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Electricity in Extra-Uterine Pregnancy

BY

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ELECTRICITY IN EXTRA-UTERINE PREGNANCY.

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New York.

If the diagnosis of extra-uterine pregnancy can be made early with certainty, or if, in doubtful cases, the probability points in that direction, *the* treatment is electricity. In spite of the paper of Dr. J. C. Reeve, and the subsequent discussion in the Transactions of this Society,[1] and Dr. William T. Lusk's paper in the "Journal of Obstetrics,"[2] this simple truth is yet far from generally known by the profession either in this country or in Europe. In perusing the journals of the last few years, we meet with numerous cases in which the diagnoses might have been made with certainty in the early months of pregnancy, and which were allowed to go on unchecked until rupture took place, or until the fetus was viable, or a more or less long time after the end of normal gestation, when dangerous operations were performed, by which sometimes the patient was saved, and oftener not.

Even systematic writers of the latest period ignore the treatment by electricity altogether, or only mention it in a cursory and deprecatory way, which shows that they do not know what this method of treatment has accomplished in this country. Thus, E. Fränkel,[3] of Breslau, in a recent number of Volkmann's "Clinical Lectures," devoted to the consideration of extra-uterine pregnancy, does not even allude to it. A. Martin,[4] of Berlin, advises against interfer-

[1] *Trans. Am. Gyn. Soc.*, iv., 313–333, 1879.
[2] *Am. Jour. Obst.*, xiv., 329–341, 1881.
[3] Volkmann. *Klinische Vorträge*, No. 217, Leipzig, 1882.
[4] *Berl. klin. Wchnschr.*, 1881, Nos. 51 and 52.

ence, even in tubal pregnancy, until the general health is disturbed. Thomas Savage,[1] of Birmingham, in discussing the extirpation of the fetal cyst during the first four months of pregnancy, believes that plan to be a safer proceeding, and more likely to cure than any of the many proposals that have been made, *e. g.*, puncture, an electro-galvanic current, starvation of the patient, injection of narcotic substances, compression, etc. Charles Bell, of Edinburgh,[2] says the diagnosis being extremely difficult, if not impossible, in earlier months, the treatment must be entirely palliative.

I therefore propose, in the following pages, not only to publish a new successful case of Faradization, practiced in the early stage of extra-uterine gestation, but to present a synopsis of the other cases scattered throughout the literature.

CASE I. — Garrigues. *Ovum developed in Right Fallopian Tube. Two Months. Faradization. Arrest of Pregnancy.*

Mrs. M. S., aged nineteen, consulted me February 21, 1882. She had been married ten months, and never been pregnant. Menstruation had always been regular, except that the last had occurred seven or eight weeks before. She had always been in good health until of late. She complained of nausea, weakness, and pain in the right iliac fossa, which, during the last week, had occurred twice in such sudden and severe paroxysms that she almost fell to the ground. These attacks had lasted ten minutes.

On vaginal examination I found the uterus symmetric, not enlarged, anteflexed, and pushed over to the left side. Close to it, on the right side, I found a soft, elastic, round tumor, which was as large as a hen's egg, slightly movable, and sensitive to pressure. On its vaginal surface was felt a pulsating artery.

The patient stated that her chest used to be quite flat, but that the breasts had become much larger of late. They were found forming pointed hemispheres. They were sore, and the seat of shooting pains. The outlines of the areolæ were effaced on their upper and outer margins.

[1] *Birmingham Med. Rev.*, February, 1882; *N. York M. Abst.*, March, 1882, ii., 94.

[2] *Edinb. M. J.*, 1881, xxvii., 297.

I made, without hesitation, the diagnosis of extra-uterine pregnancy in the right Fallopian tube, and pointed it out to the distinguished surgeon Professor Max Schüller, of Greifswald, Germany, who happened to be present.

February 24. The patient complained of constipation and frequent micturition. Two days before a few drops of blood had escaped from the vagina. The tumor presented a distinct round outline. On the anterior and exterior side it could be circumscribed by the finger in the vagina. Between the vagina and the tumor the tissue was soft, not swollen or sensitive to pressure. On the inner border of the tumor the finger could not be pushed so far up on account of the proximity of the uterus, but nevertheless a distinct line of demarkation between the two could be made out in front. Posteriorly the tumor extended slightly beyond the edge of the uterus. By examination per rectum the whole posterior surface of the tumor and of the uterus could be felt. Ballottement could not be obtained.

February 28. She had been bleeding four days, as if she had her menstrual flow. The uterine sound showed the depth of the cavity to be two and a half inches. Through the rectum the left ovary could be felt free and in its normal place. The right could not be distinguished. In the upper and posterior part of the elastic tumor a small, hard lump as large as an ovary could be felt (probably the fetus). Both areolæ were swollen, and a net of blue veins started from them, taking a direction upward and outward over the breasts. She stated that small bits of a membranous character had come away since her last visit, but had, contrary to my urgent entreaties, been thrown away.

On March 4 the electric treatment was begun. I had put it off until then because there did not seem to be any imminent danger of rupture, and I wanted to watch the development and have the opportunity of making repeated, thorough examinations before any active treatment was instituted. I used a French one-cell apparatus, composed of two carbon plates and one zinc plate, immersed in Bunsen's battery fluid. (℞. Potass. bichromatis ʒii.; acidi sulphurici concentr. fl. ʒiss.; aquæ fl. ʒxl.) The positive electrode, made of a large carbon plate, covered with cloth, was applied on the abdomen, over the tumor. The negative electrode, consisting of an isolated brass stem, with knob, was introduced into the vagina, and pressed up against the lower part of the tumor. The current was gradually increased

to the limit of her endurance, but never enough to cause real pain. This, and subsequent applications, lasted ten minutes.

Two days later (March 6) the pulsation in the vagina, which had been distinctly felt at every previous examination, had disappeared, and the tumor had decidedly diminished in size. I tried to introduce a small dilator into the uterus, in order to be able to scrape off part of the lining membrane of the cavity, but as this gave pain, and I was afraid of losing this interesting case, I was obliged to desist from the attempt. Second Faradization.

March 9. I verified the disappearance of the vaginal pulsation. The lower or soft part of the tumor had become much smaller in the three days elapsed since I had last seen her. Third application.

March 10. She complained of some pain in the hypogastric and inguinal regions, and soreness of the vagina. I examined very carefully, through the rectum, and satisfied myself that there was no trace of pulsation on the surface of the tumor.

On March 11 the soreness was gone, and even the pain, on direct pressure upon the tumor, was much less than it used to be. Only a small part of the tumor could be felt through the vagina, but it was much better made out through the rectum. The part lying behind the uterus seemed to be the ovary. The tubal cyst formed a globular tumor. Fourth application.

On March 13 she reported having had colicky pains, and some soreness for twenty-four hours. Fifth application.

On March 14 the pain had ceased, but she was still rather sore. The ovary was very distinctly felt through the vagina, separate from and situated behind and inside of the tumor, and behind the uterus. Sixth application.

On March 15 she said that a copious creamy discharge had been coming from the vagina since the day before. The breasts had become quite flaccid, and were no longer sore. The venous net had retired two inches from the nipples. The areolæ appeared shrunken and full of wrinkles. Seventh application.

March 16. She declared that she felt "first rate." The fluid part of the tumor had disappeared. There was no tenderness, even on thorough vaginal and rectal examination. Ninth application.

March 18. She complained again of some soreness, and said that she had felt some pain after yesterday's Faradization, which, during the night, had increased enough to keep her awake. Tenth application.

March 20. She felt well. The tumor had diminished to the size of an English walnut. The areolæ had lost their wrinkles, and looked quite normal.

During the whole treatment the patient had not spent a day in bed, but had even gone out and attended to the duties of her small household.

Deschamps,[1] in his work on extra-uterine pregnancy, forming a continuation of Parry's,[2] says that the difficulty of making the diagnosis of extra-uterine pregnancy during the earlier months of pregnancy is greater than that of normal pregnancy at the same period. This I take to be an erroneous view. In women who have borne children before, it is often very difficult during the first two or three months of normal pregnancy to decide whether we have to deal with pregnancy or with a disease of the womb.

