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THERE are no accidents connected with parturition more distressing in their immediate results or more destructive to the health and happiness of the victims than vesico-vaginal fistulæ. In constant misery from the unchecked flow of urine, with ulceration and abscesses undermining their physical stamina, their bodily sufferings are almost beyond endurance; yet these are slight afflictions contrasted with the shipwreck of family and social life attendant upon lesions of this character. Disgusting to themselves and offensive to those about them, these unfortunate sufferers, when not relieved by surgical interference, can look to death only for escape from their miserable lot.

In order to understand the nature of these lesions their causes must be glanced at. And here, as but too frequently is the case elsewhere in practical medicine, bad logic and worse reason have been employed in explanation of the etiology of vesico-vaginal fistula. The history of some of these cases can frequently be summed up in the statement that the given patient was long in labor, that counsel was summoned, instruments employed, and ten days or a fortnight subsequently incontinence of urine manifested itself, an examination revealing an opening between vagina and bladder. In the popular mind the connection between the instrumental aid afforded and the subsequent fistula is clear and unmistakable;

fortunate indeed is the operator if he has no reason to suspect that the practitioner to whose call he responded and whose patient he relieved has not directly or indirectly given his professional sanction to the popular view. Again, the use of instruments is immediately followed by escape of urine—in this case there can be but little doubt as to the agency of the former in the production of the fistula. Finally, in exceptional cases, fistulæ occur after non-instrumental labors, although the latter may not have been very difficult or much prolonged. In explaining these various cases it must be borne in mind that there are three distinct forms of vesico-vaginal fistulæ. In one a slough, due to pressure and consequent interruption of circulation, is the cause; occasionally the forceps by lacerating or dislodging a softened mass of necrosed tissues and opening an avenue for the immediate discharge of urine may seemingly obscure the etiology of a given case, but a little attention will render the matter clear. In others the instruments, by mischance, negligence or unskillfulness, penetrate the septum and open the bladder. These are as clearly due to traumatism as the former are to long continued pressure. In the third class of cases—fortunately of rare occurrence—ulceration of uncertain origin attacks the tissues between bladder and vagina, and a fistula forms.

There is a practical distinction of vast importance between these various fistulæ. Broadly it can thus be stated: An opening between bladder and vagina due to loss of tissue from sloughs or ulceration has little tendency to close—if much tissue has been destroyed it is never united by the unaided efforts of nature; in traumatic fistulæ, on the contrary, the tendency is towards recovery, and in the vast majority of cases the opening is healed spontaneously. When, therefore, the bladder is perforated by the forceps or other obstetrical appliance, unless pressure or disease shall have already impaired the vitality of the tissues so that the opening is made through what will in time be a slough, bad as the immediate symptoms may prove and distressing as the patient's state may be for a time, yet the prognosis is so good that

the fears of the friends may be allayed and a cure by the unaided efforts of nature safely promised.

It's a trite saying that no two grains of sand are alike; it's certainly true that no two cases of vesico-vaginal fistulæ have more than a superficial resemblance. With a restricted area in which to locate themselves, classifications on paper must necessarily arrange these lesions under similar headings. Consequently an artificial similarity founded on names is formed that may prove misleading. Fistulæ alike in size and situation are found to have no essential similarity when it comes to treatment. The experienced operator looks to other things than location and extent when striving to form an opinion as to the curability of a given case. And these are the complications due to varying amounts of destruction of tissue effected by the agency that originally produced the opening between the genital passages and the vesical cavity —complications that at the time the patient presents herself to the operating surgeon have resolved themselves into bands of cicatricial contraction. The slough that penetrates the septum at a single spot may branch and ramify in a dozen directions without destroying the whole thickness of the wall; numerous necrosed masses may be dislodged at various points that implicate only the surface. Yet wherever the tissue is injured there a cicatricial band will subsequently be located about which but one thing can certainly be foretold —that is, that it is sure to contract. Where the septum has been penetrated there at first will be an irregular opening; under the reparative process this will contract and grow smaller until a point is reached where the agencies that would render the opening smaller are just balanced by the contractile qualities of the radii of cicatricial material that center in the fistula; then a struggle ensues in which the previously circular character of the fistula alters under the traction to which it is subjected, and both bladder and vaginal cavities become strangely changed by the new forces thus brought into action. But other agencies than those alluded to speedily come into play. The bladder, no longer susceptible of distention, is the subject of fatty substitution in its

muscular wall. The vagina, distorted and contracted by scar tissue, is constantly irritated by the decomposing urine that pours through it. Sabulous material deposits itself on every breach of surface, and unless speedily removed ulceration ensues beneath it and abscesses develop in contiguous parts. As the natural tissues are thus undermined and destroyed, cicatricial material takes their place; the distortion of the vagina increases, its calibre diminishes, the bladder grows smaller, the fistula seems fixed to one or other ramus of the pubes, and the surgeon to whom the case is presented in this stage finds all natural boundaries obscured, and it is a work of weeks to obtain a view of the edges of the fistula through the wreck of pelvic structures.

The first step in any effort to relieve these patients must be towards establishing a natural condition of the vagina. The sabulous material must be removed, the excoriations treated, the ulcerations and abscesses cured. The contracted vaginal walls must be stretched and projecting contractions cut. Pressure must remove induration and appropriate medication check the tendency to renewed deposits. These matters, however, are best portrayed in connection with cases actually treated.

Some curious reflections might be made on the history of the operation for vesico-vaginal fistula, for the steps whereby a procedure but a few years since confessedly the most difficult and uncertain in surgery has become safe, sure and reasonably easy, cannot be otherwise than interesting. In this country four names demand consideration—Hayward, Mettauer, Sims and Bozeman. Hayward of Boston directed ordinary surgical methods to the cure of these fistulæ, forcibly brought the lesion into view by a whalebone bougie introduced through the urethra, dilated the vaginal outlet, pared the edges of the fistula, united them with interrupted silk suture and used a special catheter to keep the bladder empty during recovery. Mettauer of Virginia employed metallic sutures. Marion Sims of Alabama invented a speculum that enabled him to operate with the patient prone and the fistula in normal relation with adjoining parts.

Nathan Bozeman, also of Alabama, introduced the button suture, the speculum known by his name, and a chair which enables the operator to avail himself of the right angle position for his patient. He also systematized a preparatory treatment that rendered ordinary cases more readily curable and brought into the domain of possible cure many patients who otherwise would have been subjected to destructive operations as susceptible of relief in no other way. The name of Sims became a household word in both continents —Bozeman is known the world over for his success as an operator in these cases. Yet a little investigation shows that long before the day of Sims and Bozeman, Wutzer of Bonn operated with his patients on their hands and knees, and used a perineal retractor to expose the fistulæ; while Gosset of London in 1834 placed his patient on her knees and elbows, and after exposing and trimming the edges of the opening, closed the fistula with metallic sutures and effected a cure after a single operation. Truly the words of Sydney Smith were never more appropriate than when applied to the originators of this procedure: "That man is not the first discoverer of any art who first says the thing, but he who says it so long and so loud and so clearly that he compels mankind to hear him—the man who is so deeply impressed with the importance of his discovery that he will take no denial, but, at the risk of fortune and fame, pushes through all opposition, determined it shall not perish for want of a fair trial."

