner

surface of the uterus, over half its area, and the orifices of the sinuses were thus exposed; very little hæmorrhage had occurred to plug these orifices with clots; the sinuses were larger than usual. In addition the autopsy showed, as a matter of fact, that air had been admitted to the cavity of the uterus, to the sinuses, to the uterine veins and inferior vena cava, and to the heart itself.

The amount of air and its distribution as found at the autopsy were wholly incompatible with the theory that any considerable time had elapsed between the entrance of air to the heart and the death of the patient.

The post-mortem examination of the body was made so soon after death that sufficient time had not elapsed for any decomposition to have developed,—indeed, the deeper parts of the abdominal cavity were still warm; the heart was inflated by *air* without odor, and not by the fetid gas of decomposition. There was not the slightest odor or appearance of putrefaction about any part of the body.

The wounds observed on the inner surface of the uterus were *recent*; they might have been and probably were made immediately before death; they could not have been made so long as twenty-four hours before death.

The separation of the foetal membranes from the uterine surface was not a natural, spontaneous result of the normal action of the uterus, because if it had been the separation would have been in a transverse direction near the cervix, and not in a longitudinal direction involving fully one half the inner surface of the organ. Moreover, bruising could not result from a natural process, but the reddening would have been uniform.

The bruises on the orifice of the vagina, on the os, in the cervical canal, and on the inner surface of the uterus all indicate the introduction of a blunt instrument into the cavity of the uterus.

The small amount of blood found and its fluid condition indicate the suddenness of the death after the injuries which set the blood free.

The witness further stated it to be his opinion that the deceased could not herself have produced the appearances found in the uterus by the introduction of an instrument in her own hand, for the reasons that she could not pass an *elastic* instrument into her vagina through the os and up the posterior wall of the uterus to a depth of at least ten inches so as to separate the membranes as they were found; further, that she could not pass an *inelastic* instrument into her uterus without doing much more damage than the autopsy disclosed to the tissues of the os, cervical canal, and inner surface of uterus. The chances are decidedly in favor of the view that with either an elastic or stiff instrument, if no other injury were done, she would have ruptured the foetal membranes, and let out the fluid within. Again, death resulted too suddenly to be accounted for on the hypothesis of the self-infliction of the injuries found.

The operation was done by some person other than the deceased and was done just before death.

Knowledge of the pregnant condition of the woman being admitted by the person accused, the purpose of the operation was to induce miscarriage and that only.

Dr. Draper's cross-examination lasted four hours, but failed to shake him in the least, in his testimony.

Dr. W. L. Richardson testified, that the pelvic organs of the woman had been brought to him a few hours after the autopsy; that he examined them and,

as a consequence, believed that the individual came to her death from the introduction of air into the circulation. He further corroborated the testimony of Dr. Draper in all particulars.

The defendant, Dr. T., testified, among other matters, that he had made a digital examination of the woman and that it was during this examination that she fell back in a convulsion. This is in direct contradiction to the statement made to Dr. Draper at the view, at which time he stated that he had made no examination whatever. Defendant further testified that the object of this examination was simply to touch the os to determine whether there were any ulcerations about it, and that, with the exception of his finger, he introduced nothing into the vagina or uterus of this woman.

The experts for the defense, Drs. H. G. Clark and H. M. Jernegan, agreed with Drs. Draper and Richardson that death could only have resulted from air embolism, but differed from them in supposing it to be possible for the individual to have carried about in her uterus a certain amount of air, for a period varying from a few hours to two or three days; that either this air, in consequence of its gradual expansion by the heat of the body, separated the membranes from the uterine surface, thus opening the uterine sinuses and so gained entrance to the circulation; or, that as a result of some slight irritation, like that of the finger touching the os, the uterus suddenly contracted on this mass of air contained within its cavity and that the forcibly compressed air tore away the membranes and so entered the circulation. As to the method by which the air originally entered the uterus, it was thought by the experts for the defense that it might have been the result of a douche, for cleansing purposes, either improperly given or else from a leaky syringe, in the hands of the woman herself.