If the pregnancy be extra-uterine, I think the diagnosis will, in most cases, be much easier. In reviewing the above history, the diagnosis seems to me as sure as that of a pneumonia, or a peritonitis, or a broken humerus. First, the patient presented the following symptoms of pregnancy: Cessation of menstruation, nausea, increased size of and pains in the breasts, swelling and beginning enlargement of the areolæ (*aréole mouchetée* of the French), and development of the subcutaneous veins running over the mammary glands. Second, another set of symptoms showed that the seat of the ovum was not in the uterus, but in the right Fallopian tube, namely, violent attacks of colicky pain in the hypogastrium, discharge of blood and shreds from the vagina, frequent and painful micturition; the presence, on the right of the uterus, of a well-defined, elastic, movable, tender tumor, separable from the uterus and the ovary; the displacement of the uterus to the opposite side of the pelvis; pulsation on the surface of the tumor; the emptiness of the uterus on examination with the sound; and, finally, the shrinkage of the tumor and the disappearance

[1] *Grossesses Extra-utérines*, Paris, 1880, p. 23.

[2] *Extra-uterine Pregnancy*, Philadelphia, 1876.

of the mammary and gastric evidences of pregnancy after the application of the Faradic current.

When I first saw the patient these symptoms were not all developed; nevertheless I had no doubt in my mind about the diagnosis. I can only imagine few conditions which might have a remote resemblance to the one described, namely, parametritis, dropsy of the Fallopian tube, beginning cystic degeneration of the ovary, or a small cyst of the broad ligament. From parametritis the tumor differed by its sharp outline, its thin walls, its regular globular shape, and its moderate tenderness. Hydrosalpinx or a small ovarian or parovarian cyst might, indeed, give a similar sensation, but none of them would produce the changes in the breasts. Pregnancy in one half of a double uterus, which presented a great obstacle in the way of diagnosis in a case of Goodell's,[1] could be excluded by the perfectly symmetrical shape of the uterus and the separate existence of a tumor.

There are a few points in the history of the case on which I would like to make some remarks. The uterus was not enlarged. In most histories of extra-uterine pregnancy the enlargement of this organ is emphasized as part of the symptoms, but this does not seem to take place, in a marked degree, before the third month. Reamy [2] refers to the non-enlargement of the uterus in the very early part of extra-uterine pregnancy as one of the features by which that condition is distinguished from fibroids. In McBurney's case, to be mentioned below, the uterus, at the first examination, was "very slightly, if at all, enlarged."

There was no ballottement. This is, likewise, a symptom which cannot be expected in the very early stage of extra-uterine pregnancy. It was not present in Reeve's case, which belongs to the third month, but in Allen's first case, in which the uterus measured five inches in depth. Thomas could only feel it feebly, though distinctly, in the fourth month of pregnancy, in his celebrated case in which he

[1] *N. York Med. Rec.*, 1880, xvii., 109.

[2] *Tr. Am. Gynec. Soc.*, 1879, iv., 321.

opened the sac with the galvano-cautery.[1] In normal pregnancy the end of the fourth month seems to be the very earliest period in which it is felt.[2]

In several histories we read that the areolæ were well marked. In my case I say that its outline was effaced. Both observations are correct, but apply to two different things. The true areolæ become darker during pregnancy, and are, therefore, more marked; Montgomery's glands become swollen, and sometimes the whole areolæ swell so as to form part of a much smaller globe than the breast, — something like the cornea, in reference to the sclerotica. But, at the same time, pigment is deposited in the circumference of the areolæ in small tongues or rays, by which process the outline becomes effaced. In my experience, this, together with the swelling of Montgomery's glands, is one of the earliest signs of pregnancy. I have often found it as early as six weeks after conception. It is the beginning of the formation of the secondary areolæ.

It would seem, from the cessation of pulsation and decrease in the size of the tumor, that the fetus was killed by the very first application of electricity. This was only because it was so very young. The procedure was repeated nine times, partly to make sure of the death of the fetus, and partly to have the opportunity of observing the changes going on in the pelvis and the breasts. The latter returned to their normal condition in eleven days after the beginning of the treatment.

At no time did the current cause appreciable contractions of the sac or the uterus.

The first case on record in which electricity was used as a remedy for extra-uterine pregnancy was that treated by Bachetti, Bartolini, Burci, and Torri, of Pisa, Italy.

[1] *N. York M. J.*, June, 1875.

[2] Tarnier, in his *Traité des accouchements*, Paris, 1882, i., 522, says that it begins in the middle of the fifth month. Chailly-Honoré, *Traité des accouchements*, 6e éd., Paris, 1878, refers its beginning to the end of the fourth month, but says that at that time the fetus, after having been displaced, is very rarely felt to fall down again on the finger. Playfair, in his *Midwifery*, London, 1876, i., 154, says "Ballottement is practiced between the fourth and the seventh month."

CASE II.[1] — Bachetti. *Extra-uterine Pregnancy in Left Tube. Third Month. Electro-puncture with Faradic Current. Arrest of Pregnancy.*

Mrs. C., aged twenty-nine, robust, mother of four children ; had always been healthy. Toward the end of 1852 she supposed herself to be pregnant on account of the cessation of her menstruation, daily vomiting, abundant salivation, and disgust with wine. On December 29 sudden, violent pain in the hypogastric region, tenesmus, dysuria, fainting. The os uteri was closed, and no discharge came from the interior. Eight days later a small quantity of blood, mixed with albuminous flocculi, was discharged from the uterus, which flow continued for several days.

January 16, 23, and 25, new attacks of pain and fainting. On the last-named day, for the first time, a tumor was discovered in the left iliac fossa. It was plainly visible and well-defined by the touch. It was of ovoid shape, as large as a large citron,[2] the long axis of which extended upwards and outwards from the left side of the uterus to the iliac fossa of the same side, and reaching inwards almost to the median line. The lower and interior part was adherent to the uterus, the upper and outer part was movable. It was hard, with an uneven surface, and indolent on pressure.[3] Dr. Odoardo Bachetti, who first was called to see the case, called in the renowned Professors Bartolini, Burci, and Torri. All agreed in the diagnosis of extra-uterine pregnancy, in the third month. Burci proposed acupuncture, to which Bartolini advised to join the galvanic current. Burci administered

[1] *Gazzetta Medica Italiana Federativa Toscana*, 1853, vol. iii., No. 18. An abstract is found in *L'Union médicale*, 1857, xi., 168, from which the above is taken. It is a mistake when Parry (l. c., 207) cites Burci's case as another case than Bachetti's, and when Dr. Lusk (l. c., p. 335) refers the case to 1859, and, likewise, when *Bulletin général de thérapeutique*, 1872, vol. lxxxii., p. 276, quotes *Gaz. Med. Ital.*, 1857. It is one and the same case, and was published in 1853. I have named the cases after the physicians in whose practice they occurred, but it will be noticed that in several of them the treatment was suggested, and in some even the diagnosis made, by others.

[2] The French word is *cédrat*, which means the fruit of *Citrus medica*, much larger than the lemon.

[3] "Hard" means, probably, "tense ;" the uneven surface may have been due to fetal parts, or the ovary; the indolence is, probably, in comparison with the sensitiveness of an abscess.

the electricity. The operation was performed on the 2d of February, 1853. He used an electro-magnetic machine, moved by two small Bunsen's cells, containing a small quantity of exciting fluid.[1] He introduced two long and thin needles obliquely into the tumor, the first at the inner and lower part, the second at the outer and upper part, in such a way that they did not come in contact. This acupuncture excited only a slight pain. By connecting the needles with the conducting wires of the electro-magnetic machine, he caused a small shock in the tumor and on the whole body. Five minutes later he filled the cells entirely with fluid, which produced a second shock, which was much stronger than the first. The patient screamed, raised herself involuntarily up from her bed, became very red, complained of intense pain in the hypogastric region, and refused to submit to another attempt. The skin looked seared round the points in which the needles had been introduced. When these were removed, Mrs. C. became again calm and quiet.