Other investigators reaped valuable fruit in this field. Jobert employed traction on the uterus and repeated incisions in the cicatrized vagina as a means of freeing adherent parts and apposing the rigid, widely-separated edges of fistulæ due to sloughing of the genital passages; while Simon, working on the old lines, showed that ordinary surgical devices sufficed for the cure of the vast majority of these patients. The career of the latter is extremely instructive. Without the position, the speculum, the suture, the catheter or the preparatory treatment of the American operators this wonderful German surgeon attained a success second only to

that of Bozeman, and forever emphasized the too frequently forgotten fact that it is the skill of the surgeon that effects a cure, and not the elaborate devices of the mechanician or the peculiar character of the appliances employed.

The following cases illustrate many points of interest in this department of surgery. They will be detailed at sufficient length to render clear the necessity of the preparatory treatment, the peculiar nature of the given case and its special complications, the character of the operation performed and the reason for its selection. Subsequently some reflections will be appended upon the various procedures for the cure of vesico-vaginal fistula soliciting surgical favor at the present time, and an endeavor made to estimate the value of each.

CASE I.—VESICO-VAGINAL FISTULA FROM SLOUGHING.

Sarah Kinney; married; aged 26; 35 Kelley street. When between six and seven months pregnant with first child was greatly frightened by the house catching fire. Pains came on irregularly for about a fortnight: then became severe and continuous, and at 11 P. M., on the twenty-third of October, 1885, the waters broke—the doctor was at once sent for and responded within half an hour. He made an examination, said she needed rest, directed the husband to leave work and remain with her next day, and administered a hypodermic injection in the back, that gave her quiet sleep that night. The next day (October 24) she was greatly nauseated and vomited freely, but pains of a severe character did not recur until towards evening. The doctor was summoned, administered a hypodermic in the arm at 6 P. M., and left to return later. Pains became so violent that he was immediately recalled, and remained until 9 P. M. He was again sent for in haste, at 1 A. M., October 25, and in half an hour —ten minutes after the doctor entered the house—the body of the child was born. The manipulations employed by this practitioner failing to complete the delivery, another physician was sent for after daylight in the morning; he speedily disengaged the head. The child, which was between the sixth and seventh months of intra-uterine life, was dead. When

bowels moved four days subsequently a large slough passed and urine commenced dribbling. The slough was saved and given to the consulting physician, who, upon examination, pronounced it the wall of the bladder. Within a fortnight of delivery was removed to a hospital for treatment. Here, at different times between November, 1885, and May, 1886, six operations were performed upon her. She was on the point of returning for the seventh operation when pregnancy was suspected. She then remained at home, 35 Kelley street, until September, 1886, when I was summoned to take surgical charge of the case.

October 12, 1886. The following notes represent her present condition: The external organs of generation are swollen, excoriated and covered with sabulous material; all the urine passes through the vagina; the urethra is patulous and its orifice œdematous and angry looking; a firm collar of contraction is felt within ostium vaginæ, through which it is barely possible to insert the finger—when introduced the latter immediately enters the bladder. A mass of exquisitely tender induration seems to occupy all the true pelvis above the zone of contraction at the pelvic outlet, and all the internal parts are crusted with a limy deposit. No information could be obtained by exploration through the rectum. Patient's pulse 130, face flushed, tongue red and dry, hectic fever every afternoon. Physical examination of the chest shows no evidence of thoracic disease. Patient supposes herself four months pregnant. Upon consultation with Dr. D. S. Perkins, the then family physician, it was decided to devote every attention to the amelioration of the patient's condition and to postpone operative interference until after the termination of pregnancy. Injections of hot water in large quantity were employed twice daily; the external parts were lubricated with Turner's cerate, and nitrate of silver was employed to the parts encrusted with sabulous material until the latter was cast off and the excoriations healed. Whilst the rigidity of the vaginal contractions was little affected by this treatment, the patient's comfort was enhanced, and the painful indurations of the upper pelvis disappeared.

Dr. D. S. Perkins remained in charge of the patient and faithfully and efficiently ministered to her wants until labor came on, March 2, 1886. The necessity for instrumental aid soon manifesting itself, I was summoned and applied the forceps. This proved a very severe task: the collar of induration at the pelvic outlet interfered with the application of the instruments, and when they were finally introduced it seemed for more than an hour that no effort consistent with the woman's safety could effect the delivery of a living child. Partly by stretching, partly by lacerating and finally by freely incising all presenting bands, a nine pound living child was brought into the world, whose robust frame and sturdy health now (February, 1888,) give little token of the trials his mother encountered in bearing him. Repeated explorations satisfied Dr. Perkins and myself that there was no abnormality in the bony walls of the pelvis.

The position of the womb, the situation of the lower border of the fistula in close proximity to the urethral inlet, the large size of the vulvar orifice and the manner in which the urethro-vesical structures descended when the exaggerated lithotomy position was assumed, seemed sure indications that this case was one peculiarly adapted for Simon's operation. During her pregnancy the crucial test—the exposure, in proper position, of the edges of the opening with Simon's speculum—could not be applied. Soon after delivery it was attempted. The cicatricial bands had been recently severed, and all the pelvic structures stretched by the birth of the child. Consequently it would be imagined that no vaginal contractions could stand in the way. Yet when it was attempted to expose the lesion with Simon's speculum, the result was extremely unsatisfactory. A number of trials were made, and different sizes of the instrument used; and although in the end the fistula could be seen and its borders readily handled, yet it was apparent that an operation for its closure could not be performed as advantageously after this method as was at first thought. When the vaginal inlet was at its largest, and the parts most readily exposed, the smallest instrument failed to show the whole of the fistula.

By increasing the size of the instrument a point was reached where the whole circumference of the opening was brought into view: the speculum that would effect this revealed also a difference in the level of the edges—on the left side (of the patient) the border of the fistula abruptly receded toward the pubic ramus, while its sharp edge projected directly forward. With the largest blade of the speculum this irregularity of plane was rendered less apparent, but the whole fistula seemed moved towards the left and inclined to the ramus, while the tension on adjacent parts was so increased that it became impossible to make the edges of the fistula approximate. Consequently the idea of operating by Simon's method was abandoned.

The view afforded by a Sims speculum, the patient being in a semi-prone position, was very much more satisfactory. With a small instrument the parts about the fistula and the opening itself could be seen. A striking difference between the view afforded by Simon's speculum and that revealed by a Sims, was in the apparent situation of the vesico-vaginal opening: with the latter, its centre was in the median line and its edges occupied the same plane. In the softened state of the parts during the fortnight after delivery the best view ever had of the pelvic structures was obtained—in fact, it was then that I first made a satisfactory visual observation of the fistula and parts surrounding it. The opening in the septum was within a third of an inch of the vesical extremity of the urethra below; above it reached to within half an inch of the neck of the uterus, and was of such dimensions as to admit three fingers into the vesical cavity. Its general outline was an irregular oval with its long diameter from side to side; its edges were thin and sharp, and even at this time required firm traction on the neck of the uterus for them to be brought into apposition. The parts were observed almost daily from this period until the operation for the closure of the fistula was performed, and as time elapsed, notwithstanding the daily use of large quantities of very hot water and the incessant search for and section of bands of contraction, the vagina constantly grew smaller, the old collar-like indura-

tion just within the ostium began to manifest itself anew, and daily encroached more and more upon the genital passage. The vagina under the influence of these forces seemed to contract in all directions and grew smaller in all its diameters. The fistula diminished also, but to a less degree in proportion than the vagina—at the time of operation it would admit two fingers. The most unpromising thing about it was the character of its edges: they remained thin, sharp and rigid to the day of operation. Two days before operating a final effort was made to loosen the upper and left lateral border of the vesico-vaginal opening by a free dissection of the cicatricial tissue at that point, with but slight relief.