To sum up the case; both sides agreed that death resulted from air embolism. The defense maintained that the air did not enter the uterus from any measures taken by Dr. T.; that it was already in the uterus at the time she came to his office, and that the innocent digital examination was enough to make it explode, as it were, and enter the circulation; and further, the fact that air was found in the veins beyond the heart was evidence that the air had entered the circulation slowly, and that death must have been gradual. The prosecution declared that the various steps in the whole series, from the separation of the membranes to the death of the individual, must have followed one another rapidly, occupying in all less than five minutes, and that said separation must have been done by an instrument in the hands of the accused, in his office, immediately before her death.

The judge, in his charge to the jury, stated that they could not find a verdict of guilty unless the government had proved that the child was alive at the time of the attempted abortion.¹ This is a question of considerable importance from a medico-legal point of view, from the fact that it is impossible for the pathologist to determine in many cases whether a child in the dead mother's uterus was alive or not at the time the mother died. The District Attorney is authority for the statement, that the opinion of the highest English courts, is a contrary one.

The jury returned a verdict, in three hours, of guilty.

¹ We have reason to believe that his honor has subsequently modified this opinion. — Ed.

RECENT PROGRESS IN OBSTETRICS.

BY W. L. RICHARDSON, M. D.

PUERPERAL HÆMATOCELE.

DR. R. SOMERVILLE reports² two cases of this rare complication of the puerperal state. In the first case the effusion was in the septum between the vagina and the rectum, while in the second case it was in one of the labia. The mechanism of the production of the hæmorrhage would seem to have been that in the first place the pressure of the child exerted on the upper part of the vessels prevents the free return of the blood, and so causes them to become turgid. In the second place, owing to the descent of the fœtus, pressure of a severe kind is also made on the distended part of the vessel or vessels, thus causing a rupture. Finally, when this pressure is removed free hæmorrhage from the ruptured vein or veins occurs, and this will go on until the tension of the effused blood equals that of the blood inside of the vessel. Fortunately, the pressure restraining the hæmorrhage is not usually taken off until after the child is born, and therefore the development of the hæmatocele is delayed until after the labor is concluded. If, however, the pains cease, or there are long intermissions, and the fœtus recedes, and pressure is removed, then the bleeding will occur before birth, and may seriously interfere with the labor.

As regards treatment, Dr. Somerville advises that whenever the hæmatocele is developed after the termination of the labor, the pain should be soothed by opiates. Then, where practicable, a pad of some soft material should be applied, that its support may do something to prevent a rupture of the thrombus, and the consequent danger of an increased hæmorrhage. After the tumor has ceased to enlarge, and when there is a likelihood of the injured vessels being sealed up, it is a question whether the tumor should be at once incised or not. Dr. Somerville decidedly favors waiting as long as possible, with a view of avoiding the danger of that peculiar sensibility which all puerperal women have to septic influences.

In cases where the hæmatocele develops during the progress of the labor, immediate delivery is the safest course, for by waiting the swelling may become a most serious obstruction to the passage of the child, and the thrombus is liable at any moment to burst, giving rise to a frightful hæmorrhage.

ELECTRICITY IN OBSTETRIC PRACTICE.

Dr. G. Apostoli reports³ that during the last two years he has been in the habit of using the electric current in his obstetric practice, with a view of hastening the completion of the involution of the uterus. Immediately after delivery an induced current is applied to the uterus, and its intensity is gradually increased. The application is made from eight to ten times during the first six days after the termination of a natural labor. If the labor has been premature or an abortion has taken place, the application of the electricity is made from fifteen to twenty times. He is convinced that this method of applying electricity has yielded most marked and favorable results

² Edinburgh Medical Journal, July, 1881.

³ Annales de Gynéc., May, 1881.