After that day she had no more neuralgic attacks or fainting fits. The tumor diminished gradually. On the 6th of May it was reduced to the size of a pigeon egg. Menstruation recurred in April, and in May Mrs. C. was perfectly cured.

CASE III.[2] — Braxton Hicks. *Abdominal Pregnancy. Three Months and a Half. Faradization. Two Applications, with Ten Days' Interval. Puncture. Death from Internal Hemorrhage.*

Patient about thirty-five years old, healthy, mother of three children. Metrorrhagia. Severe attack of collapse, and sharp abdominal pain. Uterus enlarged, and, behind it, in the recto-vaginal pouch, a flaccid tumor, the walls of which seemed to be so thin as to add nothing to that of the vagina. A living fetus was felt moving in it, and its pelvic extremity was turned downwards. Its size was about that of a three and a half months' fetus, which corresponded to the date of conception. The upper part of the tumor could just be felt over the pelvic brim. A strong galvanic current was applied, one pole being placed externally on the tumor above the brim of the pelvis, the other on

[1] This shows that he used a faradic, not a galvanic, current, as commonly employed in electro-puncture. Consequently, the electrolytic effect can only have been insignificant, and it is, in fact, a case of Faradization.

[2] *Trans. Obst. Soc.*, London, 1866, vol. vii., p. 95.

the lower part of the tumor in the vagina. As this proved of no effect, it was repeated after ten days, with four cells of Smee's battery, strongly charged, assisted by a good *induction coil.* This, again, was without the intended effect. These applications were made under chloroform. *The fetal movements wholly ceased during the administration.* Five weeks later he punctured the fetus from the vagina. The patient died five days later from internal hemorrhage. At the post-mortem examination he found two pints of fluid blood in the peritoneum. The uterus had three times its normal size. To its left side and back there adhered a cyst, about four inches in diameter, containing purulent serum. The cavity was lined with flaky lymph. At its most dependent portion, which reached about the level of the os uteri, was a circular opening about one inch in diameter. When the fluid was removed, the membranes of the ovum were seen slightly bulging into it, containing clear liquor amnii. The membranes prevented the escape of the purulent fluid into the recto-vaginal pouch, the whole of which space was occupied by the fetus. Upon opening this pouch from below the ovular membranes were found to be closely attached to the peritoneum. Within was a clear liquor amnii and the breech of the fetus. The placenta was situated at the upper part of the ovum, and adherent to the posterior surface of the uterus and the right side as much as was not occupied by the cyst. The ovum, which was springing up out of the pouch, was wholly independent of any covering.

Hicks was the first who applied electricity externally, and had, perhaps, not much faith in it himself. This would explain that he let ten days go before he repeated the attempt, and then discontinued the treatment altogether, although he had noticed that the movements of the fetus stopped temporarily. It is very likely that by repeating the sittings, with short intervals, he would have attained his end. It seems to be the oldest fetus upon which the method has been tried. The autopsy showed that neither fetus nor ovum had been reached by the puncture, and that it had caused both suppuration and hemorrhage. Since electricity had no fair trial in this case, we cannot consider it as a failure of the method.

CASE IV.[1] — Joshua G. Allen. *Abdominal Pregnancy. Fourth Month.*[2] *Faradization. Arrest of Pregnancy.*

In 1869 a pluripara attempted to produce abortion about the second month of pregnancy, but failed, although she described something like a decidua as having been passed. She suffered greatly from abdominal tenderness and occasional colicky pains. Two and a half or three months after supposed conception, she complained of an incessant desire to urinate. A considerable tumor was found behind the uterus, unattached to it. The body of the uterus was carried forwards, and far upwards behind the pubis. The sound had to be strongly curved, and entered five inches; the uterus was empty. The diagnosis of extra-uterine pregnancy was made, and confirmed by Drs. Agnew and Pepper. The latter examined the patient several times. Later he could ascertain by ballottement the presence of a fetus.

One pole of an ordinary electro-magnetic machine was passed through a glass speculum, and applied to the vaginal portion of the tumor behind the neck of the uterus. The other pole was placed upon and over the tumor from the abdomen, where it could now be felt. This was repeated on several occasions. A weak current was first used, producing no visible impression. On the third application, a very powerful current was turned on. The patient recoiled from the current with considerable fright, declaring she felt a motion as if something turning in the abdomen. After that, a moderate current was used every three days for two weeks. The tumor ceased to grow, and then for several months diminished. The ballottement disappeared. Three years after the treatment, there was a well-defined tumor, of the size of a large fist, which gave no trouble.

CASE V. — Starling Loving and H. G. Landis.[3] *Left Tubo-abdominal Pregnancy. Three Months. Faradization. Arrest of Pregnancy.*

The patient was a pluripara. Her last child was born Feb-

[1] *Trans. Obst. Soc.*, Philadelphia; *Am. Jour. Obst.*, 1872, vol. v., p. 161.

[2] The data about visits before electricity was used, the depth of the uterine cavity (five inches), the size of the fetal sac long after treatment (as large as a large fist), the presence of ballottement, seem all to place the case beyond the third month.

[3] *Ohio Med. and Surg. J.*, Oct., 1877.

ruary 3, 1872. Menstruation returned in June, 1872, and was regular. The last, occurring January 10, 1877, was scanty, and of unusually heavy and unpleasant odor. Soon after, she began to feel nausea, mostly in the morning. There was no flow on February 10, but pain in the back and the loins. Vaginal examination revealed only an eroded os uteri, and slight anteflexion of the womb. February 23, immediately after defecation, she was seized with sudden violent abdominal and lumbar pain and tenesmus. Similar attacks were repeated every day, and later, every two, three, or four days. On one occasion half a fluid ounce of laudanum was given in fifty minutes, with barely the effect of relieving the pain. Another day (March 10) five fluid drachms of laudanum in one hour and followed by hypodermic injection of half a grain of sulphate of morphia were required to relieve the suffering. After that, hypodermics of morphia, with addition of atropia, were used three or four times a day.

February 26. She lost half a drachm of blood, after which the os, which hitherto had been closed, admitted the third phalanx of the index. From this date the uterus slowly settled in the pelvis for a week. Simultaneously there appeared a tumor in the place of Douglas' cul-de-sac. Thereafter the womb ascended until, by March 17, the os could be felt high up, just behind the pubis. The ascent was apparently caused by the growth of the tumor. By March 1 it was quite evident that the womb was enlarged. Extra-uterine pregnancy was suspected. She had no fever. The tumor was moderately tender. The sound passed with ease three inches and a half. An elastic catheter passed, without resistance, four inches, and was allowed to remain a few hours. Ergot was given. A few uterine contractions were induced, during which not only the outline of the womb could be traced in the hypogastrium, but also an irregular tumor associated with it in an ill-defined way, and which was also subject to rhythmical contractions. This tumor appeared to extend completely across the pelvic brim, but was harder and more noticeable just above the left groin.

March 7. She had an apparently menstrual flow, with clots.

March 9. She passed from the vagina a strip of membrane two and a half inches long and one inch wide. The following day there came two more, which both by gross and microscopical examination proved to be decidua, being richly supplied with tortuous blood vessels, and exhibiting decidual cells. A finger was

introduced into the cavity of the uterus, which was empty. By conjoined rectal and vaginal manipulation, the lower segment of the tumor was located in Douglas' pouch. It was obscurely fluctuating.

The diagnosis of extra-uterine, probably tubo-abdominal, pregnancy was made.

March 20. Electric treatment was begun. They used a Drescher faradic apparatus. The current was applied in moderate strength, and continued fifty-five minutes. The patient complained bitterly of its effect, especially increased backache. It caused weakness of the pulse, and increased paleness of the surface, with a sensation of faintness. It seemed also to cause contractions of the womb and the tumor. One electrode was applied in the vagina, the other on the abdomen. From March 20 till the 30th, when electricity was used for the last time, there were eight sittings.

On the 23d the pain was intense, but after that day there was neither pain nor contractions. On the 25th she walked down stairs to dinner.

Menstruation recurred on April 16, and lasted till the 21st. The following day a sound was passed into the uterus four and a half inches, showing increase of the empty organ. Very little change was observable in the tumor. She menstruated again in May and June. By July the womb had regained its normal size. The tumor could no longer be traced from the abdomen, though it was distinctly felt from the vagina, being apparently as large as an average fist. (See Case XI.)