Friday, April 8, 1887. Assisted by Doctors D. S. Perkins and William H. Capener, I this day operated on Mrs. Kinney, at her home on Kelley street. A support was improvised out of a bench such as is used to hold tubs in washing: it was wrapped with blankets and across this the patient was placed in a position midway between the right angle and knee elbow. The vagina had so contracted within a few days that the Sims speculum, heretofore used, would not work, and a Weber speculum—one in which the width of the blade can be regulated by screw and hinge—was substituted and found satisfactory in every respect. With knife and scissors the fistulous edges were removed in an unbroken circle; the thin denuded upper edge was then split as high as the neck of the uterus above and to the angles of the opening on either side. Needles, carrying loops of silk, were then passed from below upward through the fistulous edges, care being taken to enter the lower margin on its vaginal aspect one-half inch from the edge, to emerge near the vesical lining, thence to enter at the split in the upper border and to emerge where a firm grasp could be had on the tissues of the cervix. The only exception was in the central strand which had to start from tissues that made part of the wall of the urethra—here a quarter of an inch grasp could alone be had. Three loops were passed on either side of the urethra, and were followed by silver wire number twenty-six —the seventh loop, through the urethral wall, and in the

centre was the last passed and the last tightened. Less trouble than had been anticipated was experienced in bringing the fistulous edges into apposition—the uterus was grasped in a volsellum and forcibly drawn downwards; the strands of wire were carefully shouldered so that the fistulous edges were neatly apposed, and then first the one next the urethra on the right was secured, then the one on the left, and so on until all were closed but the one grasping the urethra. Some difficulty was met with in getting this one into satisfactory position, but finally it too was secured. The wires were not twisted but fastened with clamps of perforated shot compressed on the wires after they had been rendered all equally tense, and the edges of the fistula everywhere proved to be in accurate apposition. At this most anxious stage of the operation great comfort was derived from three points of detail—first, the split upper lip that furnished a much needed supply of transferable material; next, the large wire employed that held its shape well when moulded into form; and the firm grasp taken of the uterus that relieved the fistulous margins of all tension until the sutures were adapted and fastened. No anæsthetic was used and the operation lasted one hour and ten minutes. A Sims self-retaining catheter was inserted and the patient left with her nurse.

It is satisfactory to be able to say that for the next fortnight there was not the slightest misadventure. Never was a patient more determined to do all her duty in seeking to recover. The nurse was a model of self-sacrificing care, and Dr. Perkins watched and tended the patient with the most devoted solicitude—at first, twice a day he personally supervised the administration of the hot vaginal douches of large quantities of water kept all the time at as high a temperature as the patient could bear, in itself a serious demand on the time of a busy man, and towards the last a constant visitor always on the watch for that calamity we apprehended might occur at any moment. But it was not to be. On the fifteenth day after the operation, assisted by Drs. John Perrier and D. S. Perkins, I removed the wire sutures. This was fully as difficult a task as their insertion. The line of

union was perfect at every point, but the rapid diminution in the calibre of the vagina since the operation rendered its exposure very difficult. When seen it was noted that it pointed up at its left extremity and down at its right and was bent upon itself from before backwards—the ends seemingly drawn towards the rectum, whilst the centre receded towards the symphysis. The speculum employed in removing the sutures was the Sims instrument, small size.

The subsequent progress of this patient has been satisfactory in every way. The behavior of the pelvic structures under the new circumstances surrounding them has been especially interesting. At the time the sutures were removed the vagina was a mass of cicatricial induration, bands appearing to run in all directions. After the catheter was removed—at the end of the third week from the operation—and the patient made an effort to retain urine for longer and longer periods, an improved condition of the anterior wall of the vagina became apparent. The patient called on me for examination at intervals of a month. At first I could not obtain a satisfactory view of the parts with any device; finally a small and then a large Sims speculum would work—ultimately I could employ with satisfaction the Weber speculum, by the aid of which the operation was performed. The improvement seemed due in the beginning wholly to the increased flexibility of the anterior vaginal wall. Of late I find that a Bozeman speculum, with its third blade in place, can be used. This is due to the fact that the collar of induration, that at one time threatened serious consequences to the integrity of the vagina, has melted away.

The influence of cicatricial bands in distorting natural structures was well illustrated in this patient three months after she was operated upon and at a time when she was able to come to my office for examination. The vagina was so rigid and speculum investigation so unsatisfactory that I was in a measure compelled to obtain most of my information by digital exploration. As she was getting on the table she remarked that since the prior Monday, when she performed some unusually laborious household duty, she was

troubled with incontinence of urine when walking. Inserting my finger in the vagina I was startled to find just in the position formerly occupied by the fistula a cavity with irregular edges that presented all the features of a vesico-vaginal opening. Hurriedly placing the patient in position I introduced a small Sims speculum, and with much misgiving, I must confess, glanced within. There in the sight of the old fistula was the neck of the uterus, with all its ordinary features obliterated and the os strangely pulled out of shape by the very contractile bands that at one time had helped distort the fistula that was now no more!

During the interval that elapsed from the birth of her second child until the operation, the condition of the bladder was carefully noted. While the vagina was large it was possible to completely explore the vesical cavity, and the contraction of the bladder was remarkable. The situation and extent of the fistula above described clearly accounts for the absence of that part of the viscus corresponding with the greater portion of the vesico-vaginal septum—but this loss by no means sufficed to explain the diminished calibre of that organ. The slough, so far as limited to the septum, removed a portion—unsuccessful operations always destroy a certain amount of material—yet beyond the opening and far removed from the scene of the abortive operative experiments the walls of the bladder were dense and contracted. To whatever cause due, this condition seriously interfered with successful treatment, and at one time it really seemed as if a closure of the fistula would only check the dribbling of urine through the vagina and not supply her with a depot in which urine could be retained for more than a few moments at a time. This condition of the bladder and the difficulties encountered in the use of Simon's speculum led me to study the peculiarities of the case with a view to the performance of kolpokleisis in the event of being unable to effect a satisfactory closure of the vesico-vaginal fistula. But as the history detailed shows, the latter was successfully obliterated, and then it became a matter of curious interest to watch the behavior of the bladder. For three weeks the

Sims self-retaining block tin catheter was kept in the urethra; at the end of that time the nurse passed a soft rubber catheter at hourly intervals. If an attempt was made to defer the passage for a longer time the patient became distressed and the urine would flow involuntarily.

There was a time that it seemed as if the patient was acquiring the power of retaining the urine for a longer interval—occasionally two hours would pass without the necessity of introducing the catheter. But it was soon noted that the improvement was illusory—that it depended wholly on the rapidity with which urine was formed and not on any greater retentive power of the bladder—when the vesical cavity was full it demanded relief; and at the end of two months the quantity that could be retained was no greater than during the first week after the use of the self-retaining catheter was abandoned. At night if the urine was not voided every two hours it would dribble away. Very slowly the retentive power increased. With its increase the patient found herself able to sleep longer and longer without having to get up to urinate. After the use of the catheter was wholly abandoned, improvement became more manifest, and as the bladder dilated, the walls of the vagina grew more flexible. At the present time she can pass the night with little trouble if she is careful to empty the bladder on retiring and again early in the morning. During the day the calls to urinate are frequent, and the quantity of urine voided each time small, but no distress is experienced unless she exhausts herself with hard work—then towards the close of the day calls to micturate become distressingly frequent. If she is careful not to overwork, she has no trouble.

Difficult and tedious cases, long an anxious care to the operator before a cure is effected, very frequently lead the surgeon to conclusions the reason for which he would be puzzled to state. This case satisfied me that one accustomed to operate mainly by Simon's method would see sufficient evidence for vaginal obliteration (kolpokleisis) in morbid states that one operating mainly after the method of Sims or Bozeman would give little thought to—that would

certainly make no impression on him until he had failed to close the fistula after operating in the prone position. After an experience similar to the above, no one versed in both methods of operating could fail to appreciate the advantages incident to the prone position in reaching and manipulating the fistulous margins, both in incising them and closing them, it matters not how much verbal quibbling advocates of either may resort to in reference to situation of fistula during operation as contrasted with its position during recovery.

CASE 2.—TWO FISTULÆ—VESICO-VAGINAL AND VESICO-UTERO-VAGINAL; TWO OPERATIONS; CURE.

Mrs. Eliza McManamon, thirty-three years of age, a native of England, residing at 60 Higgins street, has borne eight children, two still-born, the others alive at birth. Fell in labor with her last child Sunday, October 23, 1887, at 1:30 A. M. Was attended by a midwife; the breaking of the waters the first indication of approaching confinement—pains expulsive and continuous from that moment. The exhaustion of patient and failure of pains to advance the head led the family to summon a physician at 5 P. M. Sunday. Dr. Bard responded and resorted to the use of instruments. After much trouble the head finally delivered with forceps; body remained in passages and resisted efforts to extract. Additional aid sent for. Dr. Gentsch soon arrived, and completed delivery manually. On Tuesday patient drew the midwife's attention to the fact that she had passed no water since confinement, and that the bed was constantly soaked with urine. Limy material was speedily formed on the external genitals; the parts became swollen and painful and patient's sufferings were extreme. I was called to the case November 19, made an examination, informed the patient of the existence of a vesico-vaginal fistula and the necessity for an operation.

The examination revealed the following: The vagina was encroached upon in all directions by inflammatory in-

durations, and the whole of the vesico-vaginal septum was covered with sabulous material. The vaginal aspect of the rectum at one spot was thickened with the same deposit: on passing the finger into the bladder a patch of similar character could be felt on the anterior wall of that viscus. It was impossible, with any kind of speculum, to obtain a view of the fistula.

Large quantities of very hot water were ordered injected into the vagina twice daily; the sabulous material was to be removed by Dr. Gentsch, the attending physician, and Turner's cerate applied locally. During November and December I saw the patient once, and occasionally twice, a week and endeavored to expose the fistula with Simon's speculum and free its edges of sabulous material. After December 20 I saw her every other day, and applied the solid stick of nitrate of silver to the deposits on rectum and about fistula that heretofore had proved intractable. Under this treatment they speedily disappeared. January 1, 1888, by the aid of Simon's speculum, I obtained a view of the fistula, the edges of which were thick and vascular, but a band radiating from its left side prevented a satisfactory examination. Dilatation with rubber bags first, next with Sims' glass dilators, and then with rubber dilators finally enabled me to introduce a Bozeman speculum with which I could not only explore but at the same time dilate and make applications to the deep parts. With this instrument the fistula was revealed in its natural relations to adjacent parts. The neck of the uterus had been severed in the middle line in front; a band of cicatricial tissue connected the separated segments of the cervix—this was thin and terminated below in a sharp, rigid edge. From a point above and to the left of the divided cervix downwards in a semilunar form across the septum to the right, extended the fistula. The appended diagram, fig. 1, accurately illustrates the situation of the fistula, its relation to the lacerated cervix and the relative thickness of its edges. At first glance its position and relation to the cicatricial tissue connecting separated segments of the cervix was very deceptive: only by grasping the

borders of the laceration with tenacula and forcibly approximating the edges of the torn neck could its situation be correctly determined. It was then apparent that the fistula originally involved the left vaginal cul-de-sac, that it wound around the left side of the neck and sent a branch up into the neck in the middle line in front, and that from the junction of these radii the main course of the fistula was downward and to the right. Across the branch running up into the neck an effort of repair had been initiated, and it

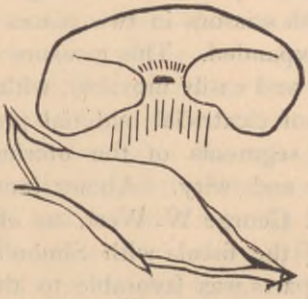

Fig. 1

seemed as if a firm band of connection of a triangular form with the base downward had been established between the separated cervical segments. The fistula at this time admitted two fingers: its edges were thick and vascular except near the middle line above where the band alluded to joined it—here they were rigid, thin and wiry. Much difficulty was experienced in getting rid of the sabulous deposit on the anterior wall of the bladder and recto-vaginal septum: it seemed as if much tissue had been destroyed in these situations—in the latter I feared the establishment of a fecal fistula. The nitrate of silver applications ultimately afforded relief: the next step was to relieve the tension seemingly exercised by a band radiating into the left vaginal culdesac. The continued use of the rubber bag dilators effected more than any other measure, especially when preceded by multiple superficial incisions. The Bozeman speculum dilated the parts admirably, but until the day of operation it was

necessary to supplement its action with thin rubber bags that could be introduced while the speculum was in place, and then forcibly expanded; they were retained without inconvenience for many hours. By this means a band running from the left superior extremity of the fistula back to the rectum was stretched to such a degree as to materially free the parts from tension. January 5 it was found that the edge of this band projected in a sharp semilunar form; that beyond it the elastic pressure of the bags had caused the vagina to become expansible—the edge of the band was deeply incised with scissors in two places and a rubber bag introduced and expanded. This measure rendered all parts of the fistula free and easily movable, with the exception of the sharp edge of cicatricial material projecting from between the torn segments of the uterine neck—this still continued sharp and wiry. About January 1, with the assistance of Dr. George W. West, an effort was made to obtain a view of the fistula with Simon's speculum. The condition of the parts was favorable to the employment of that instrument—the vaginal outlet was large, there were no cicatricial bands immediately within the ostium, and the vesical structures descended well when the patient was in the exaggerated lithotomy position. Yet it was at the expense of no little suffering to the patient that a partial view of the opening in the septum was obtained. The Bozeman speculum, while showing the fistula perfectly, seemed to explain the reason for the non-success with the Simon instrument in the firm semilunar band running down the left side of the upper part of vagina from the region of the upper extremity of the fistula to the rectum: after this was freely incised, January 5, the Simon speculum was again employed. It could be used to better advantage now, and the largest blade was inserted. The lower edge of the fistula came into view, but the upper extremity to the left of the uterine neck could not be exposed—it dipped down almost vertically and no manipulation would render it visible. The separated segments of the uterine neck could be plainly seen, and it was easy to appreciate the nature of the material that con-