CASE VI.[1] — Charles McBurney. *Left Tubo-interstitial Pregnancy. Two Months and Three and a Half Weeks. Galvanism, with Interruptions and Reversions. Delivery through the Natural Passages.*

The patient was a married lady [twenty-one years old], pregnant for the first time. Her last menstruation had been present from October 1 till the 5th. [She was married the 11th of the same month]. November 22 and 23 there was a slight

[1] *New York Med. Jour.*, 1878, xxvii., No. 3, p. 273. Dr. T. G. Thomas took, at the time, full notes of the case himself, which are found in Beard and Rockwell's *Med. and Surg. Electricity*, 3d ed., New York, 1881, pp. 606 to 610. From these I have taken what is found in brackets.

flow, without pain. On the 25th this became quite abundant. December 1st there was again a flow, and on the 9th, 10th, and 11th, a slight bloody discharge. The gastric and mammary signs of pregnancy were well marked, nausea having been present since the middle of October. December 16 and 20 there was again a slight bloody discharge.

December 25. On the left side, overhanging the edge of the true pelvis, and extending beyond about two inches, there was found a smooth tumor, apparently about the size of a large egg, pressure on which was painful. Through the vagina the uterus was felt displaced to the opposite side, very slightly, if at all, enlarged [increased in size, but not so large as it should have been at or near the third month of utero-gestation]. The cervix, examined with the speculum, appeared to be that of a non-impregnated uterus. To the left of the uterus there was a fluctuating tumor, with a very thin wall, tender on pressure [and very slightly movable]. Pressure over the tumor, felt through the abdomen, was not communicated to the cervix, but forced down the roof and left wall of the vagina. The diagnosis of extra-uterine pregnancy, probably tubal, was made.

January 2. The diagnosis was corroborated by Drs. Thomas and T. A. Emmet. The latter could feel a sort of vermicular motion in the tumor.

January 3. The sound was used, and entered three and one eighth inches. [Dr. Thomas tried to penetrate the mass on the left side, but it was impossible. He used the instrument so as certainly to have broken the fetal envelopes, and allowed the liquor amnii to escape, had the gestation been uterine. The uterus was empty.]

Dr. Thomas urged strongly the use of the galvanic current. Dr. A. D. Rockwell applied a constant battery, composed of zinc and carbon plates immersed in a solution of bichromate of potassa, ℥i, sulphuric acid, ℥ij, and water, ℥vi. Seventeen cells were used. The current was interrupted one hundred and twenty times in the minute. The whole application lasted three minutes. The negative pole, formed by a metal bulb covered with wet sponge, was passed four inches up in the rectum. The positive pole, consisting of a large wet sponge, was applied on the abdomen. Very marked contractions of the muscles of the abdomen and the limbs accompanied the shocks, and decided pain was caused, but stopped with the current.

January 4. Second application, lasting two minutes. Eighteen to twenty-three cells were used, and the current reversed twice. It caused violent contractions and intense pain. After the application there was a slight rise in temperature (99.5° F.), pulse 96, vomiting and pain, followed by a slight bloody discharge from the vagina.

January 5. Temperature 10.5° F.; pulse, rapid and feeble. The tumor felt hard. The flow became abundant. The tumor in the left iliac fossa disappeared, with the exception of a small mass on the brim. In the median line, on the other hand, was felt a smooth symmetrical tumor, and from the vagina was felt a tense and very strong bag of membranes protruding from a fully dilated cervix. On rupturing the membranes, a large amount of pure liquor amnii and with it a dead fetus about three months old came away. The placenta followed in about twenty minutes.

January 6. Temperature 101° F. [The uterus could be distinctly mapped out, and was very slightly sensitive to pressure. The fetal nest could be felt with almost equal distinctness, though now insignificant in bulk, and to the touch it was exquisitely sensitive. The uterus had resumed its normal position in the pelvis.]

She made a rapid recovery. On the 8th of February nothing abnormal was felt to the left of the uterus, and the uterus itself was perfectly normal in shape.

This case has been challenged on account of its termination in abortion, but the high authority of the gynecologists who examined it puts the diagnosis beyond a doubt. It is supposed to have been a tubo-interstitial pregnancy, and that the contractions caused by the electricity pushed the fetus into the uterine cavity.

CASE VII.[1] — J. C. Reeve. *Abdominal Pregnancy. Three Months. Faradization. Arrest of Pregnancy.*

The patient, aged twenty-five, married six years, healthy, had had one child a year after her marriage. After that menstruation was somewhat irregular as to time and rather abundant as to quantity. It was last present from Christmas, 1878, till New Year's Day, and was but scanty.

On January 26 she had a severe attack of pain in the lower

[1] *Trans. Am. Gyn. Soc.*, 1879, vol. iv., p. 313.

part of the abdomen, and almost at the same time a sanguinolent vaginal discharge. A round, smooth, tender tumor was found behind the upper posterior portion of the vagina. The os was patulous, the cervix soft, and pushed forwards.

On March 12 and 16 new attacks of pain came on. On the latter day he withdrew the decidua from the cervix. A few days afterwards the breasts were examined and found firm, not tense. The patient said they were larger than formerly. The areolæ were not strongly marked. There was ill-defined hardness and dullness over the right ramus of the pubis. The sound entered an inch deeper than normal, with a direction anterior and somewhat to the left. Posterior, and to the right of the cervix, was felt a round, smooth, elastic tumor, which was quite tender, and gave an impression as a hydrocele. It was too tense for fluctuation. Ballottement could not be made out. All the probabilities were in favor of the case being the abdominal variety of extra-uterine pregnancy.

The tumor increased steadily, crowding the cervix against the pubis. Several arteries were felt beating on the surface of the tumor.

On March 28 the secondary current of a single cell of a galvano-faradic machine, as strong as the patient could bear it, was applied for ten minutes, one pole on the tumor in the vagina, the other outside on the abdomen. The application was repeated daily till April 5, the only manifest effect being some increase of the uterine discharge.

On April 15, ten days after the last application, the breasts were more flaccid, the tumor about the same size, but fewer vessels were felt, and their pulsation was less energetic.

On May 11 the breasts were entirely flaccid, no vessels to be felt on the tumor. The sound passed only a little deeper than normal into the uterus. She had suffered no attacks of pain recently, and the discharge was slight. Menstruation returned May 21, and lasted till the 28th.

On June 4 the patient was examined both by Dr. Reeve and Dr. T. A. Reamy. The tumor was situated much higher up, only one third its former size [which is not stated], and separate from the uterus. Menstruation continued regular.

On August 1 the tumor behind the cervix and to the right was elastic, not very tender, and of the size of a small apple.

On August 31 the patient was last seen. She complained of

pelvic distress, especially when much on her feet during menstruation. The tumor was still smaller and less accessible. It had lost its cyst-like character, and become irregular in outline.

Through the courtesy of Dr. C. E. Billington I am enabled to furnish, in his own words, the following report of a case which he treated, together with Drs. T. G. Thomas and A. D. Rockwell.

CASE VIII. — C. E. Billington. (*Unpublished.*) *Right Tubal Pregnancy. End of Third Month. Galvanic Current, with Interruptions. Arrest of Pregnancy.*

Mrs. S., age thirty-four, had been married eleven years. Had an abortion about one year afterwards, since which time she had not been pregnant, and had menstruated regularly.