nected them and filled the arm of the fistula running into the lacerated cervix. This was cicatricial tissue, and the border abutting on the fistula was very thin and seemingly almost bloodless. By using a tenaculum in the fistula and inserting it into thewedge of cicatricial tissue, it was possible to estimate its thickness. At fistulous margin it was very thin, but grew thicker as the edge was receded from. By using two tenacula at the same time, and cautiously everting different portions of the fistulous margins while the uterus was drawn towards the vaginal outlet, it could be seen that not only was the cicatricial mass between separated cervical segments of a triangular form upon its vaginal aspect, but it was triangular from before backwards: the base of the triangle in this case being at its uterine extremity—its apex at the fistulous margin. In fig. 1 the triangle of cicatricial tissue, with its base abutting on the fistula and its apex reaching the uterine canal and bounded laterally by the segments of the cervix, can be appreciated, while in fig. 5 the triangle, with its base upwards and its apex towards the former site of the fistula, is shown. Furthermore, vesical mucous membrane could be exposed at either extremity and along the lower margin of the fistula, but none was to be seen along the superior border.

January 10, 1888. Mrs. McManamon was operated on in the presence and with the assistance of Drs. Charles Gentsch, John Perrier and George W. West. The patient was supported in the right angle position upon the knees and chest, and the fistula exposed with a Bozeman speculum; the extremities of the fistula were seized from within by an Emmet's double tenaculum, and while the parts were stretched and firmly grasped by this admirable instrument, with straight and angular knives the whole circumference of the fistula was removed in a single piece. The knowledge already obtained of the peculiarities of the opening in the septum led me to freely excise the lower border of the fistula, terminating the incision just at the vesical border, while on the upper margin the vaginal edge was just encroached on, the greater width of the incision being carried through parts

naturally directed towards the vesical cavity. An examination of the circlet of fistulous border removed shows that the incised surfaces are nearly of equal depth, only that the lower margin comes wholly from the vaginal aspect, while the upper is wholly from the vesical surface of the opening; the extremities are angular and include both vaginal and vesical tissues. The patient was placed on her back and a prolonged vaginal douche of hot water administered to check the very free hemorrhage that ensued. This done, her former position was resumed, the Bozeman speculum re-

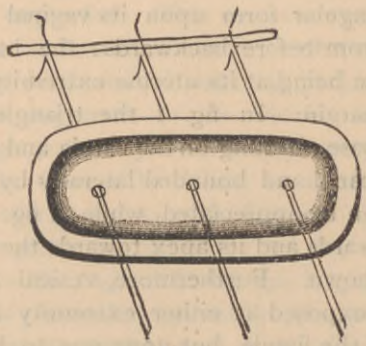

Fig. 2.

introduced, and while the uterus was drawn gently downwards the edges of the fistula were brought into apposition with tenacula. Number 26 silver wire was used and three strands passed—one in the centre and one on each side, half an inch from the first. When these were shouldered the borders of the fistula were in perfect apposition and so remained even when traction was let up on the uterus. Fig. 2 represents the aspect of the fistula during the passage of the button. These wires were, of course, preceded by loops of thread, and the needles carrying the latter were so inserted that they first entered the vaginal membrane on the lower margin a quarter of an inch from the edge of the fistula, and emerged at the vesical aspect of the incision near to, but not penetrating, the mucous membrane of the bladder; they were carried across the opening and made to enter the incised

margin of the upper border on its vesical surface, one-half an inch from its edge, and carried directly through to the vaginal canal. Each lateral wire was half an inch from the central one, and a quarter of an inch from the extremity of the fistula. A Bozeman button was modeled from lead, passed down the loops of wires, and after the edges of the fistula were seen to be nicely in place, perforated shot were used to clamp the sutures and the ends of the wires cut off. Fig. 3 represents the button in place, the ends of the wires being turned to the right and left over the compressed shot. The operation took forty-five minutes. Water was then thrown into the bladder to remove blood and to show the accuracy of the closure of the fistula. Not a drop came through the sutured wound, but to my surprise it bubbled

Fig. 3.

up through a previously unsuspected opening high up in the cervical canal. The patient was thus seen to have, in addition to the vesico-vaginal fistula just operated on, a vesico-utero-vaginal fistula in a very inaccessible situation. The patient was put to bed and left in the care of Mrs. Patterson, the same nurse who had charge of Mrs. Kinney. Hot vaginal douches were used twice a day, and a soft catheter kept constantly in the bladder. No anæsthetic used during operation.

The urine came through the vagina to a certain extent all the time, and notwithstanding every care, the external parts became raw. Cystitis developed on the third day, and great difficulty was encountered by the nurse in keeping the catheter free. January 18 I removed the button—it was heavily encrusted with urinary salts, but the line of union beneath was perfect—the wires remained until the twenty-fifth. After that period attempts were made to explore the remaining fistula and outline a plan for its cure.

January 27. The operation has completely obliterated the vesico-vaginal fistula, and the line of union is thick and firm. Fig. 4 indicates the situation and direction of the cicatrix, and the reference "A" points to the opening of the

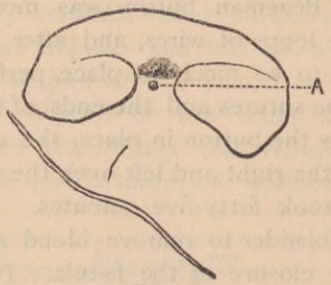

Fig. 4.

utero-vesico-vaginal fistula. With an Emmet's uterine probe bent sharply upon itself at the end, the course of the fistula can be traced. Its orifice is at the highest point of reëntering angle of cicatricial tissue between separated segments of

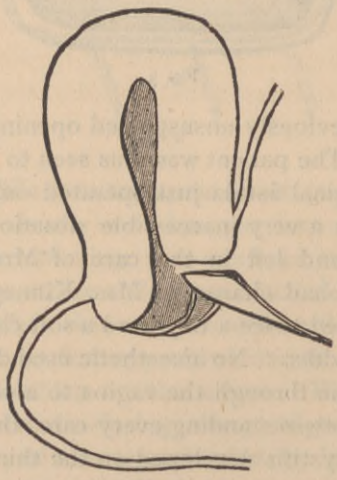

Fig. 5.

uterine neck; it opens into the cervical canal in such position that while the bent probe is inserted into fistula and cervix drawn towards sacrum with a tenaculum, the opening between uterus and bladder is seen to be far above the anterior reflection of vagina upon cervix. In its course to the bladder the

fistula is direct—it does not dip down towards the now obliterated opening in the septum. Its course and relations to adjacent parts are well shown in Fig. 5.