Her menses, which were due July 15, 1880, failed to appear. Her husband had then been absent three weeks. About August 10 she began to feel ill, and had slight hemorrhages. About August 25 she had a profuse hemorrhage, which was checked after some hours, but recurred occasionally. Getting somewhat better, she returned from Cincinnati to New York. The hemorrhages recurring, I was called to see her September 8. I found her weak and anemic, and free from fever and pain. The usual remedies were employed, with apparent success, for some days. The hemorrhage then recurred, however, quite suddenly and profusely, and accompanied with darting pain in the right iliac region. I then, for the first time, made a careful vaginal examination, and found a tumor larger than an egg behind and to the right of the cervix uteri. This had a boggy feel, and was nearly or quite free from tenderness. Suspecting extra-uterine pregnancy, I called Dr. T. G. Thomas in consultation September 19, who considered it an unusually well-marked case, and recommended the application of the galvanic current. I accordingly called Dr. A. D. Rockwell to make the first application of electricity. This was done by placing one electrode in Douglas' cul-de-sac posterior to the tumor, and the other externally over the tumor toward the right iliac region. Rapid interruptions were then made in the current for a second or two. A current of fifteen cells was used on this occasion. Although the fetus was probably killed by this application, I made three subsequent ones on alternate days, the last

time using a current of thirty cells. There was no hemorrhage after the first application. Dr. Thomas again saw the patient with me on October 1, and pronounced the tumor decidedly diminished. Two months later it had almost disappeared. The health of the lady has since been good.

Reckoning from the last presence of the husband before the non-appearance of the menses, the pregnancy must, in this case, have been nearly three months advanced.

CASE IX.[1] — William T. Lusk. *Tubal Pregnancy. Two Months. Faradization. Arrest of Pregnancy.*

The patient, aged twenty-eight, had been married twice. Soon after her first marriage she had become pregnant, but aborted at the fourth month. She had been united to her second husband seven years, during which period she had been sterile. At the end of October she had not menstruated for nearly two months, but for a month past had suffered from a slight, but continuous sero-sanguinolent discharge. The uterus was slightly enlarged and increasing from one visit to the other. The areolæ were well marked. She had two attacks of violent colic, with collapse, on November 8th and 14th. The decidua was thrown off entire. A well-defined round fluctuating tumor, covered with pulsating vessels, was felt to the [which ?] side of the uterus. The diagnosis of extra-uterine pregnancy was corroborated by Dr. Thomas, who counseled the Faradic current.

An ordinary one-cell battery was used. The first application was made on Monday, November 15, the negative pole being placed over the tumor through the vagina, and the positive pole on the abdominal wall, about three inches above Poupart's ligament. Two days later the tumor had grown larger, more tense, and bulged the vaginal wall down toward the vulva. The second time the full force of the battery was used, and the negative pole was placed in the rectum. The next day (Thursday) the sac felt flaccid, and by the end of the week it had lost its regular outline. On the tenth day the last application was made. The shrinkage had become so unmistakable that no doubt was now left as to the death of the embryo. The patient thenceforward made an uninterrupted convalescence resulting in perfect health. A small, hard, painless mass, not much larger than an

[1] *Am. Jour. Obst.*, 1881, vol. xiv., p. 333.

English walnut, alone remained when she was last examined. [The size of the tumor, before the treatment, is not stated.]

CASE X.[1]—Bache Emmet. *Abdominal Pregnancy. Three Months and a Half. Galvanic Current, with Interruptions. Arrest of Pregnancy.*

Mrs. S., aged twenty-eight, married three years, was pregnant for the first time. The menstrual period, expected at Christmas, 1880, did not come. On January 19 a trifling show appeared and continued for a few days. She was wearing a pessary for retroversion, and had some discomfort. On raising the uterus somewhat the doctor realized that it was enlarged. On March 11 there were slight pains, with a show, and the cervical canal admitted two joints of the finger. On the 13th clots and portions of decidua came away. The uterus still lay back toward the left ilio-sacral synchondrosis, and was considerably enlarged, but by far not sufficient, for the time elapsed since the examination on January 19. At the front portion, and to the right of the pelvic cavity, was another mass, evidently connected with that lying back, but how intimately it was impossible to determine. This anterior mass was of the size of a fetal head [at what month?] but very soft, and giving somewhat the impression of a thick-walled cyst. None of this mass was above the brim of the pelvis, and yet the patient was possibly at the sixteenth week of pregnancy. Dr. T. A. Emmet examined the patient, and expressed the opinion that she had an abdominal pregnancy. Dr. Thomas, on the contrary, thought there might have been a fibroid in the anterior wall which, normal pregnancy having supervened, developed rapidly, but there was considerable doubt in his mind as to the true nature of the case.

On March 18 Dr. A. D. Rockwell applied the galvanic battery, with frequent interruptions, up to two hundred a minute. From ten to eighteen cells were used. One electrode was placed in the vagina, the other on the abdomen. This treatment caused considerable distress, and could not be borne long. In all, three applications were made, with one or two days' interval.

The day after the last sitting, March 23, the cervix was dilated by sponge tent. The finger was passed well up into the canal, which was found perfectly clean. A probe entered four inches. This was followed by chills, diarrhea, and a tempera-

[1] *New York Med. Jour.*, January, 1882, vol. xxxv., p. 13.

ture of 102.5° F. On the 26th the greater portion of the decidua came away. On the 27th the temperature rose to 104.3° F., and the pulse to 130, but this coming on at the same time every day was evidently due to malaria, from which she had suffered repeatedly. Quinine, and removal to the country, produced a speedy improvement.

On April 4 appeared a slight show which lasted five days. The next show was on May 20, a very natural period, except rather too profuse.

June 7. The uterus turned backward, as before pregnancy. In front, and to the right of it, was a hard mass, which was much smaller than it had been two and a half months before. The patient herself had noticed its progressive decrease.

September 30. Her general condition was splendid. Locally there was only a mass of the size of a flattened blue plum lying just over the bladder.

In spite of the doubt which Dr. Thomas's view is apt to throw upon the case, I do not hesitate in taking it for a genuine intra-uterine pregnancy. He examined the patient only once, while Dr. B. Emmet had had her a long time under treatment, and was familiar with all the peculiarities of her womb and its surroundings. The description in itself leads likewise to the conclusion that it was a case of abdominal pregnancy, and this diagnosis is sanctioned by the high authority of Dr. T. A. Emmet.

CASE XI.[1] — Henry G. Landis. *Left Tubal Pregnancy. Three Months. Faradic Current. Arrest of Pregnancy. Same Patient as Case V.*

The tumor left by her first extra-uterine pregnancy was scarcely to be felt after a few months, and within a year no trace of it could be discovered. Menstruation continued regular from April 16, 1877, till October 4, 1881, during which period she enjoyed robust health, with the exception of a few transient ailments. On the latter date the menstruation appeared for one day, and was scanty and of ill odor. By the end of October she suffered somewhat from nausea, and believed herself pregnant. On November 9 she began to have quite severe attacks of pain, accom-

[1] *Medical News*, Philadelphia, April 8, 1882, vol. xl., p. 376.

panied by tenesmus, and referred to the rectum and lower part of the abdomen. They recurred once a day or every other day. Digital examination showed that the womb was somewhat enlarged, and there was a sensation of fullness in Douglas' cul-de-sac. Little change occurred till December 1. Dr. Loving now took part in the examination. The uterus was found enlarged and pushed forward by a cystic tumor in Douglas' cul-de-sac. On December 6 the patient was attacked by "the typical and horrible pain of extra-uterine pregnancy." In five minutes she looked as if she had been sick for months; the features were pinched, the extremities cold, the whole surface bathed in a cold sweat. A thick, lochia-like discharge was also observed, and the sound entered the empty uterus to the depth of four inches. The uterus reached nearly half way up to the umbilicus, and the tumor, indistinctly separable from it, was found in the left iliac region. Occasional contractions could be felt in the cyst, especially when the pain was severe. The womb and tumor alike seemed immovably wedged in the pelvis. Dr. A. Dunlap, one of the pioneers in ovariotomy, corroborated the diagnosis.

The induced current of a one-cell battery was used for ten minutes, after which she felt much easier. Contractions and pain were much less, but continued at intervals until the next application. Faradization was repeated December 7, 8, 9, 11, and 14th, the last time during fifty-three minutes, and increasing to the highest intensity.

No contractions were observed after the 14th, nor any pain, except when she had a passage from the bowels, which was rendered difficult by the mechanical pressure of the tumor upon the rectum. The lochia-like flow ceased on the 15th, during which time the decidua came away. A considerable amount of reflex disturbance, mainly vomiting, continued, and it was nearly a month before she could get about again. Menstruation returned on January 31. At last examination, on February 24, the tumor had considerably diminished in size, the patient appearing in excellent health, and with no complaint as to the local condition.

Perhaps this list might be prolonged, but as it is it is long enough to convince any unprejudiced mind of the high value of electricity in the treatment of intra-uterine preg-

nancy during the first three or four months. Leaving aside the case of Bachetti, in which needles were introduced into the fetal sac, and that of Braxton Hicks, in which the treatment was abandoned too early, there remain, besides my own case, eight cases, which all have been cured. All these cases occurred in this country. They were all observed by men of a high professional standing. Many of them were examined by two or three physicians, and some by men whose authority is recognized all over the scientific world. This would seem to be sufficient guarantee of the correctness of the diagnosis, and consequently a proof of the efficaciousness of the treatment.

I have left out the second case of Allen,[1] because the data are insufficient. It is said to have occurred about the tenth week of gestation. The treatment was the same as in the first case, with similar result. The tumor diminished from the size of a fist to that of a goose's egg, in which condition it remained, giving no trouble.

I have likewise left out the case of Dr. Herrick, of this city, treated together with Dr. A. D. Rockwell, because it is unpublished, and I have endeavored in vain to obtain the particulars of it.

The same applies to a fifth case of Dr. Rockwell. But these three cases are very likely genuine, which would make the dozen of successes in this country full.

I have furthermore left out the case of Dr. George Harrison, alluded to by Drs. Thomas[2] and Lusk,[3] because the doctor has informed me that perhaps the fetus was dead before the electric treatment was begun, since the breasts of the patient had become flaccid.

Finally I have left out the case of Dr. H. P. C. Wilson,[4] because the doctor states himself that he is "not satisfied it was a case of extra-uterine pregnancy," and because

[1] *Am. Jour. Obst.*, 1872, vol. v., l. c.

[2] *Diseases of Women*, 5th ed., p. 772.

[3] L. c., p. 335.

[4] *Trans. Am. Gyn. Soc.*, 1879, iv., 320; and *Am. Jour. Obst.*, 1880, xiii., p. 836.

Dr. Howard, who saw the case with him, has kindly informed me that to his mind it was a case of phlegmon in the right broad ligament.

FREQUENCY OF EXTRA-UTERINE PREGNANCY.

There is a pretty general impression among physicians that extra-uterine pregnancy is of rare occurrence, and even in some recent text-books this statement is made. Compared with the total number of uterine pregnancies it is, of course, rare, but compared with many other abnormalities of gestation, child-birth, or the puerperal state, it is not so very rare. While preparing this paper I have read the history of about two hundred cases, all published in less than four years. Thus a rich material is accumulating, to be used by the man who will try to imitate Parry, and I hope he will let the accumulation go on still for some years, for we live, in this respect, in a period of transition, many points being yet *sub judice*, and the views about the proper treatment of these dangerous cases diverging very much, not only when those who entertain them belong to different generations, but even among the most active and progressive men of the day.

DANGER.

How great the danger incurred in these unfortunate cases is, appears from the mortality, which, according to Puech,[1] is at least sixty per cent., and, according to Parry,[2] even 67.20 per cent. So much greater become the claims of a treatment which so far has succeeded in every case in which it was faithfully carried out.

DIAGNOSIS.

I am far from underrating the difficulties surrounding the diagnosis of extra-uterine pregnancy. There can be no better proof, in this respect, than the hesitation or the mistakes of some of the most experienced gynecologists of all

[1] *Gaz. obstétr.*, Paris, 1879, vol. viii., No. 21, p. 321.

[2] L. c., p. 169.

countries in their dealings with this sad condition. But the difficulties may also be overrated, and when we so frequently find it asserted in text-books and special papers that the diagnosis, especially in the earlier months, that is to say before the movements of the fetus are felt and its heart heard beating, is shrouded in the greatest obscurity, nay utterly impossible, such teachings are apt to exercise a bad influence on the general practitioners, who, of course, meet much more frequently with these cases than those who make a specialty of obstetrics and gynecology. Despairing of the possibility of making a diagnosis, they neither try to do it themselves, nor do they seek the advice of those who are more familiar with the anatomy of the pelvic organs in health and disease, and thus the period in which the best and simplest, and most innocuous treatment might be undertaken is lost never to return. I think, therefore, it is not amiss to point out that if there are difficult cases there are others in which the diagnosis is very easy, and that certain symptoms are so common in extra-uterine pregnancy that they ought to arouse a strong suspicion of its existence, and call for the most careful examination and steady watching of the case. It is painful to read the by no means rare histories of cases in which no physical examination was made. The first time the patient is sent home with a prescription for an anodyne for her colic; the next time she is found dying; and the last act in the tragedy is the autopsy revealing a small ruptured fetal cyst, with internal hemorrhage. It is no less painful to read[1] of an autopsy revealing a cyst measuring "from seven to nine inches in diameter," which had not been found, although a vaginal examination was made. It is not here the place to treat in detail of the diagnosis of extra-uterine pregnancy. I shall limit myself to recalling the chief symptoms of the early stage, namely, mammary, gastric, and nervous signs of pregnancy, cessation of menstruation, severe colicky pain, often dysuria and dyschezia, irregular bloody vaginal discharge, expulsion of the de-

[1] *New England Med. Gaz.*, Oct., 1878, vol. xiii., p. 419.

cidua, or parts thereof, enlargement and emptiness of the uterus, and, finally, the presence of the tumor, in which sometimes even the fetus can be felt. The late Stephen Rogers, of this city, in an otherwise meritorious paper [1] on the subject, says that when the patient is fortunate enough to pass on to the fourth month the fetal tumor will add an almost positive element to the diagnosis. The tumor may be felt much earlier, as proved by my own and other cases. I should even be inclined to think that in some respects it is easier to recognize its nature earlier than when, by its size, it becomes so intimately blended with other organs that its outlines can no longer be made out.

Before leaving this subject I would call attention to a warning set forth by Ernst Fränkel [2] against the use of the sound. In his case he thinks it provoked contractions of the uterus and the fetal sac, the first resulting in the expulsion of the decidua, the second in rupture and fatal peritonitis. Similar effects, says he, were observed in cases of Gervis, Guichard, Williams, and A. Martin.

Our new Fellow, Dr. B. B. Browne, in his interesting paper on "Combined Intra-uterine and Extra-uterine Pregnancy," [3] points to the important fact that the expulsion from the uterus of parts of the chorion — and the same may be said of the fetus — does not remove the possibility of the existence of extra-uterine pregnancy, since the two kinds of pregnancy may be combined, twin conceptions being even much more frequent in extra-uterine than in uterine pregnancy.

SAFETY OF ELECTRICITY COMPARED WITH OTHER METHODS.

Almost universally it is thought to be not only justifiable but proper, in the earlier months of pregnancy, to leave the right to life of the fetus entirely out of consideration. Yet there are dissentient voices to be heard. William H. Wathen,[4] professor of obstetrics in the Ken-

[1] *Extra-uterine Fetation and Gestation.* Philadelphia, 1867, p. 35.
[2] L. c., p. 18.
[3] *Trans.*, vol. vi., p. 445.
[4] *Medical Herald*, Louisville, 1882, iii., 556.

tucky School of Medicine, objects to the destruction of the fetus in any way and under any circumstances, and advises to operate just before term, both in the interest of the mother and of the child. We have seen above that similar views are advocated by A. Martin. Even Dr. Thomas[1] seems to be opposed to the destruction of the fetus if the extra-uterine pregnancy be of the abdominal variety, while he recommends it in the tubal variety.

I must say that I cannot convince myself of the validity of any objection to the destruction of the life of the fetus in extra-uterine pregnancy if we thereby can benefit the mother. We need not here repeat the old discussion about the relative rights of the mother and the child, although even in common obstetric cases the great majority of obstetricians, at least in this country and in England, untrammeled by the doctrines of a certain religious body, which have no relation to scientific observation, do not hesitate to sacrifice the unborn child in the interest of the mother. But here we have to do with an entirely different class of cases. Apart from those exceedingly rare cases, if they exist, in which an extra-uterine pregnancy terminates by the birth through the uterus of a living and viable child,[2] the fetus is doomed to certain death except by opera-

[1] *Trans. Am. Gyn. Soc.*, 1879, iv., 329. *Diseases of Women*, 5th ed., Philadelphia, 1880, p. 775.