Notwithstanding the small size of the opening, the dribbling of urine was extremely annoying and caused the patient great distress. The neck of the uterus was constantly encrusted with urinary deposits, and attempts to dislodge them provoked free hemorrhage. It was not until the first week in February that the parts were restored to such a condition that I could determine upon my next procedure. I then determined to cut off smoothly the sides of the torn cervix, to freshen the surface of cicatricial material between, removing the orifice of the fistula, to loosen the sides of the neck so that they could be swung forward into apposition and rest upon this freshened part, and pass a silver suture in such manner that its centre would go just behind the neck of the fistula at its orifice, and when made tense, serve to hold the sides of the cervix together and close the fistulous canal by pressure, the cervix above and below this central strand being united by ordinary silver sutures. A Bozeman button was made into a collar-like form and perforated so that when the parts were freed and the wires passed, it could be speedily molded into shape and serve as a point of attachment and support for the central strand and accompanying sutures.

February 10, 1888. Assisted by Dr. George W. West, I operated for the cure of the vesico-utero-vaginal fistula at patient's house, 60 Higgins street. She was placed in the right angle position upon the knees and chest, and supported on a Bozeman's operating chair; no anæsthetic was used, and Bozeman's speculum employed. The sides of the cervix were cut entirely through and the incisions carried up until they met just beyond the fistula at the apex of the laceration; this dissection was tedious and took time—no effort was spared to make the surfaces of the same breadth and depth, and perfectly smooth. Sharp-pointed scissors were now used to remove the surface of the cicatricial mass intervening; this was ultimately accomplished in such manner

that the severed sides of the neck already partly detached, and the covering of the intervening cicatrix, including the orifice of the fistula, were removed in one continuous piece. The sides of the neck could now be drawn accurately into apposition; when separated forcibly, the end of the fistula could be seen at the apex of the triangle of denuded cervical structures. A needle, armed with a loop of silk, to the end of which a strand of number 26 silver wire was hooked, was passed in such manner that it entered one-half an inch from the denuded surface, went through the cervical tissues, and out beyond the fistula, having passed behind the latter. The needle reëntered the tissues of the neck as close as possible to the point of emergence, and traversed the other side of the cervix in a reverse direction, coming out one-half an inch from the incised border. The wire was carried through and then its action when rendered tense observed. The sides of the cervix could be brought nicely into apposition by traction upon it; its influence upon the fistulous canal could not be so readily seen. The centre of the wire was beyond and below the termination of the fistula, and the freshened cervical structures above the end of the fistula and between it and the canal of the cervix could be seen to fall into contact as the ends of the wires were brought together and rendered tense. It was hoped that, when in position and tightened, this wire would not only aid in closing the cervical segments but act upon the end of the fistula in such manner as to prevent the passage of urine until the apposed structures of the cervix above could unite by the reparative process. As it seemed to be well situated for the purpose, two additional sutures were then inserted—one above, the other below this wire. These wires were silver, number 30, and were made to enter and emerge each a quarter of an inch from the borders of the denuded edges of the cervix. The wires were brought together, the button slid into place and the changes necessary in its form noted in order to make it encircle the lower half of the cervix when the severed surfaces of the latter were united. These were readily effected with the button-shaper, and the button returned to the place it was to occupy. In this button

there were four openings at right angles with each other; through those in the long axis of the button—one-half inch apart—the ends of the large central wire were passed, one on the right side, the other on the left; while through those in the short axis both wires of the sutures above and below the central wire were passed into corresponding openings in the usual manner. A perforated shot was carried down the central strand on the right and clamped; forcible tension was made on the free left extremity of this wire, a shot passed and compressed. By drawing the cervix down and inspecting the canal high up, it could be seen that the freshened tissues of the neck above the fistula were in accurate apposition. The upper suture, the ends of which passed through the single opening at the cervical border of the button, were then drawn taut and clamped; the same with the lower wires passing through the opening in the button at the border next the bladder. The parts were then carefully cleansed and the neck drawn forcibly up to see if the tissues gaped beneath. All appeared to be in proper position; the upper and lower sutures were cut off, and the projecting wires turned over the shot; the ends of the large central wire were severed, and the parts permitted to retract into their normal position. So far as could then be determined, this unusually shaped button seemed to fulfill all requirements. The operation occupied forty minutes and was neither very painful nor very tedious to the patient.

The hot water douches were continued as after the first operation, a soft catheter introduced every two hours during the day and left in all night. The nurse fell sick the day after the operation and the patient had to be committed to inexperienced hands. No trace of urinary dribbling was apparent at any time. February 18, the button removed and sutures and compressing strand of wire drawn out. There is complete union of the cervix to within an eighth of an inch of the margin of the neck. The catheter was discontinued and the patient permitted to get up.

February 21. Patient was this day examined in the presence of Dr. Bard, her former physician. The neck was

drawn down, cleansed of mucus, and a piece of old linen inserted and permitted to remain three minutes. When withdrawn it was dry. The fistula is entirely obliterated. The line of union of the neck within and without seems perfect—a slight depression alone marks the former site of the laceration. Substantially the same condition was revealed March 15, when last examination was made by Dr. George W. West and myself.

Thus was brought to a satisfactory termination a case not more trying to the poor sufferer than exhausting to the patience of the operator. It is putting it mildly to say that Mrs. McManamon was not always tractable. But when the loathsomeness of this morbid condition is taken into consideration, the only wonder is that these patients have any self-restraint at their command. And then I had led her to believe there was but a single opening to be closed, and while careful to warn her that more than one operation might be necessary for its cure, I had given her no intimation that I had any reason to suspect a second fistula existed until after the first operation was completed. Then it mattered not how much she was assured of the size of this opening and the certainty of its ultimate cure, her knowledge of the quantity of urine coming through the vagina, and the distress she continued to experience doubtless gave her reason for feeling despondent still, even when assured of the perfect success of the first operation. Finally, when the second operation did check the dribbling of urine and lead to a subsidence of the vaginal irritation, the patient's satisfaction was no greater than her surgeon's.

Again, this patient's condition after the first operation is a confirmation of the statement of Sims that the smallest opening in the bladder communicating with the genital passages is as bad as the largest, so far as the consequences due to urinary dribbling are concerned. It also has considerable weight as bearing upon Simon's view, that the urine passing over the edges of denuded and apposed fistulous margins will not necessarily prevent the reparative process.

Furthermore, as considerable discussion has taken place as to the cause of these fistulæ in this patient—a discussion in which not infrequently dogmatic assertion has taken the place of thorough appreciation of the facts involved—I think it not inadvisable to put my own opinion on record. Much stress has been laid on the circumstance that there was an almost instantaneous discharge of urine through the vagina after delivery, and this, in connection with the fact that the labor was completed with instruments, has led some to ascribe to the forceps the sole agency in the production of the woman's unfortunate condition. Laying aside all other features that bear on the etiology—such as the duration of the second stage of labor and the peculiar character of the pains—two phenomena satisfy me as to the real agency in the production of the fistulæ: These are the extensive character of the cicatricial bands high up in the vagina, and the failure of nature to effect a spontaneous cure. These tell of extensive sloughs, and as these sloughs are produced by pressure, it is to pressure from delay in delivery and not to the instruments finally resorted to for relief, that the fistulæ must be ascribed.