[2] There are several cases on record of the expulsion of the non-viable fetus in this way: Dr. Mundé's case, seen with Dr. Cornelius Williams (*New York Med. Jour.*, 1878, xxviii., 595, and *Am. Jour. Obst.*, 1879, xii., 330); two cases of Dr. John Graham, of Philadelphia, in the first of which the diagnosis was confirmed by Dr. Elwood Wilson and the late W. L. Atlee; and the case of Spencer T. Smyth (*Brit. Med. Jour.*, October 18, 1879, ii., 615), in which a six months' fetus was born alive and lived for an hour. Then there are cases in which living children were drawn out from the tube (Laugier: *Archives générales de médecine*, 1832, 1st series, xxviii., 333), or delivered by scraping or cutting through a part of the uterine wall (H. Lenox Hodge, of Philadelphia, in 1867, see Parry, l. c., p. 266; and D. D. Gilbert, of Boston, *Boston Med. and Surg. Jour.*, 1877, xcvi., 284). We may imagine that nature might overcome the obstacle, and a viable child be born without interference of art, but so far as I know no such case has ever been observed.

tive interference. A fetus thus situated, and imperiling in the highest degree its mother's life, does not seem to me to possess any right of existence important enough to weigh anything as compared with that of its unfortunate mother. I would, therefore, feel perfectly authorized, under all circumstances, to sacrifice its life, if thereby I had some prospect of bettering the condition of the mother.

Next arises the question, which is the best way of killing it? Five methods are at our command, which conveniently can be grouped under two heads. In the first class sharp instruments are used to reach the cyst through the abdominal wall, or through the roof of the vagina; in the second, no part of the body is wounded. The first comprises puncture, injection, elytrotomy, and laparotomy. The second consists of dilatation and electricity.

Puncture of the fetal sac has been successfully performed by E. Martin, Stoltz, Greenhalgh, Al. Simpson, Tanner, and Kœberlé,[1] but has given rise to death by hemorrhage (Braxton Hicks[2]), or septicemia (Goodell[3]). The latter might probably be avoided by antiseptic precautions (washing of the place to be punctured with five per cent. carbolized water, and immersion for at least five minutes of the instrument in the same fluid), but the danger of hemorrhage is very great on account of the arterial net which develops on the surface of the sac. Besides B. Hicks and Goodell, J. Y. Simpson, Conrad, E. Martin, Netzel, Hutchinson, John Scott, Gallard, and Depaul, have all reported fatal results. And, after all, this method is uncertain in its results. Spencer T. Smyth[4] has published an interesting case, which shows that the fetus may develop without being surrounded by liquor amnii. The water had been draining away for almost two months, sometimes tinged with blood. Finally a six-months'-old fetus was pushed from the right tube into the womb, and born by an entirely

[1] Cohnheim, *Archiv f. Gynäk.*, 1877, xii., 366.
[2] Case III.
[3] *Am. Jour. Obst.*, 1881, xiv., 133.
[4] *Brit. Med. Jour.*, October 18, 1879, ii., 615.

dry birth. The case of Ernst Fränkel[1] is still more to the point. Toward the end of the fourth month of tubal pregnancy he punctured from the vagina, with a trocar one fourth centimetre thick, carefully trying to avoid the much developed arteries. The trocar entered five and a half centimetres, and about twenty grammes of liquor amnii were evacuated, and followed by a rather thick column of arterial blood. Nevertheless the fetus did not die, but was four months later removed living by laparotomy, but died the next day, as the mother had done shortly after the operation.

Injection has been used twice with success by Friedreich, of Heidelberg.[2] In the first case the exact age of the fetus was not known, but it belonged probably to the third month. Four injections of from one tenth to one sixth of a grain of morphia were made, and the cyst reduced in a month from the size of a fist to that of a walnut.

The second patient,[3] although only in the third month of pregnancy, had to stay eight months in the hospital. Five injections of one or two centigrammes of morphine, four times preceded by aspiration, besides one aspiration without injection, were made, and the patient was at a time decidedly hectic.

The danger of producing hemorrhage is smaller than by the preceding method, since only a hypodermic syringe is used, and we may guard against septicemia by antiseptic precaution. Still, the tediousness of the recovery, and the dangerous condition of the patient in the last case, does not invite to imitation as long as a better method is available.

Elytrotomy. — Dr. Thomas's[4] splendid success in opening the fetal sac in a tubal pregnancy and removing the fetus is known all over the world, and nevertheless this bold

[1] *Archiv f. Gynäk.*, 1879, xiv., 208.

[2] Virchow's *Archiv*, 1864, xxix., p. 312; *Archiv für Gynäk.*, 1877, xii., 355.

[3] *Archiv f. Gyn.*, 1877, xii., 355.

[4] *New York Med. Jour.*, June, 1875.

operator, when called in consultation in Dr. McBurney's and Dr. Lusk's cases, strongly advocated electricity in preference to operative interference. Dr. Albert H. Smith,[1] in a case of Dr. M. O'Hara, used the thermo-cautery toward the end of the fourth month of abdominal pregnancy, but the patient died of gangrene of the peritoneum on the fourth day. In a case of tubo-ovarian gestation in the fifth month, Dr. Robert Battey[2] opened the cyst with a curved trocar and Chassaignac's écraseur. The patient died of exhaustion on the fourth day.

Doran[3] has made autopsies in several cases, and warns against a particular danger in vaginal incision, the rectum often being pushed down by the tumor, especially in the later stages. The danger of hemorrhage, due to the living fetus, is perhaps not always overcome by the use of the incandescent knife, especially if the placenta be situated on the line of the incision, and then this organ has to be left till it is loosened by suppuration, or comes off piecemeal by disintegration, a period in which the woman, in spite of antiseptic injections, is much exposed to absorption of septic material. Thus this method is beset with dangers.

Laparotomy. — According to Parry,[4] Brown, Routh, Playfair, Meadows, and Greenhalgh, in England, and Darby, in this country, have proposed to perform laparotomy, and extirpate the sac before rupture occurs. We have above seen that Thomas Savage, of Birmingham, likewise recommends this procedure, and so does Lawson Tait,[5] adding that if the fetus was living, it would not be wise to wait until it had reached the age of viability. But in spite of

[1] *Am. Jour. Obst.*, 1878, xi., 827.

[2] *Trans. Am. Med. Ass.*, 1879, xxx., 240. — Dr. George Harrison, of New York (*Am. Jour. Obst.*, 1878, xi., 811), made a simple incision from the vagina in an abdominal pregnancy of four months' duration, but as the fetus was dead, and decomposition beginning, the case does not come within the scope of operations with intent of destroying the fetus.

[3] *Brit. Med. Jour.*, 1880, i., 736.

[4] L. c., p. 202.

[5] *Lancet*, November 15, 1879, p. 731.

so many recommendations, the operation has never been tried, and weighty voices have been raised against it, among them that of Spencer Wells. The operation would probably prove dangerous on account of the development of arteries, which takes place around the fetal sac, and there would be all the common dangers incident to laparotomies in general, augmented by the greater vulnerability induced by pregnancy.

Dilatation. — It has been recommended[1] to dilate the cervix and the uterine ostium of the Fallopian tube, and thus reach the fetal sac through natural canals. This method might be used with success toward the end of pregnancy, but I do not see how it should be possible to dilate the tubal orifice in the earlier month of pregnancy. In Dr. McBurney's case Dr. Thomas[2] endeavored to penetrate the mass containing the fetus with the uterine sound, but found it impossible. Besides this, the dilatation with sponge tent or similar materials, although performed without harm in Dr. B. Emmet's case, must be very apt to bring on contractions of the uterus and the tubes, and thereby expose the fetal sac to a pressure which may rupture it.

Electricity. Against all these dangerous or doubtful methods stands electricity, with a record unblemished by a single failure or any dangerous consequences. It has been used in quite a number of cases. In every case the pregnancy has been promptly interrupted, and every single patient has definitely recovered within a short time. This success has been so uniform that it seems the time has come to put it down as an axiom based on experience that in the early part of pregnancy electricity is the remedy, and that it is the duty of the physician to give his patient the benefit of its application. Two objections have been raised against it. When Bernutz[3] asked Duchenne (of Boulogne) for his

[1] Dr. Williams attributes this proposal to Hodge and to Dr. Emmet. Hodge dilated only the cervix, and scraped through the septum between the uterine cavity and the fetal sac. I have been unable to find where Dr. Emmet has made the suggestion.

[2] Beard and Rockwell, l. c., p. 607.

[3] *Gazette obstétricale*, 5 février, 1879, No. 3, p. 33.

opinion on this agent, that celebrated electrician answered that it was not reliable, and, besides, apt to cause the rupture of the cyst. The first can only be based on the case of Braxton Hicks, but he did not carry the treatment through, although he saw that it temporarily arrested the fetal movements. The second is purely aprioristic, and cannot have any weight against the teachings of experience. It appears from the histories I have collected that this treatment has been successful in every case up to the middle of the fourth month. The question is only if it has a still wider range of usefulness. The common doctrine[1] is that this, and other methods intended to destroy the fetus, should be limited to the first four months, this being the time within which the rupture of the tube, when that is the seat of the ectopic pregnancy, is most apt to occur. But the rupture may take place, and has in fact taken place, at any time. It seems not improbable that the formulation of this dogma has been somewhat influenced by the circumstance that during the first four months the woman, as a rule, does not quicken, nor does the physician feel the active fetal movements and hear the pulsation of the heart. But advanced physiological knowledge has taught that the wonderful development caused by life is going on in the ovum from the very moment of its fecundation as an imperceptible little cell. If, then, we destroy the fetus during the first four months of its existence, we certainly kill it in the full sense of the word as effectually as at a later period of its existence, and if that is justifiable, which almost all concede it is, then it must likewise be justifiable to do so after the end of the fourth month, if by so doing we better the chances of the woman. The first question is, therefore, how late we can kill the fetus by electricity; the second, if it is advisable to do it? Experience only can answer these questions, and, so far, there is nothing to lead us, since the method has never been tried after the end of the fifteenth week. It would seem possible, by using a strong current, and anæsthetizing the patient,

[1] Parry, l. c., 199. Deschamps, l. c., 123.

to kill the fetus at any time by external application, and if that should prove impossible, then by electro-puncture, as in Bachetti's case. In order to form an idea if it would be advisable to attempt the destruction by electricity in the middle and last part of extra-uterine pregnancy we must consider the chances for mother and child if we let pregnancy go on unchecked. The cyst may burst at any time, and, although not absolutely fatal, this accident jeopardizes in the highest degree both lives concerned. Laparotomy may be undertaken at the end of thirty-two weeks, when the child is vital, as recommended in abdominal pregnancy, by Gusserow,[1] or in the tenth lunar month, as preferred by Litzmann.[2] But how miserable the prospects of success by these operations are appears from the excellent article of the latter, in which he has collected ten operations, performed while the fetus was living. Of these ten, only a single mother (Jessop's case) recovered, and only four of the children survived, if, by a surviving child, we understand one who lives more than a few hours or days. To Litzmann's list may be added a case of Lawson Tait's [3] and one of Netzel's,[4] of Stockholm, both ending in the loss of the mother and the recovery of the child. Thus it would seem that there is a small chance for the child and hardly any for the mother to be saved by the operation at or near term.

On the other hand Litzmann has collected thirty-three cases of laparotomy after the death of the child, of which seventeen, or more than one half, recovered. Would it not, therefore, be not only justifiable, but wise and humane, if possible, to kill the fetus by electricity, whatever its degree of development may be? We know that there is a fair chance that it will be entirely absorbed, except the bones, or become mummified. Among many other cases I shall only quote two recently observed by Matthews Duncan.[5]

[1] *Archiv f. Gyn.*, 1877, p. 84.
[2] *Archiv f. Gyn.*, 1880, xvi., 398.
[3] *Brit. Med. Jour.*, 1880, i., 737.
[4] *Centralbl. f. Gyn.*, 1881, v., 349.
[5] *Lancet*, November 15, 1879, p. 731.

in which the fetal heart was audible. The fetus died before it had reached the term of viability, and both patients were well at last accounts. But even if the worst should come to the worst, and the fetal sac suppurate, causing septicemia, there would still be a fair chance of recovery by laparotomy, and, at all events, an infinitely better chance than by laparotomy performed during the life-time of the fetus. The chances will even be better than in those cases in which suppuration sets in after the end of gestation, for the smaller the fetus and its envelopes the less trouble is to be anticipated.

KIND AND STRENGTH OF ELECTRICITY.

Burci used electro-puncture. Although the fine needles used for that purpose scarcely can do much mechanical harm, and the case proved a success, we know that the same method applied to ovarian cysts has proved fatal in more than one case.[1] It would, therefore, only be in cases where other means of applying electricity failed to produce the desired effect that it would be advisable to try this method.

Dr. A. D. Rockwell, who kindly has informed me that he has treated five cases with electricity (McBurney's, Billington's, Bache Emmet's, Herrick's, and a fifth case), has always used the galvanic current, and, on physiological grounds, believes it to be far superior for this purpose to the faradic current. As a rule he believes the fetus is destroyed on the first application, if a strength of twenty-five or thirty volts[2] be used.

Duchenne, consulted by Lesouef,[3] is said to have recommended the Leyden jar, but this has never been tried.

In at least six cases (Allen's first, Landis's two, Reeve's,

[1] Mundé, "Electrolysis of Ovarian Tumors," *Am. Gyn. Trans.*, 1877, vol. ii., pp. 408–422.

[2] A volt is the unit of electromotive force, and is equal to about the force of a Daniell's cell. (Beard and Rockwell, l. c., p. 66.)

[3] "Remarques sur trois cas de grossesse extra-utérine." *Thèse de Paris*, 1862. Spiegelberg, l. c., p. 324.

Lusk's, and Garrigues'), success was obtained by a simple one-cell electro-magnetic faradic machine. As this apparatus is much more common, easy to transport, and simple to apply, it seems to merit special recommendation.

In some cases the pain caused by the treatment has been intense (Burci, Allen, Landis, McBurney, B. Emmet). This would seem to be due to the use of an unnecessarily strong current. Lusk used the full force of a one-cell apparatus. Dr. Reeve and myself were only guided by the feelings of the patients, and succeeded quite as well.

Application. The negative electrode is introduced either into the vagina or the rectum, the positive on the abdominal wall. A moderate current may be used for ten minutes or more at a time. The sittings ought, as a rule, to be repeated every day, until the diminution of the fetal cyst and the retrograde changes in the breasts show that pregnancy has been definitely arrested. As a rule it is best, for safety's sake, to make at least four or five applications.

Nature of Effect. Several authors ascribe the effect of electricity in killing the fetus in extra-uterine pregnancy to electrolysis.[1] This may be the true working principle when the galvanic current is applied. But the electrolytic power of the faradic machine is so small that in those cases, at least, in which that was used we must look for another explanation of the death of the fetus. I have applied my apparatus to a bladder containing water, with a little albumen and salt, which might be taken for a fair representative of liquor amnii, but I failed to see any electrolytic effect, nor seemed the exosmosis increased by the current. I suppose, therefore, that the effect is not chemical, but dynamical, something like that of a strong discharge from an electric machine, or of lightning on an adult. But, however this may be, practice has shown the value of the remedy.

[1] Allen, *Am. Jour. Obst.*, 1878, xi., 830 ; Skene, *Brooklyn Proceedings*, 1879, iv., 353; Roberts Bartholow, *Medical Electricity*, Philadelphia, 1881, p. 229.

CONCLUSIONS.

1st. Experience has proved electricity to be an efficacious and safe agent to arrest extra-uterine pregnancy during the first three months, and perhaps the pregnancy in some of the cases had even advanced more or less into the fourth month.

2d. It seems likely that the same agent might be profitably used at any period of fetal life.