The needles used in this operation must be of such shape as to readily pass through the tissues to be united, and of such size as to permit the loop of thread they carry to convey with ease the wire hooked in its extremity. They may vary in length with the peculiarities of each case, but the above requirements are essential to them all. After experimenting with many different patterns, the one I like best is that known as Bozeman's needle, and shown in figure 6.

The best needle carrier is one devised by the same surgeon. Its great advantage is that it does not fill the vaginal outlet with a bulky handle, thereby interfering with vision, but permits a full view of the parts while the needles are being passed. Its peculiarities are well represented in figure 6.

The crutch on which the threads are supported plays an important part in this operation. If the threads were drawn upon at the vaginal outlet in order to pass the wire, the tissues would be cut through. The crutch is passed into the

vagina and supports the threads at the point they emerge from the fistulous margin: the threads are drawn tense, and then, by successive elevations of the crutch, the threads are passed and the wire drawn through, without the slightest danger of tearing the borders of the fistula.

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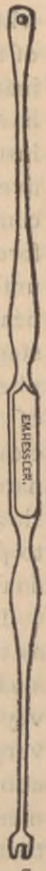
At the end of the crutch made for me by Mr. Hessler, and shown in figure 7, is a ring, the stem supporting which is flexible. When the wires are in place and it is desired to "shoulder" them as illustrated in figure 2, this ring is passed over each suture in succession and pressure made against the fistula while the extremities of the wire are drawn taut. In this way the edges of the fistula are apposed and the wires properly bent so as to hold the margins in place and prepare the part for the button. The flexible stem of the ring permits the instrument to be bent into any shape necessary for the satisfactory completion of this essential step in the operation.



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The button has been illustrated in describing the procedures adopted in the second case. Figures 2 and 3 show it on its passage down the wires and after it has been finally settled in place. It is formed of sheet lead about the twentieth of an inch in thickness and is moulded into form with a button-shaper—an instrument represented in figure 8.

It is impossible to convey a true idea of Bozeman's operation without describing the so-called chair he employs to support the patient and the speculum he uses to expose the fistula. The latter is essential; the former very convenient. In the *New York Medical Journal* for February, 1869, he

figures and describes both. From that article I have copied some of the illustrations appended, and to it I am largely indebted for the following description: What is known as the chair is in reality a supporting and confining apparatus for operating upon a patient in the right angle position upon her knees and chest. The position is an old one—having been proposed by Roux many years since—but its peculiar advantages are only enjoyed when the patient is supported by an apparatus of this kind. In the use of this device three principal objects are to be attained:

1. Extension of the vertebral column and relaxation of the abdominal muscles, essential to free gravitation forward of the pelvic and abdominal viscera.

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2. Support and mechanical confinement of the patient by controlling muscular action at certain points without encumbering the abdomen or interfering with the functions of respiration and circulation.

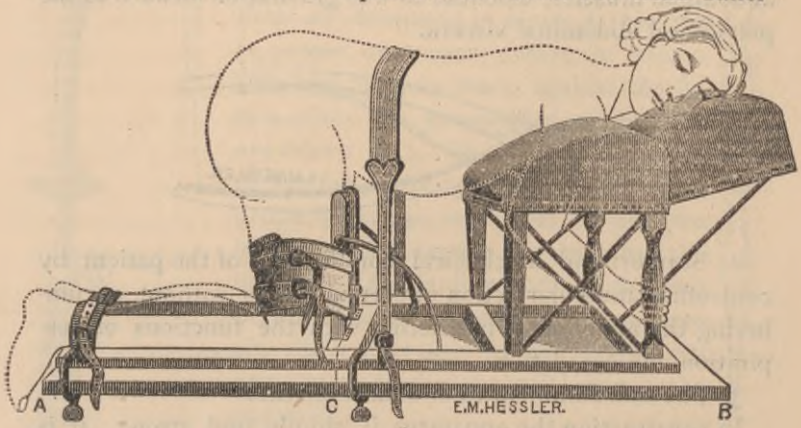
3. The safe administration of anæsthetics.

In construction the apparatus is simple and strong; it is light, weighing less than twenty pounds; is very portable when folded up; and may be placed for use upon any table, to which it is made fast by the weight of the patient and a pair of small clamps. Figure 9 illustrates the apparatus in use. The whole figure is exposed in order that the relations of all parts may be seen. It is needless to say that no such exposure is necessary in actual practice.

The apparatus, as may be seen, is placed upon and secured to the table, A. B. The patient first kneels upon a couple of cushions, the thighs being perpendicular to the table, and received against the two upright splints held in position by the corresponding braces. Around each thigh and splint is placed a pad, over which are buckled two strong straps to

secure the whole. In a similar manner the ankles are confined. The lower limbs thus arranged and secured, muscular action is effectually controlled.

The patient is next required to bend the body forward until the chest and head are received upon their appropriate supports; she then voluntarily extends the vertebral column, which position is maintained by the long girth seen passing across the loins. In this way she is deprived of all power to raise the body from its support, or otherwise to make any effective resistance. Relaxation of the abdominal muscles and gravitation forward of the pelvic and abdominal viscera are thus secured. In this position the chest and head suffer



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no restraint. Respiration and circulation go on smoothly. In short, the entire body is easy and comfortable, and the patient can remain for hours with as little fatigue as upon the back. Anæsthetics can be given with safety in this position—in vomiting no ingesta are liable to reach the larynx, and no delay need be experienced from apprehended strangulation.

When the patient is disengaged from the apparatus it is doubled up, the hinge-joint C being placed near its middle for the purpose. The head-support, attached by two hinges and held in position by a brace, drops down as soon as the latter is removed, and is placed beneath the chest-support, to which it is fastened. The two supports are thereby made to stand back to back, occupying the least possible space.

When thus folded up and set upon the floor the apparatus resembles somewhat an ordinary chair—and from this resemblance the common but misleading name of "Bozeman's chair" has doubtless originated.

One great advantage of this supporting and confining apparatus is that it enables the surgeon to carry out all the details of the preparatory treatment with but one assistant, and that person not necessarily a physician.

Bozeman's speculum is essentially a dilating bivalve to which a third blade can be added when the instrument is in place and expanded. This third blade is separate from the main part; it is about four inches in length, one in width towards its point, and one and a quarter at its outer end, where there is a short end or handle an inch and a half in length turning upward at an obtuse angle. It is thin and slightly flexible, and is bent to suit the curves of the posterior wall of the vagina, to which it is firmly applied from the perineum to the posterior cul-de-sac. To the under surface of it, near the outer end, is attached along the centre a small triangular plate, the base presenting backward and the apex forward, with a flange on the side edges. These grooves or flanges are intended to guide the depressor to its proper place when received upon the projecting arches of the speculum previously introduced into the vagina and expanded. The arrangement is such that the depressor can be slid in upon the projecting arches at any stage of expansion, and in that relationship is securely held by the resistance of the perineum and the recto-vaginal wall.

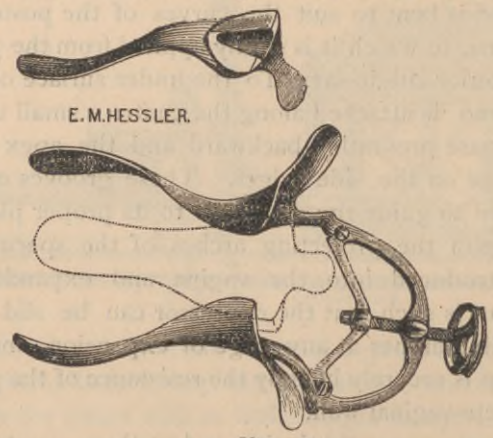
Figure 10 is a one-third size and a three-quarter view of a medium Bozeman speculum. The instrument is represented partially expanded. The dotted lines in front and between the expanded or flaring blades are intended to show the shape and position of the third blade for supporting the posterior wall of the vagina. The relationship of it to the projecting arches of the main part of the instrument is very clearly shown. The accompanying edge view of the same represents very well the curves described and the peculiar mechanism of the triangular plate on the under surface of it.

Bozeman sums up thus the principal peculiarities of this instrument:

1. "The system of leverage employed, which gives us increased power over increased resistance.

2. "Transverse dilation with uniformly varying movement of the blades, which gives us a thin and favorable form of the points for introduction, and a reversal of the size of the two ends of the instrument when expanded within the vagina. By virtue of this *flaring expansion of the blades within the ascending rami of the ischia* the instrument is made *self-retaining*, which distinguishes it from all others of this class previously constructed.

3. "The *elasticity of flexure* belonging to the working point of the instrument, which gives it an easy adaptation to the soft parts, both in the vagina and at its mouth. This is



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also a feature of the instrument that particularly distinguishes it from other valved specula heretofore in use.

4. "The applicability of it in all positions, and the advantages secured to the physician or surgeon of making all examinations, or of doing all operations required upon the vaginal walls and cervix uteri without the aid of assistants."*

In describing the two foregoing devices, their illustrious inventor is naturally anxious that those who study their

* *New York Medical Journal*, February, 1869. Page 491.

mechanism and practical working should by no means overlook the peculiar merits of the suture he introduced to the profession in 1856. For this button suture, composed of a leaden plate silver wire and perforated shot, he formulates the following claims:

1. Separate and independent action of the sutures.

2. Perfect coaptation of the edges of the fistula, and power to hold them in a certain relationship during the reparative process.

3. Perfect steadiness and support of the edges of the fistula.

4. Protection of the denuded edges of the fistula from the vaginal and uterine discharges, and from the urine, when there happens to be more than one opening, and it is not convenient or desirable to close both at the same sitting.

In order that a patient suffering from vesico-vaginal fistula may be subjected to operation according to this method with every advantage in her favor, it is essential that certain preliminary steps be taken. This is a preparatory treatment that has for its main object full dilatation of the vagina. As Bandl has well said, this is not a question of incisions, of which others make use, to render accessible a fistula obscured by cicatrices; nor is it a question merely of the dilatation of a contracted canal, for this step must be taken by all who would reach an opening in the septum when the vagina is deformed by scar tissue. Bozeman starts upon the principle that the united surfaces are to be exposed to as little tension as possible from surrounding structures. To this cause he ascribes a great proportion of the failures in fistulæ which often seemed quite simple, and endeavors to search out by eye and finger every cicatricial band and thickening of tissue, and to do away with them. To accomplish this end, incisions must frequently be conjoined with dilatation, while dilatation must be accompanied by measures that will tend to heal the excoriations and remove the deposits of sabulous material that complicate these cases. I find that frequently repeated injections of large quantities of hot water has a soothing effect upon the irritated parts and materially expedites the dilatation. Nitrate of silver alone seems adequate

to dislodge deposits of limy material and cause the excoriations beneath to heal. The judgment of the practitioner charged with the management of a case will occasionally be taxed to the utmost to put his patient in a favorable condition for this or any other operation, but if Bozeman's plan is to be adopted, an absolute prerequisite is full dilatation of the vagina. During the preparatory treatment the patients become accustomed to the position in which subsequently the operation will be performed, and when we give a moment's thought to the difference between the Simon, Sims and Bozeman position, it is evident how much the latter, of itself, tends to vaginal distension. Simon placed his patients on their back with the buttocks elevated; Sims on the left side; but Bozeman, in the right angle position on their hands and knees. In the latter situation there is a forcible tendency to vaginal distension, due to the gravitation forward and downward of the pelvic and abdominal structures—a phenomenon that renders its effect manifest in those cases where there is prolapsus of the anterior bladder wall. In a short time this may cease, and the improvement be due entirely to the influence of posture.

The proper treatment of the second fistula—the vesico-utero-vaginal opening—in case 2 is a question of much interest. Such lesions were formerly overcome by obliterating the communication between the vagina and uterus: the vesico-uterine opening remaining untouched and the patient subsequently menstruating through the bladder. This plan was the one first recommended by Jobert, and in a case somewhat similar to that of Mrs. McManamon, was carried into effect in the Woman's Hospital of New York, by Dr. T. A. Emmet, in 1863. A glance at the procedure adopted by the writer will show that his operation—based on the necessities of the case—is unique. Its value as an operation can only be determined by further experience in similar cases.

A few words as to what is sometimes called the *linen* test. Bozeman many years ago pointed out the fact that pus and mucus in small quantities adhere *to* and spread *upon* the surface of a piece of linen without being absorbed by it,

while water or urine, on the contrary, even in the minutest quantity, when brought into contact with the same material, penetrate almost instantly the entire thickness of the fabric. The presence of these fluids, if the flow be constant, is evidenced by increasing saturation of the spot acted upon, and the spreading of the moisture in every direction. Thus is presented a most valuable and reliable means of determining the presence of urine in the vaginal or uterine canal when the quantity is so small as to escape observation; not only this, but the precise situation of its escape from the bladder can be made out with the greatest certainty, when it would be impossible to detect it by the ordinary means, owing to the minuteness of the orifice, or its concealment by a fold of mucous membrane. In Mrs. McManamon's case the linen test was employed to determine the absolute closure of the fistulæ: had there been the slightest dribbling of urine into the genital passages, this test would have revealed it—the linen coming out dry showed beyond question there was no communication between bladder and utero-vaginal canal remaining.

As has already been indicated, had the operator been accustomed to employ Simon's methods alone, and unfamiliar with Bozeman's instruments and devices, it is not improbable he would have considered vaginal obliteration imperative in the first case, and very clearly indicated in the second. The details of these cases reveal the reasons why Simon's implements and procedures incline to the one rather than the other. It is, in the writer's opinion, not the least of Bozeman's merits that he has enabled the surgeon to restrict to the utmost Kolpokleisis, and by his ingenious instruments and methods, made genital renovation possible in innumerable cases of fistulæ that otherwise would have been condemned to vaginal obliteration.

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